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**PATTERNS AND PREDICTORS OF COMPLEMENTARY AND ALTERNATIVE
THERAPY USE IN A CANCER POPULATION: A SECONDARY ANALYSIS
OF THE 2002 NATIONAL HEALTH INTERVIEW SURVEY**

By

Judith M. Fouladbakhsh

A DISSERTATION

**Submitted to
Michigan State University
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ABSTRACT

PATTERNS AND PREDICTORS OF COMPLEMENTARY AND ALTERNATIVE THERAPY USE IN A CANCER POPULATION: A SECONDARY ANALYSIS OF THE 2002 NATIONAL HEALTH INTERVIEW SURVEY

By

Judith M. Fouladbakhsh

This secondary analysis of data from the 2002 National Health Interview Survey has determined factors that predict the use of complementary and alternative medicine (CAM) therapies in the United States cancer population, and patterns of use of CAM providers, practices, and products. The CAM Healthcare Model, a modification of Andersen's Behavioral Model for Health Services Use, guided the study. Predisposition to use CAM provider services, practices, and products, factors that enabled or impeded use, and need for care factors were examined with respect to CAM use for treatment and/or for health promotion purposes. Multivariate analysis has identified characteristics that distinguish CAM users from non-users in the U.S. cancer population thereby extending what has been reported in the research literature. Analysis using STATA 9.2 software has allowed for determination of significant predictors of overall CAM use and use of specific categories of CAM in the estimated U.S. cancer population of more than 14.3 million individuals who have been diagnosed with cancer. The patterns of CAM use have been compared among recent and long-term cancer survivors. The empirical findings confirm that overall CAM use in the cancer population was more prevalent among female, middle-aged, white, and well-educated people. Data further reveal that women were specifically more likely to use CAM practices, but not more likely to use

providers or products than men. Those with private insurance were more likely to use only CAM providers. Higher income, contact with nurse practitioners, physician assistants, therapists, and mental health professionals, and presence of symptoms and co-existing co-morbidity were strong predictors of CAM use in the cancer population.

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CHAPTER 1

INTRODUCTION, SIGNIFICANCE AND CONCEPTUAL FRAMEWORK

Introduction

Complementary and alternative medicine (CAM) therapies are widely used across the United States (U.S.) by healthy individuals and by those experiencing illness. Data indicate that those with cancer and/or chronic disease often seek CAM as a form of complementary treatment to promote health, treat illness and manage related symptoms and functional limitations. It is anticipated that CAM use will continue, thus reflecting changes in health care behavior with the potential to effect use of conventional health services (Astin, 1998; Barnes, Powell-Griner, McFann & Nahin et al., 2004; Eisenberg, Davis, Ettner, Appel, Wilkey, van Rompay, et al., 1998; Ernst & Cassileth, 1998; Richardson & Straus, 2002; Wolsko et al., 2003).

Trends

Trend data from population studies have revealed a continuing increase in CAM use over the past decade, with visits to CAM providers surpassing number of visits to conventional primary care providers in the US. Uses of CAM health products, such as herbs and vitamins, have increased by 380% and 130%, respectively. Increases have also been noted in the use of massage, self-help groups, folk remedies, energy healing and homeopathy (Eisenberg et al., 1998; Barnes et al., 2004). In contrast, however, other survey data have revealed lower percentages of use than the seminal work of Eisenberg and colleagues (Druss & Rosenheck, 1999). These inconsistencies may be attributed to the operational definition of CAM, and the varying list of therapies included for study.

Whereas some studies examine a very extensive array of provider services, product use and self-care practices, other studies may solely focus on use of CAM providers. In addition, findings may vary due to different sampling procedures and research methodology, for example, use of face-to-face interviews versus telephone surveys, and differences in socioeconomic status of the original populations studied (Bausell, Lee & Berman, 2001; Druss & Rosenheck, 1999). Hence, one must acknowledge that limitations in comparing prevalence and patterns of CAM use exist across studies.

Data from the National Health Interview Survey (NHIS, 2002) also support widespread CAM use, revealing that 75% of the US population used CAM during their lifetime, 62% using within the preceding year (Barnes et al., 2004). In the NHIS dataset, CAM use is determined by responses to items asking about 22 different CAM provider services, practices and products, including use of prayer for health reasons (Table 1). Frequently used CAM therapies included personal prayer (43%), prayer by others (24%), natural products (19%), deep breathing exercises (12%), participation in a prayer group (10%), meditation (8 %), yoga (5%), massage (5 %), and diet-based therapies (4%). When prayer for health reasons was excluded in the NHIS analysis the percent of the population using CAM within the preceding year decreased from 62% to 36%. Tindle, Davis, Phillips and Eisenberg (2005) have reported that the prevalence of CAM use between 1997 and 2002 has remained consistent. Cost for CAM use, most often requiring out-of-pocket expenditures, has been estimated to range from \$27 to \$47 billion per year (Barnes et al., 2004; Eisenberg et al., 1998).

Data from smaller scale cross-sectional studies also reveal widespread use of CAM across urban, suburban and rural communities. Data revealed that 76% of

community residents used CAM therapies, products, and practices for the self-treatment of pain, often without informing their primary care providers. CAM therapies used to manage pain included yoga, massage, relaxation, prayer, meditation and chiropractic treatment (Vallerand, Fouladbakhsh & Templin, 2003). Studies examining different arrays of CAM therapies and practices among diverse groups also support increasing prevalence of CAM use worldwide. Varying estimates range from 38% in Belgium, 47% in the United Kingdom, 48% in Australia, 70% in Canada to 75% in France (Lewith, Broomfield, & Prescott et al., 2002; World Health Organization, 2004).

Importance for Study

Given the apparently widespread use and rising popularity of CAM therapies, it is important to more fully understand who uses CAM and for what purposes. In order to do so, it is imperative to clearly identify what is included in the operational definition of CAM. Only then will we be able to sort the predictors of use of CAM provider services, products and practices to determine similarities and differences among diverse populations of users. This information will then be available for nurses, physicians, and other conventional healthcare providers caring for individuals who are CAM users. Ultimately, this will increase our understanding of how CAM interfaces with the use of conventional healthcare services, and its' influence on healthcare outcomes.

Definitions and Categorization of CAM

NCCAM Categorization

The National Center for Complementary and Alternative Medicine (NCCAM) within the National Institutes of Health defines CAM as a group of diverse medical and health care systems, practices, and products that are not presently considered to be a part

of conventional medicine. A *complementary therapy* is defined as a selected therapeutic method, product, or treatment by a practitioner *used in combination with* conventional mainstream medicine as a health service for patients. *Alternative therapy* is defined as a selected therapeutic method, product or treatment by a practitioner *used in place of* conventional medical therapy (NCCAM, 2004). Distinguishing between a complementary therapy and alternative therapy requires examination of the context of use, and whether the CAM user is seeking services or products for health reasons outside of the conventional health service sector. For example, herbs used *in place of* pharmaceutical products would be considered alternative, whereas herbs *used in combination with* pharmaceutical products would be considered complementary. The task of determining whether individuals use nonconventional therapies instead of, or in addition to, conventional biomedical treatments is not possible in the NHIS, hence the term CAM is used throughout this dissertation. The NCCAM categorization of CAM includes four areas and one overarching domain that include the following:

1. *Mind-body therapies*: behavioral, social, psychological and spiritual approaches to health, e.g., yoga, Tai Chi, meditation, hypnosis
2. *Biological-based therapies*: natural and biologically-based products, practices and interventions, e.g., herbs, supplements, diet therapy
3. *Manipulative and body-based systems*: systems based on manipulation and/or movement of the body, e.g., massage, Feldenkrais
4. *Energy therapies*: systems that use subtle energy fields in and around the body to promote healing, e.g. Healing Touch, Therapeutic Touch, acupuncture, Reiki

5. *Alternative medical systems*: this overarching domain, that may include therapies within the other four areas, is defined as complete systems of theory and practice developed outside of a western, conventional biomedical approach to health and illness, e.g., homeopathy, naturopathy, traditional Chinese medicine (Table 2)

The NCCAM categorization is one means of dividing up the vast array of therapies and practices inherent within the definition of CAM. It does not, however, allow for the distinction of therapies based upon use or non-use of a provider that delivers services. In addition, it must be noted that the current categorization does not fully acknowledge the overlap that occurs among the categories. For example, yoga and Tai Chi, listed as mind-body therapies, are also based on the principle of energy flow, i.e., chi, through the body to promote healing. Hence, limiting these CAM practices to one category is not fully explanatory. Since this dissertation views CAM within a health service-health practice framework, an alternative categorization will be used.

Alternative Categorization

Whereas many CAM therapies require services of practitioners, others are readily available for self-directed use by consumers for health related purposes. Thus, for this dissertation an alternative categorization of CAM is utilized (Table 3). CAM is conceptualized from a health service-health practice perspective, and it includes the following categories:

1. *CAM health services* (individual and group) provided by CAM practitioners, e.g., acupuncture, massage, naturopathic, and chiropractic treatment

2. *CAM products and resources* such as herbs, supplements, essential oils, self-help manuals, books, and other instructional materials
3. *CAM health practices* (individual and communal), such as meditation, yoga practice, breath work, and use of music

These categories are not considered mutually exclusive (Figure 1) as CAM practices and products are often used and recommended by CAM providers. This alternative categorization will allow for more specific identification of the category of CAM that is used for illness treatment as compared to health promotion, among those with and without illness.

Purpose for CAM Use

CAM, an area of great complexity, is viewed as a form of health care that includes services and therapies provided by CAM practitioners and an extensive array of products and practices that can be used independently for self-care. Although not very different from self-care in conventional medicine, what differs may be the purpose, focus, and resources available for self-care in CAM. The author postulates that this difference may be related to the philosophical premise of CAM that places greater responsibility for healing on the individual. This premise differs from conventional health care where the burden of responsibility rests with the physician. Thus, CAM in essence may encourage self-care and health promotion for those who are healthy. CAM is also viewed as meeting a need for symptom management that exists among those with chronic illness where no cure through conventional medicine is possible. Hence, it is imperative to understand benefits and risks of long-term use, impact on cost of care, and health outcomes of CAM use.

Interface: CAM and Conventional Healthcare

The pattern of increasing CAM use by those with or without illness calls attention to the need for information about the interface of CAM use with conventional health services utilization. The potential effect of CAM use on the delay, disruption, or enhancement of conventional health service use for illness prevention, health promotion, diagnosis, and treatment remains largely unexplored. CAM therapies, when used concurrently with conventional health care services must be evaluated for (a) potential positive and negative interactions with conventional biomedical and pharmaceutical treatment, (b) levels of effectiveness, and (c) influence of CAM use on concurrent use of conventional health services. In addition, the converse should also be examined: How does the lack of access to and cost of conventional health services influence the use of CAM? Emerging results indicate significant differences in use of CAM therapies between those reporting and those not reporting difficulty obtaining medical care because of cost (Pagan & Pauly, 2005).

Changes in policy and research funding priorities at the local and national level further validate increasing CAM prevalence and potential impact on conventional health care delivery. Continuing demand for the development of guidelines for CAM use in diverse populations is evident. Thus, as an increasing number of CAM users present for conventional health services, and as healthcare systems throughout the nation explore the benefits and risks of integrating CAM therapies as a health service option, it becomes imperative to understand the following:

1. Characteristics of users

2. Patterns of use (visits to CAM practitioners, and self-directed use of CAM health practices and products)
3. Factors that predict who will use this complementary form of healthcare across diverse populations (what increases likelihood of CAM use)
4. Purpose of CAM use (health promotion, illness/symptom treatment)

In summary, the increasing prevalence of CAM has created a need to identify predictors, patterns, and purposes of use among diverse populations. The aim of this dissertation was to identify characteristics of CAM users, as well as factors associated with use in the U.S. cancer population. Information from this study will increase our understanding of CAM use, and promote early recognition of CAM users. Data may also serve to inform the integration process as CAM becomes more available in conventional healthcare settings. Further, detailed understanding of patterns of use can illuminate areas for CAM effectiveness research. Overall, identification of characteristics, predictors and patterns of use is viewed as vital to promoting quality health care and maximizing positive health outcomes among those who choose to use CAM (Fouladbakhsh, Stommel, Given & Given, 2005; Jordan & Delunas, 2001; Ott & Lynch, 2002).

Conceptual Framework

Overview of the Behavioral Model for Health Services Utilization

The Behavioral Model for Health Services Utilization is a theoretical framework with a consistent and longstanding ability to guide research that examines factors related to utilization of conventional health services and resources (Aday & Andersen, 1974; Aday & Awe, 1997; Andersen, 1995; Andersen & Newman, 1973; Andersen, 1968). The

Behavioral Model uses the individual as the unit of analysis, with societal determinants (technology and norms), and the health services system (resources and organization) as aggregate determinants of an individual's health-care-seeking behavior (Awe & Aday, 1997; Andersen & Newman, 1974).

The Behavioral Model proposes that the use of health services is a function of individual determinants identified as: (a) predisposing variables - an individual's propensity to use services; (b) enabling variables - the means an individual has available for the use of health services, and (c) need variables - the individual's need for care (Andersen & Newman, 1974; Andersen, 1995). The outcome of the utilization of conventional healthcare services and resources is quality of life (Andersen, 1995). Predisposing variables include demographic characteristics such as gender, age, and marital status, social structure attributes identified as education, race, ethnicity and employment, and health beliefs as indicated by individual values and attitudes about health services, good health, physician services, and health insurance. The primary focus of the Behavioral Model, in general, and the predisposing variables, in particular, is on factors that influence the demand for services, about which information can usually be gathered through survey methods.

Enabling variables identified in the model are those conditions or factors that allow (enable) or impede use of health services. Included are resources specific to individuals and families that may potentially influence conventional health service use such as income, health insurance, employment, and regular source of care. Also viewed as potential predictors of health service use are community attributes, such as physician and hospital bed ratios, and region of the country. In addition, place of residence, e.g.,

urban or rural, influences proximity to sources of conventional health services, and may be considered as a factor affecting utilization.

The theoretical construct of need variables in the Behavioral Model includes both evaluated and perceived need. Evaluated need refers to objective measurable indicators of health status, such as actual diagnostic reports, symptom severity measurement, and treatments received. Perceived need refers to the individual's perception of health status and illness state, as measured by perception of health scales scores, and other perceived health status indicators. Need for care has also been measured through: (a) presence of illness (symptoms, limitations, number of days disabled, etc.), (b) individual's responses to illness (going to a physician, clinic visits, etc.), and (c) measures taken to prevent illness and maintain health (physician exams, etc.) (Aday & Awe, 1997).

The Behavioral Model was developed to measure the effect of individual determinants on the utilization of conventional health services by individuals and families. Health services are defined as those services provided by physicians, nurses, and other health care practitioners at conventional care settings, such as physician offices, hospitals, outpatient clinics, and emergency departments, for preventative, curative, and restorative health care. Model revisions, over time, have also allowed for the study of access to health care services and utilization patterns, among general and vulnerable populations.

The CAM Healthcare Model: Rationale for Model Revisions

The CAM Healthcare Model has been developed by the author as an extension or modification of the Behavioral Model of Health Services Use for research on CAM use. The CAM Healthcare Model is shown in its entirety in Figure 2, and is discussed from a

theoretical perspective. Recognizing that not all the model variables were available in the NHIS 2002 dataset, the full model was subsequently modified as reflected in Figures 3 and 4. For this dissertation research, the model shown in Figure 4, which is specific to cancer, was used. This progression from the full model to a more limited version reflects the process of model development used for this research. Although the entire CAM Healthcare Model (Figure 2) was not used, it is anticipated that it will guide future CAM research endeavors.

Studies focused on CAM are increasingly noted in the literature with widespread variations in findings related to patterns and predictors of use. A conceptual framework is needed at this time to guide CAM research so that more consistency and comparability exists across studies, thereby strengthening findings. The CAM Healthcare Model was employed to increase understanding of CAM utilization to promote health, prevent disease, treat illness, and manage symptoms in a cancer population (Figure 4). This model conceptualizes CAM within a health service utilization framework, hence the applicability of the Behavioral Model constructs. The Behavioral Model however is modified to include all aspects of CAM use (Table 3). Primarily, the CAM Healthcare Model differs from the original Behavioral Model at the level of health services use. The CAM Model includes utilization of health services AND/OR health practices. As depicted in Figure 1, the use of resources and products is noted to overlap with both health services and health practices.

The inclusion of CAM health practices in the revised model reflects emphasis on a self-directed (self-care) component of health care that is viewed as an internal individual resource for health. Self-care behavior is also a vital component within

conventional health care, as noted by the vast array of pharmaceutical products and medical supplies available to consumers. Conventional self-care behavior, however, is most often based on previous contact with and recommendations from conventional healthcare providers, for example, doctors who guide diabetic care and pharmacists who are available in community-based retail sites for over-the-counter sales. Inherent within the CAM Healthcare model is a higher level of personal involvement in the self-directed component of CAM health practices. Decisions to use CAM are often in opposition to established healthcare norms, and often used without conventional provider awareness (American Society of Radiation Oncology, 2005; Giveon, Liberman, Klang & Kahan, 2003; Vallerand, Fouladbakhsh & Templin, 2003). CAM health practices generally require intense self-directed information seeking from a myriad of sources, and often include an expanded sense of personal involvement in health and the healing process. Frequently, emphasis is placed on the promotion of health to maintain an existing state of wellness. This is notably different when contrasted with the predominant treatment-focused, “let’s promote a return to wellness” approach of conventional medicine. Thus, the Behavioral Model is modified in the “use of health services” construct to include both of the following: use of CAM health services (provider required or provider directed) and use of CAM health practices (provider not required/self-directed). Direct and indirect relationships among the model variables will be examined to identify factors predicting use of CAM provider services, products and health practices in the study sample.

Defining CAM in a Health Service-Health Practice Framework

Health service is defined as the assessment, treatment and/or referral for treatment of medical/health conditions provided by physicians, nurses and other healthcare

practitioners. Standards for conventional health services are mandated, as are certification and/or licensing of providers with established mechanisms of control. Within the CAM world, variation still exists in defining what CAM actually is, and who the providers are. Licensing and credentialing exists in some areas, but may be lacking in others, as are standards and guidelines for practice. Differences exist in what may be designated as a CAM therapy or practice. It is evident in the research literature that a widely varying selection of therapies, services, products, and practices are studied under the label of CAM. Disagreement occurs over, e.g., the inclusion of prayer as a CAM practice, with inclusion in some studies, but not others. Thus, one might ask whether prayer, something that is inherent within religions across the world, is indeed a complementary or alternative health therapy or practice. How is prayer, albeit personal or not, defined? What is termed CAM also differs now that conventional healthcare systems have started to integrate nonconventional therapies into their health service options. Is massage no longer a CAM therapy now that it is offered to hospitalized patients? These are just a few of the questions raised in the literature about defining CAM in research and practice. Another health service perspective considers dollars spent on CAM health care. CAM health services and products are “purchasable” from providers, whereas CAM practices are not, although they may involve the “purchase” of instruction and/or guidance through service providers and/or the purchase of products. Thus one may conclude that given the variation that exists within CAM, defining CAM within a health services context is challenging.

Therefore, the conceptual model developed for this dissertation defines CAM with a dual nature that consists of health services and health practices, respectively

provider-directed CAM and *self-directed CAM* (Figure 1). Viewing the *self-directed* health practices as an *internal resource* of the individual for health and healing allows for use of the Behavioral Model of Health Services Utilization (Figure 2) that is modified for this dissertation (Andersen, 1995). Although internally driven, *self-directed CAM* often involves *external resources*, such as the purchase of vitamins, herbs, and other products, and/or information seeking. *External resources* and CAM practices are also recommended and used by providers in the delivery of CAM health services as depicted in the overlapping area of products and resources in Figure 1.

Whether patients are using CAM as a health service, i.e., seeking services from a CAM provider, or using CAM, as a health practice/self-care activity requires distinction for several reasons. First and foremost is the issue of what constitutes CAM. Often viewed as natural therapies, the complexity of CAM is frequently underestimated. Thus, the potential for harmful interactions, as well as positive effects, may not be considered fully. *Provider-directed CAM* use allows for supervised health care, whereas *self-directed* use does not. Using a CAM provider may promote use of the client's medical health history information and coordination of health services with conventional health care providers. Ultimately, however, whether *provider-directed* or *self-directed*, CAM use is viewed as having the potential to affect the provision, cost and quality of conventional health services. This may result from (a) positive therapeutic effects of CAM that decrease need for conventional health services, (b) delay in seeking conventional treatment as one tries CAM first, and (c) potential negative interactions and adverse events resulting from concurrent and unrecognized use of CAM products and practices with conventional treatments. In addition, the CAM trend can be viewed as a

healthcare movement that is altering the relationships among the public and the medical community, in essence challenging the authority of medical expertise. In this sense, even those CAM practices and products not viewed as a health service in the traditional sense because of the absence of a provider, are presenting a challenge to the conventional health service sector.

The CAM Healthcare Model: Model Constructs

Aggregate Level Determinants

Societal determinants in relation to CAM health care behavior include increased acceptance of CAM use and availability throughout the US. The acceptability of certain CAM therapies and practices is evidence of an emerging aggregate level norm, as noted by, but not limited to: (a) Media coverage, e.g., advertisements, news articles, television commercials, (b) CAM therapy availability at health care facilities, (c) course offerings in schools of medicine, nursing, pharmacy, and health sciences, and (d) programs in integrative medicine. Technological advances, most notably the Internet, allow for rapid access to CAM providers, products and health practice information for self-directed use. Integration of CAM into conventional health-care delivery systems, and CAM reimbursement by health insurance companies are also powerful aggregate level determinants that influence CAM utilization.

Individual Determinants

The CAM Healthcare Model, although retaining all of the individual determinants, further extends and adds to the original Behavioral Model by including variables and potential empirical indicators that are considered to be specifically related to CAM use of provider services and self-directed health practices (Figure 2).

Predisposing variables.

The full CAM Healthcare Model (Figure 2) includes six categories of predisposing variables as noted below. Variables and potential indicators that specifically refer to CAM are included in the model and are noted with an asterisk.

1. Demographic characteristics (indicators: gender, age and marital status)
 2. Social structure attributes (indicators: education, race, ethnicity, employment, community lifestyle,* and cultural practices*). Culture of origin and culture of community living are both viewed as having the potential to influence individual or family predisposition to use CAM.
 3. Health beliefs (indicators: values and attitudes about good health, responsibility for health care,* and CAM practitioners, health practices, and products*)
 4. Risk perception* (indicators: illness perception* and CAM perception*). Illness perception includes perceived risk and perceived severity of illness and perceived healthcare options. CAM perception includes perceived safety, perceived efficacy, and perceived acceptability of CAM health services, practices and products.
 5. Personal Knowledge* (indicators: level of CAM knowledge* and verbalized need for CAM information*)
 6. Personality characteristics* (indicators: measures of self-efficacy*, risk-taking ability*, perception of control*, and self-care propensity)
- (Figure 2).

Enabling variables.

