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To the Graduate Council:

I am submitting herewith a dissertation written by Elizabeth Susan McGrady entitled "Acupuncture Use for Pain as Compared to Other Complementary and Alternative Medicine and Conventional Medicine." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

Robert J. Pursley, Major Professor

We have read this dissertation and recommend its acceptance:

Michael Betz, Robert E. Levey, Thomas Hood, James Neutens

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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and recommend its acceptance:

Michael Betz

Robert E. Levey

Thomas Hood

James Neutens

Accepted for the Council:

Anne Mayhew
Vice Chancellor and
Dean of Graduate Studies

(Original signatures are on file with official student records)

ACUPUNCTURE USE FOR PAIN AS COMPARED TO OTHER COMPLEMENTARY AND ALTERNATIVE MEDICINE AND CONVENTIONAL MEDICINE

A Dissertation Presented for the
Doctor of Philosophy Degree
The University of Tennessee, Knoxville

Elizabeth Susan McGrady
August 2005

DEDICATION

This dissertation is dedicated to all the people who work to improve the health status of others.

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There are many people who were instrumental in completing my PhD. Dr. Robert Pursley has been an advocate throughout the process and I am grateful for his encouragement. Dr. Michel Betz was a continual source of support and inspiration. I am also thankful for the remaining members of my committee, Dr. Hood, Dr. Neutens, and Dr. Levy for their assistance and time. All of my faculty members in the Health and Safety Science Program were helpful in teaching me new skills and information and furthering my career.

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ABSTRACT

The purpose of the study was to determine the factors associated with the use of acupuncture for pain and to compare these factors to the use of other complementary and alternative medicine (CAM) and conventional medical services. The treatment of pain is expensive. In addition, use of surgery and medication increases risk of medical errors, complications, side effects and addiction. Clinical trials of acupuncture for pain have demonstrated results at least as effective as conventional treatments with negligible side effects and complications. Only 4% of the United States population has used acupuncture. The healthcare field is studying means to predict health-related behaviors by identifying characteristics of patients. This study identifies those characteristics that increase the likelihood of adoption of acupuncture for pain.

A review of the literature provided factors that were associated with use of acupuncture, CAM, and people with pain conditions. The Behavioral Model of Health Services Use is a predictive framework that classifies factors as predisposing, enabling and need variables. Data from the national probability sample 2002 National Health Information Survey (NHIS) were used in the study. The NHIS 2002 consisted of 31,044 adults aged 18 and older residing in the United States. The survey included a special section on CAM modalities including acupuncture. The response rate for the survey was 74.3%.

Survey respondents were classified as having pain conditions if they reported having at least one of eight conditions within the past year. The pain sample size was 18,103. Respondents were then categorized as acupuncture (n=257), other CAM (n=302)

or conventional medicine (n=6,812) users based on use of each service within the past year.

SPSS was used to obtain descriptive and inferential statistics. Differences in type of service were analyzed using Chi-square for categorical data and ANOVA for continuous data. A multiple logistic regression model was used to determine those factors predictive of acupuncture use as compared to conventional medicine.

The study found that predisposing factors that predicted use of acupuncture were being younger, Asian, and having a higher level of education. Enabling factors were residing in the Eastern or Western regions of the country, and exercising at a moderate level. Need factors were higher numbers of pain conditions, and having functional limitations. The logistics regression model correctly identified 26.5% of acupuncture users and 93.8% of conventional medicine users. To improve the predictive ability of the Behavioral Model additional research is needed on beliefs and attitudes.

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CHAPTER I

THE PROBLEM

Introduction

The purpose of this chapter was to introduce the question to be studied - factors associated with use of acupuncture for pain. Clinical studies demonstrate acupuncture has proven efficacy for certain health conditions including pain. However, acupuncture is not widely used in the United States though users report high levels of satisfaction.

Healthcare providers control use of services to a great extent through accessibility and referral mechanisms. Characteristics of consumers also play a role in predicting use, particularly for discretionary and non-emergency services. Patient satisfaction levels affect use through word-of-mouth sharing of experiences and outcomes. And lastly, lack of insurance coverage is a major economic barrier to use (Aday & Awe, 1997).

A framework was needed to study the factors associated with the adoption of acupuncture for pain. Andersen's Behavioral Model of Healthcare Use includes the interaction of the characteristics of consumers, the provider sector, and healthcare policy to predict use. It is an integrated theoretical construct and has been used as a framework for the evaluation of population based surveys. This model provides a basis to measure risk factors, which in turn determine a basis for the demand for healthcare services.

The source of data for the study was the National Health Information Survey (NHIS). This survey is a national probability sample of the United States population conducted annually. In 2002 the NHIS included questions regarding use of acupuncture. A thorough analysis of these secondary data will assist clinicians, policy makers and payers in making decisions regarding acupuncture.

Statement of the Problem

The research problem explored by this study was to investigate why acupuncture is not more frequently used in the United States for pain conditions. The NHIS population-based survey was used to examine the research questions. This survey contains questions on usage patterns of acupuncture, complementary and alternative medicine (CAM) and conventional medicine for pain. Analysis of the factors associated with acupuncture use were compared with those associated with use of conventional medicine and CAM therapies other than acupuncture that involve a practitioner.

In order to address pain and its treatment among patients, the following research questions were formulated.

1. Is there a difference in predisposing characteristics e.g., (i) age, (ii) gender, (iii) race, (iv) education level, and (v) marital status, among acupuncture, other CAM, and conventional medicine users?
2. Is there a difference in enabling characteristics: e.g., (i) health insurance (ii) employment, (iii) different regions of the country, and (iv) health behaviors among acupuncture, other CAM, and conventional medicine users?
3. Is there a difference in the mental health status among acupuncture, other CAM, and conventional medicine users?
4. Is there a difference in need factors e.g., (i) number and type of pain conditions, (ii) functional limitations, and (iii) days away from work among acupuncture, other CAM, and conventional medicine users?
5. How satisfied are patients with acupuncture care?
6. What are the predictors of acupuncture utilization?

Need for the Study

The research problem addressed in this study was to describe the factors associated with use of acupuncture versus other CAM and conventional care for pain. These findings can be used to assist in the formation of healthcare policy, particularly coverage by public and private insurance programs. Chronic pain such as arthritis, low back pain, and joint pain, affects over 40 million people in the Unites States. This figure is expected to grow to 60 million by the year 2030. The cost associated with this problem is almost $150 billion per year (Lubeck, 2003).

Healthcare costs continue to escalate producing a burden to society ($4,026 per covered employee in 2001, Coile, 2002). The majority of clinical research focuses on pharmacological agents to manage pain. However, adverse drug reactions are responsible for $177 billion in additional services such as physician visits, additional prescriptions, emergency room visits, and admissions to hospitals and long term care facilities. A 1994 study estimated that 2,216,009 hospital patients in the United States had serious adverse reactions to drugs resulting in 106,000 deaths (Starfield, 2000, JAMA).

Medical modalities with fewer side effects and lower cost are needed. Investigation of the use of acupuncture as a cost-effective treatment with few side-effects is needed. Previous studies have estimated that the use of acupuncture is low (2 - 4% of the United States population). The National Center for Complementary and Alternative Medicine (NCCAM), a division of the National Institutes of Health (NIH), has funded several clinical trials that are currently underway on the efficacy of acupuncture for pain management. However, few studies have examined the factors associated with use of conventional care and other CAM as compared to acupuncture. This study is needed to

provide information on why patients fail to use acupuncture though clinical evidence regarding efficacy is strong. Findings may also identify pathways to better manage pain in addition to reducing cost and complications. Policymakers can utilize factors that predict usage to increase adoption.

The NCCAM is concerned with both the efficacy of complementary modalities and how they will be adopted by mainstream medical practice. In its 2001-2005 Strategic Plan, the NCCAM stated the goal of identifying and developing methods to overcome barriers to integrating safe and effective CAM practices such as acupuncture. Specific objectives of the NCCAM Five-Year Strategic Plan 2001-2005 were to:

1. Identify and develop methods to overcome barriers to the integration of safe and effective CAM practices.
2. Support enhanced communication and partnership-building between conventional and CAM healthcare institutions.

Fundamental to accomplishing these objectives is valid and reliable research that identifies factors predictive of use of acupuncture. Identifying predictive factors in the use of acupuncture compared to conventional modalities for pain management will assist policymakers in forming prudent recommendations in terms of research support and coverage by public and private insurance programs (Beinfield, 2002).

Assumptions

The basic assumptions made were as follows.

1. The data used were valid and reliable.
2. Participants responded honestly to the survey.

3. The sample of persons agreeing to participate is representative of the population under study.
4. The constructs of the Behavioral Model of Health Services Use represent a relevant framework for the study.

Delimitations

The following delimitations were made:

1. Patients 18 years of age or older were included in the study.
2. Only persons who volunteered participated in the study.

Limitations

This study was limited as follows:

1. The self-reported findings may or may not accurately reflect the respondent's experience. The collection of data by professionals trained in population-based surveying minimized the limitation.
2. The source of data used in the study did not include belief and attitudinal factors additional constructs of the Behavioral Model.

Definition of Terms

The following terms were operationally defined for this study.

Acupuncture is stimulation of specific anatomic points in the body for therapeutic purposes by puncturing the skin with a needle. The needling may be enhanced with heat, pressure, friction, suction, impulses of electromagnetic stimulation, smoldering herbs and twirling of the needles. Treatment may include use of herbal remedies (Beal, 2000).

Conventional medicine is allopathic medicine, the form of medicine most widely practiced in the United States. Other terms commonly used for conventional medicine are biomedicine, modern medicine, Western medicine, or orthodox medicine.

Complementary and Alternative Medicine (CAM) are those practices outside of the dominant or intrinsic medicine practiced in a culture and encompasses health system modalities and practices, and their accompanying theories and beliefs (National Academy of Sciences, 2005). Specific CAM modalities other than acupuncture included in this study were biofeedback, chiropractic care, massage therapy, naturopathy, and homeopathy. These have been referred to as "other CAM" in the study.

Chapter Summary

This chapter presented an introduction to the problem and outlined the purpose of the study. The National Center for Complementary and Alternative Medicine emphasized the need for study. Assumptions, delimitations, limitations and operational definitions were listed to establish the parameters of the study.

The following chapters provide information obtained from a review of the related literature, the methodology used, the analysis of data, and findings and conclusions. A sixth chapter is presented to retrospectively examine how this investigation was conducted.

CHAPTER II

REVIEW OF RELATED LITERATURE AND RESEARCH

Introduction

The purpose of Chapter II is to provide a review of existing studies and information to determine what factors to incorporate in a model for differentiating who chooses acupuncture and other CAM from those who choose conventional medicine for managing pain. Though acupuncture is a relatively new modality in the United States it has been practiced in China for thousands of years. It is a therapeutic technique that is part of a larger system of healing called Chinese Medicine. Public initiation occurred in the United States in the early 1970's when James Reston of the New York Times recounted his experience of acupuncture for alleviation of post-operative pain after an emergency appendectomy in China (Freeman & Lawlis, 2001).

Practice licensing requirements are defined by each state. Practitioners can obtain national certification through the National Certification Commission for Acupuncture and Oriental Medicine. The Council of Colleges of Acupuncture and Oriental Medicine has accredited 48 schools to train acupuncturists. This chapter is organized by literature findings on the framework utilized, study content and methods.

Framework: The Behavioral Model of Health Services Use

Andersen developed the Behavioral Model of Health Services Use in 1968. The model has been used as an integrated theoretical and empirical approach, which can be applied to a wide variety of health issues and populations. The model explains predisposing, enabling and need factors to predict use of healthcare services.

Andersen and Newman modified the model was in 1973 to include social determinants such as technology and system organization to make the model more workable for comparing the systems of different countries. The model was further modified throughout the 1970's by Aday and Andersen and served as a framework for the first national survey on access to healthcare services. This latest model includes the following components that effect use of healthcare services, characteristics of the delivery system, characteristics of the population, and patient satisfaction.

This study examines the characteristics of the population as determinants of use, as well as consumer satisfaction with acupuncture. Population characteristics were categorized as predisposing, enabling and need. These were the independent variables for the study.

Predisposing factors are comprised of sociodemographic characteristics of the individual. These include age, gender, race, education level, and marital status. Enabling factors include the availability of resources needed for use such as insurance coverage, income levels, location with region of the country and rural and urban settings. Need is a fundamental characteristic that predicts medical use. Use can be in response to lack of efficacy of other treatments. Many patients are referred or self-refer to acupuncture for pain relief because conventional modalities aren't effective or have too many side effects. If predisposing factors, enabling factors and need are favorable, use will follow, (Aday & Awe, 1997). The model has been applied to a variety of healthcare consumer issues.

Waxman, Tennant, and Helliwell (1998) used the Andersen's Behavioral Model as a framework to determine the factors associated with use of medical services for low back pain in a survey of 540 respondents. Predisposing variables included age group, sex,

education, work status, number of children, use of tobacco, exercise level, and social support. Perceived need factors included pain level, duration of pain, diagnosis and disability status. Psychosocial factors included beliefs, locus of control, coping strategies, fear avoidance, depression, and somatic perceptions.

They found duration of pain was a significant predictor. Pain lasting less than two weeks was associated with severity of pain. Pain lasting more than two weeks was associated with increased disability. Chronic pain (pain lasting more than three months) was associated with depression. Not being employed was an additional predisposing factor associated with use. Age and sex were not significant predictors.

Mitchell and Krout (1998) used the Behavioral Model to explain use of discretionary healthcare services in older adults. They posit that the Behavioral Model is most effective in predicting discretionary healthcare use as opposed to non-discretionary or emergent care. In a study of 2,178 community-dwelling elderly in England, they found age, race, and rural residence as significant predictors of discretionary healthcare use. Gender, and education were not predictors. Living alone, social support, and unavailability of unpaid personal care, were enabling predictors of use. Income did not predict use. Need factors of inability to perform daily living activities predicted use of medical services.

They conclude that need characteristics are most important in determining use of non-discretionary healthcare services while predisposing and enabling characteristics were better predictors of discretionary services. However, the full model had limited predictive ability (r^2=0.11) but of that value the predisposing factors represented 0.08. Though the overall model had only a small predictive ability, the differences in the

factors between discretionary and non-discretionary use was statistically significant. The factors predicting use were independent of need. They further conclude that shortfalls of the Behavioral Model might be based on its misapplication, not on the constructs of the model.

In a population-based study (n = 4,744) examining the use of eye care services by urban and rural Australians, Keeffe, Weigh, McCarty, and Taylor (2002) used the Behavioral Model to predict use. They found that predisposing characteristics of age and gender were associated with use (males had lower use). Enabling characteristics of private health insurance, speaking a foreign language, and residing in an urban area were also associated with use of services. The study did not describe the overall predictive ability of the model but identified targets of opportunity to increase use of eye care services.

Goodwin and Andersen (2002) analyzed data from the National Comorbidity Survey, a probability sample of 8,098 adults in the United States, to determine use of healthcare services for panic attacks. The Behavioral Model was used to identify factors associated with seeing a physician for panic attacks. Predisposing factors associated with treatment included older age, being currently married, and increased education. Gender, and race/ethnicity did not correlate with treatment. Enabling factors including income levels, region, and family support did not significantly correlate with use of services. Need factors correlating with use included perception of poor physical and mental health, major depression and other mental health conditions.

When all the predisposing, enabling and need factors were entered into the model, only marital status, and the need factors of agoraphobia, and substance abuse disorder

remained statistically significant. When the model controlled for evaluated need factors, perceived physical health remained a predictor.

Hargraves and Hadley (2003) used the Behavioral Model to determine the factors associated with reduced access to care due to racial/ethnic disparities. The purpose of their study was to provide information for the development of policies to reduce disparities related to access to care. Data from the 1996-1997 and 1998-1999 Community Tracking Study (CTS) were used and included 58,500 individuals. The dependent variables were "unmet needs", "no regular health provider", and "no doctor visit in the past year". The independent variables were enabling factors, predisposing factors and need factors. Enabling factors included family income (as measured relative to the federal poverty level), availability of community health resources, and health insurance coverage. Predisposing factors included age, education, marital status, presence of children, and cigarette smoking as a measure of risk-taking behavior. Need factors were measured by self-reported "general health status".

The researchers found that there was a significant difference between whites and Hispanics on having a regular doctor and visiting the doctor in the past year. One-third of the differences between Hispanics and whites in having a regular provider and two-fifths of the differences in having a doctor visit were related to coverage by insurance. The difference between whites and African Americans was not as great as whites and Hispanics, but lack of health insurance coverage was still the most significant factor. Income was the second most significant factor for Hispanics and African-Americans.

The Behavioral Model provides a valid framework for the analysis of factors related to use of healthcare services. Care must be taken in measuring the associations of the components of the model to account for interaction of the various factors studied.

Research and Literature Related in Content

The purpose of this section was to provide a review of the literature and research related to the framework for the study, factors associated with pain, acupuncture and CAM, and methodology of similar studies. While many studies have demonstrated the efficacy of acupuncture, questions remain in the minds of conventional medical practitioners and patients (Faass, 2001, Freeman & Lawlis, 2001). The NCCAM is now funding randomly, controlled, clinical trials. The scope of this study does not include in-depth coverage of the clinical or physiological efficacy of acupuncture but rather a description of factors associated with those who use acupuncture for pain management.

Pain Management

The International Association for the Study of Pain defines chronic pain as, "pain that persists beyond normal tissue healing time, assumed to be 3 months" (Haetzman, Elliott, Smith, Hannaford, & Chambers, 2003). Management of chronic pain consumes large amounts of healthcare resources. In 2001 in the United States, there were:

- 70.5 million outpatient visits to medical providers
- 40.4 million prescribed medicines for osteoarthritis and other non-traumatic joint disorders
- 99 million back pain visits, and
- 18.96 million prescriptions for back problems.

