

The Relationship between Complementary & Alternative Healthcare versus Traditional Healthcare

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Abstract

The purpose of this study is to ascertain the relationship between complementary and alternative healthcare versus Traditional Healthcare. This study finds that all forms of alternative care looked at are complements to traditional forms of healthcare. We find that higher education and being married increase the likelihood of utilizing CAM. Furthermore it is shown that white people and females tend to utilize more CAM therapies than their counterparts. Additionally it is shown that living in the west significantly increases ones' chances of utilizing CAM. The importance of such a study is justified by the increasing prevalence and usage of complementary and alternative healthcare.

Introduction

The last decade has witnessed a substantial increase in the demand for complementary and alternative medicine (CAM). CAM treatments include, for example, acupuncture, chiropractic care, massage therapy and herbal remedies.[13] In 1997 Americans spent an estimated \$27 to \$33 billion on CAM. [1] A recent study by Stanford University discovered “that nearly 7 in 10 Americans turn to alternative treatments when traditional medicine fails”.[1, p.2] In a recent decision the Washington Supreme court required insurers to cover certain types of CAM treatments. [1] The growing popularity and acceptance of CAM makes this subject worthy of further review and analysis. The purpose of this paper is to analyze whether CAM acts as a substitute or complement to traditional medical treatments, and to identify the types of persons most likely to utilize CAM.

Background

Prevalence of Complementary and Alternative Medicine

Complementary and alternative medicine (CAM) is a set of nontraditional therapies that can be used to augment traditional approaches to health care. Complementary care is the more popular form of CAM and is defined as nontraditional care in conjunction with traditional therapy. Alternative care, on the other hand, is nontraditional care used as a substitute to traditional western style medical approaches.[1] Although CAM therapy takes numerous forms there do exist a few therapies that comprise the vast majority of patient use and, therefore, medical expenditures. These are chiropractic care (35% of all CAM expenditures), herbal remedies and supplements

(27%), and massage therapy (17%). [12] Acupuncture is another popular form of CAM therapy, however it falls behind the others in frequency of use. It is difficult to determine whether these therapies are complementing traditional therapy or replacing it. Both are possible, however nearly 60 percent of patients state that their doctors have knowledge of their CAM usage, which would indicate complementary care.[12] Given that the majority of CAM patients are receiving traditional care, why do they seek non-traditional treatments as well?

There are several reasons why Americans are turning to CAM treatments in growing numbers. One reason for the growing popularity of CAM is the growing public frustration with conventional medical practices. Some Americans resent the escalating costs of health care and what they perceive as unfair and inequitable distribution of health services. Another reason for increased CAM usage stems from the occasionally serious side effects caused by aggressive and invasive treatment, such as surgery. Alternative medicine rarely causes side effects even remotely as serious as those incurred by conventional treatments. A third reason for the increased demand for CAM is demographic. The baby boom generation is now approaching or passing middle age and many are seeking ways to restore their lost youth. The sheer size of this generation coupled with their enormous buying power is an important factor driving the increased utilization of CAM. The last reason for this recent development is peoples' general demand for healthcare treatments that are more preventive (CAM) rather than curative (conventional medicine). This general emphasis on overall wellness is another driving force behind the increasing popularity of complementary and alternative medicine.[6]

Types of Complementary and Alternative Medicine

Chiropractic care is the most widely used form of CAM. In fact chiropractic care comprises 35 percent of expenditures on CAM annually. [12] There are an estimated 60,000 chiropractors practicing in the United States today, making it the third largest health profession behind traditional medicine and dentistry. [10] Chiropractic care concerns itself primarily with the condition of the musculoskeletal system and how it affects the well-being of the rest of the body. Back pain is one of the most common afflictions suffered by Americans and is the ailment most frequently treated by chiropractors. Chiropractors' primary techniques include spinal manipulation, patient education, and recommendation of devices for patients' use. There is conflicting evidence regarding whether chiropractic care is a more cost effective option than traditional treatments with regard to back pain. [5]

Herbal remedies and supplements represent the second most common form of CAM, accounting for 27 percent of this growing industry. "Herbalism is the study and practice of using plant material for food, medicine, and health promotion." [10, p.111] A person who is knowledgeable in this area is commonly referred to as an herbalist. Herbalists typically believe in treating the whole person, so most herbalists require active patient participation in treatments. [10] One obvious advantage to herbal remedies relative to prescription drugs is that they generally cause far fewer side effects than their pharmaceutical counterparts. Whereas most synthetic drugs tend to treat the symptoms of disease, herbalists believe their remedies treat the disease itself. Another distinct advantage of herbal remedies is that they tend to cost less than their pharmaceutical counterparts. One reason for the lower costs is the Dietary Supplement Health and

Education Act, passed by Congress in 1994. This legislation allows the marketing of vitamin and herbal supplements without the burden of FDA clearance [11], a process which typically adds \$230 million to the cost of developing a new pharmaceutical product.[5] Pharmaceutical companies have been cautious about entering this growing industry because natural plants, that are the source of herbal remedies, cannot be patented, therefore profits are not guaranteed.[5]