The full CAM Healthcare Model (Figure 2) retains the same *enabling variables* identified in the Behavioral model of resources and community attributes. Specific potential empirical indicators relevant to CAM health services, products and health practices are defined for the enabling variables as follows:

1. Resources (personal and other) (potential indicators: income, health insurance, CAM health coverage, employment, regular source of conventional healthcare, and regular source of CAM health care*)
2. Community attributes (potential indicators: geographic location and availability/access to CAM resources*). Specifically, measurable indicators for geographic location include region of the US, and community of living defined as rural, urban and suburban neighborhoods. Availability and access refers to presence of CAM within a community, for example, CAM provider services offered within conventional healthcare systems, CAM practices offered at community centers, and CAM product availability in retail stores. Access to other CAM users is also viewed as important, as word of mouth recommendations and referrals (referral network) may prompt and facilitate CAM use (Figure 2).

Need variables.

Need variables in the CAM Healthcare Model are defined under the middle range level construct of “illness experience” (Figure 2). Potential evaluated need indicators that can be examined for association with CAM use include morbidity diagnosis, such as cancer and chronic illness. Potential evaluated need indicators can be further delineated

among those with cancer by examining cancer site, stage, symptoms and treatment as related to CAM use. Evaluated need indicators to measure relationship between chronic illness and CAM use include diagnosis, symptoms and treatment. Perceived need indicators include reported perception of health status, and perceived need for CAM*. Determining variations in CAM use by specific illness states is an anticipated future use of the CAM Healthcare Model.

CAM use – outcomes of care

The model construct of health service use in the Behavioral model is modified in the CAM Healthcare Model to include *self-directed* CAM use, as well as *provider-directed* health services. Thus, the theoretical level construct for the CAM Model is changed to CAM Health Service – Health Practice Use (Figure 2). Potential empirical indicators in the CAM Healthcare Model for this construct include visits to CAM providers, * use of CAM products and resources, * and use of CAM health practices. * The outcome variable of the Behavioral model, quality of life, although not included in this study, remains the same in the comprehensive CAM model (Figure 2), as this is also the desired result of CAM health care interventions. Improved quality of life for an illness experience of cancer and/or chronic disease is reflected in health promotion and illness treatment. Whether health is promoted and illness treated can be measured through the following potential empirical indicators of improved quality of life: decreased symptom, increased sense of well-being, decreased functional limitations, increased satisfaction, diagnostic verification of condition improvement and increased perception of control over health as noted in the model (Figure 2). Thus, conceptualizing CAM within a health service - health practice perspective, the revised model (Figure 2):

1. Uses the major constructs within the Behavioral Model as factors influencing utilization of CAM
2. Adds potential empirical indicators specific to CAM (highlighted above)
3. Modifies the Behavioral model so *self-directed* CAM health practice and product use is included as well as *provider-directed* CAM use under the model construct of use of services and health practices

It must be noted that the CAM Healthcare Model is an attempt to identify in a consistent manner those factors that are related to the use of CAM services, products, and practices. The new model incorporates all of the factors from the original behavioral model to examine their effect on CAM utilization in a systematic way. In addition, the CAM Healthcare Model extends the original model by adding those empirical indicators that are *proposed* as potential factors influencing CAM use (noted above by asterisk*). These have been added based on the CAM literature and clinical expertise of the author. The self-directed aspect of care that is inherent within CAM is emphasized in the new model. Further, categorizing CAM as use of provider services, practices, and products will allow for examination of differences in predictors of use in these categories. Thus, the extended model should help identify more specific information about CAM use in the selected populations.

In sum, extensive research related to the use of conventional health services using the Behavioral Model has been documented in the literature. Use of complementary and alternative medicine as a health service has received less attention. Studies documenting predictors of CAM use are emerging in the research literature, however theory predicting the use of CAM health services and practices is lacking. Development of a conceptual

model to explain and predict CAM use is a needed innovation at this time of change in health care service utilization. The CAM Healthcare Model, by identifying measurable empirical indicators associated with use of CAM, may serve to guide CAM research and clinical practice. The desire to use the Behavioral Model is motivated by the apparent strength of its structure, and applicability to modification for a variant form of health care. The CAM Healthcare Model aims to provide a uniform categorization system that will promote comparison across studies on CAM. In addition, the model aims to increase understanding about the relationships among factors associated with CAM use. To reiterate, Figure 3 represents a further delineation of the CAM Healthcare Model for use with the NHIS 2002 dataset. The model further becomes more specific in Figure 4 for use with the cancer population within the 2002 NHIS dataset. The three model figures show progressive steps that make the model usable for specific purposes.

Using the CAM Healthcare Model with the NHIS 2002 Dataset

The CAM Healthcare Model was used in this research to identify potential predictors of CAM use in the U.S. cancer population using the NHIS 2002 dataset. The estimated cancer population included recent cancer survivors (individuals with a cancer diagnosis within the year preceding the NHIS interview) and long-term survivors (individuals with a cancer diagnosis more than one year before the interview). Preliminary review of the 2002 NHIS dataset revealed that not all empirical indicators identified in the CAM Healthcare Model were available for analysis. Hence, this dissertation research examined variables in the model in relationship to CAM use in the cancer population (Figure 4). The variables used in the analysis are listed in Table 4, and identified as follows: *predisposing variable* – gender, age, marital status, education and

race; *enabling variable* – income, insurance status, provider connection (contact with a conventional healthcare provider); *need variables* – recent cancer diagnosis, primary cancer site, pain, fatigue, depression, co-existing co-morbid conditions, and reported health status. The outcome of the study was CAM use for treatment and health promotion purposes, rather than quality of life as depicted in the full CAM Healthcare Model.

Purpose of the Study

This dissertation research has extended what is known about CAM use in the U.S. cancer population. CAM use has been examined by aggregating use of all CAM therapies, and by regrouping CAM use within the alternative categorization proposed. Thus, patterns of use of provider services, use of products and use of practices have been examined separately. This research aimed to:

1. Identify attributes and characteristics that distinguish CAM users from non-users in a cancer population.
2. Compare and contrast patterns of CAM use among *recent cancer survivors* (cancer diagnosis during preceding 12 months), and among *long-term survivors* (cancer diagnosis more than one year ago).
3. Examine how the type of cancer, time since diagnosis, symptoms experienced, presence of co-morbid conditions and contact with conventional healthcare provider affect patterns of CAM use.
4. Identify the "delivery mechanism" for CAM use in the cancer population.

Delivery mechanism refers to the use of CAM health services/therapies that

require a service provider as contrasted with CAM practices that are self-directed.

5. Explore purpose of CAM use in a cancer population, defined as use for treatment and/or health promotion.

CHAPTER 2

LITERATURE REVIEW

The review of the literature presents data on use of CAM health services, practices, and products in the general population and a cancer population. Information is presented according to the individual determinants of CAM health service - health practice use as identified in the CAM Healthcare Model and discussed in the Introduction of this paper. The organization of the literature review is guided by two models: the CAM Healthcare Model for NHIS Secondary Analysis, and the CAM Healthcare Model for NHIS Secondary Analysis that is specific to cancer (Figure 3 and 4). The *dependent variables* for this research were: use of CAM in general, use of CAM provider services, use of CAM health practices, and use of CAM products in the U.S. cancer population. Predisposing, enabling, and need factors were the *independent variables* that were analyzed for ability to predict use of each type of CAM. Empirical indicators for each study variable are noted in Figure 3 and Figure 4.

CAM Healthcare Model for NHIS Secondary Analysis

Predisposing Variables

Data reveal variations in the relationship of predisposing variables and CAM use in population studies and smaller scale research. National population studies consistently reveal that CAM use is more common among women than men (Bausell et al., 2001; Eisenberg et al., 1998; Lee, Charn, Chew & Ng, 2004; Wolsko, Eisenberg, Davis, Ettner & Phillips, 2002). Sparber and Wootton (2001), however, note that the difference in CAM use among women is often marginally significant and in proportion to the gender

of those seeking any type of healthcare treatment. Odds of use of CAM provider services are also noted to be greater among women in some studies (Wolsko et al., 2002). It must be stressed, however, that the definition of what constitutes CAM often varies across studies. Being a CAM user in one study may differ from “being a user” in another. Hence, it is imperative to examine the specific therapies, provider services, products, and/or practices included in the study definition of CAM use. Higher rates of use are also noted among middle-aged individuals (Bausell et al., 2001; Eisenberg et al., 1998; Lee, Charn, Chew & Ng, 2004). More specifically, Eisenberg’s data indicate higher use among those 35-49 years of age, questionably middle-aged by today’s standards. Higher prevalence of use was noted in adults aged 30-49 years of age by Bausell and associates (2001).

The literature points to a predictive effect of social structure attributes such as education, with higher level of educational attainment associated with increased likelihood of CAM use in western societies (Astin, 1998; Barnes et al., 2004; Bausell et al., 2001; Egede, Ye, Zheng & Silverstein, 2002; Eisenberg et al., 1998; Mackenzie, Taylor, Bloom, Hufford & Johnson, 2003). This, however, is notably different among eastern societies possibly related to the commitment of the less educated to cultural and traditional health practices and behaviors inherent in CAM (Lee et al., 2004). This cultural aspect is relevant given the changing ethnicity of the U.S. population and the increasing number of immigrants from the east.

Race has been shown in some national surveys to be associated with CAM use, with higher use among Caucasians (Eisenberg et al., 1993, 1998). It must be noted, however, that Eisenberg’s study populations were predominantly Caucasian. In contrast

to Eisenberg's findings, the NHIS of 2002 found that African-American adults were more likely than Caucasian or Asian adults to use CAM. This racial difference in CAM usage was noted when megavitamin therapy and use of prayer for health reasons were included in the definition of CAM. NHIS data provide the first indication that black adults and Asian adults are substantial users of CAM, with use noted at 71% and 62% respectively in these subpopulations (Barnes et al., 2004). Secondary analysis of the Medical Expenditure Survey of 1996 revealed that unlike Hispanics and African Americans, Caucasians were also more likely to visit CAM practitioners, independent of the effect of educational attainment (Bausell et al., 2001). Mackenzie, Taylor, Bloom, Hufford and Johnson (2003) found no difference in CAM use among white, African-American black, Latino, Asian, and Native American populations in the U.S. It has been suggested that CAM use may vary by race and ethnicity when one explores individual therapies and practices, especially those that are prevalent within a designated culture. For example, when compared with Caucasians data reveals that: (a) African-Americans, Asian Americans and Latinos were more likely to use herbs, (b) Asian-Americans were more likely to use acupuncture and less likely to use home remedies, and (c) Asian Americans and Latinos were less likely to use chiropractic. The study authors conclude that CAM use is "prevalent among all ethnic groups, and as such, is probably an important component of delivering culturally competent care" (Mackenzie et al., 2003, p. 55).

Enabling Variables

Personal, family, and community resource availability and use of CAM have been explored in the literature to varying degrees. Geographic region has been significantly associated with CAM use further elucidating the role of regional trends and cultural

values on health practices (Bausell et al., 2001; Eisenberg et al., 1998; Lee et al., 2004; MacLannan, Wilson & Taylor, 1996; Mujaharine et al., 2000). Bausell et al., (2001) note the highest odds of CAM use were associated with living in the western region of the U.S. Insurance coverage for CAM therapies and products, viewed as a resource and thus a potential enabling factor related to CAM use, varies across regions of the U.S. Data reveal that insurance coverage for CAM is related to increased use of CAM provider services. Wolsko et al., (2002) noted that having full insurance coverage for CAM providers increased the odds of frequent use, defined as eight visits or more per year, by a factor of five. Odds of those with partial coverage using provider services were more than 3 times greater than those with no insurance coverage. Increased demand for CAM services is expected to follow changes in insurance plans providing a wider scope of CAM coverage.

CAM therapies also differ from conventional health services at the level of out-of-pocket costs. Whereas most conventional health care therapies are paid for by private and public insurance across the country, third-party payers infrequently cover CAM therapies. Increasing reimbursement for CAM health services has been occurring across the U.S. during the past decade, a change that coincides with decreasing reimbursement for conventional health care. Survey data reveal current insurance coverage is limited to chiropractic treatment, massage therapy, acupuncture and naturopathic medicine, with differences noted among health plans, policies and practitioner requirements (Cleary-Guida, Okvat, Oz & Ting, 2001; Lafferty et al., 2004). A billing code system for CAM therapies (ABC Codes) has been developed and is currently being tested by CAM providers (alternativelink.com, 2005) in anticipation of increased insurance

reimbursement. Movement toward third-party payment is related to establishment of: (a) evidence of effectiveness, (b) assurance of safety, and (c) cost-benefit ratio.

Some studies on CAM have examined the relationship of income level and use, since CAM often requires out-of-pocket expenditures. Cherniack, Senzel and Pan (2001) found no correlation between income and use of CAM among elderly individuals in an urban population. Income was also not a significant predictor of CAM use among individuals with cancer (Boon, Westlake, Stewart, Gray, Fleshner et al., 2003; Fouladbakhsh, Stommel, Given & Given, 2005).

By contrast, one *disabling* supply factor that affected use of CAM may be an individual's rural residence. The literature indicates rural areas often have less developed health service infrastructures. Thus, distances to source of care, which affect the use of conventional health care services, should also be of consequence for access to CAM providers, products, and therapies. In fact, in a study of patients with pain (N=595), place of residence was significantly related to use of CAM, with highest use in suburban communities (82%) (Vallerand, Fouladbakhsh & Templin, 2003). CAM use in urban and rural communities was 77% and 58%, respectively. The CAM therapies most frequently used were herbal products and supplements, with highest use among suburban participants and lowest use among rural residents. NHIS data reveal almost 63% of urban residents and 60% of rural residents use CAM (Barnes et al, 2004) when prayer for healing is included. In part, such variations go back to the definition of CAM, which includes not only personal services and practices such as self-prayer, but also products that can be mailed, or otherwise shipped to users in remote areas. In fact, some researchers have argued that distance from health care providers, as experienced by those

living in rural areas, increases the potential for self-care and self-treatment (Bartlome, Bartlome, & Bradham, 1992). This may provide an impetus to seek out CAM, which is a mode of treatment that relies more heavily on self-care. Thus, the impact of rural-urban residency on CAM use remains uncertain, involving numerous factors such as availability, access, and affordability of conventional as well as CAM services, and individual tendency to engage in self-care behaviors.

Provider connection, that is having a relationship with a healthcare provider, whether conventional or CAM, is viewed as an enabling factor with the potential to predict CAM use. Seeing a conventional provider may enable or impede CAM use. Use patterns may be influenced by physician and/or nurse (a) attitudes and knowledge about CAM efficacy and safety, and (b) subsequent ability and willingness to refer to CAM providers, and to recommend products and/or practices. In addition, having a relationship or connection with a CAM provider is viewed as an enabling factor, often serving as a source of CAM referrals for treatment or health promotion. Further, the literature indicates that concurrent use of conventional medical doctors and CAM practitioners has increased significantly over time. CAM use for chronic illness often serves as an adjunct to physician visits, with few CAM users seeking solely alternative care. Concurrent use of both types of providers has been noted to vary by age, gender, chronic conditions, long-term disability, hospital days, psychosocial distress, and spiritual values. Interestingly, some studies reveal that more men than women visited both CAM and conventional providers for health services. Individuals under the age of 65 with one or more chronic medical conditions were also significantly more likely to see both types of providers. Thus, data reveal a pattern of concurrent use of CAM and conventional

health services for common chronic illnesses and related symptoms (Muhajarine, Neudorf & Martin, 2000).

Need Variables

Among individuals with cancer, current estimates of use vary widely from 7% to 64% (Ernst & Cassileth, 1998), with 30% of women and 28% of men either continuing or beginning to use CAM therapies after becoming ill with cancer (Salmenpera, 2002). National survey data reveal that having cancer increased the odds of seeing a CAM provider by a factor of three (Wolsko, Eisenberg, Davis, Ettner & Phillips, 2002). CAM in the cancer population has been widely documented in the literature examining an array of different complementary therapies (Alferi, Antoni, Ironson, Kilbourn & Carver, 2001; Jordan & Delunas, 2001; Patterson, et al, 2002; Salmenpera, 2002). However, the specific measures of CAM use, the particular services and practices included, and the populations examined, vary widely from study to study, making comparisons of results somewhat hazardous.

The frequent use of CAM for chronic illness and health-related problems is supported throughout the literature (Astin, 1999; Barnes et al., 2002; Bausell et al., 2001; Eisenberg et al., 1993, 1998; Wolsko et al., 2002). Informed consumers for symptom management often seek CAM health care for long-term chronic illness. Population data reveal that 34% of study respondents reported medical conditions, with the highest condition specific use of CAM for neck and back problems (Eisenberg et al., 1998). Wolsko et al., (2002) found back and neck problems to be significant predictors of use of CAM provider services. CAM therapies most often used for chronic medical conditions

included chiropractic treatment, relaxation techniques, and massage therapy (Eisenberg et al., 1998).

Population data from the 1996 Medical Expenditure Panel Survey (MEPS) identified three broad categories of the most frequently occurring chronic illnesses and health problems for which CAM was used. These categories include the following: (a) musculoskeletal (e.g., arthritis, back, and joint disorders), (b) mental (e.g., anxiety-somatoform-dissociative, affective, malaise-fatigue, stress related disorders), and (c) metabolic (e.g., diabetes and endocrine disorders). Individuals who experienced health problems within these three categories were more than three times more likely to use CAM. Likelihood of use increased with co-morbidity, that is, having health problems in more than one category (Bausell et al., 2001). Data further reveal an extensive range of chronic illnesses among CAM users. The authors concluded that the highest users of CAM therapies provided by practitioners are individuals with co-morbid, non-life threatening health problems. Egede et al, (2002) also found that individuals with diabetes, cancer, and hypertension were more likely to use CAM as compared with individuals with no chronic illness.

The literature assures us that the course of chronic illness is often complex and unpredictable; individuals experience a vast array of symptoms, often of long-term duration and with great personal, emotional, and psychological cost. A wide range of CAM practitioners, therapies, and practices are often used for relief of symptoms associated with chronic illness (Astin, 1998; Egede et al., 2002; Eisenberg et al., 1998; Ernst, 1998; Vallerand & Fouladbakhsh, 2003, 2004; Willison & Andrews, 2004; Wolsko, Eisenberg, Davis, Kessler & Phillips, 2003). Faced with the lack of a cure from

conventional medicine, those with chronic illness may experience a sense of helplessness, thereby seeking other avenues of care for symptom management to improve quality of life. In addition, CAM is viewed as a component of self-care management, suggesting the need for personal responsibility for health while experiencing chronic illness (Thorne, Paterson, Russell & Schultz, 2002). Further, the goal of self-healing through enhancement of psychological and physical well being often contributes to the decision to use CAM by those with chronic illness (Ritvo, Irvine, Katz et al., 1999).

With increasing age, the prevalence of chronic co-morbid conditions also increases, resulting in additional symptom burden. It is estimated that 80% of older adults have at least one chronic condition and up to 50% have two conditions that cause pain, disability, and functional limitations (Gerberding, 2006). Millar (1997) found that elders reporting three or more chronic conditions (26%) were more likely to consult with CAM providers than those with only one chronic condition (9%).

Symptom Experience

Pain, which affects millions on a daily basis, whether attributed to chronic illness, or cancer and its treatment, proliferates throughout modern society despite widespread medical, political, and legal efforts directed at management. Data reveal that the under-treatment of pain is a major public health problem within the U.S. Research findings indicate that more than 60% of the general population has experienced pain for more than five years; for 40% this pain is constant. Although more than 90% have seen a conventional medical doctor, pain persists, and quality of life is affected. Most state their daily life is altered by pain, and that prescription analgesic treatment is less than very effective (Lazarus & Neumann, 2001). It is further noted that conventional healthcare

treatments for pain focus almost solely on medication, a method acknowledged to be potentially very effective for pain control. This conventional approach however, often fails to acknowledge the (a) inherent side effects that disrupt quality of life while abating pain, (b) cost, both financial and psychosocial, and (c) individual belief systems and values about pain and its treatment.

CAM treatment for cancer pain, fatigue, anxiety, and depression is currently receiving increased attention from the National Cancer Institute (NCI), the Office of Cancer Complementary and Alternative Medicine (OCCAM) and NCCAM with numerous clinical trials in progress (<http://clinicaltrials.gov>). A summary of data includes the following findings on CAM and cancer-related symptoms. Auricular acupuncture has been noted to decrease cancer pain intensity by 36% among patients receiving analgesics (Alimi, Rubino, Pichard-Leandri, Fermand-Brule, Dubreuil-Lemaire et al., 2003). Clinical trial data also found yoga to be effective in reducing sleep disturbances, improving overall sleep quality and duration, however not affecting fatigue, anxiety, or depression (Cohen, Warneke, Fouladi, Rodriguez & Chaoul-Reich, 2004). Healing Touch and massage were more effective than standard care among cancer patients undergoing chemotherapy in reducing pain, mood disturbances, and fatigue (Post-White, Kinney, Savik, Gau, Wilcox et al., 2003). Massage provided for cancer outpatients resulted in a 50% reduction in pain, fatigue, stress, anxiety, nausea, and depression that lasted over a two day time period (Cassileth & Vickers, 2004).

Prevalent chronic illnesses, such as rheumatologic conditions affect a significant percent of the U.S. population, resulting in chronic pain and functional impairment (Rao, Mihaliak, Kroenke, Bradley, Tierney & Weinberger, 1999). Studies of individuals with

arthritis, and other rheumatologic conditions indicate 40-90% have used CAM therapies (Arcury et al., 1996; Anderson et al., 2000; Wilson et al., 1999; Rao, et al, 1999). Severe pain is also noted as a significant predictor of regular CAM use in this population, with frequent use associated with illness duration (Rao et al., 1999). The most commonly used CAM therapies and practices in studies of individuals with rheumatologic conditions include: prayer, relaxation, positive thinking, exercise, massage, and hot-tub use (Wootten & Sparber, 2001). These authors suggest that these frequently used therapies and practices indicate “a yearning for less stress, more relaxation, and a greater emphasis on care in health care” (Wootten & Sparber, 2001, p.720).

Pain and the need for pain relief are also very common experiences among the increasing aging population, most of whom endure chronic illnesses (Najm, Reinsch, Hoehler & Tobis, 2003; Vallerand & Fouladbakhsh, 2004). Data indicate older adults’ reasons for using CAM often include pain relief, improved quality of life, maintenance of health and fitness, stress relief, and prevention (Williamson, Fletcher & Dawson, 2003). Commonly used CAM therapies include chiropractic treatment, herbal medicine, dietary supplements, massage, and acupuncture (Najm et al., 2003; Williamson et al., 2003). Variations in use of CAM therapies have also been noted among the ethnic elderly. Pain was noted to be a higher indicator of CAM use among Asians, whereas gastrointestinal problems and diabetes prompted use among Hispanics. Stress, fatigue, and cardiovascular problems were associated with CAM use among white non-Hispanics (Najm et al., 2003). Estimates of population growth indicate an ongoing shift in the increasing proportion of elders in the U.S., among them the ethnic elderly. The vast majority of elders will develop chronic illness with accompanying symptoms, co-

morbidity and functional limitations, all impacting quality of life. The sheer number of these older adults is expected to influence health care services. Thus, their health behavior, cultural traditions, and subsequent treatment choices require further illumination.