The total expense for these conditions was $45.7 billion.

Musculoskeletal pain affects over 40 million people in the US and this figure is expected to grow to 60 million by the year 2030. The cost associated with this problem is almost $150 billion per year (Lubeck, 2003). The majority of clinical research focuses on pharmaceutical solutions, however adverse drug reactions are responsible for $177 billion in additional services such as physician visits, additional prescriptions, emergency room visits, and admissions to hospitals and long term care facilities. Also, 106,000 people in the USA died from adverse drug reactions in hospitals in a single year (Ernst, & Grizzle, 2001).

Efficacy

For the purposes of this study the researcher focused on perceived benefit and efficacy from the view of the patient as opposed to clinical trials conducted by researchers. However, a brief review of clinical efficacy, particularly for pain, is included. In their textbook on complementary and alternative medicine Freeman and Lawlis documented the results of an extensive list of clinical trials conducted on acupuncture within a Western medicinal context. In summary, they found acupuncture clinically effective for chronic and acute pain management for low back pain, headache pain, osteoarthritis, and musculoskeletal pain, including surgical analgesia, postoperative and chemotherapy-induced nausea and substance abuse control. They also report mixed findings for, neurological disorders and asthma (2001, pp. 320-339).

Faas's book on CAM lists acupuncture as having clinical trial efficacy for acute and chronic pain, nausea and vomiting, stroke, respiratory disease, substance abuse, respiratory conditions including asthma, cardiovascular conditions, gastrointestinal

conditions, urological conditions, reproductive dysfunction, neurological conditions, and psychological conditions (2001, pp.523-542).

Bonakdar and Bresler discuss benefits of acupuncture for pain in a guide for physicians. They cite studies demonstrating efficacy of acupuncture for headache, cancer pain, and anterior knee pain. They conclude more, and better designed studies are needed to determine efficacy (2004).

Cherkin, Eisenberg, Sherman, Barlow, Kaptchuk, Street, and Deyo conducted a randomized trial comparing acupuncture, therapeutic massage, and self-care education for chronic low back pain with 262 patients. They found therapeutic massage was superior to both self-care and acupuncture on disability after 10 weeks, and superior to acupuncture but not self-care after one year. The team also found that therapeutic massage participants used the fewest prescriptions and had the lowest cost for follow-up care (2001).

Leibing, Leonhardt, Koster, Goerlitz, Rosenfeldt, Hilgers, and Ramadori conducted a randomized, blinded, placebo-controlled study of acupuncture on 131 patients with lower back pain. All participants received physiotherapy for 12 weeks but one group received no additional care, one group received 20 acupuncture treatments and one group received 20 sham acupuncture treatments. Acupuncture outcomes were superior to both control groups after treatment for pain disability, pain intensity, and psychological distress. Results diminished at the 9-month follow-up (2002).

Therapeutic massage was effective in treating back pain. Efficacy of acupuncture was unclear due to the researcher's concern regarding the quality of the 20 random controlled trails reviewed, and spinal manipulation was found to have a small clinical

effect. Massage therapy was cost effective, but not acupuncture or spinal manipulation; all therapies were safe (Cherkin, Sherman, Deyo, & Shekelle, 2003). However, in another meta-analysis the authors randomly selected 33 controlled clinical trials and found acupuncture to be effective for low back pain, though no better than other treatments (Manheimer et al, 2005).

While the differences in outcome were statistically significant in a study of acupuncture for neck pain, the results were not clinically significant (only 12% improvement), (White et al, 2005). In a study of acupuncture for migraine headaches the researchers found that acupuncture was no better than sham acupuncture in reducing days with headaches but both were clinically superior to the control group that did not receive any treatment (Linde et al, 2005).

Adverse Effects

McPherson investigated the circumstances surrounding five fatalities associated with acupuncture use as reported in the popular media. He found one case of self-insertion of a sewing needle in the heart area, two reports of fatalities for Staphylococcal septicemia, one report of an asthmatic that collapsed and died during treatment, and one report of a needle puncturing the heart of a woman with a sternal foramen. In an extensive search of the literature of serious adverse events he found trauma and injuries, cross-infections, physiological and psychological responses, and clinical misjudgements. Overall he states the incidence of major complications as very low. The National Institutes of Health Consensus Conference, also found a low incidence of adverse events and concluded “one of the advantages of acupuncture is that the incidence of side effects

is substantially lower than that of many drugs or other accepted procedures for the same conditions" (1999, p.55).

Pearl and Schillinger reviewed the risks of acupuncture outlined in the literature as primarily infection and trauma. Infections were found worldwide including hepatitis, HIV, subacute bacterial endocarditis, and Staphylococcus sepsis. Trauma events included pneumothorax and cardiac temponade. Spinal injuries have been found as well (1999). Chung, Bui, and Mills reviewed the medical literature and found reports of minor events such as nausea and syncope and more rare serious events such as septicemia and hepatitis C (2003).

Use Rates of Acupuncture and CAM

The Landmark Report on Public Perceptions of Alternative Care, a national survey, found acupuncture use as 2% of the United States population (Landmark, 1998). The 1998 Eisenberg study of use of CAM modalities in the United States found a use rate in the past 12 months of 1.0% up from 0.4% in 1990. The study estimated that 5.4 million visits were made for acupuncture services in 1997 (1998).

Acupuncture use is lower than many other CAM modalities including chiropractic (192 million visits), massage (114 million visits), self-help groups (80 million visits), imagery (22 million visits), herbal medicine (10 million visits), but higher than hypnotherapy (4 million visits), and biofeedback (4 million visits) and homeopathy (1.7 million visits) and folk remedies (0.5 million visits) (Eisenberg, Davis, & Ettner, 1998). The visitation number in 1997 sharply contrasts with the 1 million estimated by the National Council for the Certification of Acupuncture for 1997 (Cassidy, 1998, p.17).

The number of licensed acupuncturists increased from 5,525 in 1992 to 10,512 in 1998 (Freeman & Lawlis, 2001, p.18, 499).

Jain and Astin (2001) found in their study of Stanford University alumni that 3.7% used acupuncture in the past year. As found in the Eisenberg study this use was lower than other CAM modalities such as massage (31.5%), herbal medicine (20.3%), chiropractic (10.3%), and homeopathy (8.7%), but higher than imagery (2.5%), and biofeedback (0.5%) (2001, p.692). The demographics of the sample used in this study may explain the higher rate.

The 1990 Eisenberg survey of the United States population found that 33.8% (60 million people) used at least 1 of 16 alternative therapies. The 1997 survey found that this number increased significantly to 42.1% (83 million people) (Eisenberg, Davis, & Ettner, 1998). See Table 1.

Medical management (73.7%) was the predominant outpatient services used for back pain in 1997. Other modalities used included physical therapy (9.3%) and chiropractics (30.6%). The 1987 use for these same services was 64% medical management, 5% physical therapy, and 40.5% chiropractics. All of these changes in use were statistically significant. The proportion of patients using medications for back pain did not change significantly during this period but the number of medications used did significantly increase. Medication use included prescription acetaminophen/NSAIDs, muscle relaxants, and narcotic and non-narcotic analgesics. Diagnostic procedures significantly shifted from X-ray to more expensive MRI/CRT procedures (Feuerstein, Marcus, & Huang, 2004).

Table 1: Acupuncture Use Rate

Use Rate	Population	Study/Year
1.0%	Two Managed Care Organizations	Stewart, 2001
2.0%	US Population	Landmark, 1998
1.0%	US Population	Eisenberg, 1998
14.0%	Blue Cross Medicare Subscribers	Astin, 2000
3.7%	Stanford University Alumni	Jain, 2001
15.1%	Community-Dwelling Elderly	Najim, 2003

Consumer Interest in Using Acupuncture

Weeks reports in the findings of a 1996 survey by the Provident Good Health insurance plan that 40% of their members were interested in having access to acupuncture. He also reports that a Blue Cross Blue Shield survey of senior citizens indicated interest in chiropractics and acupuncture. A Northern California Kaiser Health Plan survey found chiropractics, massage and acupuncture of greatest interest. In a study conducted by Stanford University and American Specialty Health Plans 44% of respondents indicated interest in use of acupuncture in addition to conventional medicine while 56% indicated use of acupuncture in place of conventional medicine (1999, p.107, 108, 117).

Stewart, Weeks, and Bent found in their survey of two large managed care organizations in Washington State that only 1% of plan members used CAM services, which included acupuncture, massage, and naturopathic medicine though these services were a covered benefit of the plan. They did find that use rates increased slightly between the first three months and the last three months of the year studied (2001, p.66, 68). They

found this low use rate surprising as market research in a similar market indicated interest with 39% of respondents (2001, p.70).

Previous or Concurrent Use of Conventional Medicine

Cassidy reported that in her study of acupuncture patients 54.4% of respondents used conventional care as well as acupuncture (1998). She also reported that acupuncture users reported fewer office visits to medical doctors (84.1%), use of fewer prescription drugs (78.9%), fewer insurance claims (77.0%), avoidance of surgery (70.1%), and reduction in use of psychotherapy (58.5%) (1998).

Stuart, Weeks and Bent found that 55% of respondents that used CAM services reported decreased use of conventional medicine. Use of prescriptions drugs decreased as well as reported by 61% of respondents (2001).

A regional survey by Cleary-Guida, Okvat, Oz, and Ting, found that less than half of health insurance companies covered acupuncture, some requiring that it be performed or supervised by a physician. They state that a critical issue for all CAM services including acupuncture is whether the additional cost in covering these services will be offset by a commensurate decline in conventional healthcare cost. They suggest that CAM services may be used as a marketing tool to attract subscribers due to CAM's popularity. They also suggest that acupuncture is less costly than orthopedic surgery (2001, p. 272-273).

The majority of respondents in an English study conducted by Haetzman, Elliott, Smith, Hannaford, and Chambers (2003) received both conventional and alternative therapies (67%) and medicines (85.9%). However, chronic pain patients were more likely to use alternative care only as compared to non-chronic pain patients.

In a prospective study of 5,000 acupuncture patients in Germany 75% of patients used conventional medicine prior to acupuncture and 21% saw greater than four physicians (Guthlin, Lange, & Walach, 2004). Wonderling, Vickers, Grieve and McCarney found 15% less prescription use, and a 25% decrease in physician visits with use of acupuncture for chronic headaches (2004).

An extensive study is currently underway to study the cost-effectiveness of CAM services. This study is being conducted by the Collaboration for Healthcare Renewal (CHR) Foundation and will be conducted as a retrospective review of claims data. This organization maintains that the major obstacle to utilization of CAM services is lack of adequate outcomes data. The study is being conducted to compare the cost-effectiveness of CAM services as compared to conventional medicine (CHR, Foundation, 2002, p.1).

Predisposing Factors

Predisposing factors of use of CAM, acupuncture and conventional medicine include those factors that describe the likelihood of an individual to use a service including socio-demographic factors such as age, gender, race/ethnicity, education level, location of residence, employment, geographic region, and health beliefs and attitudes.

CAM

Studies have found that CAM is used by every sociodemographic segment of the United States population. The adult (18 years and greater) United States population as reported by the Bureau of the Census in 1997 was 52% female, 27% middle aged (35-49), with 33% younger and 35% older, 73% White, 12% African American, 11% Hispanic and 4% Asian. The census shows that 48% had at least some college and 26% had annual incomes of $50,000 or greater (Eisenberg, 1998). In a population based study

of 1997, the percentage of those using healthcare services for back pain by demographics were: 53.9% female, 62% middle aged (40-49), with 46% younger and 25% older, 88% white, and 12% non-white. The study reported 50.1% had at least some college and 41.2% had high incomes (Feuerstein, Marcus, & Huang, 2004).

The overall CAM use rates in the 1997 Eisenberg study ranged from 32% to 54% depending on demographic group. The percentage of women (48.9%) using CAM was higher than men (37.8%). African Americans (33.1%) used CAM less frequently than other racial groups (44.5%). Middle-aged people (35 to 49 years) reported higher use rates (50.1%) than those older (39.1%) and younger (41.8%).

Eisenberg's study found that CAM use was higher among those more educated who had some college education (50.6%) and annual incomes above $50,000 (48.1%) than with no college education (36.4%) or with lower incomes (42.6%). Those residing in the Western United States (42.1%) had higher rates than those living in other regions. These findings, with the exception of gender differences, were consistent with Eisenberg's 1990 study (Eisenberg, Davis, & Ettner, 1998).

Stewart, Weeks, and Bent also found disparity between males and females in their study of two managed care plans offering CAM coverage - 78% of the CAM users were female and 22% were male. Of the users, 54% were between the ages 41-60 and 33% 21-40 (2001, p. 70).

Astin's national study of CAM users found that 41% of females used CAM services and 39% of males. Those with graduate degrees were the highest users, substantially higher than those with high school education or less (50% versus 31%). The CAM use rate for Whites was 41%, Blacks 29%, Hispanics 40%, Asians 44%, and Native

Americans 71%. There was only small variance between age groups with 50-64 being the greatest users at 44% (1998, p.1550).

Utilization of CAM by ethnic minorities was reported as low in all studies. McKenzie et al used a subset of data from the 1995 National Comparative Survey of Minority Health Care of the Commonwealth Fund which over-sampled minorities and used six languages to conduct interviewers. They found that use of at least one CAM modality was equally likely for all ethnicities and minorities though there was variation among CAM modalities. Overall, other findings were similar to other studies in finding that CAM use was higher for females and education levels of high school and above. They found an overall acupuncture use rate of 3% but this level was inflated by a 12% use rate for Asians, as compared to a 3% rate for Native Americans and a 1% rate for Whites, Blacks/African Americans and Latinos (Mackenzie et al, 2003).

Najim, Reinsch, Hoehler, and Tobis studied use of CAM among the community dwelling elderly. Overall CAM use was 47.8%. Specific use of modalities included dietary supplements (47.4%), chiropractics (16.3%), home remedies (15.9%), acupuncture (15.1%), and oriental medicine (12.8%). Asians were the highest users of acupuncture (28%). In the elderly, CAM use decreased among the less educated and decreased years of stay in the United States. There was not a significant difference found between users of CAM and non-users in age, gender, or perceived health (2003, p.51).

Acupuncture

Cassidy described the demographic profile of her study of 575 acupuncture users as middle-aged, well educated, employed, and mid-income. In this study 72.1% were female and 27.9% male. Users under age 40 accounted for 38.8% of those studied,

between 40-50 37.8% and 51 and over accounted for 21.4%. In this study 89.3 % of the patients were White. Only 6% of the users had less than some college education (1998, p. 20).

A recent acupuncture study found that 75% of the respondents were female, 90% were White, 60% were between the ages of 30 and 49 years, and 65% were college educated with 30% possessing at least one graduate degree (So, 2002). Gould and McPherson surveyed acupuncture clinic patients and found 75% females and 25% male with a mean age of 50 (2001). In a prospective study of 5,000 acupuncture patients in Germany 53% were women, with a mean age of 42, and 62% were employed (Guthlin, Lange, & Walach, 2004).

Gender, Pain and Conventional Medicine

Higher female use of CAM and acupuncture services is consistent with use of conventional medicine. Weir, Browne, Tunks, Gafni, and Roberts, found that women's heightened response to chronic pain correlated with increased use of chronic pain specialty clinic services (1996). Sansone, Sansone and Wiederman found that among women, obesity was predictive of all forms of healthcare utilization including number of diagnoses, medical facility contacts, number of prescriptions, and number of physicians seen (1998).

Green and Pope conducted a 22 year long longitudinal study exploring gender as a predictor of utilization and found that even controlling for gender specific utilization factors and other factors, female gender was a predictor of utilization (small but significant). In addition, self-reported negative health status and age at baseline predicted

long term utilization. Education level was a slight predictor of utilization but decreased as a predictor over time (1999).

Fillingim reviewed research related to sex, gender and the clinical and experimental response to pain. The literature supports that cognitive-affective factors, sex roles, familial factors and hormonal factors may all affect women's increased experience to pain. He concludes that this heightened sensitivity may result in women seeking earlier treatment (2000).

Walen, Cronan and Bigatti found in their study of women with fibromyalgia that high cost patients had significantly more co-morbid conditions, poorer health status, lower perceived health status, higher disease severity, less self-efficacy for functioning, higher depression scores, and lower social support scores as compared to low cost patients. There were no significant differences in marital status but high cost patients were more likely to report lower incomes (2001).

In a study to measure the effects of coping on outcomes of women with gastrointestinal disorders, the investigators found that age and race did not significantly contribute to outcomes. Lower education levels, neuroticism, abuse severity, increased problem solving, catastrophizing, and lower self-efficacy significantly effected health status (Drossman et al, 2000). In a 5-year study of HMO patients presenting for injury, chronic pelvic pain, depression or physical examination, patients with evidence of domestic violence had an overall 1.6 and 2.3-fold increase in total utilization and costs (Ulrich et al, 2003).

Haetzman, Elliott, Smith, Hannaford, and Chambers (2003) conducted a follow-up mail survey of population-based survey participants conducted in England to

determine use of conventional and alternative therapies for chronic pain conditions. The survey was sent to 2,422 individuals, with 1,560 completions of which, 840 (53.8%) reported experiencing chronic pain. Of those with chronic pain, 67.2% saw a general practitioner, 34% a specialist physician, 25.9% a physical therapist, and 18.2% an alternative practitioner. For the purposes of this study alternative medicine practitioner was not specifically defined in the questionnaire, but included aromatherapist and chiropractors as examples in the question. See Table 2.

