

12-2014

# Use of Complementary Therapies by Individuals with or at Risk for Cardiovascular Disease and Diabetes: Results of the 2007 National Health Interview Survey

Katrina Michelle Embrey

Kennesaw State University, [trina.embrey@comcast.net](mailto:trina.embrey@comcast.net)

Follow this and additional works at: <http://digitalcommons.kennesaw.edu/etd>

 Part of the [Alternative and Complementary Medicine Commons](#), and the [Nursing Commons](#)

---

## Recommended Citation

Embrey, Katrina Michelle, "Use of Complementary Therapies by Individuals with or at Risk for Cardiovascular Disease and Diabetes: Results of the 2007 National Health Interview Survey" (2014). *Dissertations, Theses and Capstone Projects*. Paper 645.

This Dissertation is brought to you for free and open access by DigitalCommons@Kennesaw State University. It has been accepted for inclusion in Dissertations, Theses and Capstone Projects by an authorized administrator of DigitalCommons@Kennesaw State University. For more information, please contact [digitalcommons@kennesaw.edu](mailto:digitalcommons@kennesaw.edu).

USE OF COMPLEMENTARY THERAPIES BY INDIVIDUALS WITH OR AT RISK  
FOR CARDIOVASCULAR DISEASE AND DIABETES: RESULTS OF  
THE 2007 NATIONAL HEALTH INTERVIEW SURVEY

by

Katrina Michelle Embrey

MSN, University of the Incarnate Word, 1993

BSN, Armstrong State University, 1988

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Science

WellStar School of Nursing

WellStar College of Health and Human Services

Kennesaw State University

December 2014

Copyright by  
Katrina Michelle Embrey  
2014

## Acknowledgements

I would like to thank my committee chair, Dr. Janice Long, and my committee members, Dr. Tommie Nelms, Dr. Patricia Hart, and Dr. Herman Ray, for their guidance and support throughout the course of this research.

I also offer thanks to the Doctoral nursing program at Kennesaw State University led by Dr. Nelms and all of the faculty members whom I have had the privilege of having as professors throughout this program of study. A portion of each faculty member's knowledge has assisted in the completion of this research project.

Thank you to my fellow doctoral students who have made my time at Kennesaw State University a great experience.

Final thanks are given to my colleagues and staff at Armstrong State University who have offered support and guidance throughout this process.

## Dedication

I dedicate this dissertation to my children, Rachel Michelle Tankersley and Stephen Steele Tankersley. Their presence in my life and continued encouragement, support, and belief in me has been pivotal factors that have led to the successful attainment of this goal. I am deeply grateful for Rachel and Steele's understanding and choice in the way they have approached and accepted the changes and challenges we have encountered throughout the last three years of this journey. I thank you for your tolerance of the "dissertation table" which can now become the dining room table once again. Words cannot express the love and appreciation I have for each of you.

## Abstract

### USE OF COMPLEMENTARY THERAPIES BY INDIVIDUALS WITH OR AT RISK FOR CARDIOVASCULAR DISEASE AND DIABETES: RESULTS OF THE 2007 NATIONAL HEALTH INTERVIEW SURVEY

by  
Katrina Michelle Embrey

Costly, debilitating and largely preventable, cardiovascular disease (CVD) and diabetes mellitus (DM) place a heavy disease burden of high morbidity, mortality, and rising health care costs on people of the United States. With mortality reports from the two diseases of over 600,000 per year and costs in excess of \$176 billion, identifying alternatives to traditional models of care must be considered. Complementary and alternative medicine (CAM) therefore becomes a viable option for prevention and treatment. Using secondary data analysis of the 2007 National Health Interview Survey, the aim of the current study was to determine whether CAM use was associated with health behaviors or risk factors known to impact CVD and DM. Results indicated that CAM use was associated overall health and wellness. People who used CAM were found to have lower risk factors for CVD and or DM whereas those who did not use CAM were more likely to have CVD. The use of CAM therapies was increased in those who had hypertension, high cholesterol, and diabetes. The study findings suggest that CAM therapies may be beneficial in the prevention of CVD; and, CAM therapies may have health promoting effects for those who have DM. Recommendations for future research include identifying the specific CAM therapies used among individuals who do and do not have hypertension, high cholesterol and DM. Understanding the cost benefits of

specific CAM therapy in CVD and DM could provide insights into cost effective  
alternative health care

## TABLE OF CONTENTS

Chapter 1: Overview of the Study.....	1
Introduction.....	2
Statement of Purpose.....	5
Significance of Project.....	6
Significance to Healthcare.....	6
Significance to Nursing Research, Practice, and Education.....	9
Theoretical Foundation.....	19
Assumptions.....	29
Research Questions.....	30
Limitations.....	31
Delimitations.....	32
Summary.....	32
Chapter 2: Overview of the Study.....	34
Review of the Literature.....	35
Defining Complementary and Alternative Medicine.....	35
CAM use Among Adults.....	38
Attitudes of CAM use Among Healthcare Providers.....	40
CAM use and Chronic Disease.....	43
CAM use and Diabetes.....	44
CAM use and Cardiovascular Disease.....	48
Safety and CAM use.....	52
Healthcare Costs and CAM.....	55



Theoretical Frameworks.....	58
Critique of Research Studies.....	65
Summary.....	67
Chapter 3: Overview of the Study.....	69
Methodology.....	70
Risk Prediction Models.....	74
Data Source.....	76
Description of Variables.....	76
Data Analysis.....	88
Validity and Reliability.....	93
Procedures for Collection and Treatment of Data.....	94
Setting.....	95
Population and Sample.....	95
Instruments.....	98
Validity and Reliability.....	99
Limitations.....	100
Summary.....	101
Chapter 4: Overview of the Study.....	103
Findings.....	104
Description of Participants.....	104
Question 1.....	105
Age.....	105
Gender.....	105

Race/Ethnicity.....	107
Employment Status.....	107
Marital Status.....	108
Geographic Location.....	108
Health Characteristics.....	108
Questions 2-5.....	109
Analytic Methods.....	109
Question 2.....	113
CAM use and CVD risk factors.....	113
Relationship between CAM use by types and risk factors.....	113
Question 3.....	115
CAM use and DM risk factors.....	116
Relationship between CAM use by types and risk factors.....	116
Question 4.....	118
Question 5.....	119
Questions 6-9.....	120
Analytic Methods.....	120
Question 6.....	121
Hypertension.....	124
High Cholesterol.....	125
Smoking.....	126
Participation in Light to Moderate Physical Activity.....	126
Question 7.....	127

Hypertension.....	128
Participation in Physical Activity.....	129
Smoking.....	130
Prediabetes.....	131
Question 8.....	131
Angina.....	132
Coronary Heart Disease.....	132
Heart Condition.....	133
Poor Circulation.....	133
Question 9.....	134
Summary of Findings.....	135
Chapter 5: Overview of Study.....	137
Methodology.....	138
Limitations.....	141
Conclusions.....	142
Sociodemographics.....	141
Hypertension.....	141
High Cholesterol.....	141
Smoking.....	142
Participation in Light to Moderate Physical Activity.....	142
Prediabetes.....	142
Angina.....	142
Coronary Heart Disease.....	143

Heart Condition.....	143
Poor Circulation.....	143
DM.....	143
Discussion.....	144
CAM and Healthcare Costs.....	146
Recommendations for CAM and Nursing Research, Practice, and Education...	148
Research.....	148
Practice.....	151
Education.....	153
Theory.....	155
CAM Therapies and the Health Promotion Model.....	155
Recommendations for Future Research.....	160
Summary.....	161
References.....	162
Appendix.....	189

## LIST OF TABLES

Table		Page
1	Sociodemographic Characteristics of Respondents.....	106
2	CVD and CAM Use.....	109
3	DM and CAM Use.....	109
4	CVD Risk Factors/Prevalence and CAM Use.....	111
5	DM Risk Factors/Prevalence and CAM Use.....	112
6	CVD Risk Factors/Prevalence and CAM Use- Logistic Regression.....	122
7	DM Risk Factors/Prevalence and CAM Use- Logistic Regression.....	123

## LIST OF FIGURES

Figure		Page
1	Revised Health Promotion Model.....	28
2	Substruction of Current Study.....	29
3	CAM Therapy Groups.....	110
4	Revised Health Promotion Model.....	155
5	Substruction of Current Study.....	157

## CHAPTER 1

### **Overview of Study**

Costly, debilitating and largely preventable chronic diseases are among the key contributors to the increased health care costs in the United States (U.S.). Seven out of ten deaths among Americans each year are from chronic diseases. Two of the most common, costly, and preventable problems in the United States are cardiovascular disease (CVD) and diabetes mellitus (DM). The chronic and complex diseases of modern times require movement away from the current medical model from one of focus on cure to a focus on prevention and promotion. People who have chronic diseases may be more likely to use complementary and alternative medicine (CAM) (Saydah & Eberhardt, 2006), but the extent to which those who use CAM and also engage in positive health behaviors or exhibit fewer risk factors is unknown. The aim of this study was to determine whether the use of CAM was associated with health behaviors or risk factors known to impact CVD and diabetes. Secondary data analysis of the 2007 National Health Interview Survey (NHIS) data, the most recent to include CAM use was conducted. Statistical analyses of the data were performed using Statistical Product and Service Solutions (SPSS). Findings from this study provide knowledge regarding the use of CAM therapies and their potential effects on the chronic diseases of CVD and DM. Findings may lead to future research such as interventional studies on the effects of CAM therapies and their role in health promotion and disease prevention.