Massage therapy is the third most common form of CAM, representing 17 percent of this industry.[12] Massage therapy is defined as the kneading or pummeling of the body's soft tissues. It is believed that massages can "relieve pain, increase blood and lymphatic flow, relax tense muscles and decrease blood pressure".[3, p.296] Massage therapy is generally accepted by physicians as a legitimate treatment with favorable outcomes. Massage therapy is most often used to treat musculoskeletal conditions, recipients have also reported positive experiences in the treatment of "arthritis, asthma, headache, circulatory problems, digestive disorders, insomnia, immune function, and stress".[5, p.605]

Acupuncture has not attained the same levels of utilization as the above therapies but it is one of the fastest growing forms of healthcare in America. A report by the FDA in 1993 estimated that approximately 9 to 12 million Americans receive acupuncture treatment annually. The low cost, safety, and effectiveness of acupuncture are the main reasons behind its growing acceptance and popularity as a form of medical treatment. The World Health Organization has deemed acupuncture an acceptable form of treatment for over 43 conditions, and 41 states in America recognize acupuncture as a legitimate medical treatment.

The theory behind acupuncture is that the life force (Qi) becomes blocked and is unable to move freely through the body's meridians, which are a system of channels that run through the body. Acupuncture uses extremely thin needles to correct the imbalances, restoring the body's natural flow of Qi. Some of the ailments for which acupuncture is recommended include: allergies, asthma, back pain, carpal tunnel syndrome, colds and flu, constipation, depression, gynecological disorders, headaches, heart problems, infertility, insomnia, premenstrual syndrome, sciatica, sports injuries, tendonitis, and stress".[5, p. 498]

Types of People who Utilize CAM

A study by Eisenberg in 1997 found that 50 percent of all CAM utilization occurred in persons between ages 35 and 49. His analysis also showed that 49 percent of females reported some type of CAM utilization, while only 38 percent of males reported the same. Eisenberg's research determined that 51 percent of those persons with some college reported some form of CAM utilization. More whites reported CAM utilization (45 percent) than blacks (33 percent). Finally, Eisenberg found that 48 percent of people with incomes greater than \$50,000 reported CAM utilization, while those with incomes below \$50,000 reported CAM utilization at a rate of 43 percent. [21]

A study by Astin in 1997 found that 42 percent of all CAM utilization occurred in persons between ages 35 and 49, while 35 percent of CAM utilizers were above the age of 64. His analysis also showed that 41 percent of females reported some type of CAM utilization, while only 39 percent of males reported the same. Astin's research determined that 45 percent of college graduates and 50 percent of those with graduate

degrees reported some form of CAM utilization. More whites reported CAM utilization (41 percent) than blacks (29 percent). Forty percent of Hispanics also reported using some form of CAM. Finally, Astin found that 44 percent of people with incomes greater than \$40,000 reported CAM utilization, while those with incomes below \$40,000 reported CAM utilization at a rate of 33 percent. [22]

Palinkas and Kabongo found that 54 percent of all CAM utilization occurred in people less than 40 years old. [12] They also discovered that women account for 67 percent of all CAM utilization and married persons account for 58. When evaluating race/ethnicity the researchers found that whites account for 57 percent of CAM usage, American Indian- 1%, African Americans- 6%, Hispanics- 23%, Asians- 7%, and others- 6%. College graduates accounted for the majority of CAM usage (52%). Finally, in contrast to the results of other studies, Palinkas and Kabongo report that CAM usage rates are split equally between people earning less than \$50,000 and more. [12]

In sum, the research suggests that those who utilize CAM tend to be females with incomes larger than \$50,000 and 35 years of age or older. The research also is in basic agreement with respect towards white people utilizing the majority of CAM therapies. One area of interest not covered in the research above is the regional variations in the utilization of CAM. All of the studies rely on descriptive statistics, rather than multivariate analysis to define trends in CAM utilization.

Model

One purpose of this paper is to investigate the relationship between traditional forms of healthcare and complementary and alternative medicine. This study focuses on

four types of alternative care, namely acupuncture, chiropractic care, massage therapy, and herbal remedies. The main question of interest is whether CAM therapies are substitutes or complements to traditional medicine.

According to economic theory, two goods are substitutes if the demand for one good increases when the price of the other good increases. An example of goods that are substitutes would be a brand-name prescription drug and its generic counterpart. When lower-priced generic drugs enter the market after the patent on a brand-name drug expires, sales of the brand-name drug decline sharply, typically as much as 80 percent. [20]

Two goods are complements if the demand for one good increases when the price of the other good decreases. An example of goods that are complements would be the various drugs that are used together to treat HIV/AIDS patients, commonly referred to as cocktails. Two drugs that are used together in this manner are the protease inhibitors ritonavir and saquinavir. If the price of ritonavir were to fall then the demand for saquinavir is expected to increase because the drug ‘cocktail’ is more affordable. [15]

The main research question of this paper is whether CAM therapies primarily act as substitutes or complements to traditional care. Some CAM therapies might be effective alternatives to traditional care, such as substituting chiropractic care for physical therapy. A person might also substitute acupuncture in place of psychiatric care. In these examples the patient who uses CAM consumes less traditional care than similar patients who do not use CAM. Some CAM therapies may act as complements to traditional forms of medicine, such as when an orthopedic physician recommends

massage therapy for back pain. A patient may also use herbal remedies to complement pharmaceutical products prescribed by a physician.