Population studies also indicate that back and neck pain are prevalent health conditions that result in considerable morbidity, disability, functional limitations, lost revenue, and psychological distress. It is estimated that almost 33% of all visits to CAM providers were for treatment of back and neck pain (Eisenberg et al., 1998; Wolsko et al., 2003), with more than 50% of individuals with this type of pain seeking CAM treatment. Frequently used CAM therapies include chiropractic treatment, massage, and relaxation, all rated as very helpful by CAM users. Effectiveness of massage as a CAM therapy for chronic pain, back pain, and musculoskeletal disorders is widely documented in the literature (Cherkin, Eisenberg, Sherman, Barlow, William et al., 2001; Walach, Guthlin & Konig, 2003). Clinical trials identify long-term benefits of massage lasting up to one year with subsequent reductions in conventional health care utilization for this prevalent chronic condition. In addition, use of prescription pain medication and costs of outpatient care were significantly lower for chronic back pain patients who received massage therapy. Study results suggest that the cost of CAM therapy use may be offset by the reductions in subsequent conventional healthcare costs (Cherkin et al., 2001). Systematic reviews of acupuncture as a CAM treatment for chronic low back pain conclude that acupuncture, when used as a complement to other conventional therapies, relieves pain, and improves functioning (Furlan, van Tulder, Cherkin, Tsukayama, Lao &

et al., 2005). It is noted that complementary use is often more effective than conventional therapies alone.

CAM Healthcare Model for NHIS: Cancer Specific

Predisposing Variables

In terms of predictors of CAM use, most studies have examined predisposing variables. In a study of breast, colon, and prostate cancer patients (Patterson et al., 2002), the reported odds of using a CAM therapy were more than 2.5 times greater among the female participants ($p < 0.05$). The odds of a female patient seeing a CAM provider were even greater, exceeding those of a male by a factor of 5.5. Spiegel et al., (2002) also found a significantly higher number of female oncology patients used CAM than male patients (33% & 20.5% respectively). This pattern of more frequent CAM use by women is consistent with study results from the National Health Interview Survey (Barnes et al., 2004). Predictors of CAM use by cancer patients also include younger age and higher education (Alferi et al., 2001; Burstein, 1999; Lee et al., 2000; Richardson et al., 2000). Variations in use by ethnicity have also been documented in cancer and general populations (Alferi et al., 2001; Barnes et al., 2004; Lee et al., 2000) with higher use among African-American women. While not all study results support the notion of CAM use rates varying by age (Shen et al., 2002), education, and ethnicity, there appears to be strong support that women are more likely to be CAM users (Fouladbakhsh et al., 2005; Lengacher et al., 2002; Sparber et al., 2001; Spiegel et al., 2002).

Enabling Variables

The impact of enabling variables on CAM use has been reported in the literature. Lee et al. (2000) found higher income to be a significant predictor of CAM use by women of varying ethnicity. Other data, however, have not supported a relationship between the enabling variables of income and family support identified in the Andersen model, and CAM use by cancer patients (Shen et al., 2002). Having a caregiver, also viewed as a potentially enabling factor, was unrelated to use of CAM among community dwelling cancer patients (Fouladbakhsh et al., 2005). While current enrollment in health insurance is a potent predictor of the use of conventional health services, it is less clear to what extent insurance coverage is relevant to services that are generally not covered.

Need Variables

Among the need variables identified for this study, cancer site is often reported in the literature, with most frequent CAM use by breast cancer patients (Boon, Stewart & Kennard, 2000; Morris, Johnson, Homer & Walts, 2000; Richardson, Sanders, Palmer, Greisinger & Singletary, 2000). Results concerning the impact of cancer staging on CAM use are mixed, with some studies reporting greater use among late stage cancer patients (Lee, 2000; Shen et al., 2002), and others showing no association with use of alternative therapies (Patterson, 2002). Fouladbakhsh et al., (2005) found patients with early stage cancer were more likely to use CAM. Cancer treatment has been reported in association with CAM use, with more than half (56%) of patients using at least one complementary therapy during conventional cancer treatment (Alferi et al., 2001). Dissatisfaction with medical treatment, pain, emotional distress, concern about cancer, and expectation of recurrence were unrelated to use. Data reveal patients treated with

surgery and chemotherapy were more likely to use CAM (Fouladbakhsh et al., 2005; Richardson, 2002). Research indicates cancer patients use CAM to enhance benefits from conventional cancer treatment and to improve general well being with use significantly associated with receiving multiple cancer treatments (Alferi et al., 2001; Patterson et al., 2002; VandeCreek, Rodgers, & Lester, 1999). Jacobson, Workman and Kronenberg (2000) note that breast cancer patients are increasingly seeking CAM, on their own as well as through conventional healthcare providers, to improve chances of survival, decrease risk of cancer recurrence, and relieve cancer and treatment related symptoms. CAM therapies used for treatment side effects of cancer, and symptom management include acupuncture for chemotherapy associated nausea and vomiting, massage therapy for post-mastectomy lymphedema and pain, and mind/body therapies to reduce stress and anxiety related to illness state and treatment measures. Data reveal that most cancer patients experience a vast array of symptoms related to illness and treatment strategies (Fouladbakhsh et al., 2005). Frequent symptoms include fatigue, anxiety and pain, with number of symptoms (three or greater) being a significant predictor of CAM use (Fouladbakhsh et al., 2005). Data indicate that fatigue is often the most debilitating cancer related symptom, with more frequent use of healthcare services, including CAM use, among those who experience this symptom (Ashbury, Findlay, Reynolds & McKerracher, 1998).

In sum, the current state of the existing literature on CAM use provides clues and partial evidence, but the complex patterns of use of nonconventional therapies, either as alternatives to or complements of conventional medical approaches require further illumination. This study offers a further exploration of how predisposing, enabling and

need variables affect CAM use for health promotion and illness treatment among those with illness and related symptoms. For this secondary analysis, CAM use is defined as including 21 of the 22 CAM health services, products, and practices included in the NHIS dataset (Table 1). Prayer for health related purposes is not included in the dissertation analysis. CAM use patterns will be examined in three different ways as follows: (a) CAM use in general, i.e., having used any one of the 21 identified CAM therapies, (b) CAM use according to the alternative categorization presented in the Introduction section, that is, use of CAM health services, use of CAM products and/or use of CAM health practices, and (c) CAM use of services, products, and practices for the purpose of health promotion and/or illness and symptom treatment. Thus, this dissertation aims to address the following research questions and hypotheses for the cancer population surveyed in the 2002 NHIS.

Research Questions and Hypotheses

Predisposing Variables

Gender

Question 1: Is there a gender difference in the use of CAM health services, CAM health practices, and CAM products for illness/symptom treatment and health promotion?

Hypothesis 1: Overall, women are more likely to use CAM health services, CAM health practices and CAM products for treatment and health promotion than men.

Age, race & marital status

Question 2: Are age, race, and marital status related to use of CAM across all three

categories of use?

Hypotheses 2a: Whites have a greater likelihood of using CAM provider services, CAM health practices and CAM products than African Americans, Hispanics, or Asians.

Hypotheses 2b: Age is predictive of use of CAM across all three categories of CAM use, with increased likelihood of use among those 35 to 55 years of age.

Enabling Variables

Income

Question 3: What is the relationship of income to use of CAM health services, CAM practices and CAM products

Hypotheses 3a: Higher income is associated with increased likelihood of use of CAM therapies illness/symptom treatment and health promotion that must be purchased (that is, health services and products) for

Hypotheses 3b: There is no association between income level and use of CAM health practices that do not require a purchase for their performance.

Education

Question 4: Is level of education attainment related to use of CAM health services, CAM practices and CAM products?

Hypothesis 4: There is a positive association between level of education completed and use of CAM across all three categories (provider services, practices and products).

Insurance

Question 5: What is the relationship between conventional health insurance coverage and CAM use?

Hypothesis 5: Individuals without health insurance coverage are more likely to use CAM health services, practices and products for both health promotion and illness/symptom treatment.

Concurrent use of conventional providers and services

Question 6: How do patterns of CAM use correlate with use patterns of conventional health care?

Hypothesis 6: Individuals who have visited conventional medical providers during the preceding year are more likely to use CAM for illness/symptom treatment and/or health promotion.

Need Variables

Cancer site

Question 7: Is cancer site associated with likelihood of use of CAM health services, practices, or products?

Symptoms

Question 8: Are reported symptoms (pain, fatigue, anxiety, and depression) associated with likelihood of use of CAM health services, practices and products?
Is there a symptom threshold (number of reported symptoms) associated with likelihood to use CAM?

Hypotheses 8a: Pain, fatigue, anxiety, and depression are significant predictors of use of CAM health services, practices and products.

Hypotheses 8b: There is a positive association between number of reported symptoms and likelihood of CAM use.

Co-existing co-morbid conditions

Question 9: Do patterns of CAM use, that is use of services, practices, and products, differ among individuals depending on the number and types of co-morbid conditions?

Hypothesis 9: Having a co-existing co-morbid condition increases likelihood of use of CAM health services, practices and products.

Time since cancer diagnosis

Question 10: Is time since cancer diagnosis, defined as recent diagnosis (within past year) and survivor diagnosis (more than one year ago), associated with differences in CAM use patterns and reasons for use?

CHAPTER 3

METHODOLOGY

Description of NHIS 2002

This dissertation used data from the National Health Interview Survey (NHIS, 2002) for a secondary analysis focused on patterns and predictors of CAM use in a cancer population in the U.S. The NHIS is a multi-purpose health survey conducted on a regular basis by the National Center for Health Statistic (NCHS), Centers for Disease Control and Prevention (CDC), to provide information on the health of the adult civilian, noninstitutionalized, household population in the U.S. The 2002 cross-sectional NHIS contains the Alternative Medicine/Complementary and Alternative Medicine (ALT) supplement, asking adult respondents (18+) about their use and experience with 22 types of CAM therapies, products, and practices (Table 1). Data from this supplement were merged with the regular NHIS sample adult file, as well as parts of the Family-level and Person-level files, to access additional information on the respondents' health status, history of health conditions, access and utilization of conventional health care, sociodemographic information and information on income and health insurance coverage (NHIS Survey Description, 2003).

Data Collection Procedures

The NHIS methodology has been well described in the literature (Botman et al., 2000). Specifically, the 2002 NHIS employs a multistage probability cluster sampling design, representative of the NHIS target universe, which was defined as "all dwelling

units in the U.S. that contain members of the civilian noninstitutionalized population.” (NHIS Survey Description, 2003). In the first stage, 339 primary sampling units (PSUs) were selected from approximately 1900 area sampling units representing counties, groups of adjacent counties or metropolitan areas covering the 50 states and the District of Columbia. The selection included all of the most populous PSUs in the U.S. and stratified probability samples (by state, area poverty level and population size) of the less populous ones. In a second step, PSUs were partitioned into substrata (up to 21) based on concentrations of Black and Hispanic populations. In a third step, clusters of dwelling units form the secondary sampling units (SSUs) selected from each substratum. Finally, within each SSU, all Black and Hispanic households were selected for interviews, while other households were sampled at differing rates within the substrata. Census interviewers who were trained and directed by survey supervisors within the U.S. Census Bureau Regional Offices across the U.S. conducted household interviews. A computer-assisted personal interviewing (CAPI) system was used allowing interviewers to read items from and enter responses directly into the computer during interviews. Total household response rate, that is total number of responding households divided by the total number of eligible households, was reported at 89.6%. Household was defined as two more related persons living together in the same housing unit, although in some cases, unrelated persons living together fit these criteria.

Sample

The sample for the secondary analysis included information provided by 31,044 adult respondents to the NHIS household interviews of 2002. Of these respondents, 2262

reported a diagnosis of cancer by a physician, 461 of whom received a cancer diagnosis within the preceding twelve months. NHIS interview questions asked about the diagnosis of thirty different types of cancer; responses indicating multiple types and sites of cancer were allowed. The current analysis was focused on different subgroups of the 2002 NHIS survey:

1. CAM users diagnosed with cancer:
 - a. Recent survivors: diagnosed within the past 12 months
 - b. Long-term survivors: diagnosed more than one year before the NHIS interview
2. Users of CAM provider services
3. Users of CAM practices
4. Users of CAM products

Instruments

Instruments used in the NHIS are discussed according to predisposing, enabling, need variables, and the outcome categories identified in the model that guided this dissertation research.

Predisposing and Enabling Variables

Extensive demographic data, information on social structure attributes, resources, and community attributes was available in the NHIS, 2002. This included age, gender, marital status, education, race, ethnicity, income, insurance coverage, and information about conventional healthcare providers. This data were used to determine the relationship of these variables to CAM use in the estimated total U.S. cancer population.

The Socio-demographic Section (FSD) of the NHIS Person-level file contained items that were used to determine educational attainment of survey respondents.

The Health Care Access and Utilization Section (FAU) of the Person-level file in the NHIS contained information about health care and utilization services. Data on visits to conventional doctors' offices, as well as use of other conventional health services, were available in this section for analysis. The Health Insurance Section (FHI) of the Person-level file contained a full range of items addressing health insurance. The item in this section of relevance to this dissertation was type of health care coverage, which included: Medicare, Medicaid, military/VA, CHAMPUS/TRICARE/CHAMP-VA, State sponsored health plan, Indian Health Service, other government programs, private insurance, and single service plans.

Need Variables

Information was available on participant health status in the Health Status and Limitation of Activity Section (FHS) of the Person-level file; additional information was also included in the Sample Adult file and the Alternative/Complementary and Alternative Medicine (ALT) supplement. Information on health conditions including cancer and a wide range of chronic illnesses and reported symptoms was available for analysis of need predictors in the model. Cancer was further delineated by site, and the chronic illness list followed the ICD-9 codes. In addition, NHIS participants who indicated use of a CAM therapy, practice, or practitioner were asked to identify three specific health conditions for their use of CAM. This data were available in the ALT section. An NHIS item asking respondents to rate their health status was used to measure perception of health.

CAM Use -Outcomes

Responses to a comprehensive set of items related to the use of complementary and alternative therapies, products, practices and practitioners were available in the NHIS 2002 dataset. Participants were asked whether they used any of the following CAM therapies, products, or practices: acupuncture, ayurvedic treatment, biofeedback, chelation, chiropractic treatment, special diets, energy healing, folk medicine, herbs, homeopathy, hypnosis, massage, naturopathy, vitamins, prayer and healing rituals, progressive relaxation, deep breathing, guided imagery, meditation, yoga, Tai Chi, or Qigong (Table 1). Subcategories of two of these items were also included. Use of diet asked participants about six different diets, and use of prayer had four separate categories to which participants could respond (Table 1). All respondents were asked to identify up to three conditions for CAM treatment, and whether CAM was found to be helpful. Responses to 21 of the CAM use item questions were used for this study. Prayer was not included in this analysis.

Study Variables

Dependent Variables

The dependent (outcome) variables used for this analysis were:

1. Overall use of CAM with 2 categories: users vs. non-users
2. Type of CAM used with 5 categories: providers only, products only, practices only, combined types of CAM, no use at all
3. Purpose of CAM use with 4 categories: CAM used for treatment only, CAM used for health promotion only, CAM used for both treatment and health

promotion, no CAM use.

Dependent Variable 1

The first dependent (outcome) variable for this analysis was a simple dichotomy: use or nonuse of any of the identified CAM providers, practices or products listed in the ALT section of the NHIS. A positive response to at least one of the 21 CAM USE items in the ALT section of the NHIS determined a respondent's classification as a "user of CAM," whereas a negative response to all of these items resulted in the classification of the respondent as a "nonuser." Use of prayer for health reasons in the original NHIS list of 22 items was not included.

Dependent Variable 2

The second dependent variable focused specifically on the use of specific categories (types) of CAM used according to the model presented in the Introduction section and the recategorization presented in Table 3. This was possible with the NHIS dataset as 10 items in the ALT section asked respondents if they saw a provider for specific CAM treatments. These included "saw a provider for" the following treatments: acupuncture, ayurvedic, biofeedback, chelation, chiropractic, energy healing, folk medicine, hypnosis, massage, and naturopathic. These items are coded 1=yes and 2=no for CAM use of provider services. The remaining 11 items on CAM use in the ALT section that were used for this analysis were further subdivided according to the model and are presented in Table 3. Use of CAM practices included responses to eight items asking about use of any of the following: diets, yoga, tai chi, qigong, meditation, guided imagery, progressive relaxation, and deep-breathing exercises (1=yes, 2=no). Use of CAM products included responses to the remaining three items in the ALT section of the

NHIS asking about use of herbs, vitamins (high dose) and/or homeopathic treatment (1=yes, 2=no).

Dependent Variable 3

The third dependent variable, purpose of overall use of CAM, was also analyzed. Responses to each of the 21 CAM items, indicating if CAM use was “to treat a specific condition” (coded as 1=yes, 2=no) were analyzed. For the responses indicating CAM was not used “to treat a specific condition,” the purpose of CAM use was considered to be “for health promotion.” Thus, a four-category variable was used in this analysis to examine CAM usage patterns: (a) use only for treatment, (b) use only for health promotion, (c) mixed usage (some CAM therapies used for treatment, some used for health promotion), and (d) no CAM use.

Independent Variables

The independent (predictor) variables used in the analyses are discussed according to the theoretical constructs in the model.

Predisposing and Enabling Variables

Variable indicators included in the analysis are: gender (male=1, female=2), age (18-29, 30-44, 45-59, 60-75, > 75), education (high school or less, some college/associate degree, bachelor/master’s degree, doctorate), marital status (married=1, widowed=2, divorced=3, separated/single=4), and race/ethnicity (white=1, black/African American=2, Indian American =3, Asian-Indian=9, Chinese=10, Filipino=11). Empirical indicators for the enabling predictor variables are: insurance (yes= 1, no=0), income (under \$20,000 = 1, \$20, 000 and over =2), and healthcare provider contact (yes =1, no=0).

Need Variables

Independent variables in the need category of the model were measured with the following empirical indicators: cancer diagnosis ever (yes=1, no=2), recent cancer diagnosis (yes=1, no=0), cancer survivor (yes=1, no=0), pain (yes=1, no=0), fatigue (yes=1, no=0), depression (yes=1, no=0), reported health status (excellent=1, very good=2, good=3, fair=4, poor=5), co-existing co-morbidity (yes=1, no=0), and number of chronic co-morbid conditions. Chronic illness was defined as having one or more of 32 specified non-cancer co-morbidities in the past 12 months as listed below:

Hypertension	Poor circulation	Stroke
Coronary heart disease	Diabetic retinopathy	Angina
Heart condition	Irritable bowel	Asthma
Emphesema	High cholesterol	Glaucoma
Congestive heart failure	Bowel problems	Ulcers
Thyroid problems	Urinary problems	Diabetes
Skin problems	Allergies (hay fever)	Sinus problems
Allergies (food/odor)	Allergies (medications)	Arthritis
Kidney problems	Chronic bronchitis	Liver problems
Gynecological problems	Prostate problems	Heart attack
Cataracts	Macular degeneration	

Information on chronic conditions was available in the 2002 NHIS dataset. Respondents who reported that they had one or more of the following conditions were identified as having a chronic health problem/illness. For more information on the independent variables refer to Table 4.

Procedure

This secondary data analysis made use of the public use files available for downloading on the NCHS website. The data are available in ASCII format with

separate command files already prepared by NCHS to convert them into STATA data files. Protection of human rights of study participants was assured through the Michigan State University Committee on Research Involving Human Subjects (UCRIHS). Approval was granted on Nov. 10, 2005, with exempt status. NHIS data has been de-identified to protect subject rights and confidentiality of responses. The sampling design of the 2002 NHIS allowed for representation of women and minorities in the dataset, with over-sampling to promote minority representation.

Data Analysis

The complex sampling design of the NHIS required special methods of variance estimation in the analysis, since, with many multistage designs, weighted parameter estimates are weighted functions of several random quantities. Currently, three alternative methods of variance estimation are used under these circumstances: linearization, the jackknife and balanced repeated replications (Levy & Lemeshow, 1999; Korn & Graubard, 1999). The sampling design and appropriate weighting information for the 2002 NHIS is contained in three variables (stratum, psu, wtf) of the public release files, which can be used for correct parameter estimations.

All statistical analyses were carried out using the STATA 9.2 software (Special Edition). The “svy” commands of STATA contain a comprehensive set of estimation procedures ranging from mean, proportion and ratio estimation to linear, logistic, multinomial logit, and ordered logit regression models. All procedures are implemented for variance estimation involving linearization, the jackknife and balanced repeated replications. Furthermore, the “subpopulation” estimation command allowed for the

analysis of subsetting data, taking full advantage of the complete sampling design information in the data. Binary and multinomial logit regressions were the primary statistical models employed in the analysis, focusing on between- subject differences in CAM use.

Steps in the analysis process included initial identification of subpopulations to be studied. Descriptive analyses were conducted using cross tabulation and Pearson Chi square computation for the (a) cancer population as compared to the non-cancer population, and (b) recent cancer survivors as compared to long-term survivors. Binary and multinomial logit regression analyses proceeded in several stages. Using the CAM Healthcare Model for the NHIS Secondary Analysis: Cancer Specific (Appendix B. Figure 4), the independent variables were entered into the logistic regression model to identify ability to predict overall CAM use. Multinomial logit regression analyses were also used contrasting treatment users to non-users, health promotion users to non-users, and combined treatment/health promotion as compared with non-users. Significance level of $p < 0.05$ was used to determine significant predictors of CAM use in the identified subpopulation. Adjusted odds ratios for significant predictors reflect the estimated likelihood of use among the population groups.

CHAPTER 4

DATA ANALYSIS AND RESULTS

Analytical Procedures

Data from the National Health Interview Survey (NHIS, 2002) were used as the source for this secondary analysis. The Alternative Medicine/Complementary and Alternative Medicine (ALT) supplement of the 2002 NHIS, asking 31,044 adult respondents (18yrs and older) about their use and experience with 22 types of CAM therapies, products and practices was merged with the regular NHIS sample adult file. Parts of the Family-level and Personal-level files were also merged to access additional information on the respondents' health status, limitations in daily activity, history of health conditions, access and utilization of conventional health care, socio-demographic information and information on income and assets. For this dissertation, the analysis focused on the subset of the sample that had reported a cancer diagnosis within the past year (recent cancer survivor) or at some point in their lifetime (long-term survivor) (N = 2262). This sub-sample represented an estimated 14,304,621 individuals in the U.S. who had been diagnosed with cancer prior to the interview. That number equaled almost 7% of the total estimated adult (age 18 and over) U.S. population of more than 205 million in 2002.