## **Introduction**

The U.S. Health Care System is failing. According to Kumar and Nigmatullin (2010), the current healthcare delivery system is causing a tremendous cost burden on society and government because of ineffective design. For example, the current healthcare delivery system is designed for treating acute illnesses yet the majority of available resources are used to treat chronic illnesses. Costly, debilitating and largely preventable chronic diseases are among the main contributors to the escalating National Healthcare Expenditures (NHE). As of June 2013, according to the Center for Disease Control (CDC), seven out of ten deaths among Americans each year were from chronic diseases. Cardiovascular disease and diabetes mellitus are two of the most common, costly, and preventable chronic diseases in the United States. Despite advances in care and management over the last several decades CVD remains the leading cause of mortality and morbidity worldwide (Anderson & Taylor, 2012). Diabetes, a known risk factor for CVD (Anderson & Taylor, 2012), is an important public health concern causing substantial morbidity, mortality, and long term complications. Diabetes affects 8% of the U.S. population (American Diabetes Association, 2014) and is expected to become even more prevalent in the future because of increased rates in adult obesity (Yeh, Eisenberg, Davis & Phillips, 2002). Without aggressive intervention into the underlying causes of these chronic diseases and their costs, current trends are expected to worsen (Kumar & Nigmatullin, 2010).

The dramatic increase in chronic conditions has led to an increased interest in complementary and alternative medicine. CAM is defined as “a group of diverse medical and health care systems, practices, and products that are not generally considered part of



conventional medicine” (USDHHS, 2011, p. 1). Complementary therapies are typically used together with conventional medicine, whereas alternative therapies are used in place of conventional medicine. The terms alternative and complementary medicine are used to describe as many as 1800 different therapies practiced globally (Berman & Snyder, 2012). CAM therapies are classified into three to six broad categories depending on the source to include natural products, mind and body medicine, manipulative and body-based practices and “other” CAM practices.

In the United States the use of alternative therapies is increasing at an astounding rate. A national government survey released in 2008 showed that 38% of U.S. adults age 18 and over had used some sort of CAM (USDHHS, 2011). Statistics from a nationwide survey released in 2009 showed that adults in the United States spent \$33.9 billion dollars out of pocket for visits to CAM practitioners and the purchase of CAM products (Barnes, Bloom & Nahin, 2008, Horrigan, 2008; Nahin, Barnes, Stussman & Bloom, 2009).

According to Saydah and Eberhardt (2006) people who have chronic health conditions may be more likely to use CAM, particularly those who have CVD and or diabetes (Arslan, Zeynep & Kulakac, 2012; Chang, Wallis & Tiralongo, 2007). An increased interest in the use of CAM therapies for cardiovascular health (Anderson & Taylor, 2012) and CAM use has been used to introduce new ways of thinking about the diabetes disease state (Yeh et al., 2002). For example, in the U.S. the rate of CAM use in cardiac patients has been reported to be as high as 61% in those with coronary artery disease and 69.4% in hypertensive adults (Arslan et al., 2012). Potential reasons why the percentage of CAM use is so high in those with CVD and related risk factors is suggested to be associated with the adverse effects of and limited

efficacy of some of the pharmacologic treatments that have been traditionally prescribed (Anderson & Taylor, 2012). Likewise, chronic diseases such as diabetes are associated with decreased quality of life (Birdee & Yeh, 2010). Many people, who have type 2 diabetes work proactively to manage their condition, optimize their health and alleviate complications through the use of CAM (Chang et al., 2007). Therefore, persons with CVD and diabetes often seek alternative treatment modalities to meet their health needs that are not being met by the traditional allopathic health model.

According to the 2002 National Health Interview Survey (NHIS) one third of U. S. adults used some form of CAM. In 2007, the NHIS survey expanded its section on CAM use in adults in order to identify trends by comparing data from the 2007 and 2002 NHIS (Barnes et al., 2008). It was found that over the last decade, the U.S. public has shown a steady and substantial use of CAM therapies, despite the out of pocket costs associated with CAM therapies. For example, in 2007, adults in the U.S. spent \$33.9 billion on visits to CAM practitioners, products, classes, and materials (Nahin et al., 2009).

It is known that individuals who use CAM are more likely to take an active role in health maintenance, meaning that consumer behaviors other than illness management, such as health promotion and illness prevention may explain the very high CAM expenditures (Davis & Weeks, 2012). According to Kraft (2009) longstanding models of health self-management and recent conceptualizations of CAM suggest that CAM can be used for two main functions: to treat existing disease and to prevent illness and maintain health. However, while research studies (Arslan et al., 2012; Braun & Cohen, 2010) on the effectiveness and safety of CAM modalities in the treatment of diseases are

increasing; prevention aspects have seldom been addressed. The aim of this study was to describe CAM therapies in the context of prevention of illness and maintenance of health. Therefore, the Health Promotion Model (HPM) proposed by Nola Pender was the theoretical framework guiding this study. HPM focuses on individual characteristics, behavior specific cognitions and behavioral outcomes. The desired behavioral outcome of the HPM is health promoting behavior. The endpoint is directed toward attaining optimal well-being, personal fulfillment, and productive living (Health Promotion Model, 2012). Prior national surveys on CAM use have found that individuals more likely to use CAM are female, live in the western U.S., have higher socioeconomic status (Nahin et al., 2009) and are more likely to have one or more chronic diseases (Saydah & Eberhardt, 2006). What is not known is the extent to which those who use CAM also engage in positive health behaviors or exhibit fewer health risk factors. These have been identified as key research questions in a recent Institute of Medicine (IOM) report on CAM (IOM, 2005).

### **Statement of the Purpose**

The purpose of this secondary data analysis was statistical analyses of the 2007 NHIS database to determine whether the use of CAM is associated with health behaviors or risk factors known to impact CVD and diabetes. Secondary data analysis of the 2007 National Health Interview Survey data, the most recent to include CAM use was conducted. Statistical analyses of the data were performed using Statistical Product and Service Solutions. Findings from this study provide a knowledge base regarding the use of CAM therapies and their potential effects on the chronic diseases of CVD and DM.

Findings may lead to intervention research on the effects of CAM therapies and their role in health promotion and disease prevention.

### **Significance of Project**

#### **Significance to Healthcare**

According to Kumar and Nigmatullin (2010), the U.S. health care system is causing a tremendous cost burden on both society and government. For the past several decades the total National Healthcare Expenditures have escalated faster than inflation. The U.S. NHE reached 2.2 trillion in 2007 and are predicted to continue increasing at an average annual rate of 6.7% until 2017. It is imperative to identify the most cost-effective policies and programs in order to calm the escalating NHE. The current health care system is designed for treating acute illnesses in the U.S. population; however, the majority of available resources are used to treat chronic illnesses. Research has shown that a small portion of the U.S. population accounts for the majority of health expenditures and health services (Davis & Weeks, 2012). The most intense spenders are considerably less healthy (49% report fair or poor health status compared to the general population) and are elderly (Davis & Weeks, 2012). The majority of NHE are caused by treatment costs associated with chronic diseases. Costly, debilitating and largely preventable chronic diseases are among the key contributors to the increased health care costs in our nation. These findings have important implications for addressing national health care spending because interventions targeting those who are in poor health could theoretically generate dramatic cost savings (Davis & Weeks, 2012). Therefore, it is important to focus on strategies to reduce the prevalence and costs of preventable diseases. Chronic conditions such as diabetes and cardiovascular disease are major causes of death in the U.S. and

major sources of illness, hospitalization, long term disability and health care costs. The burden of chronic diseases such as diabetes and cardiovascular disease has risen dramatically over the past several years (Kumar & Nigmatullin, 2010). For example, research has shown the following staggering costs associated with type 2 diabetes complications and comorbidities. Miller and Washington (2013) reported that annual direct medical expenditures related to diabetes treatment were \$176 billion. Based on the CDC's growth estimates of the number of people affected by the disease, spending could increase to \$336 billion by 2035. According to Li et al. (2013), the mean annual direct medical cost was \$2465 for a white man who had been diagnosed with diabetes for fewer than 15 years, was treated with oral medications or diet alone, and had comorbidities or complications. The annualized medical costs for women and for patients whose diabetes had been diagnosed for more than 15 years, used tobacco, and who were being treated with insulin were 10 to 50% higher. Of this population, those who had coronary heart disease and congestive heart failure were associated with 70% to 150% higher costs. Most medical costs incurred by patients with type 2 diabetes are associated with complications and comorbidities (Li et al., 2013) therefore; it is of paramount importance to determine the most cost effective interventions to prevent complications and comorbidities.