To operationalize the definitions of substitutes and complements with observable variables in my data, I assume that: (1) traditional medicine and CAM are substitutes if expenditures on traditional medicine decrease as expenditures on (utilization of) CAM increases (2) traditional medicine and CAM are complements if expenditures on traditional medicine increase as expenditures on (utilization of) CAM increases. In the regression model, the level of expenditures on traditional care is the dependent variable. The four types of CAM therapies are reviewed separately and expressed either as a binary variable or an expenditure level in the model. A negative coefficient for CAM indicates that CAM and traditional care are substitutes while a positive coefficient indicates they are complements.

The second question the paper seeks to answer is what types of people utilize CAM therapies. A probit model is used to estimate the relationship between different types of characteristics and a person's likelihood of utilizing CAM. I investigate the following characteristics that have been shown to be significantly correlated with the utilization of one or more types of CAM therapies in previous research: age, education, ethnicity, income, marital status, race, and sex. In addition, I investigate the relationship between CAM utilization and the region of the country in which a person lives as well as health status indicators.

Other Factors that Influence Health Care Expenditures

Other variables that influence healthcare spending can be categorized into three basic groups. The first group is socio-demographic variables, which include age, education, ethnicity, race, sex, marital status, and region of the country. Healthcare expenditures increase with age because, as the Grossman model suggests, as age increases people will consume a greater amount of healthcare to reach their optimal level of health. [23] Healthcare spending is expected to increase with education because persons with higher education place a greater emphasis on preventive measures, such as routine checkups and proper diet. Ethnicity and race may be correlated with healthcare spending because of cultural differences and attitudes. For example, it has been suggested that minorities do not utilize preventive therapies nearly as much as whites. [18] Furthermore, minorities may underutilize health facilities because their quality is below average in the areas minorities live. [18] This barrier to access based on race or ethnicity is closely related to income. [18] Sex is also an important determinant of expenditures, because men and women typically encounter different types of shocks to their health capital. Marital status is also of great importance since married couples, especially those with children, have a greater incentive to stay healthy in order to care for one another and their children. Married people may also make decisions pertaining to lifestyle that promote better health. Regional variations in lifestyle are also expected to influence healthcare spending.

The second category of control variables is incomes. I assume that healthcare is a normal good, so healthcare spending increases with income. Previous research has confirmed this basic relationship with the higher earners consuming more healthcare.

The final category includes measures of physical and mental health status. It is assumed that those with better health consume less healthcare, all else equal. Here it is important to point out that such people may take preventive measures that do not show up in healthcare expenditure variables.

Methodology

The main research question of this paper is whether alternative care acts as a substitute or complement for traditional healthcare. I use ordinary least squares regression to estimate healthcare cost functions where expenditures on traditional healthcare are expressed as a function of alternative care utilization, controlling for other factors that influence spending. The basic model is:

$$Y = \alpha + \beta A + \gamma X + \epsilon \quad (1)$$

where the dependent variable, Y , equals a measure of expenditures on traditional healthcare, α is the intercept, and A is a measure of different types of alternative care use, namely: acupuncture, chiropractic care, massage therapy, and herbal remedies. The sign of the coefficient β indicates the relationship between alternative care and traditional care: if β is positive, this indicates that traditional care and alternative care are complements; if β is negative, traditional care and alternative care are substitutes. The vector of control variables, $X=[S, I, H]$ includes socio-demographic characteristics (S), income (I), and measures of health status (H). The error term, ϵ , is assumed to be distributed normally with an expected value of zero. [17]

I estimate two types of models: (1) where A is a continuous variable measuring expenditures on alternative care, (2) where A is a binary variable identifying persons who

received alternative care. Several variants of the basic model are estimated to consider different types of CAM therapies.

Model 1: Total Spending on Alternative Care

The purpose of the first regression is to determine whether alternative care treatment as a whole is a complement or substitute for traditional medical treatment. The dependent variable in the regression is total expenditures on healthcare in 1998, including expenditures on prescription drugs. The main independent variable of interest represents total spending on alternative care. The basic equation for this regression is as follows:

$$E^T = \mathbf{a} + \mathbf{b}^T A + b_1^T S + b_2^T I + b_3^T H + \mathbf{e}^T \quad (2)$$

The dependent variable E^T represents the natural log of total healthcare expenditures and A equals total expenditures on alternative care.

Models (2-4): Acupuncture, Chiropractic Care, and Massage Therapy

The purpose of the second regression is to determine whether acupuncture treatment is a complement or substitute for traditional medical treatment. The dependent variable is identical to that in Model 1 except expenditures on prescription drugs are excluded because these forms of CAM have more in common with traditional healthcare providers than prescription drugs. The main independent variable of interest is a dummy variable which identifies persons who have been treated by an acupuncturist. The basic equation for this regression is as follows:

$$E^A = \mathbf{a} + \mathbf{b}^A A + b_1^A S + b_2^A I + b_3^A H + \mathbf{e}^A \quad (3)$$

Similar models are estimated for chiropractic care and massage therapy. In all of these models a binary variable is used to indicate utilization of alternative care because expenditure data for individual types of CAM therapies are not available in the data.