There was no significant difference between males and females in seeking conventional care, but older persons were more likely to use conventional care than younger persons. Females were significantly more likely to seek alternative care (21.7% vs. 14.3%), as were younger persons. Females were also significantly more likely to take

Table 2: Factors Associated with Use of Conventional Medicine for Pain

Factor	Study/Year
Female gender	Weir, 1996
	Green, 1999
	Fillingim, 2000
Obesity in women	Sansone, 1998
Self-reported negative health status	Green, 1999
Age	Green, 1999
Education level	Green, 1999
	Drossman, 2000
Higher depression levels	Walen, 2001
	Drossman, 2000
Lower self-efficacy for functioning	Walen, 2001
	Drossman, 2000
Lower incomes	Walen, 2001

prescription and non-prescription medicine (62.2% and 65.3%) and they also took more alternative medicines than men (21.1% vs. 10.0%). Older age groups took more prescription medicine and younger age groups took more non-prescription medication, while the middle age group took more alternative medications than the other two groups. See Table 3.

Those owning their homes as opposed to renting were more likely to use alternative therapies (13.1% vs. 2.6%). Higher socioeconomic class was measured using home ownership. Homeowners were also less likely to see a specialist and to take prescription medications. Pain severity correlated positively with seeking physician specialists.

Table 3: Predisposing Factors of Acupuncture Use

Population	Female	White	Age Group	College Education	Study/Year
US Adult	52%	73%	29.4% (35-49)	48%	US Census, 2000
Back Pain	55%	88%	62% (40-49)	50%	Feuerstein, 2004
CAM Users	78%	na	54% (40-60)	na	Stewart, 1998
Acupuncture Users	72%	89%	77% <50	94%	Cassidy, 1998
Acupuncture Users	75%	na	50 median	na	Guold, 2001
Acupuncture Users	75%	90%	60% (30-49)	65%	So, 2002
Germany	53%	na	42 mean	na	Guthlin, 2004

Enabling Factors

Enabling factors of health services use include factors that facilitate access to health care services such as income level and health insurance coverage, or attributes of the community that may foster support, availability or proximity of care such as attitudes of healthcare experts, or living in a rural or urban setting. An individual's positive health behaviors can also enable use.

Insurance Coverage

Insurance coverage of CAM enables patient usage. A study of CAM use among Blue Cross Medicare subscribers indicated a 41% use rate. Of the CAM modalities, 24% used herbal remedies, 20% used chiropractic, and 14% used acupuncture (Astin, Pelletier, Marie, & Haskell, 2000). The Blue Cross Medicare risk plan included covered benefit for acupuncture and chiropractic care explaining in part the higher use of acupuncture among this population.

Eisenberg et al reported the following CAM services had complete or partial insurance coverage; chiropractic 62%, acupuncture 40.7%, massage therapy 29.5%, biofeedback 74%, herbal medicine 20%, and homeopathy 0%. During the period studied (1990-1997), the number of CAM users reporting insurance coverage for their CAM treatment declined by 10% or more for herbal medicine, chiropractic, homeopathy, and biofeedback. The number of respondents reporting insurance coverage for acupuncture declined by 4%, and no respondents reported complete coverage. Coverage for massage therapy increased by almost 10% (1998).

Cassidy (1998, p.19) reports that only 22% of acupuncture users had any insurance coverage for acupuncture care, the other 88% paid out-of-pocket. Cost was not

found to discourage use except for lack of insurance coverage for chiropractics (Jain & Astin, 2001). The 1999 Landmark Report II that 31% of the participating HMO's covered acupuncture and a 2000 Employee Benefit Specialists study reported 14% coverage (Faas, 2001, p.17).

Weeks (1999) extensive research documented coverage of CAM services by insurance companies. An important issue in coverage of services is state mandates for inclusion of coverage by health plans. At the time of his article over 40 states had mandates for chiropractic coverage but only eight for acupuncture (p.109) though 41 states recognize the practice of acupuncture with legislation introduced in an additional eight states (Faass, 2001, p.498). The most significant mandate was in Washington State which, mandated acupuncture coverage in addition to other CAM services. Utilization was below expected levels. Costs were expected to rise 11% the first year in another plan but the actual experience was only 1% (p.109).

This information is similar to the later findings of Stewart, Weeks and Bent where they found only a 1% usage rate of patients covered for CAM services (acupuncture, massage, and naturopathic medicine) in two managed care plans in the Washington State mandated inclusion program. Those that used their CAM benefit averaged $188 in claims, much lower than the $500 maximum benefit, though 89% said that they would "definitely" or "probably" return to the same provider (2001, p.70).

A national survey conducted by Pricewaterhouse Coopers reported by "Business and Health" indicated the following coverage for CAM services by companies with 500 or more employees – chiropractic 80%, acupuncture 22%, massage therapy 14%, biofeedback 10% and homeopathy 9%. The reasons for extending this coverage were due

to employee request 63%, potential for cost savings 31%, potential for more effective care 31%, state mandates 6%, and other 18% including competition, primary care physician referral, and local health plan offering (Lippman, 2001p.18).

While most insurance providers in a regional study of the New York, New Jersey and Connecticut area covered chiropractics, only 39.5% covered acupuncture. Of those that provided coverage, 23.5% of plans require that it be performed or supervised by a physician (Cleary-Guida, Okvat, Oz, & Ting , 2001, p.270). Mackenzie et al found that the uninsured were almost twice as likely to use acupuncture as insured persons (Mackenzie, E., Taylor, L., Bloom, B., Hufford, D., & Johnson, J., 2003 p.53).

Other countries have greater insurance coverage of acupuncture and have found higher utilization. In a prospective study of 5,000 acupuncture patients in Germany, 69% reported "paid for by insurance company" as a reason for using acupuncture (Guthlin, Lange, & Walach, 2004). European countries in general have higher acupuncture use rates (Belgium - 19%, Denmark – 12%, France – 21%, Netherlands – 16%). Acupuncture is listed as one of the top five CAM modalities used in the United Kingdom where 40% of the primary care practices offer some form of CAM, 70% of which is covered by the National Health Service insurance coverage (Zollman & Vickers, 1999). See Table 4.

The NCCAM has funded several clinical trials regarding the efficacy of acupuncture for pain. Medicare is currently evaluating the outcomes of studies such as these to determine coverage for acupuncture for certain conditions (Medicare, 2002). Insurance coverage of acupuncture may increase as the efficacy and cost-benefit of acupuncture are demonstrated and customer demand increases.

Table 4: Insurance Coverage of Acupuncture

Percentage	Population	Study
40.7%	US Population	Eisenberg, 1998
22.0%	Acupuncture Users	Cassidy, 1998
31.0%	HMO's	Landmark, 1999
14.0%	Employee Benefits Survey	Faas, 2001
22.0%	Companies with 500+ Employees	Lippman, 2001
70.0%	British Population	Zollman, 1999
69.0%	German Population	Guthlin, 2004

Physician Attitudes Toward Acupuncture and Referrals

Conventional physician resistance to acupuncture is seen as a major barrier to patient use. Baer, Jen, Tanassi, Tsia, and Wahbeh (1998, p. 533) found that conventional medical practitioners held one of the five following positions toward acupuncture, “reactionary extreme”, “conservative opposition”, “liberal support”, “progressive support”, or “medical heretic”. They further state that there is a split even within those that support acupuncture with a majority group who want to restrict application to a limited range within orthodox neurophysiological thinking and a minority group who subscribe to the classical approach that applies acupuncture to a broader group of maladies.

Consumer perception that their physician was not receptive to CAM was a predictor of disuse (Astin, 1998). Weeks reports the findings of a survey of physicians at Baptist St. Vincent Health System in Jacksonville, Florida that 79% found acupuncture to

be “effective” or “very effective” Another national study of primary care physicians indicated that 48.7% would use acupuncture (1999 p.110).

A 2000 article in Consumer Reports indicated that 60% of CAM users informed their physician of their use. This same article indicated that 55% of physicians approved of their patients using CAM and another 40% were at least neutral. By 1997 75% of medical schools were teaching some aspect of CAM (Freshley & Carlson, 2000).

Jain and Astin found lack of physician support for CAM services as a predictor of disuse of acupuncture (2001). So reports that in a survey of first time acupuncture users that 9% of the patients were referred by a healthcare professional - 1% medical doctors and 8% non-physician providers. The 91% who were not referred by physicians were referred by the following; acupuncture students (28%), people in their lives (41%), or media information including articles and advertisements (15%). He found 8% were self-referred (2002, p 1662).

A study regarding physician attitudes toward CAM conducted in the United Kingdom indicated that physicians believed that CAM would not go away but that CAM needed more scientific testing to ensure safety and efficacy. Though the physicians indicated an overall balanced attitude they did state that they did not think that the United Kingdom National Health Service should pay for CAM services in light of the constrained budget. This indicates that though physicians may be neutral or supportive of CAM, resistance might increase toward CAM if it seriously competes for limited financial resources (Lewith, Hyland, & Gray, 2001).

Need Factors

Need factors of health services use include health status and presence of illness or disease conditions. They may be measured by self-reported injury or health status, disability, and days away from work. In addition, perceived health status may be influenced by the mental health status of the respondent.

Health Status, Disease Conditions and Illness

In Cassidy's study of users of Chinese medicine she found the following reasons or conditions for seeking care; mood (66.3%), well care (63%), musculoskeletal (58.8%), respiratory (40.2%), head and neck (31.7%), digestive (22.4%), urinary and male reproductive (20.3%), female reproductive (17.4%), infectious (13.4%), autoimmune (12.5%), and weight problems (10.8%). In the qualitative portion of her study respondents indicated that they preferred a patient-centered model of care and a holistic approach, and believed they received this care from Chinese medicine (1998, p. 21, 18).

Astin's 1998 national survey of 1,035 randomly selected participants from the National Family Opinion survey asked why they used CAM services. He found that those with poorer health status, a holistic orientation to health, classification in a cultural group identifiable by commitment to environmentalism, feminism, spirituality and personal growth psychology, or certain health problems including anxiety, back problems, and chronic pain predicted CAM use. He did not find that dissatisfaction with conventional medicine predicted CAM use (1998, p.1548).

In a companion study of CAM disuse, Jain and Astin found being healthy, male, lacking physician support for CAM, and belief that CAM treatments are ineffective or inferior associated with disuse of CAM. However for acupuncture specifically, disuse

was predicted by belief it was an inferior treatment and the inability to locate providers (2001, p. 693). Creamer, Singh, Hochberg, and Berman found that there were no psychosocial factors related to use of acupuncture (1999, p.72). See Table 5.

Pearl and Schillinger conducted a meta-analysis of efficacy of acupuncture studies and found evidence of benefit for low back pain, headache, neck pain and musculoskeletal pain, dental pain, nausea, and treatment of stroke. Inconclusive or negative results were found for asthma and addictions (1999). Faas listed studies documenting the helpfulness of acupuncture for acute and chronic pain, nausea and vomiting, stroke, respiratory disease, and substance abuse (Faass, 2001).

Gould and MacPherson found in a study conducted in England the primary reasons patients used acupuncture were physical symptoms (90%), mental and emotional problems (9%), and general health and well being (1%) (2001, p. 261). So reported that 55.7% of those using Chinese medicine do so because they were dissatisfied with conventional medical treatment. He also reported that 9.2% seek use of Chinese medicine as a last resort and 33.5% due to curiosity or insistence of friends (2002, p.1662).

Table 5: Reasons for Use of Acupuncture

Musculoskeletal	Head and Neck	Survey of	Author
58.8%	31.7%	Acupuncture Users	Cassidy, 1998
52.0%	19.0%	Population	Guthlin, 2004

In a study of patients from a CAM clinic in England that provided acupuncture, homeopathy and osteopathy, Richardson found that pain, back, and neck problems were the primary reasons for using the clinic (2004).

Najim, Reinsch, Hoehler, and Tobias found in a study of 525 community-dwelling elderly that CAM was most frequently used for pain followed by arthritis, respiratory problems, and gastrointestinal problems (2003). In a prospective study of 5,000 acupuncture users in Germany, conditions of patients were 52% musculoskeletal system, 19% nervous systems (migraine headache), 18% respiratory system and 11% other (Guthin, Lange, & Walach, 2004).

Days Away from Work and Disability

Pain is a significant factor in the cost associated with utilization of healthcare services and the cost of the inability to function at work. Loesser and Melzack concluded in their research "Health-care expenditures for chronic pain are enormous, rivaled only by the costs of wage replacement and welfare programmes for those who do not work because of pain" (1999).

Cassidy reported that 71.0% of acupuncture users reported missing fewer days of work "most of the time" and 63.6% stated that they could "work better" after using acupuncture (1998). Astin's study found that those with poorer health status were more likely to use CAM services (1998).

Richardson utilized the Short Form 36-Item Health Status Survey (SF-36) to measure the difference between baseline and post-treatment scores for users of acupuncture, osteopathy and homeopathy and a waiting-list control group. Significant

positive differences were found for physical and emotional role limitations, bodily pain, general health, vitality, social functioning, and mental health. No difference was found on the physical functioning scale (2001).

Wonderling, Vickers, Grieve and McCarney found a significant increase in quality adjusted life years (QALY), and 15 % fewer sick days as compared to the control group with use of acupuncture for chronic headaches (2004).

Guthlin, Lange, and Walach found a significant progressive decrease in the mean and median number of work days lost for patients in the study for two years post treatment with acupuncture. The prospective study of 5,000 acupuncture patients in Germany also found a moderate increase in physical role functioning, bodily pain, vitality, social functioning, and mental health and a small increase in physical functioning (2004). See Table 6.

Berman, Lao, Langenberg, Lee, Gilpin, and Hochberg found a significant increase in the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function scores 8 and 26 weeks and in the pain index at 26 weeks as compared to sham acupuncture and education control groups (2004).

Table 6: Acupuncture Effect on Days Away from Work and Disability

Days Away from Work	Disability	Author
71% of users missed fewer days		Cassidy, 1998
	Improvement in SF-36 Physical Functioning Scale	Richardson, 2001
Users had 15% fewer missed days	Improved QALYS	Wonderling, 2004
	Increase in WOMAC score	Berman, 2004
	Improvement in pain index	
Decrease in number of missed days	Increase in physical role function	Guthlin, 2004

Patient Satisfaction

Consumer satisfaction is expected to increase usage patterns. Astin found in his initial study in 1998 that perceived benefits of complementary and alternative medicine were potential determinants of use. Relief of symptoms, pain, and discomfort, and better outcomes than conventional medicine for the particular presenting complaint were the two most frequently stated benefits. The third most frequently stated benefit was that the treatment supported health as opposed to just focusing on illness (1998, p.1552)

Cassidy's study of 575 patients of six Chinese medicine/acupuncture clinics across the United States found a high level of satisfaction. Of the respondents surveyed 91.5% reported their symptoms or their condition disappeared or improved, 7.5% stated it had not changed and 0.7% said it had worsened. Respondents reported favorably toward statements including feeling better, missing less work, getting along with others, less pain, more energy, increased focus, and work productivity. In the qualitative part of the study respondents reported that in addition to relief of the presenting problem they all also experienced improvements in physiological and psychological adaptivity (1998, p.22). Patients rated acupuncture outcomes for pain relief after the prescribed treatment period using a 0-10 scale with 0 being the state prior to treatment and 10 perfectly normal. The average score was 7.6 (Lindall, 1999).

The study of two managed care plan members that utilized acupuncture services by Stewart, Weeks, and Bent found that 81% of respondents rated the care of the acupuncturist as very helpful. This compared to only 17% of the same group rating their conventional medicine physician used for the same condition as helpful. This compares to a 1997 national survey in which 57% of users rated acupuncture services as very

helpful. This group stated they would use the same CAM provider again for the same condition if needed (89%), (2001, p.69-70). See Table 7.

Gould and MacPherson's study of 132 acupuncture patients supported these findings. Respondents reported definite changes in physical symptoms (75%), emotional and mental symptoms (67%), lifestyle changes (40%), major life changes (27%), and inner life changes (54%). Some emotional change was reported by 83% of patients, and 58% attributed the changes substantially, and 25% totally, to acupuncture (2001, p.264). In a pretest posttest research design Richardson found significant improvements among 159 subjects that used a complementary medicine center in the United Kingdom. Treatment included acupuncture, homeopathy, and osteopathy. Statistically significant gains were made in physical role limits, bodily pain, general health, vitality, social functioning, emotional role limits, and mental health within a three-month period of time (2001, p323).

So found that the treatment outcomes of patient's hopefulness, expectations, beliefs about mind-body dualism, and the patient provider relationship were not related to

Table 7: Patient Satisfaction with Acupuncture versus Conventional Medicine

Acupuncture	Conventional Medicine	Population	Study
91.5% condition improved		Acupuncture Users	Cassidy, 1998
81% very helpful	17% very helpful	Managed Care Members	Stewart, 2001
75% condition improved		Acupucnture Users	Gould, 2001
85% condition improved		Acupucnture Users in Germany	Guthlin, 2004

placebo effects. A positive patient-provider relationship was most highly correlated with outcome (2002).

In a prospective study of 5,000 users of acupuncture in Germany, 73% reported seeking acupuncture care because "other treatments were unsuccessful" (Guthlin, Lange, & Walach, 2004). Thirty-six per cent reported that after acupuncture treatment they felt "better" and 49% reported feeling "somewhat better" for a total of 85% reporting positive outcomes.

Seven themes emerged in a qualitative study of patient expectations of CAM therapies; relief of symptoms, a holistic approach to treatment, desire to improve quality of life, information exchange, less risk than allopathic treatments, advice on self-help, and payer coverage (Richardson, 2004).