Knowledge from this study can be used to identify cost effective CAM therapies that can be used to decrease the staggering costs that have been shown to be associated with CVD and diabetes. CAM therapies are currently highly popular among the U.S. population and have been shown to have benefits that outweigh their costs. Knowledge from this study can identify CAM therapies that are currently being used by those with

CVD and DM and subsequent studies can be conducted to determine a cost benefit ratio for each therapy. If found to be cost effective, further intervention research can be conducted for each therapy to determine their health effects. These findings could theoretically generate dramatic cost savings by identifying interventions that target those who are accounting for the majority of health care expenditures in the U.S.

According to Herman, Craig and Caspi (2005), there is a widely held belief among the U.S. population that CAM therapies have benefits that outweigh their costs and have a reputation for good value among health conscious consumers. A testament to this belief is shown in the fact that in the U.S. it is estimated that over \$34 billion is spent per year by consumers on expenditures associated with CAM therapies. It is apparent that a large group of Americans use CAM and the public demand for CAM continues to grow. Although total expenditures on CAM are small when compared to the \$2.6 trillion spent on traditional medicine, the amount spent is impressive because these expenditures are out of pocket (Davis & Weeks, 2012). Doran, Chang, Kiat, and Bensoussan (2010) indicate that several CAM therapies can be considered cost effective when compared to usual conventional care therapies for a number of conditions. According to Herman et al. (2005), studies indicate that CAM therapies such as acupuncture, manual manipulation, guided imagery, relaxation therapy, self-administered stress management, oral nutrition supplementation, biofeedback and homeopathy have been found to have both better health effects and lower costs when compared to usual care.

As health care costs continue to rise, consumers and policymakers must allocate increasingly scarce resources toward treatments that offer the best value for the money (Doran et al., 2010) because there will be fewer resources to help and heal (Ventegodt &

Merrick, 2011). In this nation, this moment in time is a prime window of opportunity for nurses to get involved in health policy decisions that need to be made regarding CAM. According to Spinks, Hollingsworth, Manderson, Lin, and Canaway (2013) CAM may offer cost-effective treatment for health complaints that are experienced by those with chronic diseases. Lind, Lafferty, Tyree, and Diehr (2010) noted that CAM therapies may be good candidates for not only cost effective care but even cost savings because “they avoid high technology, offer inexpensive remedies, and harness the power of vis medicatrix naturae (the body’s natural ability to heal itself)” (p.411). With the widespread popularity of CAM in the U.S. it is important to devote more attention through research to develop an understanding of the economic rationale for why some consumers choose to use CAM instead of conventional medicine. Education in CAM has triggered a deeper understanding of what is needed to shift the healthcare delivery model toward facilitating health instead of treating disease. Investing in health and healing oriented education will enhance health care delivery by decreasing costs (Rakel, Guerrera, Bayles, Gautman, & Ferrara, 2008). Knowledge from this study can be used to transform the current health care system design from one of treating acute illnesses to one of treating chronic diseases in a cost effective way and from one with a focus on cure to one with a focus on prevention. This paradigm shift will have a profound effect on decreasing total National Healthcare Expenditures.

### **Significance to Nursing Research, Practice and Education**

According to Norton (1995), nurses have a professional and moral obligation to base their clinical practice on current, valid research findings. Efforts toward improving clinical practice have been based more on beliefs than on scientific research evidence

which has led to a gap between evidence based practice and clinical nursing care reality (Hudson, Duke, Haas & Varnell, 2008). Therefore, nurses should identify areas of practice which are not supported by research and actively initiate such research (Norton, 1995) in order to build the knowledge base for evidenced based nursing practice.

Complementary and alternative medicine is one area of health care where there is a paucity of research that has been conducted using rigorous scientific methodology (Smith, 2008) and “it is widely acknowledged that research investigating the effectiveness and outcomes of complementary therapies is limited” (Norton, 1995, p. 346). Therefore, this research study was significant because it is in line with the mission of NCCAM which is “to define through rigorous scientific investigation, the usefulness and safety of complementary health approaches and their roles in improving health care. NCCAM’s vision is that scientific evidence will inform decision making by the public, by health care professionals, and by health policymakers regarding use and integration of complementary health approaches” (USDHHS, 2013, p. 6).

It is posed that there are many potential health benefits that can be gained from effective integration of CAM therapies into nursing practice but more scientific evidence is required (Smith, 2008). According to Kessler et al. (2001), evaluations of efficacy and effectiveness by researchers hold the promise of minimizing adverse effects and maximizing usefulness of CAM therapies. This research study was significant because it gives research support for holism which, according to O’Regan, Wills, and O’Leary (2010) is a fundamental aspect of nursing as well as a basic tenet of many CAM therapies. This project will assist this author in initiating a program of research to advance nursing science and practice for two reasons. First, this project serves as a



springboard leading to further research related to CAM modalities and second, this project provided further development of the Health Belief Model as a framework to guide future research on CAM use and health risk behaviors.

Knowledge from this study can be used to identify CAM therapies that are currently being used among those with CVD and DM. Once these modalities are identified further research studies will be conducted that will focus on each modality in order to identify which CAM modalities can be used as nursing interventions in the healing of those with chronic disease. This is significant because CAM therapies expand the interventions that nurses can independently incorporate into their practice to provide holistic care.

As previously stated, people who have chronic health conditions may be more likely to use CAM. According to Saydah and Eberhardt (2006), chronic diseases often require daily care and multiple conventional pharmacological interventions. Although CAM use is intended to positively affect one's health, CAM use may impact the health of people in a negative way. Many CAM therapies adversely interact with aspirin therapy or diuretics, which are often used in the treatment of those with CVD. CAM may also impact conventional diabetes treatment by affecting blood glucose levels (Saydah & Eberhardt, 2006). Herbal medicine (phytomedicine), the science and art of using botanicals to prevent and treat illness, is one of the oldest forms of medicine. The overall general consensus is that herbal treatments are considered safe. However, with all medications, including herbal treatments a risk benefit should be considered before use. There is the potential of herbs interacting with pharmaceutical drugs. Some herb-drug interactions may be detrimental and may cause dangerous outcomes, where others may

be beneficial. The popularity of herbal medicines and increased use means healthcare workers are coming in contact with patients who are taking these medications. Lack of knowledge can lead to detrimental situations with patient safety and negligence (Braun & Cohen, 2010). This research study provides a basis for a beginning knowledge base for nursing practice on the use of CAM therapies and their potential effects on the chronic diseases of CVD and DM. This could possibly lead to intervention research on the effects specific CAM therapies have on the disease processes among those with CVD and or DM and the role they play in health promotion and disease prevention.

According to Dayhew, Wilkinson, and Simpson (2009), it is a certainty that CAM is here to stay and each practicing nurse will face this at some time in their practice, therefore nurses should be knowledgeable about CAM. It is vital that nurses develop and disseminate research based knowledge about CAM because knowledge is central to nursing practice. CAM therapies are becoming more acceptable in mainstream society therefore it is imperative that nurses know how to assess the effectiveness of therapies and the research base supporting such therapies (O'Reagan et al., 2010). Patients are demanding the opportunity to receive a range of therapeutic skills from nurses. If nurses value holistic care and the therapeutic role, they should seek to provide information on therapies other than those confined to western medicine. Therefore, ethically speaking, nurses have a duty to facilitate CAM therapies within their practice if patients request such care (Norton, 1995).

Findings from this study provided a knowledge base regarding CAM therapies that are being used among those with CVD and DM. Knowledge from this study can be disseminated among the profession of nursing. This provides information on specific

CAM therapies that can be incorporated into a plan of care for patients which will enable nurses to fulfill the ethical duty nurses have to facilitate CAM therapies within their practice if patients request such care.

According to O'Regan et al. (2010), nurses are not knowledgeable about complementary health and healing practices because knowledge about CAM is not derived from professional education but from individuals' own personal experience. Currently, CAM education in nursing programs tends to relate to elective courses or an occasional lecture within core curriculum. Further training in CAM may offer nurses an opportunity to have greater understanding of their patients and to integrate different approaches into patient care (Smith, 2009). According to Moore (2010) in response to the increasing trend in CAM therapies some nursing schools have begun to offer courses in CAM. Knowledge from this study provides evidenced based research that can be used to write scholarly articles and textbooks on CAM. These articles and textbooks can serve as the foundation for curriculum development that can be incorporated into nursing education programs.