The complex sampling design of the NHIS required special methods of variance estimation in the analysis, since, with many multistage designs, weighted parameter estimates are weighted functions of several random quantities. The sampling design and appropriate weighting information for the 2002 NHIS is contained in three variables

(stratum, psu, wtfa) of the public release files, which were used for correct parameter estimations. All statistical analyses were carried out using the STATA 9.2 software (Special Edition). The 'svy' commands of STATA, which contain a comprehensive set of estimation procedures, were used for calculation of descriptive summary statistics (frequencies, means, proportions, and ratio estimation) and adjusted odds ratios using logistic regression and multinomial logistic regression to determine significant predictors of CAM use in the cancer population (Agresti, 1990; Hosmer & Lemeshow, 2000). All procedures were implemented for variance estimation using linearization (Levy & Lemeshow, 1999). Two-way tables using the “svy” commands were created using Pearson Chi Square analysis and F values to determine significant differences among subpopulations. The “subpopulation” estimation command allows for the analysis of subsetting data, taking full advantage of the complete sampling design information in the dataset. Binary and multinomial logit regressions were the primary statistical models employed in the analysis (Hosmer & Lemeshow, 2000), focusing on between-subject differences in CAM use. A stepwise procedure was followed in which potential predictor variables were excluded from the model if their p-value exceeded 0.10.

Descriptive information comparing the estimated cancer population and the non-cancer population in the U.S. is presented in Table 5, with the appropriate confidence intervals for the population estimates. For some variables the estimated totals are somewhat smaller than the overall estimates for the cancer and non-cancer populations, which is due to missing information as noted in the table. Descriptive information on recent cancer survivors, as juxtaposed to the long-term cancer survivors, is presented in Table 6. F-values and significance levels are also provided indicating significant

differences between the subpopulations compared in both tables. The discussion of results will be presented in the following order:

1. Descriptive statistics for the independent model variables grouped as predisposing, enabling, and need with comparisons across subpopulations (Tables 5 and 6),
2. Descriptive statistics for the dependent variables of overall CAM use, CAM types, and CAM purpose (Tables 7 to 9),
3. Logistic regression analysis of the overall CAM use variable (Table 10);
4. Multinomial logit analysis of specific categories of CAM use (Tables 11 and 13), and
5. Multinomial logit analysis of reasons for CAM use (Tables 12 and 14).

Model Variables - Descriptive Statistics

Predisposing Variables

The estimated U.S. cancer population in 2002 included a higher percentage of women (56.9%) than men (43.1%). As the 95% confidence intervals (CI) indicate, these estimates have a margin of error of plus or minus 2.3% (Table 5). This difference by gender was also evident in the recent survivor and the long-term survivor groups, which represent more than 2.9 and 11.3 million individuals respectively (Table 6). Although the two survivor groups did not differ significantly by gender ($p < 0.08$), the gap between males and females is larger by more than ten percentage points in the long-term survivor subpopulation (Table 6). This reflects increased longevity among women and higher long-term survival rates for breast cancer (Health, U.S., 2005). In contrast, the

population estimates for gender in the (younger) non-cancer population are more balanced than in the cancer population with 48.3% males and 51.2% females in the U.S. adult population. Overall, the proportion of cancer survivors who are women is higher than in the non-cancer population ($p < 0.01$) (Table 5).

As mentioned, the age distribution within the total cancer population differs substantially ($p < 0.00$) from the non-cancer population, such that the cancer population is much older. The mean age for the cancer population is 62, whereas the mean age in the non-cancer population is 43.9. Because the cancer population is substantially older, many of the other demographic differences noted in the data, for example race and co-morbidity and the aforementioned gender, are influenced by this age effect. Therefore, adjustments for age are included in later results when indicated. The level of educational attainment in both the cancer and non-cancer populations was very similar. Of the cancer population, 18% had less than a high school education, a third had completed high school, and half had attended college and/or attained various degrees.

Racial composition, however, was noticeably different ($p < 0.01$), with substantially more non-Hispanic whites in the cancer population than in the non-cancer population (91% as compared to 72%) (Table 5). The only minority that is as often found among cancer survivors as among the non-cancer population is Native Americans. By contrast, the percentages of African Americans and Hispanics in the cancer population are lower than in the non-cancer population. Cross tabulation of age and race reveal higher population estimates of both African Americans and Hispanics in the youngest age category (18-34) and lower estimates in the older age categories (65 and older). Thus the difference in racial composition between the cancer and non-cancer

populations is, in part, explained by the large difference in the age distribution, since overall cancer incidence rates increase with age (NCI, SEER Public Use Data, 2003). With the adjustment for age, the comparison of the two populations reveals smaller variation in racial composition.

Marital status was significantly different in the cancer and non-cancer populations ($p < 0.00$). The higher proportion of widowed individuals in the cancer population again reflects, to a substantial degree, but not completely, the difference in the age distributions of the two populations (Table 5). No significant differences were noted in education, race or marital status between the recent survivor and the long-term survivor subpopulations (Table 6).

Enabling Variables

More than 94% of the total cancer population had health insurance defined as private insurance, Medicare, Medicaid, and/or other government insurance, such as military insurance (VA, CHAMPS), Indian Health Service (IHS) or other public, state-level insurance (Table 5). This did not differ significantly among the recent and long-term survivor subpopulations ($p < 0.15$) (Table 6), but did differ from the adult non-cancer population, in which 83.3% were estimated with insurance, while cancer survivors more often had multiple types of insurance ($p < 0.00$) (Table 5). More individuals in the cancer population had Medicare, Medicaid, and other public government insurance, reflecting the older age distribution and corresponding lower income level of this population (Table 5).

A significant difference ($p < 0.01$) was evident when examining household income defined as above or below \$20,000. (While this measure is a crude indicator of

income, it is based on a substantially larger number of responses compared to the more detailed income questions asked in the 2002 NHIS.) Although the majority of individuals in both the cancer and non-cancer populations were in the \$20,000 or above category, a higher percent of those with cancer had incomes below \$20,000 (21%). This again reflects the substantially higher proportion of elderly in the cancer population, many of whom are retired and on fixed incomes. In addition, the ratios of household incomes to the 2002 poverty threshold show that cancer survivors' median income was between 2.5 and 3 times the poverty level compared to between 3 and 3.5 among the non-cancer population (Table 5). However, the lower household income among cancer survivors only pertained to the long-term survivors (Table 6), again confirming the importance of the age distributions in the population group comparisons. Overall, although one out of four had incomes larger than five times the poverty level across the recent survivors and the long-term survivors, almost 10% had family incomes at or below the poverty level, which is in line with overall Census Bureau estimates of poverty. It should be noted that the ratios of family income to poverty thresholds were adjusted for family size, which ranged from one to eight people per household.

Contact with conventional healthcare providers was analyzed as an enabling variable in the CAM Healthcare model to determine relationships between contact with physicians, nurses, and other healthcare providers and CAM use. Physician contact, defined as "saw or talked with a doctor who was a medical specialist, general doctor, or OB GYN doctor in the past year," was reported by more than 93% of the cancer population. This is significantly higher than the 75% who reported this type of contact in the non-cancer population ($p < 0.01$). Contact with other healthcare providers, including

nurse practitioners, physician assistants, midwives, therapists (occupational/physical therapy) and mental health professionals, was also significantly higher ($p < 0.01$ and $p < 0.03$) in the cancer population (30% and 7%) versus the non-cancer population (18% and 6%) (Table 5). Likewise, visits to the emergency department were significantly higher in the cancer population ($p < 0.01$) (Table 5), with highest proportion of visits among recent survivors (Table 6). Contact with all conventional providers was highest in the recent survivor group, as would be expected following cancer diagnosis. Although not significantly different, noted is the decreased frequency of conventional provider contacts across all categories in the long-term survivor population (Table 6). Thus, it is evident that those with a cancer diagnosis have a higher frequency of contact with conventional healthcare providers, in particular physicians, and that contact is highest among recent cancer survivors (Table 5 and 6).

Need Variables

Based on the 2002 NHIS, primary cancer diagnoses were distributed as follows in the total population of cancer survivors: breast (14%), melanoma (9.5%), colon (6.2%), lymphoma (5.8%), prostate (2.9%), and lung (2.5%) (the breakdown by long-term and recent survivors is shown in Table 6). This prevalence distribution only partially reflects the incidence rates of the most common cancers identified by the National Cancer Institute and the American Cancer Society (2006). There were a higher number of long-term breast cancer survivors (14.9%), and a lower number of long-term survivors with melanoma, lung and prostate cancer when compared with the recent survivor subpopulation (Table 6). These differences in the prevalence of various cancer types among the long-term survivors is related to several factors, including: (a) longer lifespan

for women in the U.S., (b) the high five-year survival rate for breast cancer (75.9%), (c) the greater incidence of lung cancer among males (73.3 per 100,000) as compared with women (47.7 per 100,000), and (d) the corresponding lower survival rate for those with lung cancer (11.6%) (American Cancer Society, 2006).

Co-existing, non-cancer co-morbidity was examined as a separate dichotomous variable, that is, “had one or more co-morbid conditions,” and as a continuous variable for number of conditions reported. A significantly higher percent (89.2%) in the cancer population reported having one or more co-morbid condition as compared with 57.8% in the non-cancer population ($p < 0.00$) (Table 5). When adjusted for age, the difference in probability of having a co-existing co-morbid condition decreases in comparison of the cancer and non-cancer population (83.1% and 62.5%, respectively). Analysis using co-morbidity as a continuous variable revealed a significant difference between the cancer and non-cancer populations, with a mean number of co-existing co-morbid conditions of 3.5 and 1.5 respectively ($p < 0.00$) (Table 5). Range of the number of conditions reported was similar in the two populations (Table 5). No significant differences were found between the recent and long-term cancer survivors when co-morbidity was analyzed as “having versus not having” a condition (Table 6). Mean number of co-morbid conditions also did not differ among the recent (mean 3.4) and long-term survivors (mean 3.5) (Table 5).

Respondents were asked about different types of pain that they might have experienced over a one-month, three-month, and/or twelve-month period. During the interview they could report up to nine types of pain based on pain location and recurring/nonrecurring status. Pain was reported by 70.5% of the total cancer population

(Table 5) with approximately 21% of recent and long-term survivors reporting only one kind of pain (Table 6). Types of reported pain were: joint pain (50%), back pain (36%), leg pain (39%), neck pain (21%), and severe headaches (16%) The non-cancer population differed significantly with a smaller proportion reporting any kind of pain (54%) ($p < 0.000$). However, while reports of recurring pain were lower in the non-cancer population (17% as compared with 32.9%), the proportions experiencing nonrecurring pain (37%) were similar in the cancer and non-cancer populations (Table 5). In addition, pain was reported by a higher percent of long-term cancer survivors (Table 6). After adjusting for age, in order to take into account that musculoskeletal pain, particularly recurring pain because of arthritis, all increase with age, differences in reported pain between the cancer and non-cancer populations decreased, but did not disappear: The estimated probability of having pain in the cancer population, when adjusted for age, reduces from 70% to 66% and increases from 54% to 55% in the non-cancer population. Thus, even if the age distribution were the same between the two populations, pain would remain more prevalent in the cancer population.

Other symptoms reported in the cancer population were insomnia (28.5%), depression (24.7%), and fatigue (16.1%), with 43% reporting one or more symptoms (Table 5). All symptom reports were highest among those in the recent survivor group, with a significant difference in number of symptoms experienced ($p < 0.01$) (Table 6). Frequencies of all reported symptoms in the non-cancer population were significantly lower ($p < 0.01$) (Table 5). When adjusted for age, the difference in symptom frequency between the two populations decreases. However, fatigue, insomnia, and depression remain more prevalent among those who had cancer. Of the total cancer population, 72%

rated their health status as good, very good, or excellent, and 28% as fair or poor. Reported health status differed significantly in the non-cancer population with more (88.9%) reporting good to excellent health ($p < 0.00$) (Table 5). Reported health status was also significantly different among survivors, with lower ratings among recent survivors ($p < 0.02$) (Table 6).

CAM Use and Purpose – Descriptive Statistics

Outcome Variable – CAM Use

There were an estimated 5.6 million users of at least one CAM provider, practice, or product in the U.S. cancer population during 2002, amounting to more than 39% of the 14.3 million cancer survivors in that year. CAM use in the cancer population was slightly higher than in the non-cancer population with greatest difference in use of CAM combinations ($p < 0.01$) (Table 7). Divided into mutually exclusive categories, CAM use in the cancer population was reported as follows: (a) CAM providers only 5.2%, (b) practices only 8.6%, (c) products only 10.3%, and (d) CAM combinations 15.1% (Table 7). The latter amounts to the use of CAM combinations by more than 2.2 million individuals who have been diagnosed with cancer at some point in their lifetime. Use of CAM, however, is not significantly different in the recent and long-term survivor subpopulations ($p < 0.62$) (Table 7).

Table 8 shows proportions among cancer survivors who used individual types of CAM provider services, practices, and products in the cancer population. CAM provider use ranged from a low of less than 1% for ayurvedic treatment to a high of 8.2% for chiropractic care. More than 5% of the cancer population received massage therapy,

which is an estimated 780,000 people during the year preceding the NHIS 2002. Of the CAM practices reported, deep breathing exercises, meditation, and guided imagery were the used most frequently. Herbs were used more frequently for healing than vitamins and homeopathic products (Table 8), with use reported by one out of five individuals in the cancer population. Different types of prayer and healing rituals were also among the most highly reported practices. Although frequency of prayer use is included in the table, it was not a part of this CAM use study.

Outcome Variable – CAM Purpose

The purpose of CAM use was significantly different in the cancer and non-cancer populations ($p < 0.01$). Whereas, CAM was most often used for treatment purposes only in the cancer population (18%), CAM in the non-cancer population was used most frequently for health promotion only (14.8%). There was no statistically significant difference in purpose of CAM use between recent survivors and long-term cancer survivors ($p < 0.63$) (Table 9).

Predictors of CAM Use

Variation in CAM use was examined in two distinct ways. At the conception of this research, “CAM use” was defined as “use of at least one CAM provider, practice, or product” listed in the NHIS 2002. This binary categorical outcome variable (“used any CAM” versus “did not use any CAM”) was used in the logistic regression model to determine predictors of CAM use (Table 10). After examination of this binary outcome, the analysis focused on the use of different categories of CAM, defined as (a) use of providers only, (b) use of practices only, (c) use of products only, and (d) use of

providers, practices, and products in combination (combined CAM). A multinomial logit regression model was employed for the second analysis providing information on use of the four mutually exclusive categories of CAM (Table 11). This allowed for a fine-tuning of the operational variable, CAM use, and provided a clear-cut delineation of use of different categories of CAM. The independent/predictor variables remained the same in both logit models. The logistic regression model results for overall CAM use (Table 10) are presented first, followed by the multinomial model results for use of specific CAM categories (Table 11).

CAM Use - Overall

Among cancer survivors, gender and age were strong predictors of CAM use. Women were significantly more likely to use CAM than men, with the odds of use higher by a factor of 1.4 ($p < 0.01$). When the relationship of age to CAM use was initially examined using multiple age categories, it showed a pattern of higher use with greater age up until the middle-ages, followed by a downward trend for older people. Thus, to represent this nonlinear relationship between age and CAM use efficiently, a polynomial transformation of the continuous age variable was tested, with the quadratic polynomial providing the best fit, i.e., the final regression model contained both the linear and squared age term as predictors. As the results in Table 10 show, both the linear and squared age terms were highly significant ($p < 0.01$; OR 1.06 & $p < 0.01$; OR 0.9993 respectively), supporting the notion that age is not linearly related to CAM use in the cancer population. When testing at which age CAM use was at a maximum (Figure 5), one finds highest the adjusted odds (and probabilities) of use at age 47. Those who are younger and older have lower probabilities of use, with a steadily declining increase from

age 18 to 47, followed by a steadily rising decrease from age 48 on (Figure 5). As Figure 5 shows, the probabilities of CAM use at age 20 and 75, for example, were similar, with use only 63% as high when compared with the 47 year olds.

To determine the relationship of education and CAM use, the original NHIS 2002 education variable was modified based on post-hoc testing. Several categories of the education variable did not differ significantly and were combined. By contrast, preliminary analysis also revealed a pattern of differing CAM use among those with professional doctorates (MD, JD, etc.) and academic doctorates (PhD), so these were kept as separate categories. Thus, levels of education in the model included: (a) high school completion or less, (b) attended college/ received an Associates, Bachelors or Master's degree, (c) professional doctorate, and (d) academic doctorate. Results show that having a college education/college degree did significantly predict CAM use ($p < 0.01$), with odds of use 1.9 times higher than in the reference group of people with high school education or less. While having an academic doctorate raised the odds of using CAM by a factor of 3.7 ($p < 0.01$), those with professional doctorates did not have higher odds of CAM usage than the reference group.

In order to examine race in the logistic model, some modifications were made to the race variable in the NHIS 2002. Because of the small numbers in the Native American, Chinese, Filipino, and Asian Indian categories in the cancer population, these racial groups were combined into the "other/mixed race" category for the logistic regression analysis. Thus, identification of differences in CAM use between Asians and whites was not possible in this study. Race was recoded as (a) non-Hispanic-whites, (b) African Americans, (c) Hispanics, and (d) other/mixed race, and was a significant

predictor of CAM use in the model. Data reveal that African Americans in the cancer population were less likely to use CAM ($p < 0.01$; OR 0.40) than non-Hispanic whites. No significant differences, however, were found between Hispanics and whites in the cancer population (Table 10).

CAM use also differed significantly by income level. Those with incomes below \$20,000 were less likely to use CAM, with odds of use only 60% as high as odds in the higher income group ($p < 0.01$; OR 0.64). Adjusted household income, although included as a descriptive statistic, was not included in the logistic or the multinomial logit model because of the high number of respondents with missing information (Table 10). Having various types of health insurance coverage was unrelated to CAM use.

Provider contact was included in the model to examine relationship of contact with various, diverse conventional providers and CAM use. Having contact with nurse practitioners, physician assistants, professional midwives, and therapists in the year preceding the NHIS 2002 interview did significantly predict overall use of CAM ($p < 0.01$) in the cancer population. Odds of use by those who saw or spoke with this type of nonphysician healthcare provider were 170% higher than odds of use by those who did not have contact. Those who had contact with mental health professionals had even higher odds of using CAM ($p < 0.01$; OR 2.53). In contrast, contact with physicians was not predictive of CAM use ($p < 0.95$) (Table 10).

Primary cancer diagnosis, a measure of evaluated need, was entered into the analysis as a multi-category independent variable that included six of the most prevalent cancer diagnoses in the NHIS 2002 dataset: breast, colon, lung, prostate, lymphoma, and melanoma. All primary diagnoses were compared with the reference category defined as

“other site” cancer. None of the primary cancer diagnoses were predictive of overall CAM use in the logistic regression model (Table 10). The p-value for prostate cancer, however, approached significance ($p < 0.058$). The corresponding odds ratio suggests the possibility of decreased likelihood of CAM use among those with this primary cancer diagnosis (OR 0.54) (Table 10).

Reported symptoms, a measure of perceived need in the conceptual model, were examined to determine ability to predict CAM use. Pain as a symptom was examined separately from insomnia, fatigue, and depression because of its apparent strong predictive ability in preliminary logistic regression analyses. In the final logistic model, pain was a significant predictor of overall CAM use ($p < 0.01$). The odds of using at least one CAM provider, practice or product among those with pain in the cancer population were almost 1.8 times greater than the odds of use by those with no report of pain (Table 10). Health status, another measure of perceived need, was also a significant predictor of using at least one CAM provider, practice or product. Those who reported good to excellent health had increased likelihood of use ($p < 0.02$; OR 1.34) (Table 10).

The following variables were not predictive of overall CAM use in the logistic regression model: marital status, insurance, number of emergency room visits, number of reported symptoms, co-morbidity, and recent diagnosis (Table 10).

CAM Us – Specific Categories

A multinomial logit model was employed to show predictors of specific categories of CAM (provider use only, practice use only, product use only, combined use) (Table 11). This more detailed model revealed that women in the cancer population were significantly more likely than men to use CAM practices only ($p < 0.00$), and the

combined use of providers, practices, and products ($p < 0.00$), but did not differ from men in their probability of using a CAM provider or product. The odds of using only CAM practices were more than 2.2 times greater and odds of combined CAM use were 1.8 times greater among the women (Table 11). An adjusted Wald statistic ($F = 0.00$) supports a significant gender effect for CAM use in the cancer population.

Age showed a similar pattern as a predictor of the specific CAM use categories. Age significantly predicted use of CAM practices ($p < 0.00$; OR 1.13) and the combined use of providers, practices, and products ($p < 0.00$; OR 1.14), but had no predictive effect on use of providers only or products only (Table 11). As shown in Figure 6 (Appendix B), the probability of using CAM practices only and combined CAM both increased with increasing age up to a point, at which point a downward trend in probability of use occurred. Using elementary calculus, we estimate that for CAM practices only, the highest probability of use is at age 51, and for the use of combined CAM, the highest probability occurs at age 45 (Figure 6). The probability of using a CAM provider only or a CAM product only does not change with age. Images in this dissertation for Figure 6, Appendix B, are presented in color to distinguish the categories of CAM use. Both the linear and quadratic age coefficients for these categories of use were nonsignificant (Table 11).

Having a college education and/or college degree significantly predicted use of CAM practices only ($p < 0.01$; OR 2.1), CAM products only ($p < 0.01$; OR 1.8) and the combined use of providers, practices, and products ($p < 0.01$; 2.1). Those with a college education had odds close to 200% as high of using these types of CAM when compared with the reference group (high school completion or less). In addition, odds of combined

use of CAM providers, practices and/or products were almost 8.5 times greater among those with academic doctorates when compared with the lowest educated group ($p < 0.00$). Having a professional doctorate did not predict use of any category of CAM (Table 11).

As with overall CAM use, African Americans were the only minority that differed in their use of the specific categories of CAM from non-Hispanic whites. African Americans in the cancer population were less likely to use CAM products ($p < 0.03$), and the combined use of providers, practices and products ($p < 0.00$). Compared to whites in the cancer population, the odds of using a CAM product were more than two times smaller (0.45) among African Americans; the odds of using all of the CAM categories were even 8.5 times smaller (0.14) among African Americans. None of the other racial/ethnic groups differed significantly in their use of specific CAM categories. A decreased likelihood of use of CAM products only was also predicted by marital status, with widowed respondents less likely to use than married respondents ($p < 0.04$; OR 0.61) (Table 11).

Patterns of CAM use also varied by income level. The odds of using CAM practices were almost 2 times greater, and the odds of combined use of providers, practices and/or products were 3 times greater among those with incomes of \$20,000 or more. Interestingly, having private health insurance was a significant predictor of CAM provider use, raising the odds by a factor of 1.9 ($p < 0.04$). Having contact with nonphysician providers (i.e., nurse practitioners, physician assistants, professional midwives, and therapists) significantly predicted use of all categories of CAM.