As a result of reviewing the literature and research on acupuncture use, insight was gained on the development of a meaningful study. Many factors have been studied, but few utilized a framework or model to examine use. The Behavioral Model of Health Services use has constructs that explain the use of acupuncture and that can be compared to conventional medicine to determine similarities and differences in use of healthcare services for pain.

Research and Literature Related in Methodology

The purpose of this section is to review the literature related in methodology. Seven studies were population-based surveys using similar frameworks and statistical methodologies. Two studies were designed specifically to measure factors associated with the use of CAM; they utilized similar statistical analysis. These studies incorporated questions including attitudes and beliefs not measured in the proposed study. One of

these studies was population-based while the other was a convenience sample. The analysis was performed using multiple logistics regression.

Haetzman, Elliott, Smith, Hannaford, and Chambers (2003) conducted a follow-up mail survey of population-based survey participants conducted in England to determine use of conventional and alternative therapies for chronic pain conditions. The follow-up survey was sent to 2,422 individuals, with 1,560 completions of which, 840 (53.8%) reported experiencing chronic pain. This study was conducted using a mail survey of patients 25 years of age and older previously participating in a population-based survey in which participants agreed to further research. Chronic pain was measured as affirmative responses to one of the following questions; 1) are you currently troubled by pain or discomfort, either all the time or on and off, and 2) have you had this pain or discomfort for more than three months. Respondents identified sites of pain including back pain, neck and shoulder pain, headache, facial or dental pain, stomachache or abdominal pain, pain in the arms and legs, chest pain, or other pain. Severity of pain was measured using the Chronic Pain Grade (CPG).

Responses to the questionnaire were entered into Microsoft Access and analyzed using the SPSS statistical software. Descriptive statistics were used to describe use of the various treatments and modalities and chi square tests were performed to measure the association between the various variables. The Mantel-Haenzel test was used to analyze trends across age groups. Age was measured as groupings as opposed to a continuous variable.

Mackenzie, Taylor, Bloom, Hufford, and Johnson (2003) utilized data from the 1995 National Comparative Survey of Minority Health Care for the Commonwealth

Fund, a national probability sample of 3,789 with an over-sampling of minorities. The survey was conducted during a 25-minute telephone call conducted by Lou Harris and Associates and accommodated minorities by utilizing six languages. The survey gathered demographic information on education, income, insurance status, place of birth, and ethnicity in addition to five questions regarding CAM use. Other topics covered were source of care, relationship with physicians, access to care, utilization of care, perceived discrimination in care, health status and disabilities, mental health and well-being. Use of herbal medicine, acupuncture, chiropractors, traditional healers and home remedies in the past 12 months was measured.

The sample was representative of urban and rural areas in the mainland United States. The sampling process used a stratified random sampling of counties. Telephone numbers were randomly generated for each of the stratified sampling units. Over-sampling was obtained by interviewing cross-sections until criteria were met.

Cross tabulations were conducted using the Wald chi square to measure relationships between sociodemographic characteristics of the respondents and use of CAM modalities. Logistics regression was used to measure the significance of each variable in explaining likelihood of use. The model controlled for background variables. The Statistical Analysis System (SAS 6.12) software package was used to analyze results. Statistical significance of 0.05 was used in the study. Odds ratios with a 95% confidence ratio were used to analyze results of the logistics regression.

Waxman, Tennant, and Helliwell (1998) surveyed 1,813 adults that had completed the first part of a 1994 age stratified random sample of residents of Bradford, England Metropolitan Health District. Participants were between the ages of 25-64.

Respondents were contacted using a two-phase mail survey. In the first phase respondents were asked to indicate if they had experienced back pain for more than one day within the past 12 months. Those responding yes were asked to indicate use of health professionals for care and were sent a second questionnaire to determine characteristics of their pain, treatments, work history and benefits, health and social support, disability, plus measures of six psychosocial constructs.

Logistics regression was used to model the association between the independent variables and use of medical care. Variables were entered into the model in single steps. The age grouping variable and sex were retained in the model regardless of significance. Odds ratios with a 95% confidence interval were used to determine significance.

Feuerstein, Marcus, and Huang (2004) conducted a study using the 1987 National Medical Expenditure Survey (n= 34,459), and the 1997 (n= 32,636) National Medical Expenditure Panel Survey (MEPS), a national probability sample, to examine national trends in nonoperative care for nonspecific back pain. Data were extracted from the surveys of civilian noninstitutionalized adults. Both surveys were conducted by the Agency for Health Care Policy and Research (AHCPR) later renamed the Agency for Healthcare Research and Quality (AHRQ). The MEPS utilizes a subset of the National Health Information Survey (NHIS). Adults 18 years of age and older were interviewed in person three times throughout 1997 regarding health care utilization. They were encouraged to maintain a personal diary to facilitate memory. Medical reasons for use were coded into International Classification of Diseases (ICD) Ninth Revision categories. Healthcare service categories included outpatient visits for medical management,

physical therapy, chiropractic care, emergency room visit, X-ray, magnetic resonance imaging, laboratory tests and prescriptions.

Data were analyzed to determine rates per thousand for comparison between the two time periods. Association with age, gender, race/ethnicity, marital status, education, employment status, and insurance type, and use of service was measured. The chi square statistic was used to measure differences in rates and *t* tests were used to measure differences in the mean number of medical visits. Multivariable logistics regression was used to measure differences in access to services and multivariable linear regression was used to measure differences in number of visits. The analyses were adjusted for sociodemographic factors. Analyses were conducted using the SUDAAN software package.

Keefe, Weigh, McCarty, and Taylor (2002) used the findings of a previously conducted population-based study entitled the Visual Impairment Project. The study used structured interviews to obtain demographic information, health status, vision conditions, and use of healthcare services of 4,744 people in Australia. Chi square tests were used to compare proportions and the Mantel-Haensel test was used for linear trends. ANOVA was used to compare means and multivariable logistics regression was used to analyze the relation of factors with eye care services use, defined as seeing an ophthalmologist. Statistical analysis was performed using SAS version 6.10. A p value of 0.05 was used to determine statistical significance.

Goodwin and Andersen (2002) used data from the National Comorbidity Survey (NCS) to measure correlates of panic attacks in the community. The 1990-1992 national probability sample size was 8,098 with an 82.4% response rate. This is an

epidemiological survey to determine the prevalence of mental disorders among noninstitutionalized adults (aged 15 to 54) in the United States. Weighting for differential probabilities of selection and non-response was performed and post stratification weight was assigned to match the sample to the demographics of the population on a variety of sociodemographic factors.

Diagnoses were classified using a modified World Health Organization Composite International Diagnostic Interview, which is used to construct DSM-IV mental disorders including panic disorder. Three questions were used to measure the dependent variables – use of primary care, specialized mental health services, and use of psychotropic medication for pain disorder.

Pearson's chi square and ANOVA's were used to determine the factors associated with use. The significance level was set at 0.05. Multivariate logistics regression was then used to determine adjusted odds ratios, with a 95% confidence level. Statistical analysis was conducted to identify the predisposing, enabling, and need predictors of use of mental health services – the dependent variable. The predisposing factors were first entered into the model, and then enabling factors, followed by perceived and measured need factors.

Hargraves and Hadley (2003) investigated the effect of predisposing, enabling, and need factors on access to healthcare by minorities for the purpose of guiding policy. Data for the analysis were obtained from the 1996-1997 and 1998-1999 Community Tracking Study (CTS). This study was conducted using continental United States household surveys in 60 randomly selected, nationally representative communities. Non-elderly Hispanic, African American, and white, civilian, non-institutionalized people

were included in the study. People older than age 65 and military were excluded from the sample for a final sample size of 96,414. Estimates were weighted for non-response.

Lack of access was measured through three variables- reporting unmet needs, having no regular healthcare provider, and no physician visits in the past year. Regression-based decomposition was used to measure the differences between whites, Hispanics, and African Americans in terms of access to care in two components – differences based on observed characteristics and differences presumed to be attributed to care-seeking behavior, attitudes, or discrimination. This model uses linear ordinary least squares regression. Characteristics of the average white person were used for comparison with Hispanics and African Americans to construct a model that indicated the proportion of the difference explained by each component. The SUDAAN software was used to measure error and test statistical significance. This software used the Taylor series linearization procedure, which handles the multistage design and joint inclusion probabilities used in the survey.

Astin completed a national study using a survey mailed to a random sample of 1,500 individuals to determine factors associated with CAM therapy use including demographics, perceived benefits and risks, and health belief attitudes. The purpose of his study was to replicate the 1993 Eisenberg study and to measure sociocultural and personal factors correlated with CAM use. The survey was designed to test three additional hypotheses; patient dissatisfaction with conventional medicine, patient need for personal control and philosophical congruence, and to determine on an exploratory basis how demographics and health status related to CAM use.

The items used to determine philosophical congruence were based on an instrument developed by Ray in 1997, which identified value subcultures in the United States. The values subcultures were developed empirically using factor analysis and multidimensional scaling, which were categorized into value groupings using K-means clustering. Satisfaction with conventional medicine was measured using Likert-like responses to statements, need for control was measured using a forced choice selection of three options, philosophical congruence used a yes/no response to 23 questions, and belief in efficacy used a yes/no response to three statements. Dichotomous measures were used for 25 specific health problems to measure health problems and a Likert scale was used to measure agreement with three statements regarding health status. Demographic variables included education, sex, income race, and age. The dependent variable, acupuncture use, was measured replicating questions constructed by the Eisenberg 1993 study. It was structured as a dichotomous measure of use of a list of CAM modalities.

The survey was conducted through National Family Opinion, Inc, which maintains a panel of eligible persons who agreed in advance to participate in surveys. A random sample of 1500 was selected from the panel. Multiple logistics regression was used to determine the relevant factors using 0.05 significance as the criterion for entering the factor. Adjusted odds ratios and 95% confidence intervals were used to measure the significance of each of the independent variables selected by the model. Of those selected 1,035 people completed the questionnaire, which was a response rate of 69%. Variables predicting use included; 1) being more educated; 2) belonging to a value subculture classified as cultural creatives; 3) having experienced a transformational experience that changed one's world view; 4) having poorer overall health; 5) believing in the

importance of mind, body, and spirit; 6) reporting one of the following health conditions – anxiety, back problems, chronic pain, or urinary tract problems. (1998, p. 1549).

Jain and Astin (2001) found in their study of CAM disuse that 3.7% used acupuncture in the past year. As found in the Eisenberg study, use of acupuncture was lower than other CAM modalities. (2001, p.692). The purpose of this study was to determine why people did not use CAM services. Factor analysis yielded the following constructs for inclusion as the independent variables; perception of CAM as ineffectual, inadequate scientific evidence, lack of adequate knowledge, cost, and lack of support from conventional physicians. These constructs were measured through Likert type agreement with two to five statements for each construct. A factor analysis using principal components analysis with varimax rotation was used to determine if the questions measured the hypotheses.

Rate of use for specific CAM therapies in the previous 12 months was measured using a yes/no response. In addition to the attitudinal data, demographic and health status information were measured including, date of birth, gender, race/ethnicity, family income, degree level, state of residence, and number of physician visits as a measure of health status.

This study used a two-page survey consisting of 43 items mailed to a random selection of 1,680 Stanford University Alumni. The sample was selected using an alphabetical alumni database and selecting every 76^{th} name. The response rate was 35.8% and they received 601 completed surveys. It was mailed once with no follow-up. Bivariate correlations were computed for the hypothesized predictors and CAM disuse. Those variables meeting a threshold of ($p < 0.05$) significance were utilized as

independent variables in a multiple logistic regression model to determine predictors of CAM use. Two blocks were used, demographic characteristics and all other factors. A separate regression analysis was performed on individual CAM modalities as well. Frequency of use was calculated for the CAM modalities. Predictors of acupuncture disuse were belief that it was ineffective or inferior to conventional medicine and the inability to locate a provider.

This section described studies of acupuncture, complementary and alternative medicine or conventional medicine that utilized a survey methodology, sampling, population or instrument designed to determine factors associated with use of acupuncture. Included were studies that measured constructs of the Behavioral Model of Healthcare Utilization.

Chapter Summary

As a result of the literature review, insight was gained by previously conducted research on the factors associated with pain conditions, and conventional, complementary and alternative medicine, and acupuncture use.

Other studies measuring the constructs of the Behavioral Model of Health Services Use served as models for measuring the factors associated with use of acupuncture and conventional medicine, particularly for pain. Population-based studies served as methodological models.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purpose of this chapter is to describe the population, source of data, and statistical design and analysis that were used for the study. Data were obtained from a national probability sample of the United States population to determine the relationship among predisposing, enabling, and need factors associated and use of acupuncture as compared to use of other CAM and conventional medicine.

Population

The data used for this study are from the 2002 NHIS Family Core Component, Sample Adult Component, and Alternative Medicine supplement. The NHIS is an ongoing data collection system of the Center for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). The sample is nationally representative of the civilian noninstitutionalized population in the United States. A complex sample design was used involving stratification, clustering, and multistage sampling. This study is limited to adults 18 years of age and older. The total sample size of the entire survey was 93,386 persons from 36,161 households with a response rate of 89.6%. The 2002 Adult Sample Core component primarily used in this study consisted of 31,044 persons.

Instrumentation

The NHIS has been conducted continuously since 1957. The instrument has been revised periodically with the latest major revision occurring in 1997. The NHIS consists of the Basic or Core Survey with three components, the Family Core, the sample Adult Core, and the sample Child Core. The data used in this study were obtained primarily

from the Sample Adult Core. The Sample Adult File included the following sections; Adult Condition, Health Status and Limitations of Activity, Health Behaviors, Health Care Access and Utilization, Demographics, AIDS, and Disability.

Also included in 2002 were additional questions from the Alternative Health/Complementary and Alternative Medicine Supplement. The questions included in this survey were constructed in cooperation with the National Center for Complementary and Alternative Medicine (NCCAM), a division of the National Institutes of Health (NIH) in fulfillment of their 2000-2005 Strategic Plan.

The U.S. Census Bureau was contracted to collect the data used in this study. Data were collected through structured, personal interviews. Interviewers received thorough training and were supervised by Civil Service employees whose primary responsibility is the NHIS. Computer-assisted personal interviewing (CAPI) was used to enter results directly into a computer at the time of interviewing. The data are in the public domain and special permission is not required for use.

A strength of using the NHIS is that it is a nationally representative sample and of sufficient size to study subgroups. A limitation to the collection methodology is that the items were self-reported. Another limitation is that though the sample size of the survey overall is large, the use of acupuncture is small limiting subgroups that can be studied. A final limitation is that satisfaction rates for conventional medicine were not reported in the survey.

Variables

Items were selected from the survey responses to measure the predisposing, enabling, need and use factors for the study. Factors were coded using the NHIS coding unless recoding was indicated. See Figure 1.

Pain Condition

In the Adult Core survey of 31,044 persons, respondents were asked if "During the past 3 to 12 months (depending on condition), have you had…?" A list of disease conditions (Appendix A) was given based on the International Disease Classifications – 9th Edition (ICD-9) and responses recorded as "Yes", "No", "Refused", or "Don't Know". An affirmative response to at least one of the items was used to categorize participants as having a pain condition. The size of the pain condition group was 18,103, but only 7,371 used one of the three types of treatment for pain.

Dependent Variables – Utilization of Acupuncture, Other CAM, or Conventional Medicine

The dependent variables in the study were utilization of acupuncture, other CAM, or conventional medicine within the past year. Pain condition patients answering negatively to these questions, refusing to answer the question, or stating that they "didn't know" were not included in the study. This included 12,941 respondents.