Incorporating information on CAM modalities into nursing academia is of vital importance to the nursing profession because questions on CAM are now being included in the national licensure examinations for registered nurses. Each candidate for licensure is required to pass an examination that measures the "competencies needed to perform safely and effectively as a newly licensed, entry-level registered nurse (RN)" (NCSBN, 2013, p.3), meaning that knowledge on CAM contributes to competency as a registered nurse. According to the detailed test plan for the National Council Licensure Examination for Registered Nurses (NCLEX-RN) educator version (2013), CAM questions are

included in three of the eight content areas. For example, under the health promotion and disease prevention category, questions are included on how to “integrate complementary therapies into health promotion activities for the client” (NCSBN, 2013, p. 19). Under the lifestyle choices category, questions are included on how to “evaluate client alternative or homeopathic health care practices (e.g. massage therapy, acupuncture, herbal medicine and minerals)” (NCSBN, 2013, p. 20). Under non-pharmacological comfort interventions questions are included on how to “assess the client’s need for alternative and/or complementary medicine” (NCSBN, p.28) and “evaluate the outcomes of alternative and/or complementary therapy practices” (NCSBN, p.29). Knowledge from this study provides information that will have graduate nurses prepared to successfully answer NCLEX-RN exam questions related to CAM.

In order to facilitate the incorporation of CAM therapies within nursing practice, nurses must be knowledgeable about alternative treatments in order to provide correct and safe care to patients. As health professionals on the clinical frontline, nurses are required to provide correct information and guidance to patients about safe and effective treatments (Smith, 2009). CAM is used widely by many patients and some CAM treatments have been shown to interact with some prescribed medicines, causing serious side effects. Several nursing articles have focused on the importance of integrating alternative health care with conventional medicine, in theory and education, into the nursing curriculum in order to address concerns about client safety. There are approximately 600 nursing schools in the United States. Fenton and Morris (2003) conducted a survey of 585 of the nursing schools in the U.S. resulting in 125 respondents. Of the respondents 85% answered that CAM modalities were included in their

curriculum. Current nursing practice requires knowledge of CAM because consumer demand is growing and it is unknown as to whether healthcare providers are adequately prepared to address their needs (Avino, 2011). Current nursing students are graduating unprepared to answer questions and process information related to CAM and this puts the nurses and their patients in an unsafe position. It is important for nurses to know what therapies there are, how they are used and the risks and contraindications associated with these therapies.

Knowledge from this study provides information that will prepare nurses to be informed members of the healthcare team regarding CAM. Providing knowledge on which CAM therapies are being used among those with CVD and DM enable nurses to have the necessary tools to provide correct and safe care to patients.

The importance of increasing the complementary and alternative treatment knowledge base of healthcare professionals has been emphasized. A 2008 report on the state of the nation's health workforce by the Association of Academic Health Centers described a dysfunction in private and public health workforce policy that is contributing to vulnerabilities for the workforce and putting the health of the American public at risk. Interest in and growth of integrative medicine and CAM by consumers has led to concern from the IOM that "health professionals be sufficiently informed about integrative health that they can effectively care for patients" (Kreitzer, Kligler & Meeker, 2009, p. 4). In their report that was commissioned for the IOM Summit on Integrative Medicine and the Health of the Public these authors chose to focus on the professions of medicine and nursing. Their report made the following recommendations on how the health of the public can be served by incorporating an integrative perspective into health professions

education. First, a list of core competencies should be developed for all health professions students. Next, a reform in health professions education is needed to place an emphasis on wellness and the regulatory bodies governing health education should be charged with mandating the inclusion of integrative health in all levels of training. Third, academic programs should create cultures of wellness among their students.

Nurses are an important safety link between the patient and physician (Moore, 2010). Nurses, beginning at the student level must address the assessment of client use of complementary health practices and their evaluation of their health outcomes (Richardson, 2003). The nursing profession cannot afford to fall behind in this area of healthcare that is reflective of the basic values of nursing care. Nurses are the gatekeepers for consumers and should use this position to enhance the safety of CAM (Sparber, 2001).

Patient disclosure of the use of alternative treatments to their healthcare providers is lacking. One of the most alarming findings related to CAM therapies is that patients are not disclosing to their health care providers more than 60 percent of the CAM therapies they use (Dossey & Keegan, 2009). Most CAM users consult doctors who know little about CAM and probably don't ask their patients about CAM use; therefore, people don't discuss CAM use with their doctors (Eisenberg et al., 1998; Gulla & Singer, 2000). When patients sense an impression of disinterest or negative response from the nurse, they hold back information that could be vital for their health care. Patients value the input of the nurse and fear they will lose respect if they disclose the use of CAM (Armeen, 2010). Skeptics profess that people who use CAM therapies are poorly educated and gullible.

Research has shown the opposite to be true as consumers of CAM tend to be well educated and believe in the importance of holistic health (Dossey & Keegan, 2009).

Patient disclosure of the use of alternative treatments to their healthcare providers is lacking. This research study provides valuable information on the CAM therapies that the U.S. population is using to treat CVD and DM. Disseminating these findings to nurses could increase their knowledge base on CAM which could lead to more open discussions with patients regarding CAM use which could in turn address the issue of patient disclosure.

Complementary therapies have been used in healing practices since 5000 B.C. and there has been a recent reemergence of non-traditional therapy use in the U.S. population. Education in CAM has triggered a deeper understanding of what is needed to shift the U.S. healthcare delivery model toward facilitating health instead of treating disease. Investing in health and healing oriented education will enhance health care delivery by decreasing costs (Rakel et al., 2008). Despite the remarkable achievements in both science and medicine in the modern era humankind is still faced with many life threatening diseases. There is an increasing recognition that the disease-oriented approach which dominates western health care is no longer working. The goals of searching for a cure of a disease through diagnosis and treatment are no longer working with the advent of chronic diseases. It is clear that western medicine and synthetic drugs alone cannot meet all of the health care needs of today. The disease spectrum of today differs significantly from the past. For example, in the early 20<sup>th</sup> century infectious diseases were the main cause of death. Now, chronic diseases are the leading causes of death. The biomedical model is no longer sufficient to meet the health care needs of

today. There has been an increase in use and support for CAM which is due in part to the inability of western medicine to meet the many medical needs that are seen in patients today. Knowledge from this study may contribute to a revolutionary change in the healthcare system with a change in focus from cure to prevention (Pan, Gao, Zhou, Tang, Yu & Ko, 2012).

According to Clark (2012) the increasing chaos within the healthcare system is leading to a point where new order and new ways of being may emerge. Nurses are at the forefront of providing patient care, health education and information (O'Reagan et al., 2010) and according to Norton (1995), complementary therapies have the potential to complement and enhance current nursing practice because complementary therapies focus on the holistic care of the individual with an emphasis on patient involvement. Nursing care is holistic in nature and therefore complementary therapies recognize the interdependence of the physical, social, environmental, cultural and spiritual aspects of health. The study's findings provide information on what groups of CAM modalities may be effective in the prevention and treatment of the chronic diseases CVD and DM. This could have a significant impact on nursing practice by identifying therapies that can be used to promote factors that decrease health risks associated with the development of CVD and DM. There is some support of preventive treatment with evidence based effectiveness for some CAM modalities in in the conditions of CVD and DM. For example, Kraft (2009) noted that dietary supplements, phytotherapy, and relaxation have been used in the prevention of CVD and a combination of CAM modalities have been shown to positively affect diabetic patients who have higher HbA1c values. Many CAM therapies can be used by nurses and do not require a doctor's order. Knowledge from this



study identified CAM therapies that can be used in nursing practice to promote health and prevent further development of CVD and DM among individuals.

The chronic and complex diseases of modern times require movement away from the current medical model from one of focus on cure to a focus on prevention and promotion. The public is turning to alternative treatment modalities to meet their holistic health needs that are not being met by the traditional allopathic health model of this country. Attitudes of health care professionals regarding the effectiveness of CAM continue to vary but there is beginning to be a more receptive openness toward the possibilities CAM may have to offer that is starting to be seen in the current health care profession's graduates. Studies regarding the safety and effectiveness of the various modalities are currently being conducted at a pace that has never been seen before in this country. Learning about CAM is no longer an option; it is a certainty that CAM is here to stay (Moore, 2010). The U.S. is at a transitional stage of healthcare reform and nurses have a unique opportunity to use their position as key members of the healthcare team to influence the decisions that will be made on health promotion and disease prevention public health policy.