Particularly noteworthy is the fact that contact with this group of nurses and other healthcare providers raised the odds of using a CAM provider by a factor of 2.2 ($p < 0.01$). The use of CAM practices ($p < 0.01$; OR 3.1), products ($p < 0.02$; OR 2.2) and the combined use of providers, practices and products ($p < 0.01$; OR 2.7) were all significantly predicted by contact with mental health professionals. Contact with this group of healthcare providers did not, however, predict use of CAM providers ($p < 0.42$). Contact with a physician over the preceding twelve months and visits to the emergency department were not predictive of any of the specific categories of CAM use (Table 11). When examined in the multivariate model, only the primary diagnosis of prostate cancer was a significant predictor of the use of some CAM category. Specifically, those in the cancer population with this type of cancer were less likely to use CAM practices ($p < 0.50$; OR 0.22), with odds of use only 22% as high when compared with “other site” cancer survivors (Table 11).

Reported pain, entered into the multinomial logit model as an independent variable, was a significant predictor of CAM provider use only ($p < 0.01$), and combined use of providers, practices and/or products ($p < 0.01$). Among those who reported pain in the cancer population, odds of using CAM providers only were 2.9 times greater than among those who did not report pain. Odds of using combined CAM were more than 2.5 times greater (Table 11). Number of symptoms, including insomnia, depression and fatigue, was predictive of use of CAM practices only, with a 29% increase in odds of use with each additional symptom a person reported ($p < 0.02$). The number of symptoms had no predictive ability for use of any other category of CAM (Table 11). Non-cancer co-morbidity predicted increased likelihood of the combined use of providers, practices

and/or products ($p < 0.01$; OR 1.09). The odds of using a combination of CAM approaches increased by 9% for each additional non-cancer co-morbid condition that a cancer survivor reported in the NHIS 2002 interview.

The following variables were not predictive of any specific category of CAM use in the multinomial logit model: number of emergency room visits, reported health status, and recent cancer diagnosis.

Predictors of Purpose of CAM Use

A multinomial logit model was used to determine predisposing, enabling and need factors that predicted the use of CAM for (a) treatment purposes only, (b) health promotion purposes only, and (c) treatment and health promotion purposes combined. Gender was a significant predictor ($p < 0.01$) of using CAM for treatment and health promotion combined. The odds of a woman using CAM for these purposes were 2 times greater than among men in the cancer population (Table 12). Age was also predictive of using CAM for combined purposes ($p < 0.01$; 0.9984) and for health promotion reasons only ($p < 0.02$; 0.9991). Those in the cancer population with a college education were significantly more likely to use CAM for all three defined purposes when compared with those having a high school education or less. The odds were highest for using CAM for treatment and health promotion combined ($p < 0.01$; OR 2.6). In addition, among those with an academic doctorate, odds of use for both treatment and health promotion were more than 10 times greater ($p < 0.01$) (Table 12).

Among African Americans in the cancer population, CAM use was significantly less likely for treatment only ($p < 0.01$; OR 0.29) and for treatment and health promotion

combined ($p < 0.04$; OR 0.28). The odds of a white cancer survivor using CAM for these purposes were more than 3 times greater ($1/0.28$; Table 12). Income also predicted use of CAM for health promotion only and for treatment/health promotion combined, with decreased odds in the under \$20,000 group ($p < 0.01$; OR 0.33 & $p < 0.05$; OR 0.65 respectively). Those with higher incomes were more likely to choose CAM to promote health and to treat illness/symptoms. Contact with nurse practitioners, physician assistants, midwives, and therapists predicted CAM use for treatment only ($p < 0.01$) and for treatment/health promotion combined ($p < 0.01$). Odds of use for these purposes were close to 2 times greater among those who had contact with these conventional healthcare providers (Table 12). Odds of using CAM for all purposes were greatest among those who had contact with a mental health professional (Table 12).

Primary diagnosis, pain, co-morbidity and recent cancer diagnosis were also significant predictors of the purpose of CAM use. Those with prostate cancer were significantly less likely to use CAM for treatment only ($p < 0.01$; OR 0.26) and for health promotion only ($p < 0.05$; OR 0.31) in comparison to those with “other site” cancer. Among those reporting pain in the cancer population, likelihood of use for treatment and health promotion combined increased by a factor of almost 3 ($p < 0.00$), and by a factor of 2.2 for treatment only ($p < 0.00$). Co-morbidity predicted use for treatment only ($p < 0.03$) and for treatment/health promotion combined ($p < 0.02$), with a 6% and a 9% increase in odds respectively, for each additional co-morbid non-cancer condition reported (Table 12). Those reporting good to excellent health status were more likely to use CAM for health promotion only ($p < 0.01$; OR 1.96) when compared with those reporting poor to fair health status.

The following variables in the multinomial model were not predictive of the purpose of CAM use: marital status, insurance, number of emergency room visits, number of reported symptoms, and recent cancer diagnosis.

Summary: Predictors and Purpose of CAM Use

Table 13 shows the significant predisposing, enabling, and need predictors of the specific categories of CAM use. Although women in the cancer population were significantly more likely to use CAM, there is a distinct pattern of use identified in the multinomial logit model. The data do support the hypothesis that women are more likely to be CAM users; however, this hypothesis must be qualified, as analyses clearly show that women are only more likely to use CAM practices and combined CAM. The relationship of age and overall CAM use is best depicted using the quadratic polynomial transformation, which shows a curvilinear pattern of overall CAM use associated with age (Figure 5). The relationship of age and CAM use however, differs for the specific categories CAM. Whereas CAM practice use and combined CAM use change with age, use of CAM providers and CAM products do not. The age of highest probability of use also differed for the different categories of CAM (Figure 6). The data thus lend strong support to the hypothesis that age is related to CAM use.

A positive association between level of education and CAM use is evident, but not uniform. Having a college education or an academic doctorate were both strong predictors of most categories of CAM use. The contrast between academic and professional doctorates, however, calls into question the influence of other factors on CAM use, such as professional socialization, values, and role expectations.

Results also support the hypothesis suggesting a relationship between income and use of CAM. Data clearly reveal an association between income level and use of both purchasable and nonpurchasable CAM. Being uninsured was not related to CAM use, thereby lending no support in the data for the hypothesis that the uninsured were more likely to use CAM. In contrast, use of CAM providers only was more likely by the privately insured in the cancer population. This may be explained by increasing health insurance coverage for certain CAM therapies, for example chiropractic, biofeedback, and massage therapy. Contact with conventional healthcare providers was also strongly predictive of CAM use; however, the type of provider was an important factor. Pain, as a reported symptom, was very strongly related to CAM use, especially combined use of providers, practices, and/or products. Thus, data support the hypotheses that pain, number of symptoms, and co-existing co-morbidity are associated with CAM use in the cancer population.

The hypothesis that women are more likely to use CAM for both treatment and health promotion was supported by the data. Age, education, race, income, and provider contact are also significantly associated with purposes for CAM use, with the exception of contact with physicians. Contact with mental health professionals was the only predictor of CAM use for all three purposes. Reported pain and co-morbidity predicted use for both treatment only and for treatment/health promotion combined. Health status was the only variable in the model that predicted use of CAM for health promotion purposes only in the cancer population. Most of the model variables predicted use of CAM for combined purposes (Table 14).

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This research has identified patterns and predictors of CAM use in the U.S. cancer population. The CAM Healthcare Model, an extension of the Behavioral Model for Health Services' Use, has provided the conceptual framework to guide this research study. Evidence from the 2002 NHIS has supported the notion that many of the predisposing, enabling, and need factors identified in the model were related to the use of CAM in the population of recent and long-term cancer survivors. Furthermore, while the use of the CAM Healthcare Model as a framework has led to the identification of hitherto unexplored predictor variables of CAM use, the decision to widen the definition of CAM into specific categories based on CAM types and purposes, has added considerable refinement to our understanding of CAM use. The empirical results of the multivariate analyses presented here confirm, and often go beyond, what has been reported in the literature on CAM use. The following discussion is organized around the major constructs of the CAM Healthcare Model. This includes highlights of the comparison of the cancer and non-cancer populations in the US, and implications of the findings concerning predictors, patterns and purposes of CAM use. This study has identified characteristics of CAM users in the cancer population, and has increased our understanding of how and why they used CAM.

Cancer Population

The prevalence of overall CAM use in the cancer population (39.2% used CAM) was higher than previously reported by Salmenpera (2002), and falls within the wide

range of estimated use reported by Ernst & Cassileth (1998). It is important to note the wide variation that exists among studies reported in the literature on CAM use among those with cancer, and in general, populations. The variation in the CAM therapies that have been examined influences interpretation of results across studies. The current study has also identified use of the different categories of CAM identified in the CAM Healthcare Model. Highest use was reported for the combined use of providers, practices, and/or products among cancer survivors, followed by product use, practice use, and lastly, use of CAM providers only. Overall CAM use was significantly lower in the non-cancer population (34.9% as compared with 39.2%) ($p < 0.01$), with the greatest difference noted in use of combined CAM. The use of CAM practices only, products only, and providers only, were similar in both populations. CAM use, both overall and the use of the specific categories, did not differ among the recent and long-term cancer survivors ($p < 0.63$) (Table 7).

The cancer population differed significantly from the non-cancer population in gender, age, race, and marital status. The cancer population included more women, especially in the long-term survivor group. This probably reflects the longer lifespan of women in the U.S., and the higher prevalence and survival rate for those diagnosed with breast cancer, a disease that primarily affects women. Breast cancer was also one of the most prevalent cancers in the NHIS 2002 subset of respondents used for analysis of the estimated total cancer population in the U.S. The age distribution and mean age of the cancer population indicated that this population was substantially older, necessitating adjustments for age in the analysis for many of the study variables. Age was adjusted in the analysis using the population age distribution from the 2000 U.S. Census. Once

adjusted for age, differences in the gender and race composition of the two populations decreased, but did not disappear completely. The cancer population still had a higher number of women and non-Hispanic whites. It is our belief that this reflects the greater number of whites and women that reach the 6th and higher decades of life in the U.S. Factors that negatively influence longevity among African Americans, such as higher morbidity and mortality because of chronic illness, violence, and lack of access to healthcare, have been widely reported in the literature (Gillum, Mussolino & Madans, 1997; Schneider, Staggers, Alexander, Sheppard, Rainforth et al., 1995; Williams, 1999; Zoratti, Havstad, Rodriguez, Robens-Paradise, Lafata et al., 1998). This has contributed to (a) lower numbers of African Americans who will reach an age when cancer is likely to occur, and (b) decreased cancer survival rates related to high co-existing co-morbidity. The difference in the number of Hispanic respondents in the cancer population may represent the lower numbers of Hispanic elders in the U.S. as compared with young Hispanic individuals, possibly related to increased immigration among the young. The differences in the age distribution of the two populations also influenced findings on marital status. It is not surprising that there were more widowed, and fewer single individuals in the cancer population given the higher number of elderly.

Recent and long-term cancer survivors had lower incomes, were more insured, and had more contact with health care providers than those in the non-cancer population. Both recent and long-term cancer survivors had a higher mean number of co-existing co-morbid conditions, and higher frequency of reported pain and other symptoms. This is not surprising since many had recent cancer, and that the cancer population is older and, thus, subject to additional health problems and symptoms associated with aging.

This presents the picture of a population that has more health needs requiring more conventional healthcare services, and possibly a greater need for CAM health services and practices. The finding that a higher percentage of the cancer population used CAM therapies, when compared with the non-cancer population, may reflect this greater need.

Predictors of CAM Use and CAM purpose

Predisposing Variables

All of the predisposing variables included in the conceptual model significantly predicted overall use of CAM and/or the use of specific categories of CAM. These empirical findings confirm that overall CAM use in the cancer population was more prevalent among female, middle-aged, white, and well-educated people, as has been previously reported for the general population in the research literature (Bausell et al., 2001; Eisenberg et al., 1998; Lee et al., 2004; Wolsko, Eisenberg, Davis, Ettner & Phillips, 2002). In addition to confirming these predictive relationships between the model variables and overall CAM use, we have gone one step further by providing a more complete picture of the patterns and purposes of use. Breaking down overall CAM use, based on types and purposes, it could be shown that women were more likely to use only CAM practices, or a combination of providers, practices, and/or products, for both treatment and health promotion purposes. On the other hand, this greater female emphasis on CAM practices does not extend to CAM providers or products. Thus, the greater likelihood of use of combined CAM therapies among women alone accounts for the generally reported higher odds of using all CAM approaches. This supports findings by Sparber (2000) that women with cancer were more likely to use a wide variety of

CAM therapies. The likelihood of using practices such as meditation, guided imagery, and deep breathing for relaxation may reflect the tendency of women to be more actively involved in self-care than men are, as has been suggested in the healthcare literature. It may also reflect a belief that these types of practices are important for health and symptom management. Further study can ensue with the NHIS 2002 dataset to determine if having symptoms, for example, is a better predictor of CAM use among women than among men. Further research is also needed to address additional questions on gender and CAM use behavior, such as: (a) do women chose CAM practices because of their health beliefs or self-care tendencies, (b) do women assume more self-responsibility for their healthcare and/or (c) are they more confident about their healthcare choices.

The curvilinear relationship of age and CAM use in the cancer population was an interesting and important finding that extends what has been presented in the CAM research literature. Like gender, age specifically predicted the use of CAM practices only, and the combined use of providers, practices and/or products. It is interesting to note that odds of use by younger individuals (20-30 yr olds) mirror the odds of use by older individuals (70 +). Peak use occurred in the hypothesized age range with highest probability of use occurring from ages 45–51 for the different CAM categories (Figures 5 & 6). This confirms previous findings by Bausell, et al. (2001), Eisenberg, et al. (1998) and Lee et al. (2004) who found higher rates of use among middle-aged individuals. Our findings, however, are much more precise regarding the age effect on CAM use. In contrast to the broad age categories mentioned in the literature, we have identified the specific age of highest probability of use for the different categories of CAM that were studied. The relationship between age and purpose of CAM use is similar, indicating

higher probability of use for treatment and health promotion during middle-age. There remains, however, a fundamental ambiguity in interpreting the “age effect” in this case. In cross-sectional surveys, age effects are completely confounded with cohort effects. That means we cannot know from the data whether the age cohort of 45-50 is historically uniquely predisposed to CAM use, or whether their greater CAM use is somehow intrinsically connected to age itself. It is worth emphasizing though that, at least in a crude way, income and health status were controlled for in the multivariate analysis. Interestingly, the lower likelihood of use for health promotion in the younger age range coincides with a pre-illness time in life when health promotion (and illness prevention) should be a prime concern. Most of the time, since they do not experience many adverse health problems, young people are unconcerned about their health and simply do not go to any provider, whether conventional or CAM. In that respect, the use of CAM perfectly mirrors the use of conventional health services. Similarly, the decreased likelihood of use for treatment and health promotion in the later years coincides with increased prevalence of chronic illness and symptoms that need treatment.

Having attended college and/or completing a college degree was one of the strongest predictors of CAM use, with a variety of significant patterns of CAM use identified. Interestingly, this level of education was not predictive of the use of providers only, suggesting that after income and insurance status are controlled for, higher education may primarily affect self-directed activities, such as CAM practices, and seeking out CAM products. However, there is one exception to this rule: the difference between those with academic and professional doctorates. One may speculate that many of the professional doctorates included physicians and other conventional health care

providers with doctorates. These groups may be least inclined to see merit in CAM therapies, but at this point, this finding raises more interesting questions for further study than it suggests answers. The greater likelihood of CAM use by academic doctorates, and use for both treatment and health promotion, is consistent with the overall trend of a positive association of education and greater CAM use. Overall, the findings on education confirm that likelihood of CAM use increases with higher education among cancer survivors just as in the general population, as has been suggested in the literature (Ashikaga, Boomer, O'Brien, & Nelson, 2002; Astin, 1998; Barnes et al., 2004; Bausell et al., 2001; Egede, Ye, Zheng & Silverstein, 2002; Eisenberg et al., 1998; Mackenzie, Taylor, Bloom, Hufford & Johnson, 2003).

Regarding race, our data show that African Americans in the cancer population were less likely to use CAM than whites, supporting earlier findings by Eisenberg et al., (1993, 1998). These findings, however, differ from Barnes et al., (2004) who found higher CAM use among African Americans, when compared to whites using the same data, the NHIS 2002. We suggest that the difference in these findings on race and overall CAM use in the NHIS 2002 dataset are primarily because of the exclusion of the prayer variables as a CAM therapy in our study. Barnes et al., (2004) also reported that the percentage of the general U.S. population that used CAM decreased from 62% to 36% when prayer was excluded in the analysis, and prayer, as a way of dealing with health issues, is more prevalent among African-Americans. The proportion of African Americans in the cancer population that used prayer was significantly higher than among non-African Americans (82% as compared to 69.8%) ($p < 0.0035$). Furthermore, Barnes' estimates were not adjusted for age, income, and all the other variables in the current

multivariate model, making any comparison to the current findings hazardous. The finding of a greater likelihood of whites using CAM providers, in the context of combined CAM use, is supported by previous findings that whites were more likely to visit CAM practitioners (Bausell et al., 2001). There were no significant differences in CAM use by Hispanics when compared with whites. African-American race did significantly predict decreased likelihood of CAM use for treatment only, and use for both treatment and health promotion by the African Americans in the cancer population.

Widowed individuals in the cancer population were significantly less likely to use only CAM products when compared with those who were married, despite the fact that more than three-fourths (80.4%) of the widowed were women. Here we might conclude that this pattern emerged because married couples, as compared with widowed individuals, have more financial resources, just by virtue of single versus combined household incomes, and the effect of age on income level. It is true that the multivariate analysis included an income variable, but the binary division of income into less than or more than \$20,000 is a rather crude measure and conceals substantial remaining variation in income. CAM products cost money, and are usually not reimbursable through insurance. Although no precise theoretical reasons exist for considering marital status as a predisposing predictor of CAM use, it was included in this study for several reasons. Marital status has been examined in relationship to CAM use with interesting findings (Fouladbakhsh et al., 2005). Further, in research examining use of conventional healthcare services, marital status is often interpreted as a proxy for social support. Viewed as such, married individuals would have access to more financial resources (income etc.) and interpersonal social support that may influence healthcare decisions and

use of healthcare services. If this proves to be valid with CAM use behavior, marital status may more likely be an enabling factor, rather than a predisposing factor, and should be considered in this light. Further study is thus indicated to sort the influence of marital status, social support, and financial resources on CAM use in this population, and how these variables should be categorized in the CAM Healthcare Model.

Enabling Variables

Provider contact was highest among recent cancer survivors as would be expected in the first year following diagnosis. It is safe to conclude that CAM use in the cancer population was complementary, rather than alternative, given the high percentage that had contact with a physician, nurse practitioner, physician assistant, therapists, or mental health professional over a one-year period. When these contacts were examined independently, we find that more than 94% of the cancer population had seen or spoken with a conventional healthcare provider.

In examining factors that might enable or impede use of CAM provider services, CAM practices, and CAM products, the analysis focused on the predictive ability of income, insurance, and connection with a conventional healthcare provider. Those in the cancer population with private insurance, the most widely held insurance, were more likely to use CAM providers, with use for treatment purposes only. A high percentage of those who saw CAM providers had private insurance as follows: acupuncture (91.7%), chiropractic (83.8%), naturopathic (76.7%) and massage (79%). Therefore, use of CAM providers by those with private insurance may be attributed to: (a) health insurance coverage for certain CAM provider services such as chiropractic, acupuncture, and massage, which are generally offered for treatment purposes, and/or (b) more available

financial resources for the purchase of non-reimbursable CAM provider services because the cost of conventional healthcare was covered by insurance (this is what an economist would call an “income effect”). This finding supports previous research that reported greater odds of using provider services among those with even partial insurance coverage for some CAM health services, when compared with those with no insurance (Wolsko et al., 2002). The literature reveals that insurance coverage for CAM provider services is increasing across the U.S., but is often limited to chiropractic treatment, massage therapy, acupuncture, and naturopathic medicine, Cleary-Guida, Okvat, Oz & Ting, 2001; Lafferty et al., 2004). More study is needed to identify the relationship between personal financial resources, cost of CAM, and factors that influence the decision to use CAM, particularly as some CAM services have become a more integral part of “conventional” health care.

The findings in the literature regarding the relationship of income and CAM use have been contradictory. This may be because of varying operational definitions of CAM, and the different populations that have been examined. It may also be because of the complexity of a measure such as income. Income has generally been defined as the amount of money coming into a household. Of great importance is the composition and size of the household, i.e., the number of family members who are supported by this income. Our measure of adjusted household income took this into consideration. Although not included in the logistic and multinomial models, it has still informed us that the cancer population has more individuals with lower income levels, most likely related to the age distribution. It is not, however, a complete indicator of financial resources, as

it does not reflect savings and other sources of available money that could be spent on CAM health care.

In our study, higher income was a significant predictor of CAM use in the cancer population, confirming findings in the literature that have shown a positive relationship between CAM and income level (Kao & Devine, 2000; Lee, Lin, Wrensch, Adler & Eisenberg, 2000; Tindle, Davis, Phillips, & Eisenberg, 2005). Interestingly, in the current study, those with higher incomes were more likely to use CAM practices only, which sometimes involve no financial costs, as well as combined CAM approaches, for both treatment and health promotion. Many CAM practices, although largely cost-free when self-directed, except for the time commitment, are also available through private and community-based classes with a fee requirement. Hence, higher household income would provide additional financial resources for guided learning of CAM practices (class instruction, learning materials, such as CDs, book etc.), and for out-of-pocket costs of other CAM services and products. There are likely to be other reasons for the association between the income variable and CAM use. The binary income variable, with a cut-off at \$20,000 essentially divides the population into “poor” and “not-poor” groups. Yet, poverty status is associated with a host of barriers to access (Bodenheimer & Grumbach, 2004), not least among them is simply access to information about CAM services and practices. It is clear, however, that more research needs to be conducted to understand more completely the relationship between available financial resources and use of CAM therapies that require purchase.

Contact with a conventional healthcare provider was another enabling factor that significantly predicted overall use of CAM, and use of the specific CAM categories. The

conventional healthcare provider categories were created based on available data in the NHIS 2002, and served to represent physician providers, nonphysician providers (nurse practitioners, physician assistants, physical, and occupational therapists), and mental health professionals (physician and nonphysician). Although contact was highest with physicians, this was not predictive of any CAM use in the cancer population. Thus, there appears to be neither a substitution effect, e.g., cancer patients seeking out CAM instead of conventional care, nor a re-enforcement/complementary effect, for example, cancer patients who go to conventional physicians being more likely to use CAM. However, any conclusion needs to be tempered by the realization that more than 90% of the cancer survivors had contact with a physician in the previous year, which means that there is insufficient variation to establish a relationship between physician contacts and CAM use. By contrast, contact with nurse practitioners, physician assistants, or physical and occupational therapists, which occurred at a lower rate of 29.5%, was a strong predictor of all categories of CAM use, providing evidence for the complementary use of CAM and conventional healthcare services among cancer patients. This type of contact also predicted use of CAM for treatment purposes only, and for both treatment and health promotion combined. These providers primarily care for those who are ill and/or experiencing symptoms, such as pain, hence it makes sense that contact would be mostly predictive of CAM use for treatment purposes. It also suggests that CAM therapies provide an additional source of care for symptoms that may not respond to conventional treatment. Further study is indicated to understand more fully the relationship of contact with nurses and CAM use. This should include advanced practice nurses, such as nurse

practitioners, as well as other nurses, who provide care in hospitals, clinics, and community-based settings.