One of the difficulties in establishing the type of service groups was that many participants used various combinations of the treatments. The acupuncture group was configured first because it was the focus of the study and was the smallest group. Utilization of acupuncture was determined by an affirmative response to the question

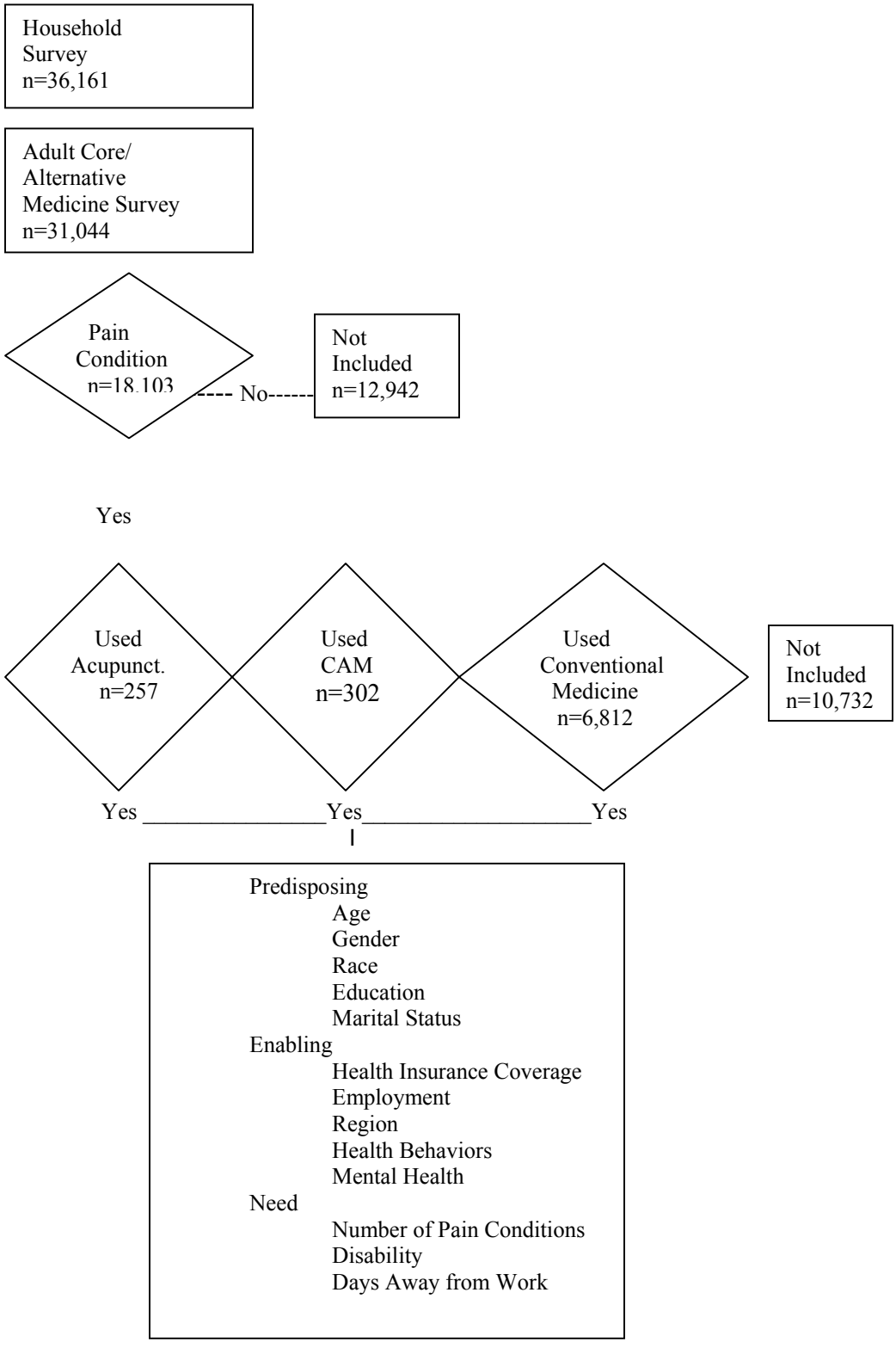

Figure 1: Research Design

"During the past 12 months, did you see a practitioner for acupuncture?" The sample size for this group was 257 respondents, which was 20.4% of the final sample used.

Utilization of other CAM was determined by first extracting those that had ever used acupuncture. The Other CAM group consisted of those that had used biofeedback, chiropractics, massage therapy, homeopathy or naturopathy within the past year. The remaining CAM therapies were not included because they either did not use a practitioner, were not often used for pain, were too small in sample size, or too large in sample size (such as prayer). The other CAM group sample size was 302 respondents, 24% of the final sample used.

Utilization of conventional medicine included those that had seen a physician, nurse practitioner or physician's assistant in the past 12 months and had not seen an acupuncturist or other CAM practitioner. This type of service group had a sample size of 6,812. A 10% random selection of this group was conducted using SPSS so that the type of service groups was more comparable in size. The final sample size for the conventional medicine group was 699, 55.6% of the final sample used. The 10% random sample was not significantly different from the original sample in terms of demographic characteristics (gender p=.682, race p=.491, age p=.829, marital status p=.629, region p=.056, employment p=.677).

Independent Variables – Predisposing, Enabling and Need Factors

The independent variables in the study included predisposing, enabling and need factors. Predisposing factors included age, gender, race, education level, and marital status. Enabling factors included employment, health insurance coverage, region of the

country, health behaviors, and mental health status. Need factors included the number of disease conditions, disability status, and days away from work.

Analysis of the Data

This study utilized 31,044 completed interviews of adults aged 18 year and older. Interviews were self-reported. The final response rate for this survey was 74.3%, accounting for those unwilling to participate and incomplete surveys. Descriptive statistics were performed for each of the factors. The independent variables studied were examined for correlation with the dependent variable using Pearson correlations and tested for significance using Chi Square for categorical variables or *t*-tests for continuous variables. The factors were then entered individually stepwise into a multivariate logistics regression model to determine the likelihood of each variable explaining use of acupuncture.

First, predisposing variables age, gender, race, education level, marital status, and employment status were entered into the model. Next, enabling variables employment status, health insurance coverage, health behaviors, mental health status, and region of the country were entered. In the final step need factors number of pain conditions, disability, and days away from work were entered into the model. Odds ratios were used to determine the predisposing, enabling, and needs factors predictive of use with a 95% confidence interval. The p statistic was used to determine significance. Descriptive statistics were used to describe satisfaction with use of acupuncture and the other factors associated with use.

The sample sizes were sufficient to detect meaningful differences in use of acupuncture. The statistical significance level was predetermined at 0.05%. All analyses

conducted in this study were generated using Statistical Software for the Social Sciences (SPSS) software package version 12.0.

IRB Approval and Confidentiality

The Form A Exempt Review of the University of Tennessee Institutional Review Board (IRB) for human subjects was required for this study in addition to review by the Health and Safety Science Program. Category 4 approval, research involving the study of existing data, was the basis for the exemption. The data are publicly available. The investigator recorded the information in such a manner that participants could not be identified, directly or through identifiers linked to the participant.

The IRB application contained the project identification, objectives, description and source of participants, methods and procedures and specific risks and related protective measures. The benefits of the study were outlined, the methods for obtaining consent from the participants, and qualifications of the investigators. No special facilities or equipment were required for the study. The research described was found to be in compliance with 45 CFR 46.101 (b) and presented participants with no more than minimal risk as defined by applicable regulations.

Chapter Summary

This chapter described the population, source of data, and statistical design and analysis that were in the study. Data from a national probability sample of the United States population were used to determine the relationship among predisposing, enabling, and need factors associated and use of acupuncture as compared to use of other CAM and conventional medicine. Correlations and multiple logistics regression were used to determine the significant findings presented in the following chapter.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF THE DATA

Introduction

The purpose of this chapter was to present the statistical analysis used to determine use of acupuncture, other CAM, and conventional medicine for pain. The independent variables studied were categorized as predisposing, enabling or need factors utilizing the framework of the Behavioral Model of Health Services Use. The factors were then analyzed to determine the predictability of the model.

Descriptive Statistics

Those respondents reporting the following pain conditions were included in the study: dental pain in the past 12 months, joint pain in the past 30 days, arthritis, gout or lupus, neck pain, lower back pain, jaw pain, severe sprains in the past 12 months, or headaches and migraines in the past 30 days. See Table 8. Of these 40.8% sought professional help from one of the three types of treatment. Participants reported multiple types of pain with the average having 2.3 conditions. The sample was comprised of 257 acupuncture users (20.4%), 302 other CAM users (24%), and 699 conventional medicine users that did not use acupuncture or CAM (55.6%). See Table 9. The acupuncture users may have used other CAM and conventional medicine and the other CAM users may have used conventional medicine but not acupuncture.

Predisposing Factors

The average age of the sample population was 50.67 years. The sample population's age was measured in years and averaged for each group. Acupuncture users

Table 8: Distribution of Pain Conditions Studied

Type of Pain Condition	Yes	
	Count	%
Had severe sprains, past 12 months	194	15.4%
Had dental pain, past 12 months	281	22.3%
Had pain/aching at joints, past 30 days	656	52.2%
Ever told you had arthritis, gout, lupus	511	40.7%
Had neck pain, past 3 months	383	30.5%
Had low back pain, past 3 months	608	48.4%
Had pain in jaw/front of ear, past 3 months	125	9.9%
Had severe headache/migraine, past 3 months	328	26.1%

Table 9: Frequency of Type of Service

	Frequency	Percent
Acupuncture	257	20.4
Other CAM	302	24.0
Conventional	699	55.6
Total	1258	100.0

were the youngest at 46.54, other CAM users averaged 50.28, and conventional medicine users were the oldest at 52.37. The female group (67.1%) was much larger than males (32.9%). See Table 10.

Whites represented 80.9% of the sample, Black/African Americans 10.9%, American Indians 0.6%, Asians 3.3%, other races 3.2%, and multiple races 1.2%. Due to the small size of the American Indian group and the ambiguity of the "other" and "multiple race" groups, analysis was restricted to White, Black/African Americans, and Asian groups as indicated in Table 11. Half of the respondents were married, 11.9% widowed, 14.8% divorced, 3.4% separated, 16.1 % never married, and 3.7% living with a partner. See Table 12.

Enabling Factors

The respondents were more likely to have insurance (88.8%) than not (11.2%). See Table 13. Of those who had ever used acupuncture, 37.5% indicated that their health insurance covered their care. See Table 14. Most of the respondents (96.4%) had worked at some time in their lives, but only 57.6% were currently working. The remaining were either retired (19.5%) or had previously worked but currently unemployed (19.0%). Only 3.6% had never worked. See Table 15.

The South represented the region with the most respondents (34.0%). The West region housed the second largest group with 26.9%, and the Northeast and Midwest were similar in size with 18.8% and 20.2% respectively. See Table 16.

Almost two-thirds (63.1%) of the respondents were overweight. Those 10% or more below desirable weight were categorized as "underweight" (13.8%). Those between

Table 10: Gender of Respondents

	Study Percent	2002 NHIS	2000 US Percent
Male	32.9	43.5	49.1
Female	67.1	56.2	50.9

Table 11: Race of Respondents

	Study Percent	2002 NHIS	2000 US Percent
White	85.1	87.7	82.5
Black/African American	11.5	14.3	14.3
Asian	3.4	3.0	4.0

Table 12: Marital Status of Respondents

	Study Percent	2000 US Percent
Married	50.0	54.4
Widowed, Divorced, or Separated	30.1	18.5
Never married	19.8	27.1

Table 13: Respondents with Health Insurance

	Frequency	Percent
No health insurance	140	11.2
Health Insurance	1116	88.8
Total	1256	100.0

Table 14: Percentage of Acupuncture Patients Covered by Insurance

	Frequency	Percent
Yes	84	37.5
No	140	62.5
Total	224	100.0

Table 15: Employment Status of Respondents

	Percent
Currently working	57.8
Retired	19.5
Not currently working but has worked previously	19.1
Has never worked	3.6
Total	100.0

Table 16: Region of Residence of Respondents

	Study Percent	2002 NHIS Percent
Northeast	18.8	18.3
Midwest	20.2	23.0
South	34.0	37.0
West	26.9	21.7

9.9% below and 9.9% above desirable weight (31.4%) were categorized as “normal”. Those between 10% and 19.9% above desirable weight (16.4%) were categorized as “overweight”, and those 20% and greater above desirable weight (34.7%) were categorized as “obese”. See Table 17.

Almost half never exercised (45.4%), while 41.3% were moderate exercisers (at least three times a week, but less than five). See Table 18. The population studied had few to no mental health issues (84.7%). Only 15.3% reported numerous mental health issues. See Table 19.

Need Factors

One quarter of the population reported functional limitations. See Table 20. Almost half of those that worked reported no days away from work (47.5%). Of those that worked 35.7% were away from work for one week, 7.7% for one to two weeks, and 9.0% more than two weeks. See Table 21. Though presence of only one pain condition qualified respondents for inclusion in the study 64.5% had two or more pain conditions and 22.9% had at least four. See Table 22.

Statistical Analysis of the Research Questions

The non-parametric statistical measure Chi-square was used to test the significance of the differences in observed versus expected frequency counts for each of the categorical factors among the three groups. An analysis of variance (ANOVA) was run for ordinal data to determine significant differences. The Post hoc multiple comparison test Tukey’s honest significance difference (HSD), was used to determine which group means were significantly different than other groups. (Gay & Airasian, 2003). Crosstabulations of the factors and the three types of services were run and

Table 17: Body Weight Categories of Respondents

		Frequency	Percent
Underweight	10% or more below desirable weight	173	13.8
Normal	9% below desirable weight to 9.9% above	394	31.4
Overweight	10-19.9% above desirable body weight	206	16.4
Obese	20+% above desirable body weight	411	32.7
	Unknown	74	5.9
	Total	1258	100.0

Table 18: Exercise Levels of Respondents

	Frequency	Percent
Never	571	45.4
Light	168	13.4
Moderate	519	41.3
Total	1258	100.0

Table 19: Mental Health Status of Respondents

	Frequency	Percent
Poor Mental Health	191	15.3
Good Mental Health	1054	84.7
Total	1245	100.0

Table 20: Functional Limitations of Respondents

	Frequency	Percent
Limited in any way	326	25.9
Not limited in any way	930	73.9
Unknown if limited	2	.2
Total	1258	100.0

Table 21: Days Away from Work

	Frequency	Percent
None	387	47.5
1 week	291	35.7
1 to 2 weeks	63	7.7
2-3 weeks	73	9.0
Total	814	100.0

Table 22: Number of Pain Conditions of Respondents

	Frequency	Percent
1	447	35.5
2	320	25.4
3	203	16.1
4 or more	288	22.9
Total	1258	100.0

Adjusted Residual (AR) differences examined to identify which type of service were different for the factors that were significant. Adjusted residuals of -2.0 or less and 2.0 and greater indicated that the value differed markedly from the expected value. (SPSS, 1999).

Multiple logistics regression was used to construct a model predicting use of acupuncture as compared to conventional medicine. The predisposing, enabling, and need factors were entered into the model in three steps to determine which were significant in predicting use of acupuncture compared to conventional medicine. Values exceeding 0.05 were considered significant for all statistical tests.

Research Question #1: Is there a difference in predisposing characteristics e.g., (i) age, (ii) gender, (iii) race, (iv) education level, and (v) marital status, among acupuncture, other CAM, and conventional medicine users?

Age

An analysis of variance indicated that the means of the three groups were significantly different ($p<.001$). Homogenous subsets analyzed using Tukey's HSD indicated that acupuncture users were significantly younger than other CAM and conventional medicine users. The difference in average age was even greater between acupuncture and conventional. CAM and conventional medicine users were not significantly different. See Table 23.

Gender

Crosstabulations were run to examine the differences in frequency between males and females among the three groups. Among males, 23% used acupuncture, 19.6% used

Table 23: Average Age of Respondents by Type of Service

Type of Service	N	Average Age Subset	
		1	2
Acupuncture	257	46.54	
Other CAM	302		50.28
Conventional	699		52.37

$F(2, 1255) = 11.332$, $p<.001$

CAM and 56.8% used conventional medicine. This compares respectively to 18.8%, 26.2%, and 55.9% for females. Chi-square tests indicated that there was a significant difference ($p=.015$) between males and females. Analyzing the adjusted residuals indicated that males were more likely to use acupuncture, and females were more likely to use CAM. There was no significant difference between males and females for conventional medicine. See Table 24.

Race

Crosstabulations were run to determine the differences in type of service among racial type. Chi-square analysis indicated a significant difference ($p<.001$) among groups. Adjusted residuals indicated that Whites were more likely to use other CAM and less likely to use conventional medicine. Black/African Americans were less likely to use other CAM and more likely to use conventional medicine. Asians were more likely to use acupuncture and less likely to use conventional medicine. See Table 25.

Table 24: Distribution of Gender by Type of Service

		Type of Service			Total
		Acupuncture	Other CAM	Conventional	
Male	Count	98	81	235	414
	% within Sex	23.7%	19.6%	56.8%	100.0%
	Adjusted Residual	2.0	-2.6	.6	
Female	Count	159	221	464	844
	% within Sex	18.8%	26.2%	55.0%	100.0%
	Adjusted Residual	-2.0	2.6	-.6	
Total	Count	257	302	699	1258
	% within Sex	20.4%	24.0%	55.6%	100.0%

Pearson Chi-square = 8.405, df = 2, p = .015

Table 25: Distribution of Race by Type of Service

			Type of Service			Total
			Acupuncture	Other CAM	Conventional	
	White only	Count	204	267	547	1018
		% within Race	20.0%	26.2%	53.7%	100%
		Adjusted Residual	-.1	2.8	-2.4	
	Black/African American only	Count	20	20	97	137
		% within Race	14.6%	14.6%	70.8%	100%
		Adjusted Residual	-1.7	-2.9	3.9	
	Asian only	Count	16	9	16	41
		% within Race	39.0%	22.0%	39.0%	100%
		Adjusted Residual	3.1	-.4	-2.1	
Total		Count	240	296	660	1196
		% within Race	20.1%	24.7%	55.2%	100%

Pearson Chi-square = 24.502, df=4, p <.001

Education Level

Those using other CAM (16.09) had the highest average number of years of education, with acupuncture (15.58) second and conventional medicine third (14.55). An analysis of variance indicated a significant difference (p=.005) among groups. Homogenous age group subsets were analyzed using Tukey's HSD. Other CAM and acupuncture users were not significantly different. Acupuncture and conventional medicine users were also not significantly different. However, other CAM users were significantly more educated than conventional medicine users. See Table 26.

Marital Status

Chi-square analysis indicated a significant difference among types of service groups and marital status. Analysis of adjusted residuals indicated that those married and widowed were less likely to use acupuncture, while never married were more likely to use acupuncture. Widowed were also less likely to use other CAM but divorced were more likely to use other CAM. Divorced and living with a partner were less likely to use conventional medicine. See Table 27.