### **Theoretical Foundation**

According to The World Health Organization [WHO] (2014) chronic diseases are at epidemic proportions globally. More than 133 million Americans are currently living with a chronic disease (Centers for Disease Control and Prevention [CDC], 2009). The current medical model of curing diseases is not working and the benefits of a healing approach would assist in the management of the everyday maladies that plague millions of people, as well as aid in the prevention of the major chronic illnesses that currently

account for major health spending (Freedman, 2011). Those who are living with and/or have the potential of developing a chronic illness will be looking for ways of healing and improving their health. Nurses play a major role in caring for chronically ill people therefore giving meaning to the concepts of healing and health will be useful to the practice of nursing.

According to Senzon (2011) “a transformative revolution in the way wellness and lifestyles are viewed is long overdue” (p. 1085). Chronic diseases such as diabetes and CVD develop over time and relate to health lifestyles. In fact, almost half of all preventable deaths in the U.S. are related to lifestyle. Understanding the complex holistic systems relationships associated with lifestyle and chronic disease is of paramount importance (Blanks, 2009; Riley, 2010; Hyman, 2010; Redwood, 2010; Cockerham, 2010).

Currently, there is increased interest and awareness in the term complementary and alternative medicine modalities that encompass holistic care. Consumers of healthcare are attracted to CAM therapies because they are less invasive, more accessible and non-narcotic. Holistic nursing care encompasses mind, body and spirit with the goals of healing (Dossey & Keegan, 2009) and health (Pender, Murdaugh & Parsons, 2011). Knowledge from this study was intended to help answer the following questions. What exactly does healing and health mean in this context? How can nurses facilitate healing and health in all aspects of a patient’s being? And how does invoking complementary and alternative therapies affect healing and health? A discussion follows of how the concepts of healing, health and CAM use were formulated into the guiding framework for this study.

Senzon (2011) proposed five keys of real transformation in health care, four of which the study did. The first key to transformation in health care is to harness the wisdom and passion of CAM practitioners because they are poised to lead a great health renaissance (Redwood, 2010). With a holistic view of healing coupled with a common belief in the importance of healthy lifestyles, CAM practitioners hold a cultural authority regarding prevention and promotion. A wider vision of health as human potential is needed. Regaining health differs from adopting a healthy lifestyle just as adopting a healthy lifestyle differs from achieving one's potential. It is suggested that placing human potential with the creation of emergent and sustainable levels of wellness at the center of health care will forever change it.

The second key to transformation is to optimally utilize clinics, communities and the law. The potential to help millions in the creation of positive lifestyle change is inherent in the health care reform legislation. A crucial aspect of the legislation is its support of wellness initiatives, health promotion and lifestyles (Kamerow, 2010). A government task force has been charged to create proposals for "evidence-based models, policies, and innovative approaches for the promotion of transformative models of prevention, integrative health, and public health on individual and community levels across the United States" (HR3590, 2011, p. 421.).

The third key to transformation is to develop an evidenced base for a wide variety of prevention and promotion practices that include CAM. Schuster, Dobson, Jauregui, and Blanks (2004) defined wellness lifestyles to include health lifestyles, health promotion, and CAM use for wellness enhancement. While most CAM practices share a holistic philosophy toward health, healing, and the body, the trend toward integrative

medicine has led to the application of various CAM practices in a reductionist, treatment oriented paradigm. This proves the importance of researching evidence based protocols regarding CAM. Knowledge from this study contributed to expanding the evidence base and assists in better understanding the dynamics of wellness and lifestyles with regard to the individual's personal transformation (Senzon, 2011).

The fourth key to transformation is to assist individuals to personally transform at the opportune time. This suggests that everyone has the ability to change. The depth of change depends on the individual's resources of body, emotion, mind, soul, and spirit, and the timing of the change is crucial. This is in direct line with the HPM that embraces transformation with the individual depending on their unique moment in life. Change is more sustainable when the time is right (Pender et al., 2011). CAM practitioners hold a unique opportunity in the lives of their patients and knowledge from this study can help CAM practitioners to be change agents and lead a cultural transformation toward wellness and human potential (Senzon, 2011).

The fifth and final key to health care transformation is based on American philosopher Ken Wilbur's Integral Theory. The final key is to increase awareness that all sentient beings view the world through four domains; personal experience (subjective), body and behavior (objective), social and economic circumstances (interobjective), and habitus, worldview or culture (intersubjective) (Wilber, 2006). This view situates lifestyles in a deeply holistic way. Each CAM practitioner views the world through each of these four domains. Each individual seeking lifestyle change also views the world through each domain and can be observed from each domain. Health care providers assess each individual in terms of a receiver of an intersubjective message, a recipient of

an interobjective structure, a physical body, who acts and chooses behaviors that can be objectively studied, and a subjective person transforming and developing in their own time. Integration unites all facets of the whole and is therefore the fifth and final key to healthcare transformation (Senzon, 2011).

Healing is a familiar term among healthcare professionals, but complex. Heal and cure are often used interchangeably but using heal to refer to cure is not the correct definition of the concept of healing as it relates to nursing. The term “cure” refers to alleviation of symptoms and focuses on a disease process while the term “healing” refers to movement toward wholeness and focuses on the person with the disease. The approach to cure is treatment and the approach to healing is health. Treatment modalities that follow the medical model are mechanistic and symptom oriented and the goal is the absence of signs and symptoms. Cure uses outside agents to manipulate the body in order to reduce symptoms of disease and healing refers to our natural capacity focusing on our natural human capacity and focuses on that which is impeding our wholeness (Landis, 1997). Healing is achieved when a patient overcomes the effects of chronic illness in such a way that he or she is able to go on living his or her life in a meaningful way. Healing also occurs when a person reaches acceptance of his or her illness from which they are unlikely to recover. Healing occurs when a person is able to go on living with a new reality that comes after experiencing some sort of suffering. While perfect health or cure may not be realistic, people still need healing. To be truly healed one must be healed emotionally, psychologically, and spiritually, with or without physiologic cure (McCabe, 2007).

Currently, there is increased interest in complementary and alternative treatments with healthcare and numerous self-help books written on ways to selfheal the mind and the body. A holistic nursing approach incorporates many practices that address each aspect of being human that need to be included for one to be truly healed and therefore can be considered part of nursing's role in facilitating self and others toward healing. Each individual's belief system, willingness and culture must be considered when coming up with the best plan for healing. Concept analysis has built upon past analyses of healing and incorporated the potential use of CAM practices to assist people in the process of healing.

Health is a frequently articulated goal of nursing yet different conceptions about the meaning of health are common. The once commonly accepted definition of health – the absence of diagnosable disease- is now only one of many views of health today. The emergence of health promotion as the central strategy for improving health has shifted the paradigm from defining health in the curative, biologically based model to a multidimensional definition of health which opens up many options for improving health (Pender et al., 2011) such as complementary and alternative medical therapies. In a multidimensional model of health, emphasis is placed on strengths, resiliencies, resources, potentials, and capabilities rather than on existing pathology, meaning that the health behaviors one chooses (i.e. CAM use) is of major import when defining one's health. In the framework of the current study, health can be an aspiration for those with a chronic illness and can be achieved despite being diagnosed with disease and illness experiences can either hinder or facilitate one's continuing quest for health (Pender et al., 2011). This view of health correlates to one's use of CAM because many people have

reported that CAM use was integral in the treatment and prevention of chronic illness (Spinks et al., 2013).

Integrative medicine combines mainstream medical therapies and CAM therapies for which there is some high quality scientific evidence of safety and effectiveness (Weil, 2013). Integrative health care is a growing trend according to the U.S. Department of Health and Human Services which has stated that integrative medicine is happening now, is growing among providers and health care systems, and is the scientific evidence is limited (USDHHS, 2013). Health as a holistic experience frames the proposed study as opposed to the fragmented biological model because although the biological model has provided sophisticated medical care it has led to a narrow focus on disease. In contrast, an expansive, holistic view of health goes beyond disease prevention and risk reduction emphasizing physical capacities that can be integrated with traditional biomedical models (Pender et al., 2011) to facilitate health and healing. Within the context of holistic health, health must be viewed from a positive perspective when conducting an assessment, meaning the focus should be on available resources, potentials and capabilities that are available to help clients to move toward their health goals (Pender et al., 2011). Therefore, this study was an assessment of the CAM resources, potentials and capabilities that alternative therapies may have on those with risk behaviors and or the chronic diseases of CVD and DM. With this knowledge nursing science can develop a deeper understanding and expand the strategies that nurses can independently implement to provide holistic care to patients. This knowledge lends support to theories that purport that healing is much more than curing disease.