Although contact with a mental health professional was a strong predictor of CAM use, especially use of CAM practices, it did not predict use of providers only. Since many CAM practices focus on promoting relaxation and reducing stress, the need for this is understandable among those with mental health concerns. Practices, such as deep breathing, meditation, and guided imagery, have been widely used in the mental health field by nurses, psychotherapists, and psychiatrists for symptom management. Use of CAM products included herbs, vitamins, and homeopathic preparations, many of which are used for the management of physical and psychological symptoms such as pain, anxiety, depression, insomnia, and fatigue, which were prevalent in the cancer population.

Need Variables

This research has confirmed that many need variables identified in the conceptual model were related to the use of CAM provider services, CAM practices, and the use of a combined CAM approaches by those in the cancer population. Perceived and evaluated need, as measured by reported health status, pain, number of other symptoms, and number of co-existing co-morbid conditions, was predictive of CAM use in the cancer population. Having a primary diagnosis of prostate cancer was also a significant evaluated need factor predictive of use.

Our findings concerning the relationship of good to excellent health status and use of CAM for health promotion purposes only, have interesting implications. The need for health promotion among those who are ill has been well documented. This finding,

however, suggests that those CAM therapies that have a strong health promotion component were not readily used by those with lower health status ratings in the cancer population. A possible factor for lower likelihood of use for health promotion among those with poorer health status is the self-care aspect of CAM, which requires active involvement of the individual. Those in fair to poor health may simply lack the energy and focus to become involved in self-care activities that are not directed at treatment and relief of symptoms. Clearly, at this point, however, such interpretations are speculative, and further study is indicated to clarify why CAM therapies were chosen for health promotion purposes by those who reported better health, and if this was prompted by the beliefs about use.

Overall, the probability of using CAM services, products, or engaging in CAM practices does not appear to be affected by the specific primary cancer diagnosis. The only significant difference involved a decreased likelihood of use of CAM practices for treatment and health promotion by those with prostate cancer. This finding may be the result of (a) a possible gender difference in the use of self-directed, self-care health activities, and (b) the extensive information in the media regarding a CAM treatment for prostate cancer, specifically a product (PC-specs) that was banned by the FDA around the time of the 2002 NHIS. Hearing about a contaminated, nonconventional cancer treatment that caused serious, unexpected effects may have prompted hesitancy to use anything outside of the conventional healthcare realm among those with prostate cancer. Only data from a different year could show if the current finding is the result of a temporary “history” effect (Shadish, Cook, & Campbell, 2002)

That the presence of co-existing co-morbid conditions predicted CAM use in the cancer population is not surprising and confirms previous findings in the CAM research literature (Bausell et al., 2001; Egede et al., 2002; Eisenberg et al., 1998; Wolsko, 2002). CAM therapies have frequently been used for the treatment of symptoms related to chronic illness. Indeed, the current findings support the notion that, the more co-morbid conditions cancer patients have, the more likely they are to use CAM for treatment purposes primarily. The finding that co-morbidity was a significant predictor of CAM use as treatment provides valuable information for nurses and other healthcare providers caring for recent and long-term survivors. It points out that cancer survivors with co-existing co-morbidity are seeking relief from the burden of chronic illness by including CAM in their healthcare regimen. This is further supported by the significance of pain as a predictor of the use. Having pain was one of only three variables in the CAM Healthcare Model that predicted use of CAM provider services only. This reflects the use of chiropractors, massage therapists, acupuncturists, and other CAM providers for the very common problems of back, neck, joint, and other types of pain. More than 56% of those with low-back pain and 36.7 % with neck pain had visited a chiropractor ($p < 0.00$). Almost 88% of those who saw an acupuncturist ($p < 0.05$), and 82% of those who received massage ($p < 0.05$) in the cancer population reported pain.

The relationship of pain, chronic illness, and CAM use has been reported in the research literature and is confirmed by our findings (Eisenberg et al., 1998; Wolsko et al., 2003). The strong ability of pain to predict use of a combination of CAM approaches for both treatment and health promotion further suggests that those who have pain are seeking a variety of care options to address this widespread problem. Our data also show

that pain significantly predicts use of CAM as a treatment option only. The number of other symptoms reported also predicted the use of CAM, but only the use of practices. It is clear that as the number of symptoms increases, the burden experienced by the individual intensifies. This burden may very likely prompt use of self-directed approaches to promote relaxation, ease stress and manage symptoms. Further study, however, is necessary to sort the relationship of other symptoms experienced (depression, insomnia, and fatigue) and use of specific CAM practices.

Use of the CAM Healthcare Model

The CAM Healthcare Model, an extension of the Anderson Behavioral Model for Health Services' Use, provided a useful framework for enumerating and showing the potential predictive relationships between the predisposing, enabling, and need factors, and the outcome variable defined as CAM use. Using this model to guide the secondary analysis of the 2002 NHIS dataset allowed us to determine the significance of these relationships. Further revision of the operational definition of our outcome variable to include specific categories of CAM allowed for a more specific delineation of use in the cancer population. This multicategory outcome variable was based on the alternative categorization of CAM presented in the Introduction section. One of the more surprising aspects of employing the CAM Healthcare Model is that it appears to apply to CAM practices, and products, as well as to CAM services offered by providers, even though the original Anderson Behavioral Model was specifically devised to predict use of conventional health services. Perhaps, the pursuit of self-care practices is not all that different from seeking out health care services: both require time, resourcefulness

(“enabling factors”), an urge to make the effort (“needs”), and a predisposition to use them.

It is in the measurement of the predisposing factors that the current analysis has its biggest shortcomings. Age, education, and race are only rough proxies for the actual attitudes underlying the predisposition to use CAM. Only actual measures of these attitudes will fully clarify the role that predisposing factors actually play in seeking out and using CAM.

It is also important to note that some factors included in this study as predisposing, based upon previous research and the original Behavioral Model, may also serve as enabling factors when examined in a different context. For example, education, viewed in the literature as a factor that predisposes one to use healthcare services, may also be considered an enabling factor for CAM use. This is noted by the difference in use among academic and professional doctorates in the current study. Perhaps it is professional socialization, collegial relationships, and/or the work environment (conventional healthcare) created through the education process that influences healthcare choices, rather than solely acquired knowledge. The distinctions for classifying variables in the model categories are not absolute or clear-cut. Further study is needed to illuminate how the factors identified in the CAM Healthcare Model influence CAM use, with subsequent recategorization in the model as indicated.

In sum, the extended model provided a conceptual framework that was theoretically sound, easy to implement, and amenable to changes as familiarity with the dataset increased. The model identified measurable empirical indicators associated with CAM use in the cancer population. This allowed us to study CAM on a health service –

health practice continuum, thereby reflecting the nature of CAM use defined in the Introduction section. Examining the distinct categories of CAM has provided valuable information on both the self-directed and the provider-directed components of CAM health care. Thus, we conclude that the extended model was very useful in guiding this research. Continued use of this model for future CAM research may promote increased comparability across studies, and allow for confirmation of findings about characteristics of CAM users, and the patterns and predictors of use.

Conclusions

This dissertation research has provided a wealth of information about CAM use in the U.S. cancer population that confirms and extends what has been presented in the research literature. Our findings are strengthened by the methodology of the NHIS 2002, which employed a multistage cluster sampling design, and represents the civilian, noninstitutionalized adult U.S. population. Using STATA 9.2 for analysis of the NHIS 2002 dataset allowed us to estimate the total surviving adult U.S. cancer population of more than 14 million individuals, and to compare this population group to the more than 190 million adult individuals who did not have cancer. Analysis using logistic regression and multinomial logit models has provided conclusive findings on significant predictors of overall CAM use, the use of specific categories of CAM, and the purpose for use in the cancer population.

These findings provide important information for nurses, physicians, and other conventional and CAM healthcare providers who care for oncology patients and cancer survivors. Characteristics of users have been clearly identified, which will assist with the

assessment process as cancer survivors navigate the conventional healthcare system for care. This information will serve to enhance health outcomes by promoting early recognition of users and their patterns of use. This recognition can assist nurses and other healthcare providers maximize outcomes of healthcare by (a) preventing potential negative interactions and adverse events that are possible between CAM use and conventional treatment, (b) incorporating those CAM therapies that benefit patients into the overall nursing plan of care, and (c) allowing for integration, and hence, availability of CAM, in the conventional healthcare arena. Overall, this will allow for a more comprehensive system of healthcare that addresses the needs of those who have survived cancer. As it grows in popularity, CAM may change the boundaries of the healthcare arena as we know it today.

Nurses who are directly involved in the care of oncology patients and cancer survivors, whether hospitalized or in the community, should comprehensively assess CAM use by their patients. In the assessment process, nurses should recognize that patients might not reveal their use of CAM. Data have shown that many cancer patients are reluctant to discuss use of CAM therapies and practices with healthcare providers. Hence, nurses should establish open communication with patients and their families, and use assessment tools that include a CAM component or are specifically focused on CAM use (Fouladbakhsh, 2005). Nurses should identify potential benefits, risks of use, and how CAM has been incorporated into the patient's program of healthcare.

CAM therapies and practices that provide assistance with the management of symptoms, whether related to the disease process or the treatment regimen, should be considered for inclusion in the nursing care plan when possible. As adjuncts to

conventional care, certain CAM therapies and practices can also be provided and/or guided by nurses who are knowledgeable and/or credentialed to do so. Nurses are also in a prime position to provide education about CAM. Nurses can independently incorporate teaching about CAM practices, such as guided imagery, meditation, and other relaxation techniques, which may be useful for self-care during chemotherapy, radiation, and before and after cancer surgery. Increased involvement in self-care for symptom management may increase a patient's sense of control during the illness experience and treatment process, ultimately affecting comfort, quality of life, and overall satisfaction with healthcare. Nurses should also be attuned to those patients with co-existing co-morbid conditions and related symptoms such as pain, depression, insomnia, and fatigue, recognizing their greater likelihood to use CAM. Recognizing that women are more likely to use CAM practices, nurses should allow for continued, appropriate use while CAM users are in their care. They should also include male cancer patients in their teaching about beneficial CAM practices, noting their lower likelihood of use. Nurses are also in an ideal position to provide resource and referral information for those who use CAM.

In summary, nurses are often the healthcare providers most consistently and most intensely involved with cancer survivors. Therefore, it is important that nurses (a) recognize who uses CAM, (b) understand patterns and purposes of use, (c) assess risks and benefits of use, (d) prevent negative interactions and adverse events through recognition and documentation of use, (e) educate patients about benefits, and (f) ultimately, serve as a link and resource for their patients who concurrently use CAM and conventional health care services, practices and products. Nurses are in the ideal position

to provide comprehensive care and guidance about CAM to cancer survivors, thereby promoting positive health outcomes.

This research has also raised further questions about CAM use in the cancer population. The CAM Healthcare Model includes empirical indicators for the predisposing, enabling, and need factors that we were unable to measure because of limitations imposed by the use of secondary data. Information on health beliefs, values, cultural lifestyle factors, community norms, personality factors, social support, and more were not available in the 2002 NHIS data. Clearly, a crucial factor in understanding CAM use is the motivation that prompts one to select a CAM provider, practice, and/or product to address health needs. This study has highlighted that in the U.S. cancer population, the use of CAM appeared to be complementary in nature. More research specific to cancer is needed to sort out clearly why individuals chose a specific CAM therapy, what factors led this decision, and whether this was used concurrently with conventional treatment, and with provider awareness and direction. Understanding why individuals make the healthcare choices they do, is of course, complex. It is only with further study that we can illuminate additional factors that prompt a cancer survivor to choose CAM.

Limitations

This study was limited to information available in the 2002 NHIS dataset. Because of lack of information, we were unable to explore the relationship between factors that might potentially predispose an individual to use CAM, such as health beliefs, cultural background, values, and attitudes. Beliefs about health and personal responsibility for healthcare are very important in understanding the health services one

seeks and uses. Without this information, one cannot understand fully the underlying motivations that influence CAM use behavior. No variables were available in the NHIS 2002 dataset to explore the link between beliefs and attitudes and CAM use in the cancer population. Thus, further study is warranted to examine these predisposing factors in relationship to CAM use.

Specific information about need factors such cancer stage, cancer treatment and length of survivorship was unavailable in the dataset. Although we could determine the timing of the cancer diagnosis within a one-year, or more than one-year classification, we were unable to sort the respondents who were concurrently undergoing conventional cancer treatment at the time of the NHIS interview. In addition, although respondents were able to report symptoms, there was no way to identify (a) relationship of reported symptoms to the cancer experience or treatment, and (b) symptom severity. These need factors are important in understanding the use of CAM by those with a cancer diagnosis and whether use is for management of symptoms related to: (a) ongoing cancer treatment, (b) the cancer diagnosis, (c) the progression of disease, and/or (d) co-existing co-morbidities. In addition, although we were able to examine the relationship of CAM and the enabling factor of income, the categories used were restrictive (limited). Extended analysis with finer distinctions in income level, and examination of the relationship between overall financial resources, and cost of CAM in relationship to use in the cancer population is indicated.

Table 1. List of CAM Therapies in the 2002 NHIS

Acupuncture	Yoga
Ayurvedic	Tai Chi
Biofeedback	Qi gong
Chelation	Meditation
Chiropractic	Guided imagery
Energy Healing	Progressive relaxation
Folk medicine	Deep breathing exercises
Massage	Herbs
Naturopathic	Homeopathic products
Vitamins daily multiple megavitamin use individual use	Diets Atkins Zone Pritikin Vegetarian Ornish Macrobiotic
Hypnosis	Prayer Self or others Healing rituals

Table 2. NCCAM Categorization of CAM Therapies

Domain	Description & Examples
Mind-body therapies	Behavioral, social, psychological and spiritual approaches to health, <u>Example:</u> yoga, Tai Chi, meditation, hypnosis
Alternative medical systems	Complete systems of theory and practice developed outside of a western, conventional biomedical approach to health and illness <u>Example:</u> homeopathy, naturopathy, traditional Chinese medicine
Biological-based therapies	Natural and biologically-based products and practices and interventions <u>Example:</u> herbs, supplements, diet therapy
Manipulative and body-based systems	Systems that are based on manipulation and/or movement of the body <u>Example:</u> massage, Feldenkrais
Energy therapies	Systems that use subtle energy fields in and around the body to promote healing <u>Example:</u> Healing Touch, Therapeutic Touch, acupuncture, Reiki

Table 3. Alternative Categorization of CAM Providers, Practices and Products (*included in the NHIS 2002)

<u>CAM Providers</u> Health services	<u>CAM Products</u> Products -materials	<u>CAM Practices</u> Self-care activity
Acupuncture*	Essential Oils	Acupressure
Chiropractic*	Herbal products*	Meditation*
Naturopathic*	Self-help books	Nutritional variations; diets*
Ayurvedic*	Educational materials: CDs, videos, audiotapes	Breathing exercises Deep breathing * Breathwork -pranayama
Massage*	Music/art materials	Use of vitamins, herbs & supplements
Homeopathic	Internet websites	Music, listening, drumming playing, singing
Energy healing*	Vitamins*	Prayer & spiritual activities*
Chelation*	Nutritional supplements	Self-massage
Music therapy	Teas	Guided imagery*

Requires CAM practitioner to provide care or treatment

Often used by CAM practitioner; can be used independently

Used independently no practitioner required

Table 3 (cont'd).

<u>CAM Providers</u> Health services	<u>CAM Products</u> Products -materials	<u>CAM Practices</u> Self-care activity
Hypnosis*	Magazines	Yoga, Qi Gong, Tai Chi*
Spiritual healing *-use of spiritual mediums	Food products	Shamanic rituals; vision quests
Shamanic healing	Spiritual artifacts	Energy healing
Holistic consultations	Crystals	Self-chakra balancing
Cranial sacral therapy	Healing equipment Full spectrum light	Progressive relaxation*
Aromatherapy	Magnets	Visualization
Art Therapy	Spa supplies	
Folk Medicine*	Homeopathic products*	
Biofeedback*		
Requires CAM practitioner to provide care or treatment	Often used by CAM practitioner; can be used independently	Used independently no practitioner required

Provider-directed CAM use ----- *Self-directed CAM use*

*Included in NHIS, 2002.

Table 4. Independent Variables in the CAM Healthcare Model

The independent (predictor) variables in the analyses are listed according to the theoretical constructs in the model.

Variable	Variable name	Variable type	Empirical Indicator
<u>Predisposing</u>			
Gender	sex	Categorical	Male = 1 Female = 2
Age	age_p & sqage_p	Continuous	
Education	educatc	Categorical	HS or less = 1 College = 2 Prof.doc = 3 Academic doc = 4
Race	newraced	Categorical	White = 1 African Amer = 2 Hispanic = 3 Other/mixed = 4
Marital Status	marital3	Categorical	Married = 1 Single = 2 Widowed = 4

Table 4 (cont'd).

Variable	Variable name	Variable type	Empirical Indicator
Enabling			
Income	incgrpcat	Categorical	\$20,000 & over = 1 < \$20,000 = 2
Insurance	insprivate_r	Categorical	No = 0 Yes = 1
	insmedicare_r	Categorical	No = 0 Yes = 1
	insmedicaid_r	Categorical	No = 0 Yes = 1
	insgovern_r	Categorical	No = 0 Yes = 1
Provider-Physician	provider2	Categorical	No = 0 Yes = 1
RN, NP, PA	provider6	Categorical	No = 0 Yes = 1
Mentalhealth	provider7	Categorical	No = 0 Yes = 1
ER Visits	EDfrequse	Continuous	

Table 4 (cont'd).

Variable	Variable name	Variable type	Empirical Indicator
Need			
Primary Cancer dx	primdiag	Categorical	Othersite = 1 Breast = 2 Lung = 3 Colon = 4 Prostate = 5 Lymphoma = 6 Melanoma = 7
Pain	anypain	Categorical	No = 0 Yes = 1
Symptoms	othersymp	Continuous	
Co-morbidity	comorb1	Continuous	
Health status	phstat3	Categorical	Poor-fair = 1 Good-excellent = 2
Survivor time since diagnosis	cnrecent	Categorical	No = 0 Yes = 1

Table 5. Comparison of the Non-cancer Population and the Cancer Population

	Total Non-cancer Population		Total Cancer Population	
	Percent	95% CI	Percent	95% CI
<u>PREDISPOSING VARIABLES</u>				
<u>Gender</u>				
Male	48.3	47.6 - 49.1	43.1	40.8 - 45.4
Female	51.7	50.9 - 52.4	56.9	54.6 - 59.2
Total	191520474*		14304621*	
Design-based F (1,339)=	20.1042		P = 0.0000	
*Population estimates remain the same except where noted in the table.				
<u>Age</u>				
18-34	33.0	32.2 - 33.9	6.2	5.1 - 7.5
35-44	22.3	21.7 - 22.9	8.6	7.4 - 10.0
45-54	19.2	18.6 - 19.8	15.7	13.9 - 17.7
55-64	11.9	11.5 - 12.4	19.8	17.9 - 21.8
65-74	7.5	7.1 - 7.9	24.5	22.6 - 26.4
75+	6.1	5.7 - 6.5	25.2	23.2 - 27.3
Design-based F (4.88,1655.52)=	379.9622		P = 0.0000	
<u>Education</u>				
Less than HS	16.5	15.9 - 17.1	18.0	16.4 - 19.7
HS degree	29.8	28.7 - 30.1	31.8	29.3 - 33.8
College	50.7		47.7	

Table 5 (cont'd).

Some college	19.9	19.3 - 20.5	18.3	16.7 - 20.1
Associate	8.9	8.5 - 9.4	8.9	7.6 - 10.3
Bachelors	16.2	15.7 - 16.8	14.4	12.7 - 16.0
Master	5.7	5.3 - 6.2	0.8	4.8 - 7.0
Professional	1.3	1.1 - 1.6	1.2	0.7 - 1.8
Doctorate				
Academic	1.0	0.8 - 1.2	1.3	0.8 - 2.2
Doctorate				

Design-based F (3.92,1327.64)= 2.3430 P = 0.0543

Race

White (non Hisp)	71.7	70.8 - 72.6	90.6	89.1 - 91.0
African American	12.1	11.4 - 12.8	4.6	3.7 - 5.6
Native American	0.7	0.5 - 0.9	0.7	0.3 - 1.4
Hispanic	11.4	10.9 - 12.0	3.2	2.5 - 4.1
Chinese	0.8	0.6 - 1.0	0.1	0.02- 0.7
Other/mi	3.3	2.9 - 3.6	0.9	0.5 - 1.4

Design-based F(4.68,1584.86)= 54.8555 P = 0.0000

Marital Status

Married	57.4	56.6 - 58.3	62.6	60.3 - 64.7
Single	20.4	19.7 - 21.2	5.9	4.9 - 6.9
Divorced	8.1	7.7 - 8.4	10.1	8.9 - 11.3
Widowed	5.7	5.4 - 6.0	15.7	14.2 - 17.3
Separated	2.1	1.9 - 2.3	2.1	1.6 - 2.7
Living with partner	6.0	5.6 - 6.4	3.6	2.7 - 4.7

Design-based F(5.48,1857.77)= 90.0109 P = 0.0000

Table 5 (cont'd).

ENABLING VARIABLES

<u>Health Insurance - Private</u>				
Yes	70.4	69.6 - 71.2	71.7	69.6 - 73.7
No	29.1	28.3 - 29.9	28.1	26.0 - 30.2
Unknown	0.5	0.4 - 0.7	0.2	0.1 - 0.5
Design-based F(1.93, 652.67)= 2.1204			P = 0.1228	
<u>Health Insurance - Medicare</u>				
Yes	14.2	13.7 - 14.7	50.3	47.9 - 52.7
No	85.3	84.8 - 85.8	49.5	47.1 - 51.9
Unknown	0.5	0.4 - 0.7	0.2	0.1 - 0.5
Design-base F(1.92,651.61)= 914.1570			P = 0.0000	
<u>Health Insurance - Medicaid</u>				
Yes	6.0	5.6 - 6.4	7.1	6.0 - 8.4
No	93.5	93.1 - 93.9	92.7	91.4 - 93.0
Unknown	0.5	0.4 - 0.7	0.2	0.1 - 0.5
Design-based F(1.96,665.36)=3.9268			P = 0.0208	
<u>Health Insurance - Other government</u>				
Yes	3.9	3.5 - 4.3	6.6	5.6 - 7.9
No	95.6	95.3 - 96.0	93.1	92.0 - 94.2
Unknown	0.5	0.4 - 0.7	0.2	0.1 - 0.5
Design-based F(1.95, 660.71)= 21.8484			P = 0.0000	

Table 5 (cont'd).