Table 26: Years of Education by Type of Service

Tukey HSD

Type of Service	N	Mean Years of Education Subsets	
		1	2
Conventional	699	14.55	
Acupuncture	257	15.58	15.58
Other CAM	302		16.09
Sig.		.142	.629

Significance = 564.62, df = 2, F = 5.42, p = .005

Table 27: Marital Status by Type of Service

			Type of Service			Total
			Acupuncture	Other CAM	Conventional	
Marital Status	Married	Count	127	146	356	629
		% within marital	20.2%	23.2%	56.6%	100%
		Adjusted Residual	-.2	-.7	.8	
	Widowed	Count	20	18	112	150
		% within marital	13.3%	12.0%	74.7%	100%
		Adjusted Residual	-2.3	-3.7	5.0	
	Divorced	Count	31	70	85	186
		% within marital	16.7%	37.6%	45.7%	100%
		Adjusted Residual	-1.4	4.7	-2.9	
	Separated	Count	10	9	24	43
		% within marital	23.3%	20.9%	55.8%	100%
		Adjusted Residual	.5	-.5	.0	
	Never married	Count	55	46	102	203
		% within marital	27.1%	22.7%	50.2%	100%
		Adjusted Residual	2.6	-.5	-1.7	
	Living with partner	Count	14	13	19	46
		% within marital	30.4%	28.3%	41.3%	100%
		Adjusted Residual	1.7	.7	-2.0	
Total		Count	257	302	698	1257
		% within marital	20.4%	24.0%	55.5%	100%

Pearson Chi-Square = 51.999, df = 10, $p < .001$

Research Question #2: Is there a difference in enabling characteristics: e.g., (i) health insurance coverage, (ii) employment, (iii) different regions of the country, and (iv) health behaviors among acupuncture, other CAM, and conventional medicine users?

Health Insurance Coverage

Chi-square tests indicated that there was not a significant difference among the type of service groups and having insurance (p=.082).

Employment Status

There is a significant difference among type of service and employment status (p<.001). Acupuncture users were less likely to be retired (AR= 3.7) and more likely to not be currently working but previously employed (AR=2.3). Other CAM users were more likely to be working currently (AR=2.5), less likely to be retired (AR=-2.0), and less likely to have never worked (AR=-2.1). Conventional medicine users were less likely to be currently working (AR=-3.5), more likely to be retired (AR=4.8), and more likely to have never worked (AR=3.1). See Table 28.

Regions of the Country

The region of respondent residence was significantly different among service type as measured by Chi-square analysis (p<.001). Adjusted residual analysis showed that acupuncture users were more likely to reside in the Northeastern and Western regions (AR2.6 each) and less likely to live in the Southern region (AR=-3.5). Other CAM users were more likely to live in the Western region (AR=3.5) and less likely to live in the Southern region (AR=-3.9). Conventional medicine users were much more likely to

Table 28: Employment Status by Type of Service

Employment status		Type of Service			Total
		Acupuncture	Other CAM	Conventional	
Currently working	Count	161	193	371	725
	% within Employment status	22.2%	26.6%	51.2%	100.0%
	Adjusted Residual	1.8	2.5	-3.5	
Retired	Count	29	47	169	245
	% within Employment status	11.8%	19.2%	69.0%	100.0%
	Adjusted Residual	-3.7	-2.0	4.8	
Not currently working but worked previously	Count	62	57	120	239
	% within Employment status	25.9%	23.8%	50.2%	100.0%
	Adjusted Residual	2.3	-.1	-1.8	
Has never worked	Count	5	5	35	45
	% within Employment status	11.1%	11.1%	77.8%	100.0%
	Adjusted Residual	-1.6	-2.1	3.1	
Total	Count	257	302	695	1254
	% within Employment status	20.5%	24.1%	55.4%	100.0%

Pearson Chi-square = 38.639, df = 6, $p < .001$

reside in the Southern region (AR=6.1) and much less likely to reside in the Western region (AR=15.2). See Table 29.

Health Behaviors

Several health behaviors were measured to determine if there were differences among type of service. An overall health behavior index could not be created because the scale of measurement differed for weight, smoking and exercise. The individual health behavior indicators were selected for analysis – weight, smoking behavior, and level of exercise.

Weight

Four categories of weight were created from the levels measured in the instrument. There was no significant difference among the three types of service for weight (p=.093).

Smoking

Smoking behaviors differed slightly among types of service (p=.027). Former smokers were more likely to use other CAM (AR=2.8) and less likely to use conventional medicine (AR=-3.0). All other groups were not significantly different. See Table 30.

Exercise Level

Exercise frequencies were collapsed to four categories based on the number of times respondents reported exercising per week. Those who never exercised were categorized as “Never” (45.4%). The “Light” category averaged exercising more than never but twice a week or less (13.4%). Those that averaged exercising at least three times a week were considered “Moderate” (41.3%). There were no respondents that exercised at least 5 times a week (“Heavy”). See Table 31.

Table 29: Region of Residence by Type of Service

			Type of Service			Total
			Acupuncture	Other CAM	Conventional	
Region	Northeast	Count	63	51	123	237
		% within Region	26.6%	21.5%	51.9%	100.0%
		Adjusted Residual	2.6	-1.0	-1.3	
	Midwest	Count	44	71	139	254
		% within Region	17.3%	28.0%	54.7%	100.0%
		Adjusted Residual	-1.4	1.6	-.3	
	South	Count	64	75	289	428
		% within Region	15.0%	17.5%	67.5%	100.0%
		Adjusted Residual	-3.5	-3.9	6.1	
	West	Count	86	105	148	339
		% within Region	25.4%	31.0%	43.7%	100.0%
		Adjusted Residual	2.6	3.5	-5.2	
Total		Count	257	302	699	1258
		% within Region	20.4%	24.0%	55.6%	100.0%

Pearson Chi-square = 52.800, df = 6, $p < .001$

Table 30: Smoking by Type of Service

			Type of Service			Total
			Acupuncture	Other CAM	Conventional	
Smoking Status:	Current	Count	50	48	139	237
		% within Smoking Status:	21.1%	20.3%	58.6%	100.0 %
		Adjusted Residual	.3	-1.5	1.1	
	Former	Count	83	111	187	381
		% within Smoking Status:	21.8%	29.1%	49.1%	100.0 %
		Adjusted Residual	.8	2.8	-3.0	
	Never	Count	124	143	371	638
		% within Smoking Status:	19.4%	22.4%	58.2%	100.0 %
		Adjusted Residual	-.9	-1.4	1.9	
Total		Count	257	302	697	1256
		% within Smoking Status:	20.5%	24.0%	55.5%	100.0 %

Pearson Chi-square = 10.987, df = 4, p = .027

Table 31: Levels of Exercise by Type of Service

			Type of Service			
			Acupuncture	Other CAM	Conventional	
Exercise	Never	Count	92	98	381	571
		% within Exercise	16.1%	17.2%	66.7%	100.0 %
		Adjusted Residual	-3.5	-5.2	7.3	
	Light	Count	37	58	73	168
		% within Exercise	22.0%	34.5%	43.5%	100.0 %
		Adjusted Residual	.6	3.4	-3.4	
	Moderate	Count	128	146	245	519
		% within Exercise	24.7%	28.1%	47.2%	100.0 %
		Adjusted Residual	3.1	2.9	-5.0	
Total		Count	257	302	699	1258
		% within Exercise	20.4%	24.0%	55.6%	100.0 %

Pearson Chi-square = 56.291, df = 4, $p < .001$

There were significant differences among type of service and exercise level as measured by Chi-square ($p<.001$). Acupuncture users were more likely to exercise at a moderate level (AR=3.5) and less likely to never exercise (AR=-3.1). Other CAM users were least likely to never exercise (AR=-5.2) and more likely to exercise at the light (AR=3.4) and moderate levels (AR=2.9). Conventional medicine users were much more likely to never exercise (AR=7.3) and less likely to exercise at a light (AR=-3.4) or moderate level (AR=-5.0).

Research Question #3: Is there a difference between the mental health status of acupuncture, other CAM, and conventional medicine users?

An index was created for mental health status by averaging responses to six mental health indicators. Respondents were asked the frequency with which they felt so sad that nothing cheered them up, nervous, restless/fidgety, hopeless, that everything was an effort, and worthless. There were significant differences among type of service as measure by Chi- square ($p<.001$). Those using acupuncture (AR=2.1) and Other CAM (AR=2.2) were more likely to have numerous mental health issues. Conventional medicine users were significantly less likely to have mental health issues (AR=14.1). See Table 32.

Research Question #4: Is there a difference in need factors e.g., (i) number of pain conditions, (ii) functional limitations, and (iii) days away from work among acupuncture, other CAM, and conventional medicine users?

Need factors were measured by the number of pain conditions reported by respondents, the presence of functional limitations, and the days missed from work due to illness or injury.

Table 32: Mental Health by Type of Service

			Type of Service			
			Acupuncture	Other CAM	Conventional	Total
Mental Health	Numerous Mental Health Issues	Count	53	58	80	191
		% within Mental Health	27.7%	30.4%	41.9%	100%
		Adjusted Residual	2.7	2.2	-4.1	
	Few to No Mental Health Issues	Count	203	242	609	1054
		% within Mental Health	19.3%	23.0%	57.8%	100%
		Adjusted Residual	-2.7	-2.2	4.1	
Total		Count	256	300	689	1245
		% within Mental Health	20.6%	24.1%	55.3%	100%

Pearson Chi-square = 16.730, df = 2, $p < .001$

Number of Pain Conditions

There was a significant difference in the number of pain conditions within type of service as measured by Chi-square ($p<.001$). Those using acupuncture (AR=3.0) and other CAM (AR=5.0) were more likely to have four or more pain conditions unlike those using conventional medicine (AR=-6.8). Those using conventional medicine were much more likely to report just one pain condition (AR=7.2). See Table 33.

Differences in the type of pain condition were significant for each type of service. Respondents using acupuncture were more likely to report neck pain (AR=5.9), jaw/front of ear pain (AR=4.6), back pain (AR=4.2), and headaches and migraines (AR=4.0) and less likely to report arthritis, lupus and gout (AR=-3.1). Those using other CAM were more likely to report neck pain (AR=5.4), joint pain (AR=3.9), back pain (AR=3.4), and dental pain (AR=2.1). Users of conventional medicine were less likely to report joint pain (AR-2.3), dental pain (AR=-2.7), headaches and migraines (AR=-4.8), back pain (AR=-6.4), and neck pain (AR=-9.4). See Appendix B, Tables B1-B7.

Functional Limitations

There was a significant difference in report of functional limitation among the type of service as measured by Chi-square ($p=.001$). Those using other CAM were more likely to report functional limitations (AR=2.8) while those using conventional medicine were less likely (AR=-3.8). There was no significant difference in those using acupuncture. See Table 34.

Days Away from Work

There was a significant difference in days away from work among type of service as measured by Chi-square ($p<.001$). Those using acupuncture (AR=2.6) and other CAM

Table 33: Number of Conditions by Type of Service

			Type of Service			
			Acupuncture	Other CAM	Conventional	Total
Number of Conditions	1	Count	71	67	309	447
		% within Number of Conditions	15.9%	15.0%	69.1%	100.0%
		Adjusted Residual	-3.0	-5.6	7.2	
	2	Count	57	78	185	320
		% within Number of Conditions	17.8%	24.4%	57.8%	100.0%
		Adjusted Residual	-1.3	.2	.9	
	3	Count	52	56	95	203
		% within Number of Conditions	25.6%	27.6%	46.8%	100.0%
		Adjusted Residual	2.0	1.3	-2.7	
	4 or more	Count	77	101	110	288
		% within Number of Conditions	26.7%	35.1%	38.2%	100.0%
		Adjusted Residual	3.0	5.0	-6.8	
Total		Count	257	302	699	1258
		% within Number of Conditions	20.4%	24.0%	55.6%	100.0%
		Average	2.52	2.63	2.00	

Pearson Chi-square = 78.336, df = 5, $p < .001$

Table 34: Functional Limitations by Type of Service

			Type of Service			Total
			Acupuncture	Other CAM	Conventional	
Functional limitations	Limited	Count	138	169	310	617
		% within Any functional limitation, all conds	22.4%	27.4%	50.2%	100%
		Adjusted Residual	1.7	2.8	-3.8	
	Not limited	Count	118	132	389	639
		% within Any functional limitation, all conds	18.5%	20.7%	60.9%	100%
		Adjusted Residual	-1.7	-2.8	3.8	
Total		Count	256	301	699	1256
		% within Any functional limitation, all conds	20.4%	24.0%	55.7%	100%

Pearson Chi-square = 14.658, df = 2, p = .001

(AR=2.3) were more likely to report over two weeks away from work per year and less likely to report no days away from work. Those using conventional medicine were more likely to report no days away from work (AR=2.0) and less likely to report 11 or more days (AR=-4.2). See Table 35. A summary chart was compiled to indicate the similarities and differences for the factors among the types of service. See Appendix C.

Research Question #5: How satisfied are patients with acupuncture care?

Respondents were asked to mark which conditions prompted use of acupuncture. Conditions were listed alphabetically. If they marked more than three they were asked to indicate which three were the most bothersome. They were then asked how much acupuncture helped for each of the three conditions. Responses included "a great deal" (4), "some" (3), "only a little" (2), or "not at all" (1). Averaged responses could range from 4.0 to 1.0, with 4.0 representing the most satisfied. The level of satisfaction for acupuncture increased as the number of conditions treated increased. See Table 36. Satisfaction with massage therapy and chiropractics was slightly higher for the first and second condition, but comparable for the third condition.

When asked the degree of importance of acupuncture treatment for maintaining their health and well-being, 63% reported very or somewhat helpful. See Table 37. Conventional medicine satisfaction was not measured in the survey however, almost half (47.4%) of acupuncture users reported that the reason they used acupuncture was that conventional medicine was not helpful. See Table 38. Only 10.2% reported using acupuncture because conventional treatments were too expensive. See Table 39. A little over half (53.5%) used conventional medicine in addition to acupuncture. See Table 40.

Table 35: Days Away from Work by Type of Service

			Type of Service			Total
			Acupuncture	Other CAM	Conventional	
Sick days	None	Count	89	86	212	387
		% within sick days	23.0%	22.2%	54.8%	100.0 %
		Adjusted Residual	-.2	-2.1	2.0	
	1-5 days	Count	57	75	159	291
		% within sickdays	19.6%	25.8%	54.6%	100.0 %
		Adjusted Residual	-1.9	.1	1.5	
	6-10 days	Count	18	20	25	63
		% within sickdays	28.6%	31.7%	39.7%	100.0 %
		Adjusted Residual	1.0	1.2	-1.9	
	11 or more days	Count	26	27	20	73
		% within sickdays	35.6%	37.0%	27.4%	100.0 %
		Adjusted Residual	2.6	2.3	-4.2	
Total		Count	190	208	416	814
		% within sickdays	23.3%	25.6%	51.1%	100.0 %

Pearson Chi-square = 24.964, df = 6, $p < .001$

Table 36: Mean Satisfaction Score with Using Acupuncture, Massage and Chiropractics

	Acupuncture	Massage	Chiropractics
Degree of help for first condition	2.95	3.37	3.33
Degree of help for second condition	3.25	3.48	3.62
Degree of help for third condition	3.61	3.63	3.57

Minimum=1, Maximum=4

Table 37: Importance of Acupuncture in Maintaining Health

	Frequency	Percent
Very important	105	40.9
Somewhat important	57	22.2
Slightly important	40	15.6
Not at all important	48	18.7
Refused	1	.4
Not ascertained	2	.8
Don't know	4	1.6
Total	257	100.0

Table 38: Reason for Using Acupuncture

	Frequency	Percent
Conventional not helpful	105	47.5
Did not state this was a reason for use	116	52.5
Total	221	100.0

Table 39: Acupuncture Patient's Belief that Conventional Treatments Were too Expensive

	Frequency	Percent
Yes	23	10.2
No	198	87.6
Total	226	100.0

Table 40: Was Acupuncture Used with Conventional Medicine?

	Frequency	Percent
Yes	121	53.5
No	99	43.8
Refused	1	.4
Not ascertained	2	.9
Don't know	3	1.3
Total	226	100.0

Only 26.5% reported that a conventional medicine practitioner suggested they use acupuncture for their condition. See Table 41.

Research Question #6: What are the predictors of acupuncture utilization?

Multiple logistic regression was used to determine which factors were significant in predicting use of acupuncture versus conventional medicine. Within each categorical factor a reference group was selected. The following categories were selected as the reference groups, male gender, white race, being married, having insurance, being employed, living in the Northeast, not smoking, not exercising, being normal weight, having none to few mental health conditions, having no functional limitations, and no days away from work. The factors were entered in three steps according to whether they were predisposing, enabling, or need.

The first step indicated acupuncture use decreased with age (p=.007). Asians were three times more likely to use acupuncture (p=.003). Black/African Americans were half as likely to use acupuncture (p=.049) as non blacks. As years of education increased so did use of acupuncture (p=.036).

In the second step, enabling factors were added to the predisposing variables in the regression model. This resulted in the factors age and being Black/African American losing their significance. Asians were still almost three times as likely to use acupuncture (p=.014) and use still increased with educational attainment (p=.038). Those residing in the South were half as likely to use acupuncture (p=.002). Those who exercised were more likely to use acupuncture (p=.003), and those with no or few mental health conditions were half as likely to use acupuncture (p=.001). In the third step, need factors were added to the model. Increased age again became a significant predictor of

Table 41: Was Patient Referred to Acupuncture by a Conventional Provider?

	Frequency	Percent
Yes	60	26.5
No	162	71.7
Refused	1	.4
Not ascertained	2	.9
Don't know	1	.4
Total	226	100.0

acupuncture disuse (p=.011). Asians were only one and one-half as likely to use acupuncture (p=.008). Those more educated were more likely to use acupuncture (p=.024). Residing in the South (p=.005) still predicted disuse and exercising predicted greater likelihood of use (p=.001), but mental health status did not remain a factor. Those with a greater number of pain conditions were one and one-half times as likely to use acupuncture (p<.001). Those with functional limitations were more likely to use acupuncture (p=.015). See Table 42. The full model correctly classified 93.8% of those who did not use acupuncture and 26.0% of those that did, for an overall correct score of 75.3%. See Table 43.