Framing this research study with the HPM requires a thorough assessment of health behaviors. Assessment findings provide the data for identifying the characteristic health behaviors related to CAM use that can potentially lead to intervention research that could identify CAM therapies that are effective in improving one's health and preventing the diseases and comorbidities that are associated with CVD and DM. According to Pender et al. (2011) the HPM as a guiding frame for research assesses the client in the areas of physical fitness, nutrition, life stress, spiritual health and lifestyle. Each of these assessment areas correlates with one of four groups of CAM therapies to include: mind body therapies, biologically based, manipulative based, and alternative medical systems.

According to Hawk, Ndetan and Evans (2012) there is an urgent need to provide disease prevention and health promotion services to all Americans yet it is not clear how this need can be met with current resources. With respect to the portion of disease prevention and health promotion relating to the modification of personal health behavior, possible contributions could be made with an untapped source, CAM.

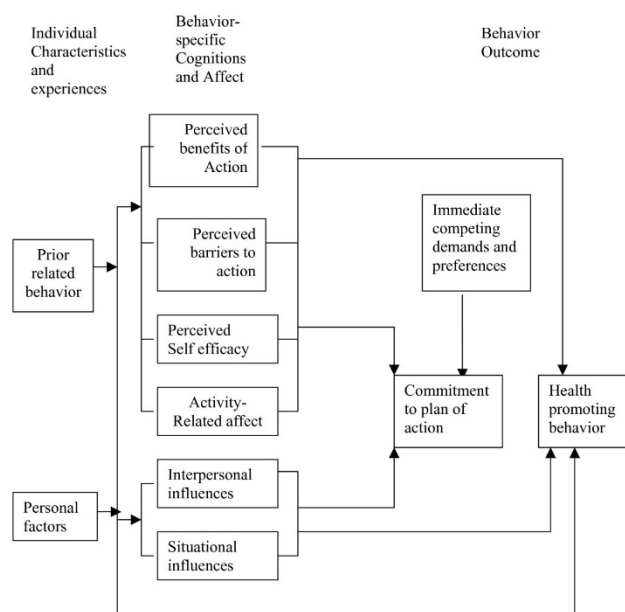
According to Chang, Wallis and Tiralongo (2012) it is recommended that theories and models be used in research for studying human behavior, to plan more effective evaluations and conduct more productive research. Using an appropriate model as a guiding framework to study predictors of CAM use has heuristic utility. The Health Promotion Model proposed by Nola Pender (1982; revised 1996) seeks to improve the health of the population by influencing behaviors through positive motivation (Williams, 2012). According to McEwen and Wills (2011), Pender's model was proposed as a framework for integrating nursing and behavioral science perspectives on factors that influence health behaviors. The model is to be used as a guide to explore the



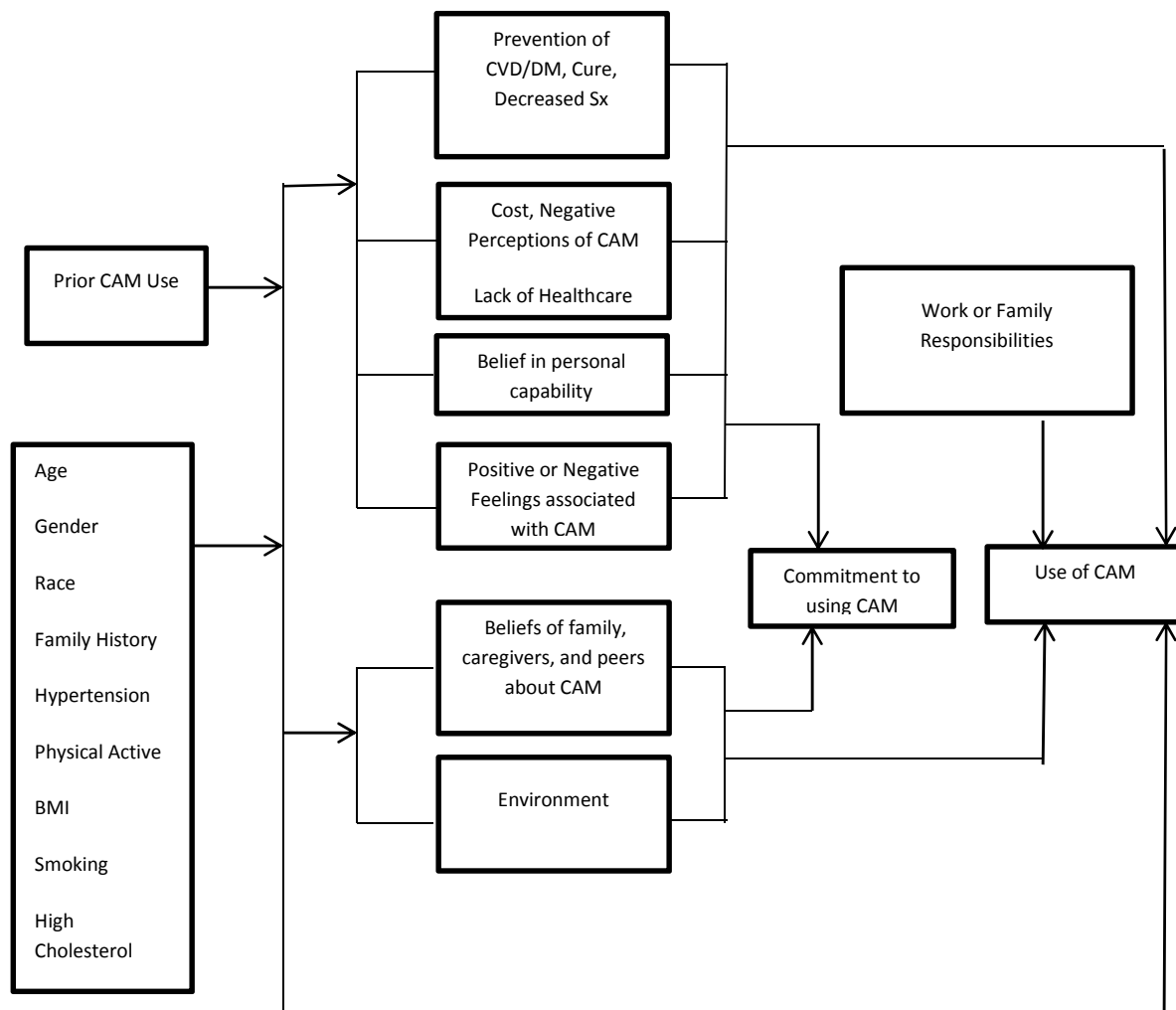
biopsychosocial processes that motivate individuals to engage in behaviors that are directed toward health improvement. Major concepts of the HPM are individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes. The HPM proposes that health beliefs determine whether or not an individual engages in any particular health behavior. According to the HPM, each person has unique characteristics and experiences that affect subsequent actions. Persons engage in behaviors from which they expect to derive personally valued benefits. Health seeking behaviors are influenced by the individual's perceived susceptibility to illness and perceived severity of illness, and by the evaluation of benefits and barriers to action.

Pender's revised HPM (1996) was used as the theoretical framework for this research. The HPM is derived from expectancy-value theory and social cognitive theory and operates within a nursing perspective of holistic human functions (Pender, 1996). According to Yoon and Horne (2004) the three major components of the HPM are as follows. First, individual characteristics and experiences affect subsequent actions, including prior related behavior and personal factors (biological, psychological, and sociocultural). Second, behavior-specific cognitions and affect, which are considered to be factors of major motivational significance and are a critical "core" for nursing interventions, including perceived benefits of action perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences. And third, behavioral outcome, including commitment to a plan of action, immediate competing demands and preferences, and health-promoting behavior directed toward attaining positive health outcomes.

The HPM has been used extensively as a framework for predicting health promoting lifestyles as well as specific behaviors. The model has been useful to numerous nursing scholars in explaining and predicting specific health behaviors. Most research studies use Pender's model as one component of a conceptual framework for study such as to examine health promoting behaviors. The HPM was an appropriate conceptual framework to guide the proposed research study that examined CAM use and behavioral risk factors and support from the literature will be presented in chapter two of this dissertation.



*Figure 1.* Revised Health Promotion Model



*Figure 2.* Substruction of current study

### **Assumptions**

“Assumptions are statements that are taken for granted or are considered true, even though they have not been scientifically tested” (Burns & Grove, 2001, p. 46). The assumptions for this research study were comprised of both assumptions related to the theoretical model as well as personal assumptions related to CAM. According to Berman and Snyder (2012), the HPM success is based on the following seven assumptions. First, people attempt to create living conditions through which they can express their unique human health potential. Second, people have the ability for reflective self-awareness and to identify their

strengths. Third, people value growth in positive directions. Fourth, people seek to regulate their behavior. Fifth, individuals, in their biopsychosocial complexity interact with and transform their environment. Sixth, health professionals are an integral part of the interpersonal environment, which exerts influence on people throughout their lifespan. Seventh, people have the ability to change their behavior.