<u>Health Insurance</u> (count of types)					
0	16.7	16.1 - 17.3	5.8	4.9 - 6.9	
1	72.8	72.1 - 73.4	54.5	52.2 - 56.9	
2	10.3	9.8 - 10.8	38.5	36.1 - 41.0	
3	0.2	0.1 - 0.3	1.2	0.7 - 1.8	
Design-based $F(2.91, 987.63) = 506.2581$ $P = 0.0000$					
<u>Income 1 - Family Grouped Income</u>					
Under \$20,000	17.9	17.3 - 18.6	21.0	19.1 - 22.9	
\$20,000 or more	75.7	75.0 - 76.4	72.0	69.9 - 74.1	
Not ascertained	6.3	5.9 - 6.9	7.0	5.9 - 8.4	
Design-based $F(1.99, 673.93) = 6.5522$ $P = 0.0016$					
<u>Income 2 - Ratio of family income to poverty threshold</u>					
Median	3.00 - 3.50		2.50 - 2.99		
Total	154370835		10404026		
<u>Contact with conventional provider: MD</u>					
Yes	74.9	74.2 - 75.6	93.3	92.1 - 94.3	
No	25.1	24.4 - 25.8	6.7	5.7 - 7.9	
Design-based $F(1, 339) = 361.1548$ $P = 0.0000$					
<u>Contact with conventional provider: RN, Physician Assistant, Therapist</u>					
Yes	17.5	17.0 - 18.1	29.5	27.4 - 31.7	
No	82.5	81.9 - 83.0	70.5	68.3 - 72.6	

Table 5 (cont'd).

Design-based F(1, 339)= 169.2622				P = 0.0000			
<u>Contact with conventional provider: Mental health professional</u>							
Yes	6.1	5.7 - 6.5	7.3	6.1 - 8.6			
No	93.9	93.6 - 94.3	92.7	91.4 - 93.8			
Design-based F(1, 339) = 4.5047				P = 0.0345			
<u>Contact with conventional provider: Visits to ER</u>							
	Mean: 0.4	0.357 - 0.386	Mean: 0.6	0.518 - 0.645			
	Range: 0 - 18		Range: 0 - 18				
Design-based F(7.34,2488.74)= 11.2598				P = 0.0000			
<u>NEED VARIABLES</u>							
<u>Co-morbidity - (Has a non-cancer co-morbid condition)</u>							
Yes	57.8	57.1 - 58.6	89.2	87.6 - 90.5			
No	42.2	41.4 - 42.9	10.8	9.4 - 12.4			
Design-based F(1, 339)= 643.4446				P = 0.0000			
<u>Co-morbidity (Number of conditions)</u>							
0	42.2	41.4 - 42.9	10.8	9.4 - 12.4			
1-2	35.9	35.2 - 36.5	33.0	30.8 - 35.2			
3-5	16.4	15.9 - 16.9	35.3	33.1 - 37.6			
6 +	5.6	5.2 - 5.9	20.8	18.9 - 22.9			
Design-based F(2.99, 1012.12)= 412.6494				P = 0.0000			

Table 5 (cont'd).

<u>Co-morbidity</u> - (Mean number of conditions)					
	Mean: 1.5	1.50 - 1.56	Mean: 3.5	3.34 - 3.61	
	Range: 1 - 23		Range: 1 - 20		
Design-based	F(18.21, 6174.67) = 75.5836 P = 0.0000				
<u>Pain</u>					
No pain	45.5	44.8 - 46.3	29.5	27.5 - 31.7	
Recurring	17.0	16.4 - 17.6	32.9	30.7 - 35.2	
Not recurring	37.2	36.5 - 38.0	37.5	35.3 - 39.7	
Design-based	F(2.95, 1001.55) = 113.5400 P = 0.0000				
<u>Fatigue</u>					
Yes	9.3	8.8 - 9.8	16.1	14.5 - 17.9	
No	90.5	90.0 - 90.9	83.8	82.0 - 85.4	
Design-based	F(1.94, 658.23) = 55.1160 P = 0.0000				
<u>Insomnia</u>					
Yes	16.6	16.1 - 17.1	28.5	26.2 - 30.9	
No	83.2	82.6 - 83.7	71.4	69.0 - 73.7	
Design-based	F(1.97, 666.34) = 76.6960 P = 0.0000				
<u>Depression</u>					
Yes	15.0	14.5 - 15.6	24.7	22.7 - 26.7	
No	84.6	84.1 - 85.1	74.9	72.9 - 76.8	
Design-based	F(1.96, 665.06) = 65.0191 P = 0.0000				

Table 5 (cont'd).

<u>Symptom Number (depression, fatigue & insomnia)</u>					
0	73.7	73.0 - 74.5	57.0	54.3 - 59.6	
1	15.1	14.6 - 15.7	23.2	21.2 - 25.4	
2	7.6	7.1 - 8.0	13.3	11.7 - 15.1	
3	3.6	3.3 - 3.8	6.5	5.4 - 7.8	
Design-based $F(2.95, 1000.82) = 74.9932$ $P = 0.0000$					
<u>Health Status</u>					
Excellent	31.8	31.1 - 32.6	14.0	12.4 - 15.7	
Very good	32.2	31.5 - 32.8	25.1	23.2 - 27.2	
Good	25.0	24.4 - 25.6	32.4	30.1 - 34.7	
Fair	8.4	7.9 - 8.8	19.7	17.8 - 21.7	
Poor	2.6	2.3 - 2.9	8.6	7.2 - 10.0	
Design-based $F(5.80, 1966.92) = 110.3012$ $P = 0.0000$					
<u>Health Status (combined categories)</u>					
Good-v.good-excellent	88.9	88.5 - 89.4	71.5	69.3 - 73.7	
Poor - fair	11.0	10.5 - 11.4	28.2	26.1 - 30.5	
Design-based $F(1.99, 674.33) = 240.3826$ $P = 0.0000$					

Table 6. Comparison of Recent and Long-term Survivors in the Cancer Population

	Recent Survivors		Long-term Survivors	
	Percent	95% CI	Percent	95% CI
<u>PREDISPOSING VARIABLES</u>				
<u>Gender</u>				
Male	47.3	41.9 - 52.8	42.0	39.4 - 44.5
Female	52.7	47.2 - 58.1	58.0	55.5 - 60.6
Total	2957989*		11346632*	
Design-based F(1, 339) = 3.1114		P = 0.0786		
*Population estimates remain the same except where noted in the table.				
<u>Age</u>				
18-34	7.7	5.3 - 11.0	5.8	4.6 - 7.3
35-44	8.4	5.9 - 11.9	8.7	7.2 - 10.4
45-54	13.8	10.5 - 18.0	16.3	14.2 - 18.5
55-64	18.8	14.8 - 23.6	20.0	17.9 - 22.3
65-74	27.7	23.4 - 32.4	23.6	21.6 - 25.8
75+	23.7	19.7 - 28.1	25.6	23.4 - 28.0
Design-based F(4.85, 1644.28) = 1.0186		P = 0.4039		
<u>Education</u>				
Less than HS	17.6	14.2 - 21.6	18.1	16.3 - 20
Completed HS	32.3	27.7 - 37.2	31.6	29.3 - 34.1
College	45.6	40.6 - 50.7	48.3	45.9 - 50.8
Some college	16.1		18.9	
Associate's	8.4		9.0	
Bachelor's	15.6		14.1	
Master's	5.0		6.0	

Table 6 (cont'd).

Professional docterate	2.2	1.1 - 4.4	0.9	0.5 - 1.6
Academic docterate	2.3	1.0 - 5.3	1.1	0.6 - 1.8

Total 14178957

Race

White (non Hispanic)	90.4	86.9 - 93.0	90.6	89.1 - 92.0
African American	4.4	2.7 - 7.2	4.6	3.7 - 5.7
Native American	0.9	0.3 - 2.5	0.7	0.3 - 1.3
Hispanic	3.3	2.0 - 5.4	3.2	2.4 - 4.1
Chinese	0.0	0.0 - 0.0	0.1	0.0 - 0.8
Other/mixed	1.3	0.3 - 2.8	0.8	0.4 - 1.4

Design-based $F(4.43, 1500.85) = 0.2048$ $P = 0.9480$

Marital Status

Married	62.9	58.1 - 67.4	62.5	59.9 - 64.9
Single	6.2	4.4 - 8.7	5.8	4.7 - 7.0
Separated	2.4	1.4 - 3.9	2.0	1.4 - 2.7
Widowed	15.3	12.6 - 18.4	15.8	14.2 - 17.6
Divorced	10.1	8.7 - 11.5	10.1	7.7 - 13.1
Living with partner	3.1	1.7 - 5.6	3.7	2.7 - 5.1

Design-based $F(5.35, 1812.08) = 0.2519$ $P = 0.9467$

Table 6 (cont'd).

ENABLING VARIABLES

<u>Health Insurance - Private</u>				
Yes	73.0	68.0 - 77.5	71.4	69.1 - 73.5
No	26.9	22.4 - 31.9	28.3	26.2 - 30.6
Unknown	0.1	0.0 - 0.6	0.3	0.1 - 0.6
Design-based F(1.56, 527.33) = 0.6211 P = 0.4987				
<u>Health Insurance - Medicare</u>				
Yes	51.8	46.7 - 57.0	49.9	47.4 - 52.4
No	48.1	43.0 - 53.3	49.9	47.3 - 52.4
Unknown	0.1	0.0 - 0.6	0.3	0.1 - 0.6
Design-based F(1.62, 548.01) = 0.7488 P = 0.4471				
<u>Health Insurance - Medicaid</u>				
Yes	7.3	5.0 - 10.3	7.1	5.9 - 8.4
No	92.7	89.7 - 94.9	92.7	91.3 - 93.8
Unknown	0.1	0.0 - 0.6	0.3	0.1 - 0.6
Design-based F(1.62, 548.95) = 0.4152 P = 0.6173				
<u>Health Insurance - Other government insurance</u>				
Yes	5.8	3.8 - 8.8	6.9	5.7 - 8.2
No	94.1	91.2 - 96.1	92.9	91.5 - 94.0
Unknown	0.1	0.0 - 0.6	0.3	0.1 - 0.6
Design-based F(1.56, 528.83) = 0.7751 P = 0.4321				

Table 6 (cont'd).

<u>Health Insurance</u> (count of types)					
No insurance	4.5	2.8 - 6.9	6.2	5.1 - 7.4	
One type	54.3	48.8 - 59.7	54.6	52.2 - 57.0	
Two types	40.9	35.5 - 46.5	37.9	35.4 - 40.4	
Three types	0.4	0.1 - 1.3	1.4	0.8 - 2.1	
Design-based F(2.83, 958.02) = 1.7846 P = 0.1519					
<u>Income 1 - Family Grouped Income</u>					
Under \$20,000	19.3	16.0 - 23.1	21.4	19.4 - 23.5	
\$20,000 or more	72.6	68.2 - 76.6	71.9	69.6 - 74.1	
Not ascertained	8.1	5.5 - 11.8	6.7	5.6 - 8.1	
Design-based F(1.89, 641.25) = 0.8011 P = 0.4432					
<u>Income 2 - Ratio of Family Income to Poverty Threshold</u>					
		Median: 3.25 - 3.49	Median: 2.50 - 2.99		
Total 10404026	2106507	8297519			
<u>Contact with conventional provider: MD</u>					
<u>Medical specialist, general MD, OB-GYN</u>					
Yes	95.1	92.3 - 96.9	92.8	91.5 - 94.0	
No	4.9	3.1 - 7.8	7.2	6.0 - 8.5	
Design-based F(1, 339) = 2.3409 P = 0.1269					

Table 6 (cont'd).

<u>Contact with conventional provider: RN, Physician Assistant, Therapist</u>					
Yes	31.8	27.3 - 36.7	28.9	26.6 - 31.3	
No	68.2	63.3 - 72.7	71.1	68.7 - 73.4	
Design-based F(1, 339)	= 1.2610	P = 0.2623			
<u>Contact with conventional provider: Mental health professional</u>					
Yes	8.7	6.1 - 12.2	6.9	5.7 - 8.3	
No	91.3	87.8 - 93.9	93.1	91.7 - 94.2	
Design-based F(1, 339)	= 1.3495	P = 0.2462			
<u>Contact with conventional provider: Visits to ER</u>					
		Mean: 0.67	0.523 - 0.817	Mean 0.56	0.489 - 0.629
		Range: 1 - 18		Range: 1 - 18	
Design-based F(7.02, 2380.20)	= 5.2566	P =	0.0000		
<u>NEED VARIABLES</u>					
<u>Primary Cancer Diagnosis</u>					
Breast	10.9	8.2 - 14.3	14.9	13.0 - 16.9	
Colon	5.7	3.8 - 8.3	6.3	5.2 - 7.6	
Lung	5.5	3.6 - 8.1	1.8	1.2 - 2.6	
Prostate	4.1	2.3 - 7.2	2.6	1.8 - 3.7	
Lymphoma	6.2	4.0 - 9.6	5.7	4.5 - 7.2	
Melanoma	11.7	8.6 - 15.5	8.9	7.5 - 10.5	
Other sites	56.0	50.9 - 60.9	59.8	57.1 - 62.3	

Table 6 (cont'd).

<u>Co-morbidity</u> (Has non-cancer co-morbid condition)				
Yes	91.0	87.7 - 93.5	88.7	86.8 - 90.3
No	9.0	6.5 - 12.3	11.3	9.7 - 13.2
Total 14297648	2951016		11346632	
Design-based F(1, 339) = 1.5855		P = 0.2088		
<u>Co-morbidity</u> - (Number of conditions)				
0	9.0	6.5 - 12.3	11.3	9.7 - 13.2
1-2	33.7	29.5 - 38.2	32.8	30.4 - 35.4
3-5	37.0	32.3 - 41.9	34.9	32.3 - 37.5
6 or more	20.3	16.8 - 24.4	21.0	18.8 - 23.3
Total 14297648	2951016		11346632	
Design-based F(2.98, 1009.66) = 0.6702		P = 0.5694		
<u>Co-morbidity</u> (Mean number of co-morbid conditions)				
	Mean: 3.4	3.18 - 3.67	Mean: 3.5	3.33 - 3.66
	Range: 1 - 20		Range: 1 - 23	
<u>Pain type</u> - reported experiencing pain				
No pain	35.1	30.5 - 40.0	28.1	25.7 - 30.6
Recurring pain	31.0	26.5 - 35.9	33.4	31.0 - 36.0
Not recurring	33.7	29.4 - 38.2	38.5	35.9 - 41.0
Design-based F(2.69, 911.28) = 4.0441		P = 0.0095		

Table 6 (cont'd).

<u>Pain count</u> - count of types of pain experienced					
0	35.3	30.7 - 40.2	28.1	25.7 - 30.6	
1	20.9	17.1 - 25.3	21.3	19.2 - 23.5	
2	12.3	9.5 - 15.8	16.0	14.2 - 17.9	
3	13.6	10.6 - 17.3	12.2	10.6 - 13.9	
4	6.0	4.0 - 8.9	8.9	7.4 - 10.6	
5	4.9	3.1 - 7.6	6.3	5.1 - 7.8	
6	3.3	1.8 - 6.0	3.4	2.5 - 4.5	
7	2.0	0.8 - 4.8	2.5	1.7 - 3.5	
8	0.8	0.2 - 3.0	1.1	0.6 - 2.0	
9	0.8	0.3 - 2.2	0.4	0.1 - 0.8	
Design-based $F(8.25, 2797.06) = 1.4698$ $P = 0.1604$					
<u>Fatigue</u>					
Yes	18.7	14.8 - 23.4	15.4	13.7 - 17.3	
No	81.1	76.4 - 85.0	84.5	82.6 - 86.2	
Design-based $F(1.86, 631.58) = 1.8301$ $P = 0.1640$					
<u>Insomnia</u>					
Yes	30.6	25.7 - 35.9	28.0	25.5 - 30.6	
No	69.2	63.8 - 74.1	72	69.4 - 74.4	
Design-based $F(1.98, 671.46) = 0.8852$ $P = 0.4122$					
<u>Depression</u>					
Yes	26.2	21.4 - 31.6	24.3	22.2 - 26.5	
No	73.3	67.9 - 78	75.3	73.1 - 77.4	
Design-based $F(1.97, 667.96) = 0.3220$ $P = 0.7215$					

Table 6 (cont'd).

<u>Symptom Number</u> (depression, insomnia & fatigue)					
0	55.2	49.4 - 60.8	72.8	72.1 - 73.6	
1	23.2	19.0 - 28.1	15.6	15.1 - 16.1	
2	12.6	9.2 - 16.9	7.9	7.5 - 8.3	
3	9.0	6.0 - 13.2	3.7	3.4 - 4.0	
Design-based $F(2.97, 1007.18) = 17.8265$ $P = 0.0000$					
<u>Health Status</u>					
Excellent	12.0	9.0 - 15.7	14.5	12.8 - 16.5	
Very Good	23.5	19.5 - 28.0	25.6	23.4 - 27.9	
Good	30.8	26.1 - 36.0	32.8	30.3 - 35.4	
Fair	23.2	19.4 - 27.5	18.7	16.7 - 20.9	
Poor	10.5	7.6 - 14.3	8.1	6.7 - 9.7	
<u>Health Status 3</u> (combined categories)					
Good-v.good-excellent	66.3	61.0 - 71.2	72.9	70.4 - 75.3	
Fair-poor	33.7	28.8 - 39.0	26.8	24.5 - 29.2	
Design-based $F(1.93, 654.00) = 3.8141$ $P = 0.0239$					

Table 7. Prevalence of CAM Use in the Cancer and Non-Cancer Population

<u>CANCER POPULATION (Percent & 95% CI)</u>				
No CAM Use	Used a CAM provider, practice or product			
60.8 (58.5 - 63)	39.2 (37 - 41.5)			
Total 8693808	5610813			
	Provider only	Practice only	Product only	CAM Combination
	5.2 (4.2 - 6.4)	8.6 (7.3 - 10)	10.3 (9.1 - 11.7)	15.1 (13.5 - 16.9)
Total	746509	1225167	1478381	2160756
<u>NON-CANCER POPULATION (Percent & 95% CI)</u>				
No CAM Use	Used a CAM provider, practice or product			
65.1 (64.4 - 65.9)	34.9 (34.1 - 35.6)			
Total 124730422	66790052			
	Provider only	Practice only	Product only	CAM Combination
	4.7 (4.4 - 5.1)	8.4 (7.9 - 8.8)	9.9 (9.4 - 10.3)	11.9 (11.4 - 12.4)
Total	9062209	16036644	18863762	22827437

Table 7 (cont'd).

RECENT & LONG-TERM SURVIVORS (Percent only)

	CAM use	Provider only	Practice only	Product only	CAM Combination
Recent	38.9	4.1	9.8	11	14
Long-term	39.3	5.5	8.2	10.2	15.4

Comparison of CAM use in cancer & non-cancer populations
 Design-based $F(1, 339) = 14.5666$ $p = 0.0002$

Comparison of CAM use in recent & long-term subpopulations
 Design-based $F(3.96, 1342.72) = 0.6447$ $p = 0.6291$

Table 8. Frequency of Use of Specific Types of CAM in the Cancer Population*

	Total Cancer Population Percent	95% CI	Recent Survivor Percent	Long-term Survivor Percent
<u>Acupuncture</u>				
Yes	1.1	0.7 - 1.7	1.0	1.2
No	98.9	98.3 - 99.3	99.0	98.8
<u>Ayurveda</u>				
Yes	0.07	0.0 - 0.5	0.0	1.0
No	99.9	99.5 - 1.0	1.0	99.0
<u>Biofeedback</u>				
Yes	0.3	0.0 - 0.1	0.2	0.3
No	99.7	99.3 - 1.0	99.8	99.7
<u>Chelation</u>				
Yes	0.2	0.0 - 0.5	0.5	0.1
No	99.8	99.5 - 1.0	99.5	99.9
<u>Chiropractic</u>				
Yes	8.2	6.9 - 9.7	6.4	8.7
No	91.8	90.3 - 93.0	93.6	91.3
<u>EHT/Reiki</u>				
Yes	1.0	0.5 - 1.8	0.7	1.1
No	99.0	98.2 - 99.4	99.3	98.9

*Use within past twelve months

Table 8 (cont'd).

<u>Folk medicine</u>				
Yes	0.2	0.0 - 0.4	0.2	0.1
No	99.8	99.6 - 99.9	99.8	99.9
<u>Hypnosis</u>				
Yes	0.6	0.2 - 1.2	0.2	0.7
No	99.4	98.8 - 99.7	99.8	99.3
<u>Massage</u>				
Yes	5.5	4.4 - 6.8	5.0	5.6
No	94.5	93.2 - 95.6	95.0	94.4
<u>Naturopathy</u>				
Yes	0.3	0.0 - 0.8	0.2	0.3
No	99.7	99.3 - 99.9	99.8	99.7
<u>Used herbs</u>				
Yes	20.5	18.7 - 22.4	21.0	20.3
No	79.5	77.6 - 81.3	79.0	79.7
<u>Used homeopathic treatment</u>				
Yes	1.5	1.0 - 2.3	2.0	1.4
No	98.5	97.7 - 99.0	98.0	98.6
<u>Used a vegetarian diet</u>				
Yes	2.1	1.5 - 2.9	3.0	1.8
No	97.9	97.1 - 98.5	97.0	98.2

Table 8 (cont'd).

<u>Used a macrobiotic diet</u>				
Yes	0.3	0.1 - 0.9	1.2	0.1
No	99.7	99.2 - 99.9	98.8	99.9
<u>Used the Atkin's diet</u>				
Yes	1.7	1.1 - 2.0	1.1	1.8
No	98.3	97.6 - 98.9	98.9	98.2
<u>Used the Pritikin diet</u>				
Yes	0.2	0.0 - 0.6	0.0	0.2
No	99.8	99.4 - 99.9	100.0	99.8
<u>Used the Ornish diet</u>				
Yes	0.2	0.0 - 0.6	0.2	0.2
No	99.8	99.4 - 99.9	99.8	99.8
<u>Used the Zone diet</u>				
Yes	0.3	0.1 - 0.9	0.3	0.3
No	99.7	99.2 - 99.9	99.7	99.7
<u>Used vitamins</u>				
Yes	4.5	3.6 - 5.7	5.5	4.3
No	95.5	94.4 - 96.4	94.5	95.7
<u>Yoga</u>				
Yes	4.2	3.2 - 5.4	5.3	3.8
No	95.8	94.7 - 96.8	94.7	96.2

Table 8 (cont'd).

<u>Tai Chi</u>					
Yes	1.7	1.1 - 2.5	2.5	1.5	
No	98.3	97.5 - 98.8	97.5	98.5	
<u>Qigong</u>					
Yes	0.4	0.1 - 0.8	0.0	0.5	
No	99.6	99.2 - 99.8	100.0	99.5	
<u>Used meditation</u>					
Yes	9.2	7.9 - 10.7	10.0	9.0	
No	90.8	89.3 - 92.1	90.0	91.0	
<u>Used guided imagery</u>					
Yes	3	2.2 - 4.0	5.0	2.5	
No	97	96.0 - 97.7	95.0	97.5	
<u>Used progressive relaxation</u>					
Yes	4.3	3.4 - 5.5	6.0	4.0	
No	95.7	94.6 - 96.5	94.0	96.0	
<u>Used deep breathing exercises</u>					
Yes	13.4	11.9 - 15.0	13.3	13.4	
No	86.6	85.0 - 88.1	86.7	86.8	
<u>Prayed for own health</u>					
Yes	58.3	55.8 - 60.7	61.0	57.5	
No	41.7	39.3 - 44.2	39.0	42.5	

Table 8 (cont'd) .