Model 5: Herbal Remedies

The purpose of the fifth regression is to determine whether herbal remedies complement or substitute for prescription drugs. The dependent variable in the regression is total expenditures on prescription drugs. The main independent variable of interest is a dummy variable which identifies persons who purchased herbal remedies. The basic equation for this regression is as follows:

$$E^H = \mathbf{a} + \mathbf{b}^H A + b_1^H S + b_2^H I + b_3^H H + \mathbf{e}^H \quad (4)$$

In all cases (Models 1-5) the dependent variable E^H is the natural log of the expenditures variable.

Probit Analysis

To address the second research question, which asks what types of people are more likely to utilize CAM, I obtain maximum likelihood estimates of the probability of receiving alternative care. Assume there is an underlying latent variable y^* that measures the propensity to consume alternative care. The basic model is as follows:

$$y^* = \mathbf{g}_0 + x\mathbf{g} + e, \quad y = 1[y^* > 0] \quad (5)$$

We cannot observe y^* ; instead we observe y which takes on the value of 1 (consumes CAM) if $y^* > 0$ and 0 (does not consume CAM) otherwise.

The response probability for y is:

$$P(y = 1 | x) = P(y^* > 0 | x) = P(e > -(\mathbf{g}_0 + x\mathbf{g}) | x) \quad (6)$$

Assuming that e has a standard normal distribution, estimates of \mathbf{g}_0 and \mathbf{g} can be obtained by maximizing the likelihood function: [16]

$$\ell_i(\mathbf{g}) = y_i \log[G(x_i\mathbf{g})] + (1 - y_i) \log[1 - G(x_i\mathbf{g})] \quad (7)$$

where G is the standard normal cdf (cumulative distribution function).

Five different probit models are estimated where the dependent variable is a dichotomous variable identifying persons who utilize: (1) any type of CAM therapy, (2) acupuncture, (3) chiropractic care, (4) massage therapy, or (5) herbal remedies. The independent variables in x include the vectors: H , S , and I , described below.

Control Variables

The vector H includes two health status variables describing self-reported physical and mental health status. Both of these variables use a ranking system whereby 1 represents poor health status and 5 represents excellent health status. Theory would suggest that the better a person's health status the less they would spend on health care, all else equal.

The vector S represents socio-demographic characteristics which theory suggests have an impact on healthcare expenditures. These include dichotomous variables identifying: gender (male=1); race and ethnicity (White, Black, Hispanic, Asian, and Indian); region (northeast, midwest, west, south); education (high school dropout, high school graduate, some college, and college graduate); and marital status (married,

married previously, or never married). Age is also included in the vector of socio-demographic characteristics. This variable is top-coded at 90.

The vector I represents the income category. Total income is a continuous variable, which sums the following sources of income: wage income, retirement income, self-employment income, social security income, transfer payments, and other income.

In Model 1, “A” equals an expenditure variable indicating the total amount spent on CAM. In Models 2-4 “A” equals one of the dummy variables identifying persons who consume acupuncture, chiropractic care or massage therapy. In model 5 “A” identifies persons who purchased herbal remedies.

Data

The data are derived from the 1998 Medical Expenditure Panel Survey (MEPS). The National Center for Health Statistics and the Agency for Healthcare Research and Quality cosponsored the MEPS data collection process. The MEPS data is a continuation of a series of national surveys that strives to observe changes in the health care industry over time. This dataset also provides national estimates pertaining to healthcare expenditures, healthcare utilization, and payment sources. Such information is intended to evaluate current healthcare policy in the United States.

The MEPS data is comprised of three different files: a Full Year Consolidated File, a Medical Conditions File, and a Jobs File. The data were collected in 1998 and are limited to respondents in the U.S. The full year consolidated file (HC-028) is the foundation of this study’s research. It contains various healthcare expenditure variables along with demographic characteristics such as age, education, income, race, sex and

region of the country. Health status, both physical and mental, is recorded in order to assess the general well-being of the respondent. Other variables in the MEPS data describe medical services, fees, healthcare access, satisfaction with healthcare, and payment sources. [19] The original data set contains 24,072 observations and 1,262 variables.

The data for this analysis are restricted to persons age 17 and older. Observations where marital status is unknown are deleted. Observations that have missing values for physical and/or mental health status are deleted as well. Finally, people with negative total incomes are excluded from the dataset. These restrictions reduce the total number of observations to 16,560. All the variables used in the analyses are defined in Appendix A.

Results

Sample Statistics

The sample statistics in Table 1 compare characteristics of persons who utilize CAM versus those who do not. On average, persons who utilize CAM spend approximately \$2,000 more on overall healthcare expenditures than persons who do not utilize CAM. Also, the total income of those who use CAM is greater than those who do not across the board. The average age of CAM users tends to be in the mid to late forties, slightly older than those who do not use CAM. One of the most striking details is that women consume far more CAM therapies than men.

The results suggest that people with greater amounts of education tend to consume more CAM therapies. Also, whites tend to consume relatively more CAM than

blacks or Hispanics. Surprisingly, Asians are also under-represented among the CAM groups, even for acupuncture.

The group that consumes CAM includes a greater proportion of previously married persons, and smaller proportion of never married persons, than the group with no CAM. There are also differences in the types of CAM therapies chosen by persons of different marital status. Married persons receive a disproportionate amount of chiropractic care, while previously married people tend to select acupuncture, massage, and herbal remedies.