Personal assumptions related to this research study included that one can be healed without being cured, there is a difference between conventional and complementary and alternative medicine, most CAM therapies are not scientific, many CAM therapies that have not been scientifically proven to work have some medical benefit, mind can overcome established physical law, the credibility of an emerging field of medicine is greatly impacted by one's understanding of the terms used to describe that field, not all treatments based on the biomedical model are accurate and "best" for the patient. Knowledge can contribute to a deeper understanding of healing, health, and cure and may contribute to new theoretical frameworks in these areas.

### **Research Questions**

The goal of the present study was to answer the following research questions:

- 1) What are the characteristics of CAM users who participated in the NHIS 2007 survey?
- 2) Is there a relationship between CVD risk behaviors and CAM use?
- 3) Is there a relationship between DM risk behaviors and CAM use?
- 4) Is there a relationship between CVD prevalence and CAM use?
- 5) Is there a relationship between DM prevalence and CAM use?
- 6) Does CAM use affect the presence of CVD risk factors?

- 7) Does CAM use affect the presence of DM risk factors?
- 8) Does CAM use affect the presence of CVD?
- 9) Does CAM use affect the presence of DM?

It was hypothesized that individuals who have fewer health risk behaviors for CVD and DM are more likely to use one or more of 20 different CAM modalities than those who have higher health risk behaviors. It was also hypothesized that individuals who use one or more of 20 CAM modalities have less severe complications of CVD and DM. The modalities that will be included are: 1) acupuncture, 2) Ayurveda, 3) biofeedback, 4) chelation therapy, 5) chiropractic or osteopathic manipulation, 6) energy healing therapy, 7) hypnosis, 8) massage, 9) naturopathy, 10) traditional healers, 11) movement therapies, 12) herbal and non-vitamin supplements, 13) vitamins and minerals, 14) homeopathy, 15) special diets, 16) yoga/tai chi/qi gong, 17) relaxation techniques, 18) prayer, 19) meditation, and 20) deep breathing exercises.

### **Limitations**

Limitations of this study were related to the questions of the adult alternative health survey and the NHIS. First, data are dependent on a respondent's memory, knowledge of CAM and a willingness to report its use accurately. Second, the survey does not report information about culturally relevant CAM use according to ethnicity. Third, the sampling strategy used random digit dialing which may not accurately reflect the U.S. population because this sampling technique requires the use of a landline. Fourth, the data collection occurred at a single point in time and results in an inability to produce consecutive annual prevalence estimates and it reduces the ability to produce

reliable estimates prevalence estimates for small subgroups of the population (Anderson & Taylor, 2012; Barnes, et al., 2008).

### **Delimitations**

The purpose of this secondary data analysis was statistical analyses on the 2007 NHIS database to determine whether the use of CAM was associated with health behaviors or risk factors known to impact CVD and diabetes in adults. This study did not intend to cover whether CAM use was associated with health behaviors or risk factors that may impact other chronic diseases or in children. This study was bound by the CAM therapies as listed by the NHIS and this number of therapies was limited and may not have included all therapies that may be used by individuals.

### **Summary**

The chronic and complex diseases of modern times require movement away from the current medical model from one of focus on cure to focus on prevention and promotion. The biomedical health model gives insufficient attention to chronic health needs. Costly, debilitating, and largely preventable chronic diseases are among the key contributors to the increased health care costs in our nation. The majority of NHE are caused by treatment costs associated with chronic diseases. The public is now turning to alternative treatment modalities to meet their holistic health needs that are not being met by the traditional allopathic health model of this country. These findings have important implications for addressing national health care spending because interventions targeting those who are in poor health could theoretically generate dramatic cost savings (Davis & Weeks, 2012). Attitudes of health care professionals regarding CAM vary but learning about CAM is no longer an option; it is a certainty that CAM is here to stay. We are at a

transitional stage of health care reform in this country and nurse researchers have a unique opportunity to use their position as key members of the healthcare team to influence decisions that will be made on health promotion and disease prevention health policies. This research study was significant to nursing research, practice and education. The study provided a basis for a beginning knowledge base on the use of CAM therapies and their potential effects on the chronic disease of CVD and DM. This could lead to intervention research on the effects of CAM therapies and the role they play in health promotion and disease prevention which could be used in nursing practice and education. CAM therapies are cheaper than traditional medical practices and research that lends support to the effectiveness of CAM therapies in treating and preventing chronic diseases has the potential of providing a way to significantly cut health care spending in the United States. Expanding the evidence base on wellness enhancement, using the HPM as a guiding theoretical framework, has assisted us in better understanding the dynamics of wellness and lifestyles, in regard to individual's personal transformation. Health behavior is the central concern for health promotion and one of the most important factors of disease, since over 50% of chronic diseases are potentially preventable.

## CHAPTER 2

### **Overview of Study**

Costly, debilitating and largely preventable chronic diseases are among the key contributors to the increased health care costs in our nation. Seven out of ten deaths among Americans each year are from chronic diseases. Two of the most common, costly and preventable problems in the United States are CVD and diabetes mellitus. The chronic and complex diseases of modern times require movement away from the current medical model from one of focus on cure to focus on prevention and promotion. It has been suggested that people who have chronic diseases may be more likely to use CAM, but the extent to which those who use CAM and also engage in positive health behaviors or exhibit fewer risk factors was unknown. The aim of this study was to determine the use of CAM among people who reported having CVD or CVD risk factors as well as those who reported having DM or DM risk factors with the general United States population. Secondary data analysis of the 2007 National Health Interview Survey (NHIS) data, the most recent to include CAM use was conducted. Statistical analyses of the data were performed using Statistical Product and Service Solutions (SPSS). Findings from this study provide a knowledge base regarding the use of CAM therapies and their potential effects on the chronic diseases of CVD and DM. Findings can lead to intervention research on the effects of CAM therapies and their role in health promotion and disease prevention.



## **Review of Literature**

A search was conducted of CINAHL and MEDLINE databases first using the key terms complementary and alternative medicine use and management of chronic disease. Limits were placed to include peer reviewed journal articles that had been published within the last ten years. The search yielded 65,293 articles. The search was then limited to the last five years and used the key terms complementary and alternative medicine use and health promotion. Eighteen articles were found. A search using the National Center for Complementary and Alternative Medicine research database was used to search for published articles over the last five years that had used the 2007 National Health Interview Survey data and CAM. One hundred twenty-seven results were found. Of these results, only two articles were found that focused on CAM use and CVD and no articles were found that focused on CAM use and diabetes. Because of the paucity of published research relative to CAM use in diabetes and cardiovascular disease, the search was expanded to include all articles that had been published on CAM use in diabetes and cardiovascular disease within the last 20 years in order to obtain a comprehensive review.

### **Defining Complementary and Alternative Medicine**

The field of complementary and alternative medicine is broad and constantly changing. There are many definitions of CAM and the National Center for Complementary and Alternative Medicine (USDHHS, 2013) purports that none of the definitions are perfect. The National Institutes of Health (NIH) defines CAM “as a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine” (USDHHS, 2011, p. 1). NCCAM defines CAM in similar terms simply stating that CAM is “a group of diverse medical and health

care interventions, practices, products, or disciplines that are not generally considered part of conventional medicine” (USDHHS, 2011, p. 1). By definition, CAM practices are not part of conventional medicine because there is insufficient evidence supporting their safety and effectiveness (USDHHS, 2013). Conventional medicine is also known as Western, traditional, or allopathic medicine. When referring to CAM, three terms are predominately found throughout the literature. The first is complementary medicine. The term complementary medicine refers to the use of CAM in addition to western medical practices. An example of this would be practicing yoga in addition to the usual medical treatments used to lower high blood pressure. A second term is alternative medicine and this refers to the use of CAM in place of conventional medicine. An example of this would be practicing yoga instead of using medications to treat high blood pressure. And third is integrative or integrated medicine which is the combining of treatments from conventional medicine with CAM treatments that have some evidence for safety and effectiveness (USDHHS, 2013).