Chapter Summary

This chapter provided the statistical analysis and interpretation of the individual factors of the Behavioral Model of Healthcare Use for acupuncture, other CAM, and convention medicine users with pain. Descriptive statistics of the respondents were given for each of the factors. Correlations of each factor and type of service were analyzed. The data were analyzed between acupuncture users and conventional medicine users to determine those factors predictive of acupuncture use using multivariate logistics regression. In addition, descriptive statistics were given for the respondents in the study and the patient satisfaction information studied.

Table 42: Logistics Regression Model of Acupuncture Compared to Conventional Medicine

Determinants	Predisposing		Predisposing and Enabling		Predisposing, Enabling and Need	
	Odds ratio	P value	Odds ratio	P value	Odds ratio	P value
Predisposing						
Age	.984	.007*	.989	.098	.982	.011*
Male**						
Female	.855	.365	.849	.386	.753	.143
White**						
Black	.581	.049*	.713	.432	.719	.267
Asian	3.225	.003*	2.739	.014*	1.348	.008*
Educated	1.036	.036*	1.035	.038*	1.005	.024*
Married**						
Widowed	.896	.734	.883	.710	.974	.939
Divorced	1.135	.620	.987	.961	.980	.943
Not married	1.093	.692	1.002	.994	.975	.918
Enabling						
Insurance			.681	.166	.723	.259
Employed			.937	.831	.870	.511
Northeast**						
Midwest			.726	.223	.720	.225
South			.486	.002*	.507	.005*
West			1.115	.653	1.032	.900
Smoking			1.004	.968	1.065	.574
Exercise			1.311	.003*	1.359	.001*
Weight			.954	.583	.891	.187
Ment. Hlth.			.465	.001*	.637	.070
Need						
# Conditions					1.416	.000*
Disability					.612	.015*

* significant at the .05 level, ** Reference category for categorical variables

Table 43: Predictive Ability of the Model

	Observed		Predicted Acupuncture		Percentage Correct
			.No	Yes	
Step 1	Acupuncture	No	546	36	93.8
		Yes	162	57	26.0
	Overall Percentage				75.3

CHAPTER V

FINDINGS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Summary of the Study

The purpose of the study was to determine the factors associated with the use of acupuncture for pain and to compare these factors to use of other CAM and conventional medicine services. The treatment of pain is expensive. In addition, use of surgery and medication increases risk of medical errors, complications, side effects and addiction. Clinical trials of acupuncture for pain have demonstrated results at least as effective as conventional treatments and side effects and complications are negligible. However, adoption of acupuncture is low, only 4% of the United States population. The healthcare field is examining means to predict adoption of treatments by identifying characteristics of patients. This study identifies those characteristics that increase the likelihood of adoption of acupuncture for pain.

A review of the literature provided factors that were associated with use of acupuncture, CAM, and people with pain conditions. These factors were classified as predisposing, enabling and need factors utilizing the Behavioral Model of Health Services Use as a predictive framework. Data were obtained from the 2002 National Health Information Survey of 31,044 adults aged 18 and older residing in the United States. The survey included a special section on CAM modalities including acupuncture. The response rate for the survey was 74.3%.

Survey respondents were classified as having pain conditions if they reported having at least one of eight pain conditions in the past year. The pain sample size was

18,103. Of this sample 7,371 respondents used at least one of the three types of service within the past year.

The remaining 10,732 respondents did not use one of the three types of service being studied. They may have used an emergency room, medications prescribed during a visit the prior year, other non-provider types of CAM, self treatment, or nothing at all. Respondents were then categorized as acupuncture (n=257), other CAM (n=302) or conventional medicine (n=6,812) users based on use of each service within the past year.

Descriptive and inferential statistics were performed using SPSS. Differences in type of service were analyzed using Chi-square for categorical data and ANOVA for continuous data. Adjusted residuals and Tukey's HSD were analyzed to identify specific differences. A multiple logistics regression model was used to determine those factors predictive of acupuncture use as compared to conventional medicine.

Findings and Conclusions

Research Question 1: Is there a difference in predisposing characteristics e.g., (i) age, (ii) gender, (iii) race, (iv) education level, and (v) marital status, among acupuncture, other CAM, and conventional medicine users?

1. Acupuncture users were significantly ($p<.001$) younger (46.54 years) than CAM (50.28 years) and conventional medicine users (52.37 years). Though conventional users were the oldest, they were not significantly older than CAM users.
2. Males were significantly more likely ($p=.015$) to use acupuncture and less likely to use CAM. Females are more likely to use CAM and less likely to use acupuncture. There was no gender difference for conventional medicine.

3. Whites were significantly ($p<.001$) less likely to use conventional medicine and more likely to use CAM. Blacks were less likely to use CAM and more likely to use conventional medicine. Asians were the most likely of the race groups to use acupuncture.
4. CAM users had the highest level of education (16.09 years), acupuncture second (15.58 years), and conventional medicine third (14.55 years), ($p=.005$).
5. Persons never married were more likely to use acupuncture (AR=2.6). Divorced persons were more likely to use CAM (AR=4.7). Widows (AR=5.0) were more likely to use conventional medicine and not likely to use acupuncture ($p<.001$). There were no differences in married persons.

Based upon the findings above it is concluded there are differences in predisposing factors.

Research Question 2: Is there a difference in enabling characteristics: e.g., (i) health insurance (ii) employment, (iii) different regions of the country, and (iv) health behaviors among acupuncture, other CAM, and conventional medicine users?

1. There was no significant difference among the three types of service for having health insurance coverage. Only 37.5% of acupuncture users treatments were covered by health insurance.
2. There were significant differences in employment and type of service ($p<.001$). Retirees were much less likely to use acupuncture (AR=-.37). Those not currently working but who had previously worked were more likely to use acupuncture (AR=2.3). Those currently working were more likely to use CAM (AR=2.5).

Those who had never worked were more likely to use conventional medicine (AR=3.1).

3. Region of residence was significant for type of service used (p<.001).Those living in the Western and Northeast regions of the United States were more likely to use acupuncture (AR=2.6 for each). Southerners were less likely to use acupuncture (AR=-3.5) and CAM (AR=-3.9).
4. There was no difference for type of service and weight. Those that had once smoked and quit were more likely to use CAM (AR=2.8). Acupuncture and CAM users were more likely to exercise at a moderate level (AR=3.1, and AR=2.9 respectively, p<.001). Those using conventional medicine only were much less likely to exercise (AR=7.3).

Based upon the findings above it is concluded there are differences in enabling factors.

Research Question 3: Is there a difference in the mental health status among acupuncture, other CAM, and conventional medicine users?

1. People with numerous mental health issues were more likely to use acupuncture and CAM (AR=2.7 and AR=2.2 respectively, p<.001). Those with no, or few, mental health issues were much more likely to use conventional medicine (AR=4.1).

Based upon the finding above it is concluded there are differences in mental health factors.

Research Question 4: Is there a difference in need factors e.g., (i) number and type of pain conditions, (ii) functional limitations, and (iii) days away from work among acupuncture, other CAM, and conventional medicine users?

1. There was a significant difference in the number of pain conditions reported among type of service ($p<.001$). Acupuncture and CAM users were much more likely to report four or more pain conditions (AR=3.0, and AR=5.0 respectively). Those using conventional medicine alone were much more likely to report only one pain condition (AR=7.2).
2. Acupuncture patients were not different in functional limitations. CAM users were more likely to have functional limitations (AR=2.8) while conventional medicine users were not (AR=-3.8), ($p=.001$).
3. Acupuncture and CAM users were more likely to report 11 or more sick days per year (AR=2.6, and AR=2.3 respectively), ($p<.001$). Conventional medicine users were more likely to not report sick days (AR=2.0).

Based upon the findings above it is concluded there are differences in need factors.

Research Question 5: How satisfied are patients with acupuncture care?

1. Acupuncture users reported higher satisfaction levels for second and third conditions reported than the first condition (3.61 out of 4.0 vs. 2.95 out of 4.0).
2. Over 40% of acupuncture users thought it was very important in maintaining their health and 22% thought it was somewhat important. Only 18.7% did not think it was important.

3. Almost half (47.5%) sought acupuncture treatment because conventional medicine was not helpful. Only 10.2% used acupuncture because conventional medicine was too expensive. Over half (53.5%) used acupuncture with conventional medicine.

Based upon the findings above it is concluded that patients are satisfied with acupuncture treatment.

Research Question 6: What are the predictors of acupuncture utilization?

1. The full model predictors of acupuncture use were age (p=.011), being Asian (p=.008), being educated (p=.024), not residing in the South (p=.005), exercising at least a moderate amount (p=.001), having multiple pain conditions (p<.001), and having functional limitations (p=.015).
2. The Behavioral Model of Health Services Use as applied in the study was 93.8% correct in predicting those that did not use acupuncture and 26.0% accurate in predicting those that did for an overall accuracy value of 75.3%.

   Based upon the findings above it is concluded that factors are predictive of acupuncture use.

Implications

Healthcare in the United States is one of the most expensive per capita in the world. While longevity is high, this investment has not yielded commensurate healthy life years without co-morbidity such as pain. Research has found that 10-20% of the population utilizes 80-90% of the healthcare resources (Meek, Lyon, May & Lynch, 2000). Organizations that assume the financial risk for high utilization such as managed care organizations and self-insured companies, are seeking predictive models to identify

high-risk patients. The models will assist them in referring pain patients to appropriate care earlier in the treatment process reducing utilization and cost

Chronic pain contributes to both expense and morbidity. Clinical evidence indicates that acupuncture is effective for managing chronic pain with few side effects. However, few patients use acupuncture and many of those who do use it as a treatment of last resort. An acupuncturist described some of his patients as "train wrecks" who would benefit from treatment much earlier in the process (Norris, 2000). Use of acupuncture earlier in the treatment process could reduce cost and adverse reactions to medications. A model that predicts those more likely to adopt acupuncture for pain management will assist referral sources in identifying and directing patients to an additional efficacious treatment option.

This study tested which factors of the Behavioral Model of Health Services Use were predictive of those more likely to adopt acupuncture for treatment of pain. The factors predictive of acupuncture use were younger age, being Asian, educated, not residing in the Southern region, exercising, having multiple pain conditions and functional limitations. The full model correctly classified 93.8% of those who did not use acupuncture and 26.0% of those that did, with 75.3% accuracy overall.

Much discussion in the modeling field is about what predictive value has meaning. The financial industry, which uses predictive modeling for loan and credit card applications, may reject a prospect with as low as a 15% chance of default value. Other fields suggest a 50% threshold. The complexity of people's health issues diminishes the likelihood of finding models with that high a predictive ability (Hobbs, 2001). The 26% predictive ability found in this study may not be particularly low.

A limitation of this study was that the data did not include items regarding beliefs and attitudes, which are constructs of the Behavioral Model. Health service utilization researchers are successfully incorporating the affective domain to increase predictive modeling of high users and incorporation of these constructs in this study might have increased the predictive ability (Meek, Lyon, May & Lynch, 2000).

A difference in both acupuncture and CAM users from conventional medicine users was type of pain condition. The acupuncture and other CAM users were more likely to neck, jaw, face, and back pain as well as headaches and migraines. It appears that conventional medicine is less successful in meeting the needs of patients with these pain conditions.

One of the strongest predictors of use of both acupuncture and other CAM was the number of pain conditions. People reporting one pain condition were much more likely to use conventional medicine while those reporting four or more conditions were most likely to use other CAM and more likely to use acupuncture. Others support this finding in the literature.

People with multiple pain conditions have a high level of morbidity, clinical complexity and greater cost. They are the "train wrecks" that need new clinical pathways to improve health in the most expeditious and cost-effective manner. Additional analysis of those with four or more pain conditions revealed them as being more likely to be female (AR=3.0), more likely to be between the ages of 45-64 (AR=4.5), more likely to be divorced (AR=2.2) or separated (AR=2.6), and much more likely to have numerous mental health issues (AR=9.6). As expected they also have more sick days (AR=2.8). See Appendix D, Tables D1-D5.

This profile is consistent with the pain profile found in the literature and CAM users in general. However, all other conditions being equal, females were less likely to use acupuncture than males. Educating this high risk group about acupuncture and providing referrals early in the health service pathway provides an opportunity to improve health, decrease morbidity and decrease direct and indirect cost such as time away from work. However, only 26.5% of those using acupuncture in this study were referred by physicians. Physicians need to be educated as well as patients.

One of the barriers to adoption of acupuncture is the lack of insurance coverage for treatment. The literature and this study, show that people will seek acupuncture and other CAM treatments despite lack of insurance coverage. This willingness to pay out-of-pocket is supported by the study's finding that half of the people choosing acupuncture do so because conventional medicine did not provide satisfactory relief.

This study supported previous studies that found high satisfaction levels with acupuncture and CAM. Interestingly, this study found that satisfaction was higher for the second and third pain condition reported. This could be a function of the way the question was asked and responses structured. Respondents were instructed to select from a list of pain conditions. Those not highly associated with acupuncture and other CAM such as arthritis and joint pain were closer to the top of the list. Conditions more highly associated with acupuncture and other CAM such as neck pain, back pain and headaches were toward the bottom of the list. Respondents may have rated conditions in the order they appeared on the list as opposed to those that were more serious for them.

Unfortunately acupuncture satisfaction levels could not be compared to conventional medicine satisfaction because no question was asked about satisfaction with

conventional medicine. Cassidy's study also reports that those who use acupuncture find it helpful in the overall feeling of wellness. This was supported in this study with 63% reporting that acupuncture was very or somewhat important in maintaining their health.

Being older is a predictive factor of overall use of conventional healthcare. However, previous surveys of CAM use, including acupuncture, indicate that users are middle-aged. This study also found CAM users were younger than conventional and acupuncture users were the youngest on average. This bodes well for increased adoption of acupuncture.

Acupuncture is currently outside the practice of allopathic medicine. Though some medical doctors are also acupuncturists and have their own professional association, the American Academy of Medical Acupuncturists, it is not likely most will become staunch advocates. Acupuncture users have reported reduced use of conventional medicine, prescription drugs, insurance claims and surgery. But currently many acupuncture users with pain conditions first exhaust conventional treatment and seek acupuncture in desperation after other treatments do not provide relief. This results in the most expensive medical pathway. Additional studies on the use of acupuncture will help determine if it is cost-effective if used earlier in the treatment pathway.

Recommendations

1. Population-based studies such as the National Health Information Survey should include items regarding attitudes and beliefs to provide more comprehensive predictive information regarding use.
2. The NHIS survey should include information about satisfaction with conventional healthcare services. All types of treatment should be studied using the same scale

to improve comparability. The item measuring satisfaction with acupuncture for multiple conditions should be restructured so that it is less confusing.

3. Cost-effectiveness studies of acupuncture for pain are needed in addition to clinical trials.
4. Middle-aged women who are divorced or separated with mental health issues are at high risk for multiple pain conditions. More research is needed about how to meet the healthcare needs of the group.
5. Additional studies are needed regarding treatment pathways for pain including where and how acupuncture treatment is accessed in the process.

Chapter Summary

This chapter summarized the study and listed the findings. The conclusions and implications of the study were also presented and discussed. Differences in use of acupuncture, CAM and conventional medicine were found. The model used was successful in identifying some of the differences but the addition of affective factors could strengthen the predictive ability of the study. Additional research is needed to demonstrate whether acupuncture treatment for pain is a cost-effective healthcare modality and to better understand the treatment pathway of pain patients and where acupuncture would best fit as an efficacious treatment for the management of chronic pain.

CHAPTER VI

STUDY IN RETROSPECT

This chapter is a retrospective view of the study. The purpose of the study was to explore why acupuncture is not more frequently used for pain in the United States. Conventional medicine as currently practiced in the United States is the most sophisticated system of medicine from a technological perspective in the world. Evidence shows that though the United States is among the largest investors in healthcare per capita commensurate higher levels of health have not been attained.

Chronic pain consumes large amounts of resources. New strategies for managing chronic pain are needed that are cost-effective, have better outcomes, and fewer side effects. Though acupuncture is effective in managing pain, its utilization remains low. Much of the research on acupuncture is focused on efficacy. Cassidy conducted the most extensive study on acupuncture use but her sample was not population-based. Most of the other studies were conducted on CAM in general where so many modalities were included that it was not possible to obtain specific data on individual modalities. Use of acupuncture is so low that sample sizes were too small or the items examined limited to provide much information.

Of initial interest was to investigate beliefs and attitudes of those who chose acupuncture and to track the decision process. However, the literature review indicated the need for a more fundamental study of basic demographics and need factors. The results of this study indicate the need to include attitudes and beliefs in utilization predictive models. Recent studies demonstrate the relationship with attitudes and beliefs

in use of services and researchers are examining tools to identify high risk patients earlier in the healthcare pathway.

Additional interest was studying the attitudes and beliefs of physicians about acupuncture because they are the predominant gatekeepers of medical care in the United States. Acupuncture is more accepted by allopathic physicians than other CAM modalities but physicians have little incentive to advocate acupuncture. Physicians are training in acupuncture and have established a professional society of medical acupuncturists, which may accelerate use of acupuncture within the traditional physician referral framework. A major reason for not pursuing this study was the difficulty in obtaining data from this group.

Consumer buyer behavior models were considered for use in this study. They portrayed health care as a commodity like automobiles and seemed simplistic. Health care is more personal than consumer goods. The Behavioral Model of Health Services Use provided a more complex framework that seemed to better fit this study. The constructs of the model determine and differentiate the factors correlated with use of both conventional medicine and acupuncture.