There are pronounced regional differences in the utilization of CAM. People living in the west tend to consume more CAM therapies than people living in other regions. People in the midwest tend to consume more chiropractic care than people in the northeast or south, but people in the west consume more of all types of CAM. Indeed, 63 percent of those who receive acupuncture live in the west.

Table 2 describes the self-reported physical and mental health status of CAM users versus non-CAM users. Both the physical and mental health status of persons who consume CAM tend to be slightly poorer than among those who do not consume any CAM. The results also suggest that people who use acupuncture tend to have poorer physical and mental health than any other group. One may speculate that acupuncture is a therapy of 'last resort'. That is, persons seek acupuncture after other therapies have failed to improve their condition.

Coefficient Estimates for the Health Care Cost Functions

Table 3 reports OLS estimates of the coefficients that relate CAM utilization to traditional healthcare expenditures. Because the natural log is used as the dependent variable, the log points are shown in the table. The percentage effects can be computed by taking the inverse log of the coefficient estimate and subtracting one. That is,

$$\text{Percentage Effect} = e^{\hat{b}} - 1$$

where \hat{b} represents an estimated coefficient. However, any variable that has a coefficient below 0.15 is close to its actual percentage value; a conversion is not necessary.

Model 1 estimates the relationship between traditional health care expenditures, including expenditures on prescription drugs, and total CAM expenditures. The independent variables in this model explain 24 percent of the variation in healthcare expenditures. The variable of main interest is total CAM expenditures. The estimated coefficient is positive and significant, suggesting that CAM is a complement to traditional health care. However, the coefficient is very small, close to 0 percent.

In Models 2-4 the coefficient estimates of the CAM utilization variables are all positive and significant. The dependent variable in these models is the same as in model 1 except prescription drugs are no longer included. The results indicate that people who use acupuncture spend twice as much on traditional healthcare, as people who do not. People who use chiropractic care spend 72 percent more on traditional care and massage therapy users spend 177 percent more. Thus, the results consistently show that CAM therapies and traditional medicine are complementary.

In Model 5 the dependent variable is expenditures on prescription drugs. Here the results suggest that people who use herbal remedies spend 30 percent more on prescription drugs than people who do not use herbal remedies, but this coefficient is only significant at the .10 level. Again, it appears that herbal remedies are used as complements to traditional medicine.

The results for other variables are not the main focus of this paper, but they do reveal some interesting trends. Referring to Model 1, total income is significant but its coefficient is roughly zero, indicating it has very little effect on traditional healthcare expenditures. Age is significant and the data suggest that for every extra year older a person becomes their traditional healthcare expenditures increase by 4 percent. Of particular interest is that males consume 68 percent less on healthcare than women do. Education proves to be an important indicator as well, for higher educated people tend to consume significantly more healthcare than high school graduates. Those people with just some college consumed 72 percent more healthcare than high school graduates, while college graduates consumed 93 percent more. The data also suggest that minorities consume a significantly lower amount of healthcare than whites do. African Americans and Asians consume approximately 56 percent less healthcare than whites do. Hispanics also consume a significantly lower amount of healthcare (63 percent) than non-Hispanics.

The region of the country a person lives also is an important indicator of healthcare expenditures. In model 1 the only significant value is for those people in the midwest who spend 20 percent more on healthcare than people in the south. People who are married also tend to spend significantly more (13 percent) on healthcare than those

who have never been married. Good physical health suggests lower expenditures on healthcare; good mental health has a much smaller positive effect.

Maximum Likelihood Estimates of the Probability of Receiving CAM

Table 4 shows maximum likelihood estimates of the probit models of receiving different types of CAM therapies. Model 1 confirms previous research with respect to education, marital status, race/ethnicity, and sex. Higher education and being previously married have a significantly positive effect on CAM utilization. The probit model also finds that males are significantly less likely to utilize CAM than females. Finally, consistent with previous research whites are more likely to consume CAM than any other racial or ethnic group. A source of disagreement with previous studies arises when we observe the effects of age and income. The probit results for Model 1 show that increasing age and income have a negligible impact on CAM utilization, whereas previous research suggests that higher age and income increases CAM utilization.

Model 1 also evaluates the effects of additional variables on CAM utilization, including region and health status. Here we find that people living in the west are significantly more likely to utilize CAM therapies than people in the south. It is also determined that those people living in the northeast utilize significantly less CAM therapies than people in the south. Those people with better physical health are also shown to be significantly less likely to utilize CAM therapies.

When looking across different forms of CAM therapies, we find that increased age significantly decreases one's chances of utilizing massage therapy, while it significantly increases the chances of utilizing herbal remedies. Increased income is

shown to have a significantly positive impact on massage therapy utilization, although the effect is small. Another notable observation is that living in the northeast has a significantly positive effect when it comes to acupuncture utilization. Finally, the last interesting observation is that persons who utilize chiropractic care have no poorer physical health status than those who do. This is consistent with allegations that chiropractors treat less severe cases than medical doctors, on average. [24]

Conclusion

This study suggests that CAM therapies act as complements to traditional forms of healthcare. Although the percentages may vary, every form of CAM analyzed indicated a complementary relationship to traditional healthcare. One limitation of the research is the absence of more precise objective health measures. Such measures could provide a more accurate assessment with respect to the relationship between CAM utilization and traditional healthcare. Also the MEPS dataset did not provide an individual breakdown of CAM expenditures, which would have been useful.