<u>Others prayed for your health</u>				
Yes	6.5	34.2 - 38.8	46.5	33.8
No	63.5	61.2 - 65.8	53.5	66.2
<u>Participated in a prayer group</u>				
Yes	23.9	23.9 - 23.9	9.3	27.8
No	76.1	76.1 - 76.1	90.7	72.2
Total	2716472	569806	2143471	
<u>Healing ritual for own health</u>				
Yes	4.3	3.4 - 5.4	5.4	4.0
No	95.7	94.7 - 96.5	94.6	96.0

Table 9. Purpose of CAM Use in the Cancer and Non-cancer Population

<u>CANCER POPULATION</u>		
	Purpose of CAM Use	
Treatment only	Health Promotion only	Treatment/health promotion
18	12.7	8.5
[16.2,19.9]	[11.2,14.4]	[7.25,9.94]
Total 14304621		
<u>NON-CANCER POPULATION</u>		
	Purpose of CAM Use	
Treatment only	Health Promotion only	Treatment/health promotion
12.7	14.8	7.3
[12.3,13.2]	[14.3,15.3]	[6.88,7.66]
Total 191520474		
<u>RECENT & LONG-TERM SURVIVORS*</u>		
*Percent only	Purpose of CAM Use	
	Treatment only	Health Promotion only Treatment/health promotion
RECENT	18.6	13.5
LONG-TERM	17.8	12.5
		6.9
		8.9
Comparison of Purpose of CAM use in the cancer & non-cancer populations		
Design-based F(2.93,993.34) = 15.1698 P = 0.0000		
Comparison of Purpose of CAM use in recent & long-term survivor subpopulations		
Design-based F(2.96,1002.83) = 0.5409 P = 0.6519		

Table 10. Logistic Regression Model: Predictors of CAM Use in the Cancer Population

Independent Variables	Used at least one CAM provider service, practice OR product		
	OR	P value	95% Confidence Interval
<u>PREDISPOSING VARIABLES</u>			
<u>Gender</u>			
Male ^a			
Female	1.44	0.00	1.147 - 1.815
<u>Age</u>			
Age in years	1.06	0.01	1.012 - 1.114
Age squared	0.9993	0.00	0.998 - 0.999
<u>Education</u>			
HS or less ^a			
College	1.90	0.00	1.483 - 2.449
Professional			
Doctorate	0.90	0.84	0.328 - 2.473
Academic			
Doctorate	3.73	0.00	1.408 - 9.865
<u>Race</u>			
White ^A			
African Amer.	0.40	0.00	0.253 - 0.620
Hispanic	0.76	0.33	0.446 - 1.308
Other/mixed	1.47	0.48	0.501 - 4.309

Table 10 (cont'd).

<u>Marital Status</u>			
Married ^a			
Single	1.04	0.79	0.779 - 1.390
Widowed	0.85	0.34	0.603 - 1.191
<u>ENABLING VARIABLES</u>			
<u>Insurance</u>			
<u>Private</u>			
No ^a			
Yes	0.99	0.96	0.758 - 1.303
<u>Medicare</u>			
No ^a			
Yes	0.77	0.14	0.549 - 1.086
<u>Medicaid</u>			
No ^a			
Yes	1.09	0.70	0.691 - 1.732
<u>Government</u>			
No ^a			
Yes	0.89	0.64	0.551 - 1.442
<u>Income</u>			
\$20,000 & over ^a			
<\$20,000	0.64	0.00	0.462 - 0.873
<u>Provider Contact</u>			
<u>Physician</u>			
No ^a			
Yes	1.01	0.95	0.662 - 1.550
<u>Nurse & other</u>			
No ^a			
Yes	1.70	0.00	1.342 - 2.144
<u>Mental health</u>			
No ^a			
Yes	2.53	0.00	1.667 - 3.854

Table 11. Multinomial Logistic Regression Model: Predictors of Use of Specific Categories of CAM in the Cancer Population

Independent Variables	Specific Categories of CAM Use (Comparison group: No CAM use)					
	Provider Use only	Practice Use only	Product Use only	Combined CAM Use	OR	P-value
<u>PREDISPOSING VARIABLES</u>						
<u>Gender</u>						
Male ^a						
Female	0.86	0.59	2.21	0.00	1.05	0.77
<u>Age</u>						
Age in years	1.03	0.55	1.13	0.00	0.99	0.72
Age square	0.9997	0.52	0.9987	0.00	1.00	0.77
<u>Education</u>						
HS or less ^a						
Advanced ed	1.49	0.10	2.13	0.00	1.83	0.00
Professional						
doctorate	1.09	0.94	2.33	0.21	0.43	0.43
Academic						
doctorate	1.92	0.37	3.19	0.13	1.09	0.94
<u>Race</u>						
White ^a						
African Amer	0.57	0.30	0.71	0.34	0.45	0.03
Hispanic	0.24	0.18	0.29	0.06	1.42	0.31
Other/mixed	1.17	0.89	1.18	0.84	1.82	0.40

Table 11 (cont'd).

<u>Marital Status</u>									
<u>Married^a</u>									
Single	0.82	0.50	1.25	0.36	0.82	0.36	1.22	0.27	
Widowed	0.76	0.51	1.14	0.61	0.61	0.04	1.01	0.98	
<u>ENABLING VARIABLES</u>									
<u>Insurance</u>									
<u>Private</u>									
No ^a									
Yes	1.94	0.04	0.97	0.91	0.93	0.76	0.83	0.36	
<u>Medicare</u>									
No ^a									
Yes	1.10	0.80	1.00	0.99	0.70	0.16	0.68	0.13	
<u>Medicaid</u>									
No ^a									
Yes	1.66	0.36	1.45	0.26	0.84	0.64	1.01	0.98	
<u>Government</u>									
No ^a									
Yes	0.28	0.11	1.46	0.34	1.24	0.49	0.54	0.60	
<u>Income</u>									
\$20,000 & over ^a									
<\$20,000	0.74	0.33	0.55	0.02	1.09	0.68	0.33	0.00	
<u>Provider Contact</u>									
<u>Physician</u>									
No ^a									
Yes	1.29	0.64	1.18	0.71	0.94	0.83	0.92	0.76	
<u>Nurse & other</u>									
No ^a									
Yes	2.24	0.00	1.48	0.04	1.45	0.04	1.92	0.00	
<u>Mental health</u>									
No ^a									
Yes	1.61	0.42	3.08	0.00	2.18	0.02	2.73	0.00	

Table 12. Multinomial Logistic Regression Model: Purpose of CAM Use in the Cancer Population

Independent Variables	Purpose of CAM (Comparison group: No CAM use)					
	Treatment and Health promotion only (n=177)	Treatment only (n=400)	Health Promotion only (n=278)	OR	P-value	P-value
<u>PREDISPOSING VARIABLES</u>						
<u>Gender</u>						
Male ^a						
Female	2.02	0.00	1.28	1.38	0.12	0.09
<u>Age</u>						
Age in years	1.16	0.00	1.02	1.09	0.50	0.02
Age squared	0.9984	0.00	0.9996	0.9991	0.24	0.02
<u>Education</u>						
HS or less ^a						
College	2.64	0.00	1.57	2.08	0.00	0.00
Professional doctorate	0.00	0.00	0.51	1.67	0.40	0.41
Academic Doctorate	10.27	0.00	2.32	2.40	0.14	0.19
<u>Race</u>						
White ^a						
African Amer	0.28	0.04	0.29	0.58	0.00	0.10
Hispanic	0.55	0.20	0.56	1.20	0.11	0.60
Other/mixed	2.40	0.10	0.59	2.24	0.44	0.26

Table 12 (cont'd).

<u>Marital Status</u>							
Married ^a							
Single	1.29	0.23	0.81	0.23	1.25	0.28	
Widowed	1.08	0.80	0.66	0.08	1.07	0.77	
<u>ENABLING VARIABLES</u>							
<u>Insurance</u>							
Private							
No ^a							
Yes	0.91	0.72	1.01	0.94	1.05	0.81	
Medicare							
No ^a							
Yes	0.57	0.11	0.82	0.36	0.95	0.84	
Medicaid							
No ^a							
Yes	1.37	0.52	0.94	0.82	1.27	0.49	
Government							
No ^a							
Yes	0.58	0.23	0.95	0.87	1.07	0.81	
<u>Income</u>							
\$20,000 & over ^a							
<\$20,000	0.33	0.00	0.76	0.17	0.65	0.05	
<u>Provider Contact</u>							
Physician							
No ^a							
Yes	0.81	0.55	1.07	0.82	1.08	0.81	
Nurse & other							
No ^a							
Yes	2.09	0.00	1.92	0.00	1.24	0.26	
Mental health							
No ^a							
Yes	1.93	0.04	2.48	0.00	2.96	0.00	

Table 12 (cont'd).

<u>ER Visits</u>	1.05	0.30	1.01	0.85	0.93	0.39
<u>NEED VARIABLES</u>						
<u>Primary Diagnosis</u>						
<u>Other site^a</u>						
Breast	0.95	0.86	1.15	0.53	1.42	0.08
Colon	0.41	0.16	1.24	0.45	0.89	0.73
Lung	0.93	0.91	1.53	0.17	0.31	0.07
Prostate	1.74	0.25	0.26	0.00	0.31	0.05
Lymphoma	0.90	0.81	0.76	0.35	1.09	0.80
Melanoma	1.32	0.46	0.64	0.14	0.64	0.23
<u>Pain</u>						
No ^a						
Yes	2.93	0.00	2.20	0.00	1.23	0.27
<u>Other Symptoms</u>						
No ^a						
Yes	0.89	0.33	1.13	0.15	1.03	0.74
<u>Comorbidity</u>	1.09	0.02	1.06	0.03	0.98	0.57
<u>Health Status</u>						
Poor-fair ^a						
Good-excel	1.30	0.32	1.08	0.63	1.96	0.00
<u>Recent Diagnosis</u>						
No ^a						
Yes	0.78	0.37	1.14	0.42	1.27	0.21

^a reference category

Model Statistics	Design df = 339	
No. of observations = 30157	F(96,244) = 107.20	Prob > F = 0.0000
No. of observations in subgroup = 2199	Estimated subpopulation size = 14011251	

Table 13. Summary of Predictors of Specific CAM Use Categories

Variable	Providers only	Practices only	Products only	Combined CAM
Predisposing				
Gender		X		X
Age		X		X
Education		X	X	X
Race			X	X
Marital status			X	
Enabling				
Income		X		X
Insurance	X			
Provider contact				
MD				
NP, PA, OT/PT	X	X	X	X
Mental Health		X	X	X
ER visits				
Need				
Cancer diagnosis		X		
Pain	X			X
Symptoms		X		
Comorbidity				
Health status				X
Recent diagnosis				

X - Significant predictor

Table 14. Summary of Predictors of Purpose for CAM Use

Variable	Treatment only	Health Promotion only	Treatment & Health promotion
Predisposing			
Gender			X
Age		X	X
Education	X	X	X
Race	X		X
Marital status			
Enabling			
Income		X	X
Insurance	X		
Provider contact			
MD			
NP, PA, OT/PT	X		X
Mental Health	X	X	X
ER visits			
Need			
Cancer diagnosis	X	X	
Pain	X		X
Symptoms			
Co-morbidity	X		X
Health status		X	
Recent diagnosis			

X - Significant predictor

Figure 1. Dual Nature of CAM

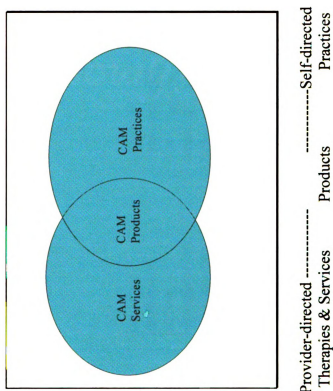


Figure 2. CAM Healthcare Model (Modification of Behavioral Model for Health Services Use)

<i>Theoretical Level</i>	Predisposing → Factors	Enabling → Factors	Need for Care → Factors	Health Service → Use	Outcomes of Care
<i>Mid-range Level</i>	Demographics Social structure attributes Health beliefs Health perceptions Health information	Resources Community attributes	Illness Experience	CAM Use	↑ QOL
<i>Empirical Indicators</i>	<u>Demographics</u> Gender Age Marital status <u>Social structure</u> Education attainment Race/ethnicity Employment Community lifestyle* Cultural practices* <u>Health beliefs</u> Values & attitude: health & self-care <u>Risk perception</u> Illness perception risk, severity, care options* CAM perception: safety, efficacy, acceptability*	<u>Resources</u> Employment Income Insurance status Provider connection Geographic location urban rural region of US Availability/access to CAM providers* CAM products* CAM literature & self-help materials* CAM users*	<u>Cancer dx</u> <i>Evaluated need</i> Site Stage Symptoms Treatment <u>Chronic Illness dx</u> <i>Evaluated need</i> Symptoms Treatment <i>Perceived need</i> Perceived health status Perceived need for CAM* dx - diagnosis	<u>Use of</u> CAM providers* <i>provider-directed</i> CAM practices* <i>self-directed</i> CAM products* CAM for treatment* CAM for health promotion*	↓ symptoms ↓ limitations ↑ well-being ↓ symptom burden ↑ satisfaction ↑ perceived control

* specific to CAM

Figure 2 (cont'd).

CAM knowledge
Level & need for

Personality characteristics
Self-efficacy, risk taking
Self-care ability

* specific to CAM

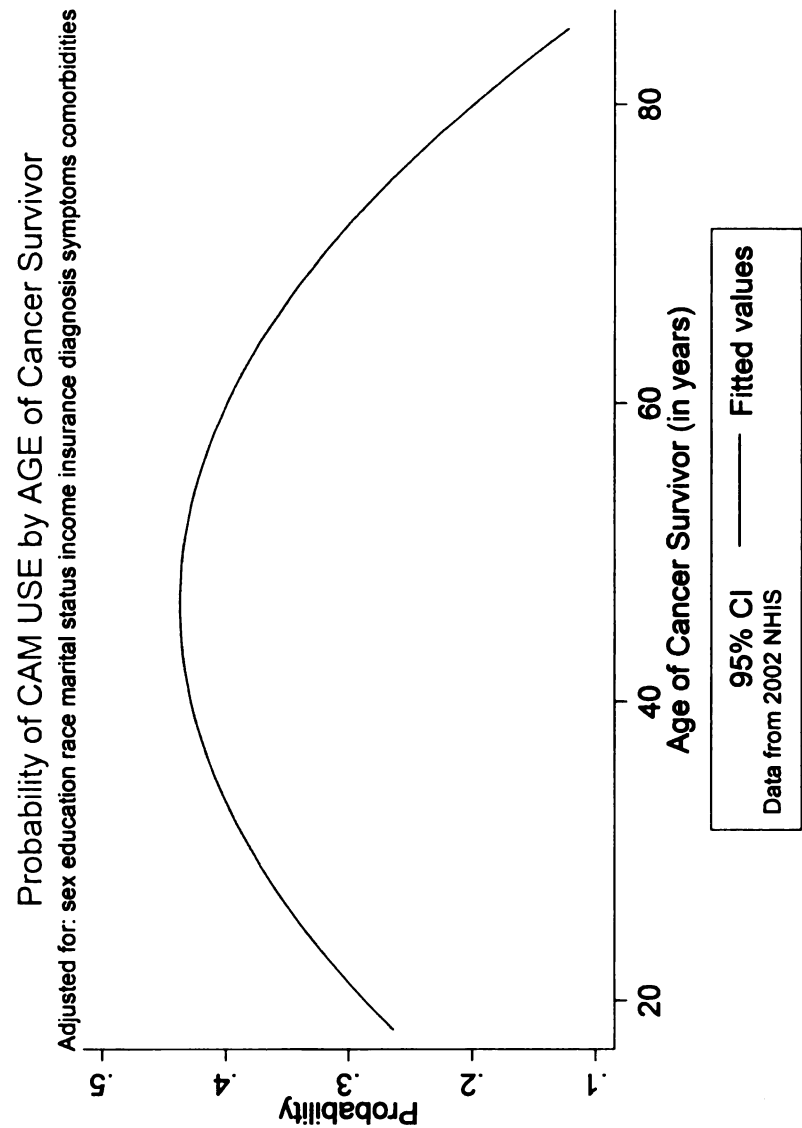
Figure 3 CAM Healthcare Model for NHIS Secondary Analysis

<i>Theoretical Level</i>	Predisposing Factors →	Enabling Factors →	Need for Care Factors →	Health Service Use – Outcomes
<i>Mid-range Level</i>	Demographics Social structure attributes	Resources Community attributes	Illness Experience	CAM Use*
<i>Empirical Indicators</i>	<u>Demographics</u> Gender Age Marital status <u>Social structure</u> Education attainment Race/ethnicity	<u>Resources</u> Income Insurance status Geographic location urban rural region of US Provider connection	<u>Need</u> <i>Evaluated need</i> Cancer diagnosis Chronic illness diagnosis Symptoms fatigue pain anxiety	<u>Use of</u> CAM providers* <i>provider-directed</i> CAM practices* <i>self-directed</i> CAM products* CAM for treatment* CAM for health promotion*

Figure 4. CAM Healthcare Model for NHIS Secondary Analysis: Cancer Specific (cancer population)

<i>Theoretical Level</i>	Predisposing Factors →	Enabling Factors →	Need for Care → Factors	Health Service Use - Outcomes
<i>Mid-range Level</i>	Demographics Social structure attributes	Resources Community attributes	Illness Experience	CAM Use
<i>Empirical Indicators</i>	<u>Demographics</u> Gender Age Marital status <u>Social structure</u> Education attainment Race/ethnicity	<u>Resources</u> Income Insurance status Provider contact physician nurse other	<u>Need</u> <i>Evaluated need</i> Cancer diagnosis cancer-recent cancer survivor Cancer site Symptoms fatigue pain depression insomnia Chronic co-morbid conditions	<u>Use of</u> CAM providers* <i>provider-directed</i> CAM practices* <i>self-directed</i> CAM products* CAM for treatment* CAM for health promotion*
			Perceived need Perception of health status	

Figure 5. Graph Relating Probability of Overall CAM Use to Age



(adjusted for all variables in logistic regression model) See notes - next page

Figure 5 (cont'd).

Note: The CAM Use - Age Graph is based on the following equation (using regression coefficients and log-odds of CAM use as dependent variable), but in the graph, the log-odds are converted to predicted probabilities:

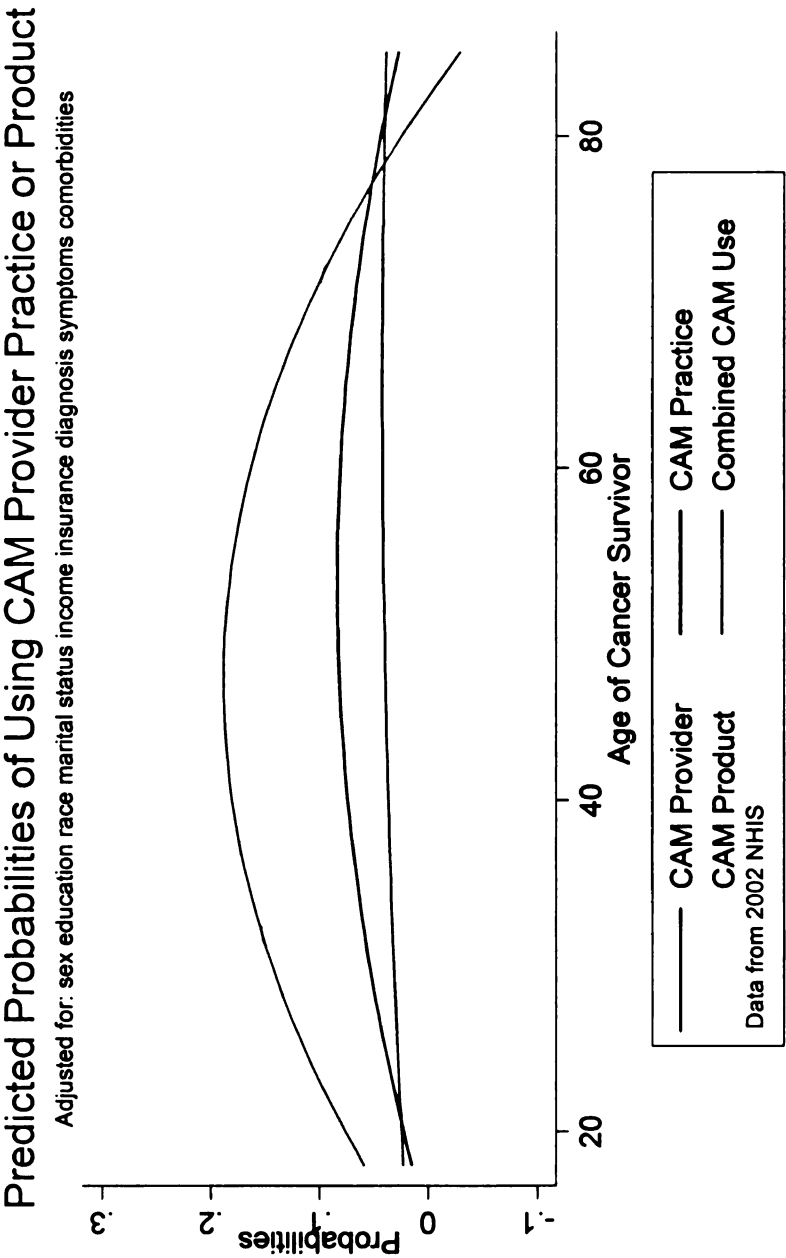
$$Y = \ln(p/1-p) = \text{constant} + 0.060019(\text{Age}) - 0.0006402(\text{Age}^2) + \sum b_i X_i, \text{ where the } X_i \text{ stand for all other predictor variables (sex, education, co-morbidities, etc.)}$$

In order to obtain the Age value for which Y is at a maximum, we obtain the first derivative with respect to Age and set it to zero (since the slope of the curve at the maximum is equal to zero):

$$\partial Y / \partial \text{Age} = 0.0600199 - 0.0012804(\text{Age}) = 0.$$

The second derivative is: $\partial^2 Y / \partial^2 \text{Age} = 0.0012804 < 0$; since it is negative, we have a maximum value.

Figure 6. Graphs Relating Probability of Use of Different Categories of CAM to Age



(adjusted for all variables in the multinomial logit regression model) See notes – next page

Figure 6 (cont'd).

Note: The probability of using a CAM provider only or a CAM product only does NOT change with age (both the linear and quadratic age coefficients are non-significant).

Again using elementary calculus, we estimate that for CAM practice only, the highest probability of use is at age 51, for the combined use of practices, products and providers, the highest probability occurs at age 45.

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