This study demonstrated some predictive ability and serves as a foundation for additional research. It provided a good foundation for future research, as this is a field that will continue to grow. Assisting those with chronic pain to identify successful pain management therapies in a timely manner is also a worthy area of further research.

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APPENDICES

APPENDIX A

CODING

Pain Conditions

Condition	Code
Recurrent Pain	>PAINYR<
Severe Sprains and Strains	>SPRAINYR<
Dental Pain	>DENTLPYR<
Joint Symptoms	>JNTSYMP<
Arthritis	>ARTH1<
Neck Pain	>PAINECK<
Low Back Pain	>PAINLB<
Facial Pain	>PAINFACE<
Severe Headaches	>AMIGR<

Conventional Medicine User

Question		Code
During the past 12 months, that is since (12 month reference date), have you seen or talked to any of the following health care providers about your own health?…		>AHCSYR6<
Nurse Practitioner, Physician Assistant, Midwife		>AHCSYR6<
A doctor specializing in women's health		>AHCSYR7<

Acupuncture User

Question		Code
During the past 12 months, did you see a practitioner for acupuncture?		>ACU_USEM<

CAM User

Question		Code
During the past 12 months, did you see a practitioner for:	biofeedback	>BIO_USEM<
	chiropractics	>CHP_USEM<
	massage therapy	>MAS_USEM<
	homeopathy	>HOM_USEM<
	naturopathy	>NAT_USEM<

Factors and Question Code	Response Codes
PREDISPOSING FACTORS	
Age AID.050	
How old is {sample adult name}? >AIDAGE<	(000-120) 0-120 years old
Gender AID.050	
Is {sample adult name} Male or Female? >AIDSEX<	(1) Male, (2) Female
Race	
Recode of full detail race groups HHC Recode >RACERP_I<	(01) White only (02) Black/African American only (03) AIAN only (04) Asian only (05) Other race only (06) Multiple races
Highest level of school completed >EDUC<	00 Never attended 01-11 Grades 1-11 12 12th grade, no diploma 13 High school graduate 14 GED 15 Some college 16 AA degree technical 17 AA degree academic 18 Bachelor's degree 19 Master's degree 20 Professional degree 21 Doctoral degree
Marital Status >R_MARITL FID Recode	(1-3) Married (4) Widowed (5) Divorced (6) Separated (7) Never married (8) Living with partner (9) Unknown

ENABLING FACTORS

Any family members have health insurance coverage? FHICOVYN, FHI Recode	1 Yes 2 No 8 Not ascertained
During the past 12 months were any of the costs of using acupuncture covered by insurance? >ACU_INSC<	1 Yes 2 No 3 No costs 4 No insurance
Employment Status ALL_SA, ASD Recode	(1) Currently working (2) Retired (3) Not currently working, but has worked previously (4) Has never worked
Region of the country. >REGION<	1 Northeast 2 Midwest 3 South 4 West

Health Behaviors

Smoking status SMKSTAT 1	1 Current 2 Former 3 Never

Exercise

How often do you do vigorous activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate? >VIGNO<	000	Never
	001-995	1-995 times/yr
	996	Unable to do
How often do you do light or moderate activities for at least 10 minutes that cause only light sweating of a slight to moderate increase in breathing or heart rate? >MODNO<	000	Never
	001-995	1-995 times/yr
	996	Unable to do

Recode >EXER<

VIGNO 000, 996 and MODNO 000, 996	=	1	Never
VIGNO 1-104 and/or MODNO 1- 995	=	2	Moderate
VIGNO 105 – 995	=	3	Heavy

Weight

Desirable body weight >DESIREWT<

1 10%+ below desirable weight
2 5-9% below desirable weight
3 4.9% +/- of desirable weight
4 5-9.9% above desirable weight
5 10-19.9% above desirable weight
6 20-29.9% above desirable weight
7 30%+ above desirable weight

Recode >WGHT<

1 = 6 or 7	High
2 = 3, 4, or 5	Moderate
3 = 1 or 2	Low

Health Behavior Index Recode

>HEALBEH< = SMKSTAT 1+ EXER + WGHT

1 1-3 Poor
2 4-6 Moderate
3 7-9 Good

Mental Health Status

During the past 30 days, how often did you feel…

…so sad nothing cheers you up. >SAD<

…nervous. >NERVOUS<

…restless/fidgety. >RESTLESS<

…hopeless. > HOPELESS<

…that everything was an effort. >EFFORT<

…worthless. >WORTHLS<

1 All of the time
2 Most of the time
3 Some of the time
4 A little of the time
5 None of the time

Mental Health Index Recode

MHI Recode =
SAD+ NERVOUS+ RESTLESS+ HOPELESS+ EFFORT+WORTHLS

6-11	Poor
12-17	Fair
18-23	Good
24-30	Very Good
30	Excellent

NEED FACTORS

Number of Pain Conditions

Severe Sprains and Strains >SPRAINYR<	1 Yes 2 No
Dental Pain >DENTLPYR<	1 Yes 2 No
Joint Symptoms >JNTSYMP<	1 Yes 2 No
Arthritis >ARTH1<	1 Yes 2 No
Neck Pain >PAINECK<	1 Yes 2 No
Low Back Pain >PAINLB<	1 Yes 2 No
Facial Pain >PAINFACE<	1 Yes 2 No
Severe Headaches >AMIGR<	1 Yes 2 No

Disability

Do you have any functional limitation? >FLA1AR<	1 Limited in any way 2 Not limited in any way 3 Unknown if limited

Days away from work

During the past 12 months, about how many days did you miss work at a job or business because of illness or injury (not including maternity leave)? (9,655 not in universe) >WKDAYR<	000 None 001-366 1-366 days 103 Not ascertained 195 Don't Know 997 Refused

Use Rate of Acupuncture

Have you ever seen a provider or practitioner for acupuncture? >ACU_EVER< # Mentioned per 1,000 population	1 Mentioned 2 Not mentioned
During the past 12 months, did you see a practitioner for acupuncture? >ACU_USEM< # Yes per 1,000 population	1 Yes 2 No

Patient Satisfaction

How much do you think acupuncture helped your Condition (1,2 and 3)? >ACUHELP1,2,3<	1 A great deal 2 Some 3 Only a little 4 Not at all
Did you choose acupuncture for the following reason: Conventional medical treatments would not help you? >ACU_NOHP<	1 Yes 2 No

APPENDIX B

PAIN CONDITION BY TYPE OF SERVICE

Table B1: Dental Pain by Type of Service

			Had dental pain, past 12 months		Total
			Yes	No	
Type of Service	Acupuncture	Count	64	193	257
		% within Dental pain,	22.8%	19.8%	20.4%
		Adjusted Residual	1.1	-1.1	
	Other CAM	Count	81	221	302
		% within Dental pain,	28.8%	22.6%	24.0%
		Adjusted Residual	2.1	-2.1	
	Conventional	Count	136	563	699
		% within Dental pain,	48.4%	57.6%	55.6%
		Adjusted Residual	-2.7	2.7	
Total		Count	281	977	1258
		% within Dental pain,	100.0%	100.0%	100.0%

Pearson Chi-Square =7.819(a), df=, p=.020

Table B2: Aching Joints by Type of Service

			Had pain/aching at joints, past 30 d		
			Yes	No	Total
Type of Service	Acupuncture	Count	125	132	257
		% within Had pain/aching at joints, past 30 d	19.1%	22.0%	20.4%
		Adjusted Residual	-1.3	1.3	
	Other CAM	Count	187	115	302
		% within Had pain/aching at joints, past 30 d	28.5%	19.1%	24.0%
		Adjusted Residual	3.9	-3.9	
	Conventional	Count	344	354	698
		% within Had pain/aching at joints, past 30 d	52.4%	58.9%	55.5%
		Adjusted Residual	-2.3	2.3	
Total		Count	656	601	1257
		% within Had pain/aching at joints, past 30 d	100.0%	100.0%	100.0%

Pearson Chi-Square=15.122(a), df=2,p=.001

Table B3: Arthritis by Type of Service

			Ever told you had arthritis, gout, lupus		
			Yes	No	Total
Type of Service	Acupuncture	Count	83	174	257
		% within Ever told you had arthritis, gout, lupus	16.2%	23.3%	20.4%
		Adjusted Residual	-3.1	3.1	
	Other CAM	Count	134	168	302
		% within Ever told you had arthritis, gout, lupus	26.2%	22.5%	24.0%
		Adjusted Residual	1.5	-1.5	
	Conventional	Count	294	404	698
		% within Ever told you had arthritis, gout, lupus	57.5%	54.2%	55.5%
		Adjusted Residual	1.2	-1.2	
Total		Count	511	746	1257
		% within Ever told you had arthritis, gout, lupus	100.0%	100.0%	100.0%

Pearson Chi-Square=9.793(a), df=2, p=.007

Table B4: Neck Pain by Type of Service

			Had neck pain, past 3 months		
			Yes	No	Total
Type of Service	Acupuncture	Count	117	140	257
		% within Had neck pain, past 3 months	30.5%	16.0%	20.5%
		Adjusted Residual	5.9	-5.9	
	Other CAM	Count	130	172	302
		% within Had neck pain, past 3 months	33.9%	19.7%	24.0%
		Adjusted Residual	5.4	-5.4	
	Conventional	Count	136	561	697
		% within Had neck pain, past 3 months	35.5%	64.3%	55.5%
		Adjusted Residual	-9.4	9.4	
Total		Count	383	873	1256
		% within Had neck pain, past 3 months	100.0%	100.0%	100.0%

Pearson Chi-Square=89.506(a), df=2, p=.000

Table B5: Low Back Pain by Type of Service

			Had low back pain, past 3 months		
			Yes	No	Total
Type of Service	Acupuncture	Count	154	102	256
		% within Had low back pain, past 3 months	25.3%	15.7%	20.4%
		Adjusted Residual	4.2	-4.2	
	Other CAM	Count	172	130	302
		% within Had low back pain, past 3 months	28.3%	20.0%	24.0%
		Adjusted Residual	3.4	-3.4	
	Conventional	Count	282	417	699
		% within Had low back pain, past 3 months	46.4%	64.3%	55.6%
		Adjusted Residual	-6.4	6.4	
Total		Count	608	649	1257
		% within Had low back pain, past 3 months	100.0%	100.0%	100.0%

Pearson Chi-Square=41.183(a), df=2, p=.000

Table B6: Jaw Pain by Type of Service

			Had pain in jaw/front of ear, past 3 m		
			Yes	No	Total
Type of Service	Acupuncture	Count	45	211	256
		% within Had pain in jaw/front of ear, past 3 m	36.0%	18.6%	20.4%
		Adjusted Residual	4.6	-4.6	
	Other CAM	Count	37	265	302
		% within Had pain in jaw/front of ear, past 3 m	29.6%	23.4%	24.0%
		Adjusted Residual	1.5	-1.5	
	Conventional	Count	43	656	699
		% within Had pain in jaw/front of ear, past 3 m	34.4%	58.0%	55.6%
		Adjusted Residual	-5.0	5.0	
Total		Count	125	1132	1257
		% within Had pain in jaw/front of ear, past 3 m	100.0%	100.0%	100.0%

Pearson Chi-Square=29.681(a), df=2, p=.000

Table B7: Headaches or Migraines by Type of Service

			Had severe headache/migraine, past 3 m		
			Yes	No	Total
Type of Service	Acupuncture	Count	92	165	257
		% within Had severe headache/migraine, past 3 m	28.0%	17.7%	20.4%
		Adjusted Residual	4.0	-4.0	
	Other CAM	Count	91	211	302
		% within Had severe headache/migraine, past 3 m	27.7%	22.7%	24.0%
		Adjusted Residual	1.8	-1.8	
	Conventional	Count	145	554	699
		% within Had severe headache/migraine, past 3 m	44.2%	59.6%	55.6%
		Adjusted Residual	-4.8	4.8	
Total		Count	328	930	1258
		% within Had severe headache/migraine, past 3 m	100.0%	100.0%	100.0%

Pearson Chi-Square=25.490(a), df=2, p=.000

APPENDIX C

Table C1: Categories of Likeness among Types of Service

Factor		Acupuncture	CAM	Conventional
Age		-	+	+
Gender	Males	+	-	o
	Females	-	+	o
Race	Whites	o	+	-
	Blacks	-	-	+
	Asians	+	o	-
Education		o	+	-
Marital Status	Married	o	o	o
	Widowed	-	-	+
	Divorced	o	+	-
	Separated	o	o	o
	Never Married	+	o	o
	Living Together	o	o	-
Insurance		-	o	o
Employment	Currently	o	+	-
	Retired	-	-	+
	Previously	+	o	o
	Never	o	-	+
Region	Northeast	+	o	o
	Midwest	o	o	o
	South	-	-	+
	West	+	+	-
Weight		o	o	o
Smoking	Current	o	o	o
	Former	o	+	-
	Never	o	o	o
Exercise	Never	-	-	o
	Light	o	+	-
	Moderate	+	+	o
Mental Health	None/Few	-	-	+
	Numerous	+	+	-
# Pain Cond.	1	-	-	+
	2+	+	+	-
Disability	Limited	o	+	-
	Not Limited	o	-	+
Sick Days	None	-	-	+
	1 week	o	o	o
	2 weeks	o	o	o
	3 weeks	+	+	-

+ = Greater/Higher, - = Less/Lower, o = no difference, shaded areas are alike

APPENDIX D

Table D1: Number of Pain Conditions by Marital Status

		Number of Conditions				Total
		1	2	3	4	
Married	Count	230	166	101	132	629
	Adjusted Residual	.8	.8	-.1	-1.6	
Widowed	Count	44	49	29	28	150
	Adjusted Residual	-1.7	2.2	1.1	-1.3	
Divorced	Count	61	46	25	54	186
	Adjusted Residual	-.8	-.2	-1.1	2.2	
Separated	Count	14	6	6	17	43
	Adjusted Residual	-.4	-1.8	-.4	2.6	
Never married	Count	82	47	33	41	203
	Adjusted Residual	1.6	-.8	.0	-1.0	
Living with partner	Count	15	6	9	16	46
	Adjusted Residual	-.4	-2.0	.6	2.0	
Total	Count	446	320	203	288	1257

Pearson Chi Square= 28.695, df=15, p=018.

Table D2: Number of Pain Conditions by Mental Health

			Number of Conditions				Total
			1	2	3	4	
Mental Health	Numerous Mental Health Issues	Count	31	34	31	95	191
		Adjusted Residual	-6.0	-2.6	.0	9.6	
	Few to No Mental Health Issues	Count	411	282	172	189	1054
		Adjusted Residual	6.0	2.6	.0	-9.6	
Total		Count	442	316	203	284	1245

Pearson Chi Square= 100.422, df=3, p <.001

Table D3: Number of Pain Conditions by Sickdays

			Number of Conditions				Total
			1	2	3	4	
Sickdays	None	Count	165	91	54	77	387
		Adjusted Residual	2.2	-.7	-1.0	-1.0	
	1-5 days	Count	115	77	46	53	291
		Adjusted Residual	.4	.9	.3	-1.6	
	6-10 days	Count	19	10	15	19	63
		Adjusted Residual	-1.4	-1.7	2.0	1.8	
	11 or more days	Count	16	23	9	25	73
		Adjusted Residual	-3.1	1.4	-.7	2.8	
Total		Count	315	201	124	174	814

Pearson Chi Square= 25.657, df=9, p=.002

Table D4: Number of Pain Conditions by Gender

			Number of Conditions				Total
			1	2	3	4	
Gender	Male	Count	167	104	69	74	414
		Adjusted Residual	2.5	-.2	.4	-3.0	
	Female	Count	280	216	134	214	844
		Adjusted Residual	-2.5	.2	-.4	3.0	
Total		Count	447	320	203	288	1258

Pearson Chi Square= 10.932, df=3, p <.012.

Table D5: Number of Pain Conditions by Age

			Number of Conditions				Total
			1	2	3	4	
Age	18-24 years	Count	35	14	13	15	77
		Adjusted Residual	1.9	-1.5	.2	-.7	
	25-44 years	Count	172	103	56	80	411
		Adjusted Residual	3.3	-.2	-1.7	-2.0	
	45-64 years	Count	152	109	77	143	481
		Adjusted Residual	-2.3	-1.8	-.1	4.5	
	65-69 years	Count	20	23	17	17	77
		Adjusted Residual	-1.8	.9	1.5	-.2	
	70-74 years	Count	28	23	12	18	81
		Adjusted Residual	-.2	.6	-.3	-.1	
	75 years and over	Count	40	48	28	15	131
		Adjusted Residual	-1.3	3.1	1.7	-3.3	
Total		Count	447	320	203	288	1258

Pearson Chi Square= 58.214, df=18, p <.001.

Vita

Elizabeth McGrady, FACHE has more than 25 years of healthcare experience including clinical services, executive level hospital management, strategic planning, business development and strategic marketing. She currently is a Graduate Teaching Associate pursuing a PhD is Community Health at the University of Tennessee and maintains a healthcare consultant practice specializing in new ventures including hospital-based Complementary and Alternative Medicine programs and services. Past projects include ventures in ambulatory surgery, occupational medicine, outpatient cardiology, orthopedics, cancer, wellness, women's services and guest relations. She holds a Bachelors of Science in Medical Technology from the University of Florida, a Masters in Education from the University of Florida, a Masters in Healthcare Administration from Tulane University, and is a PhD candidate in Human Ecology specializing in Public Health from the University of Tennessee. She is a Fellow in the American College of Healthcare Executives. She is published in the field of Complementary and Alternative Medicine and has spoken at numerous local, state, and national seminars on this topic as well as workplace wellness.