The probit estimates confirm the conclusions taken from previous research pertaining to education, marital status, race/ethnicity, and sex. Here we find that higher education and being married increase the likelihood of utilizing CAM. Furthermore it is shown that white people and females tend to utilize more CAM therapies than their counterparts. Additionally it is shown that living in the west significantly increases ones' chances of utilizing CAM. The effects of age and income did not parallel those found in previous research, hence their impact on CAM utilization remains debatable.

As mentioned previously, Americans spent an estimated \$27 to \$33 billion on CAM in 1997 [1]. This fact alone warrants additional research pertaining to this issue. Future research should strive to find more precise health measures and more accurate measures of CAM expenditures. Such research is important for it appears that the future growth of CAM therapies is a trend that will not reverse itself.

Table 1. Sample Statistics

	<i>No CAM</i> (<i>n=15,990</i>)	<i>Received CAM</i> (<i>n=570</i>)	<i>Received acupuncture</i> (<i>n=59</i>)	<i>Received chiropractic care</i> (<i>n=99</i>)	<i>Received massage therapy</i> (<i>n=214</i>)	<i>Received herbal remedies</i> (<i>n=242</i>)
Total expenditures	2,245.16 (6,217.51)	4,254.26 (9,620.50)	5,797.46 (14,683.21)	3,112.72 (3,825.48)	4,784.64 (8,105.87)	3,632.20 (5,063.05)
Total Income	13,406.37 (25,104.28)	28,888.96 (25,777.92)	34,699.16 (34,348.15)	26,293.85 (23,714.79)	32,495.73 (28,579.34)	26,300.32 (22,593.37)
Age	43.78 (18.03)	46.07 (15.72)	49.83 (15.57)	44.69 (15.59)	43.48 (14.70)	48.76 (15.49)
Male	0.47 (0.50)	0.27 (0.45)	0.37 (0.49)	0.33 (0.47)	0.27 (0.44)	0.29 (0.45)
Education						
HS dropout	0.27 (0.44)	0.11 (0.31)	0.12 (0.33)	0.10 (0.30)	0.05 (0.21)	0.12 (0.33)
HS graduate	0.33 (0.47)	0.28 (0.45)	0.20 (0.41)	0.37 (0.48)	0.23 (0.42)	0.27 (0.45)
Some college	0.21 (0.41)	0.29 (0.46)	0.27 (0.45)	0.31 (0.47)	0.36 (0.48)	0.29 (0.45)
College graduate	0.19 (0.39)	0.32 (0.47)	0.41 (0.50)	0.22 (0.42)	0.36 (0.48)	0.32 (0.47)
Race						
African American	0.15 (0.35)	0.06 (0.24)	0.07 (0.25)	0.07 (0.26)	0.05 (0.22)	0.04 (0.19)
White	0.80 (0.40)	0.90 (0.30)	0.90 (0.30)	0.92 (0.27)	0.93 (0.26)	0.92 (0.27)
Asian	0.04 (0.20)	0.03 (0.15)	0.03 (0.18)	0.00 (0.00)	0.02 (0.14)	0.02 (0.16)
Indian	0.01 (0.10)	0.01 (0.11)	0.00 (0.00)	0.01 (0.10)	0.00 (0.00)	0.02 (0.13)
Ethnicity						
Hispanic	0.22 (0.41)	0.12 (0.33)	0.14 (0.35)	0.11 (0.32)	0.11 (0.32)	0.15 (0.36)
Region						
Northeast	0.19 (0.39)	0.11 (0.31)	0.17 (0.38)	0.05 (0.22)	0.10 (0.30)	0.09 (0.29)
Midwest	0.20 (0.40)	0.21 (0.41)	0.10 (0.30)	0.27 (0.45)	0.18 (0.38)	0.22 (0.41)
West	0.24 (0.43)	0.40 (0.49)	0.63 (0.49)	0.48 (0.50)	0.50 (0.50)	0.39 (0.49)
South	0.37 (0.48)	0.28 (0.45)	0.10 (0.30)	0.20 (0.40)	0.22 (0.41)	0.30 (0.46)
Marital Status						
Married	0.55 (0.50)	0.56 (0.50)	0.52 (0.50)	0.64 (0.48)	0.52 (0.50)	0.58 (0.49)
Previously married	0.20 (0.40)	0.28 (0.45)	0.36 (0.48)	0.15 (0.36)	0.27 (0.45)	0.30 (0.46)
Never married	0.25 (0.43)	0.16 (0.37)	0.12 (0.33)	0.21 (0.41)	0.21 (0.41)	0.12 (0.33)

Source: Medical Expenditure Panel Survey, 1998.
Standard deviations appear in parentheses.

Table 2. Distribution of Sample by Self-Reported Health Status

	No CAM (n=15,990)	Received CAM (n=570)	Received Acupuncture (n=59)	Received Chiropractic Care (n=99)	Received massage therapy (n=214)	Received herbal remedies (n=242)
Physical Health Status						
Poor	4.18 %	5.96 %	10.17 %	5.05 %	5.61 %	4.96 %
Fair	10.63	14.04	16.95	14.14	13.08	12.40
Good	28.26	27.37	22.03	34.34	25.70	27.27
Very Good	30.05	30.35	32.20	28.28	28.97	34.30
Excellent	26.88	22.28	18.64	18.18	26.64	21.07
Mental Health Status						
Poor	1.94 %	2.98 %	5.08 %	2.02 %	1.87 %	1.65 %
Fair	5.83	7.72	6.78	9.09	6.54	7.85
Good	26.10	27.54	23.73	34.34	26.17	28.51
Very Good	29.30	29.47	30.51	29.29	29.91	34.30
Excellent	36.82	32.28	33.90	25.25	35.51	27.69
<i>Source: Medical Expenditure Panel Survey, 1998.</i>						

Table 3. Coefficient Estimates for Health Care Cost Functions

	<i>Model 1 Total expenditures</i>	<i>Model 2 Acupuncture</i>	<i>Model 3 Chiropractic care</i>	<i>Model 4 Massage therapy</i>	<i>Model 5 Herbal remedies</i>
CAM expenditures	0.0003*** (0.00008)				
CAM utilization		1.10*** (0.35)	0.54** (0.27)	1.02*** (0.19)	0.26* (0.15)
Total Income	4.59 E -5*** (9.16 E -7)	5.20 E -5 (9.44 E -7)	5.23 E -5*** (9.44 E -7)	5.13 E -5 (9.44 E -7)	6.44 E -8 (8.31 E -7)
Age	0.04*** (0.001)	0.04*** (0.001)	0.04*** (0.004)	0.04*** (0.001)	0.05*** (0.001)
Male	-1.14*** (0.04)	-1.11*** (0.04)	-1.11*** (0.04)	-1.10*** (0.04)	-0.95*** (0.04)
Education					
HS dropout	-0.14** (0.06)	-0.15*** (0.06)	-0.15*** (0.06)	-0.15** (0.06)	-0.13*** (0.05)
Some college	0.54*** (0.06)	0.56*** (0.06)	0.55*** (0.06)	0.55*** (0.06)	0.35*** (0.05)
College graduate	0.66*** (0.06)	0.68*** (0.06)	0.69*** (0.06)	0.68*** (0.06)	0.32*** (0.06)
Race					
African American	-0.80*** (0.06)	-0.84*** (0.06)	-0.84*** (0.06)	-0.83*** (0.06)	-0.62*** (0.06)
Asian	-0.87*** (0.11)	-0.81*** (0.11)	-0.81*** (0.11)	-0.80*** (0.11)	-0.84*** (0.10)
Indian	-0.32 (0.20)	-0.35* (0.21)	-0.36* (0.21)	-0.34 (0.21)	-0.07 (0.18)
Hispanic	-0.99*** (0.06)	-0.96*** (0.06)	-0.96*** (0.06)	-0.96*** (0.06)	-0.67*** (0.05)
Region					
Northeast	0.08 (0.06)	0.19*** (0.06)	0.19*** (0.06)	0.20*** (0.06)	-0.23*** (0.05)
Midwest	0.18*** (0.06)	0.22*** (0.06)	0.21*** (0.06)	0.22*** (0.06)	-0.05 (0.05)
West	0.09 (0.05)	0.16*** (0.06)	0.16*** (0.06)	0.15*** (0.06)	-0.16*** (0.05)
Marital Status					
Married	0.13** (0.06)	0.09 (0.06)	0.09 (0.06)	0.09 (0.06)	0.03 (0.05)
Previously married	-0.04 (0.07)	-0.06 (0.08)	-0.05 (0.08)	-0.06 (0.08)	-0.05 (0.07)
Health Status					
Physical	-0.60*** (0.02)	-0.55*** (0.03)	-0.55*** (0.03)	-0.55*** (0.03)	-0.68*** (0.02)
Mental	0.05* (0.03)	0.07** (0.03)	0.07** (0.03)	0.07** (0.03)	-0.02 (0.02)
<i>Adj. R-Squares</i>	0.24	0.20	0.20	0.20	0.30
<p><i>Notes:</i> In Model 1 the dependent variable is the natural log of total healthcare expenditures. In Models 2-4 the dependent variable is the natural log of total non-Rx healthcare expenditures. In Model 5 the dependent variable is the natural log of Rx expenditures. ***=0.01 significance level, **=0.05 significance level, *=0.10 significance level. Standard errors appear in parentheses. N=16,560</p> <p><i>Source:</i> Source: Medical Expenditure Panel Survey, 1998.</p>					

Table 4. Maximum Likelihood Estimates of the Probability of Receiving Alternative Care

	<i>Model 1 All CAM</i>	<i>Model 2 Acupuncture</i>	<i>Model 3 Chiropractic care</i>	<i>Model 4 Massage therapy</i>	<i>Model 5 Herbal remedies</i>
Male	-0.37*** (0.04)	-0.09 (0.10)	-0.20*** (0.08)	-0.35*** (0.06)	-0.27*** (0.06)
Age	-0.0006 (0.001)	0.003 (0.003)	-0.0009 (0.003)	-0.004** (0.002)	0.004** (0.002)
Total Income	1.09 E-6 (7.54E-7)	1.56 E-6 (1.47 E-6)	6.29E-7 (1.44 E-6)	2.05 E-6** (9.78 E-7)	-1.18 E-6 (1.12 E-6)
Education					
HS dropout	-0.31*** (0.07)	-0.11 (0.16)	-0.34*** (0.13)	-0.48*** (0.12)	-0.25*** (0.09)
Some college	0.20*** (0.05)	0.22 (0.14)	0.08 (0.09)	0.30*** (0.07)	0.20*** (0.07)
College graduate	0.33*** (0.05)	0.41*** (0.13)	0.02 (0.11)	0.36*** (0.08)	0.34*** (0.07)
Race					
African American	-0.40*** (0.07)	-0.18 (0.18)	-0.25* (0.14)	-0.39*** (0.11)	-0.52*** (0.12)
Asian	-0.40*** (0.12)	-0.24 (0.25)	-4.83*** (4631.60)	-0.55*** (0.20)	-0.33** (0.17)
Indian	0.07 (0.19)	-4.65 (8864.2)	-0.064 (0.39)	-5.05 (5,470.80)	0.18 (0.22)
Hispanic	-0.28*** (0.06)	-0.16 (0.14)	-0.30** (0.12)	-0.28*** (0.09)	-0.11 (0.08)
Region					
Northeast	-0.15** (0.06)	0.36** (0.17)	-0.24 (0.16)	-0.08 (0.10)	-0.25*** (0.09)
Midwest	0.04 (0.06)	0.14 (0.18)	0.22** (0.11)	0.06 (0.09)	0.03 (0.07)
West	0.35*** (0.05)	0.75*** (0.14)	0.49*** (0.10)	0.49*** (0.07)	0.24*** (0.06)
Marital Status					
Married	0.08 (0.06)	0.10 (0.15)	0.03 (0.10)	-0.003 (0.08)	0.17** (0.08)
Previously married	0.22*** (0.07)	0.34** (0.17)	-0.15 (0.14)	0.19** (0.10)	0.30*** (0.10)
Health Status					
Physical	-0.07*** (0.02)	-0.12** (0.05)	-0.07 (0.04)	-0.09** (0.03)	-0.008 (0.03)
Mental	-0.04 (0.02)	0.02 (0.06)	-0.07 (0.05)	-0.0005 (0.04)	-0.06* (0.03)
Log Likelihood	-2,270.78	-345.77	-556.30	-1,010.39	-1,171.30
***=0.01 significance level, **=0.05 significance level, *=0.10 significance level Standard errors appear in parentheses. N=16,560 Source: <i>Source: Medical Expenditure Panel Survey, 1998.</i>					

Appendix A. Variable Definitions

<p>Dependent Variables</p> <p>Total Expenditures</p> <p>Total Non-Rx Expenditures</p> <p>Total Rx Expenditures</p>	<p>Total healthcare expenditures, including prescription drugs.</p> <p>Total healthcare expenditures excluding prescription drugs expenditures.</p> <p>Total healthcare expenditures on prescription drugs.</p>
<p>CAM Expenditures</p> <p>Total CAM Expenditures</p>	<p>Total healthcare expenditures on CAM care including devices.</p>
<p>Alternative Care Dummies</p> <p>Acupuncture</p> <p>Chiropractic Care</p> <p>Massage Therapy</p> <p>Herbal Remedies</p>	<p>1=person saw an acupuncturist.</p> <p>1=person saw a chiropractor.</p> <p>1=person saw a massage therapist.</p> <p>1=person purchased herbal remedies.</p>
<p>H: Health Status Variables</p> <p>Physical Health Status</p> <p>Mental Health Status</p> <p>S: Socio-demographic characteristics</p> <p>Age</p> <p>Sex</p> <p>HS Dropout</p> <p>HS Graduate</p> <p>Some College</p> <p>College Graduate</p> <p>African American</p> <p>White</p> <p>Asian</p> <p>Indian</p> <p>Hispanic</p> <p>Northeast</p> <p>Midwest</p> <p>West</p> <p>South</p> <p>Married</p> <p>Previously Married</p> <p>Single</p> <p>I: Income</p> <p>Total Income</p>	<p>Categorical 1-5, 1 being the poorest, 5 the best.</p> <p>Categorical 1-5, 1 being the poorest, 5 the best.</p> <p>Age of person in 1998, top-coded at 90.</p> <p>1=Male.</p> <p>1=Did not graduate from high school.</p> <p>1=Did graduate from high school, no college.</p> <p>1=Received some college.</p> <p>1=Graduated from college.</p> <p>1=Person is African American.</p> <p>1=Person is white.</p> <p>1=Person is Asian.</p> <p>1=Person is either Indian or Eskimo.</p> <p>1=Hispanic.</p> <p>1=Resides in northeastern U.S.</p> <p>1=Resides in midwestern U.S.</p> <p>1=Resides in western U.S.</p> <p>1=Resides in southern U.S.</p> <p>1=Married.</p> <p>1=Previously married.</p> <p>1=Never married.</p> <p>Total Annual Income of individual, 1998.</p>

Source: Medical Expenditure Panel Survey, 1998.

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