The White House Commission on Complementary and Alternative Medicine Policy (WHCCAMP, 2002) says CAM “can be defined as a group of medical, health care, and healing systems other than those included in mainstream health care in the United States. CAM includes worldviews, theories, modalities, products, and practices associated with these systems and their use to treat illness and promote health and well-being” (Chapter 2, p.1). The terms alternative and complementary medicine are used to describe as many as 1800 different therapies practiced globally (Berman & Snyder, 2012). The literature revealed that CAM practices can be grouped into four to six broad categories depending on the source. For the purposes of this research, 36 CAM therapies

were included in the 2007 NHIS and were grouped into five broad categories for analytical purposes. According to Chang et al. (2007), the NHIS categorized CAM into the same five major domains as the NCCAM and were as follows. Alternative medical systems: these are built upon complete systems of theory and practice, such as homeopathic medicine and traditional Chinese medicine; Biologically based therapies: these use substances found in nature, such as dietary supplements, herbal products and botanical products; Manipulative and body-based therapies: these are based on the movement of one or more body parts, such as chiropractic, osteopathic and massage; Mind-body therapies: these use a variety of techniques designed to enhance the mind's ability, such as medication, prayer and art therapies; and Energy healing therapies: these involve the use of energy fields that are believed to surround and penetrate the human body, such as biofield therapies (therapeutic touch) and bioelectromagnetic-based therapies (magnetic fields). The first broad category, alternative medical systems includes acupuncture, Ayurveda, homeopathic treatment, naturopathy and traditional healers. The second category, biologically based therapies includes chelation therapy, folk medicine, nonvitamin, nonmineral, natural products, diet based therapies and megavitamin therapy. The third category, manipulative and body based therapies include chiropractic care, chiropractic or osteopathic manipulation, massage and movement therapies. The fourth category, mind body therapies include biofeedback, meditation, guided imagery, progressive relaxation, deep breathing exercises, hypnosis, yoga, Tai chi and qui gong. The final category, energy healing therapy included Reiki.

## **CAM Use among Adults**

In the United States the use of alternative therapies is increasing at an astounding rate. A large shift toward alternative medicine began when the results of the 1993 Harvard study conducted by David M. Eisenberg, MD were published. This telephone survey found that sixty-one million Americans used at least one CAM therapy with a resulting comparative analysis of these results showing that the reported 425 million visits to CAM providers exceeded the number of visits to primary care physicians by more than 47 million (Nurse Link, n.d.). A national government survey released in 2008 showed that 38% of U.S. adults aged 18 and over and 12% of children used some sort of CAM (NCCAM, 2011). According to the National Health and Nutrition Examination Survey III dietary supplement use has increased from 40% of the U.S. population in 1988-1994 to over 50% in 2003-2006 (Gauche, Bailey, Burt et al., 2011).

The literature revealed that in 2007, almost 4 out of 10 U.S. adults had used some sort of CAM within the last 12 months. Of these adults, 42.8% were women, 55% had higher levels of education meaning they held a master's, doctoral or professional degree, 43.3% reported being "not poor", 44.6% resided in the western United States, and 44.1% were within the age range of 50-59 years (Nahin et al., 2007; Barnes & Bloom, 2008; Davis, West, Weeks & Sirovich, 2011). Two articles focused on health behaviors of those who reported using CAM for health promotion versus treatment. Findings reported that adults who used CAM engaged in leisure time physical activity, were not currently heavy drinkers, and were former smokers (Nahin et al., 2007). Those who used CAM for health promotion reported better health status and healthier behaviors than those who used CAM

as treatment meaning they had higher rates of physical activity and lower rates of obesity (Davis et al., 2011).

The most current literature revealed the following information regarding the most common CAM modalities utilized in the United States in 2007. The NHIS report demonstrated that the top five most frequently used CAM therapies were natural products (7.7%), deep breathing (12.7%), meditation (9.4%), chiropractic and osteopathic (8.6%), and massage (8.3%) (Rabito & Kaye, 2013). These findings are comparable to the NHIS 2002 survey data which showed that the most commonly used modality was herbal supplements (18.6%, representing over 38 million adults) followed by relaxation techniques (14.2%, representing 29 million adults) and chiropractic (7.4%, representing 15 million adults) (Tindle, Davis, Phillips & Eisenberg, 2005). Likewise, in 1998, a review of the literature in looked at the incorporation of CAM by mainstream physicians into their practices. According to Astin, Marei, Pelletier, Hansen, and Haskell (1998) acupuncture had the highest rate of physician referral (43%), followed by chiropractic (40%) and then massage (48%). Interestingly, only 13% of the physicians believed in the value of herbal approaches to health care and the aforementioned study found the most commonly used modality of CAM by the public to be herbal supplements.

The reasons people utilize CAM are multifactorial. The popularity of CAM therapies can be attributed to individual's desire for autonomy in health care decisions, the rising cost of healthcare, the perceived safety of these therapies, insurance and legislative changes and shifts in the therapeutic relationship between patients and providers (Dossey & Keegan, 2009), a growing public awareness of CAM therapies and the availability of CAM practitioners, the desire for a more holistic approach to

healthcare, internet use, advertisers, and the general promotion of self-care (Eisenberg, Kessler et al., 2001; Jonas, 2001; Lin et al., 2009).

The dramatic increase in chronic conditions has led to an increased interest in CAM. People with the most serious conditions such as cancer, HIV and chronic pain along with those who have traditional healing practice ties in their ethnic backgrounds are the ones who are the most frequent users. And then there are some who are looking for more natural ways to heal themselves without using lab created pharmacologic medications or resorting to needless surgery. Others turn to alternative treatments to promote overall health and to supplement the conventional treatments they are receiving. And then there are those that are dissatisfied with the current medical approach that often treats the symptoms without finding true healing. A healing approach to patient care includes giving patients large amounts of attention and time. Today, an average doctor's visit lasts 20 minutes, the doctor interrupts the patient's initial statement after 23 seconds and they spend only one minute providing information. The general findings conclude that people are looking for therapies that are more helpful and less toxic. The current system of managed care is becoming more pervasive and people are looking for on-going healing partnerships with healthcare providers (Freedman, 2011; Gordon, 2004; Nurse Link, n.d.; USDHHS, 2011; WHCCAMP, 2002).

### **Attitudes of CAM Use among Healthcare Providers**

It is important to look at the attitudes and knowledge base of healthcare professionals with regards to CAM because of the increased use of diverse nonconventional health practices among the general population. Several surveys have been documented in the literature ascertaining healthcare professional's attitudes toward the

effectiveness of CAM, their use of CAM in the clinical practice setting, referrals made and personal knowledge levels of CAM. Participants of the studies included many healthcare team members such as dietitians, pharmacists, social workers, public health workers, physicians and nurses. This paper's focus is on physicians and nurses.

The literature revealed that nurses were more positive in their views and felt more comfortable discussing CAM with patients than physicians. It is believed that patients are more likely to discuss CAM with nurses than other health professionals (Levine, Weber-Levine & Mayberry, 2003; Montbriand, 2000; Hann, Baker & Denniston, 2003). Differences were noted in the ages and gender of physicians and their likelihood of recommending CAM to their patients. Older male physicians were less likely to recommend CAM to their patients than younger female physicians (Jump, Yarbrough, Kilpatrick, & Cable, 1998; Ko & Berbrayer, 2000; Kurtz, Nolan, & Rittinger, 2003; Goldszmidt, Levitt, Duarte-Franco, & Kaczorowski., 1995; Winslow & Shapiro, 2002). Younger physicians were more open and optimistic about CAM than their older colleagues. Internal medicine and family practice doctors said they would consider recommending CAM to their patients more often than primary care doctors, yet less than 20% of all physicians actually incorporated CAM into their practices or made referrals (Rose, O'Toole, Skeist, Pfeiffer, & Carlsen, 1998). Rural providers and mental health physicians were more likely to recommend alternative treatments to patients than urban medical personnel.

The overall attitudes of health professionals toward integrative healthcare and CAM are going through significant shifts (Kreitzer et al., 2009). The importance of increasing the complementary and alternative treatment knowledge base of healthcare

professionals has been emphasized. A 2008 report on the state of the nation's health workforce by the Association of Academic Health Centers described a dysfunction in private and public health workforce policy that is contributing to vulnerabilities for the workforce and putting the health of the American public at risk. Interest in and growth of integrative medicine and CAM by consumers has led to concern from the Institute of Medicine (IOM) that "health professionals be sufficiently informed about integrative health that they can effectively care for patients" (Kreitzer et al., 2009). In their report that was commissioned for the IOM Summit on Integrative Medicine and the Health of the Public these authors chose to focus on the professions of medicine and nursing. Their report made the following six recommendations on how the health of the public can be served by incorporating an integrative perspective into health professions education. First, a list of core competencies should be developed for all health professions students. Next, a reform in health professions education is needed to place an emphasis on wellness and the regulatory bodies governing health education should be charged with mandating the inclusion of integrative health in all levels of training. Third, academic programs should create cultures of wellness among their students. Fourth, legislation at the federal and state level should be implemented that will provide incentives for conventional and licensed CAM professions that will accelerate reform. Next, legislation should be enacted at the state level to remove barriers that are preventing CAM providers and advanced practice nurses from practicing to their full potential. And lastly, federal and state agencies responsible for workforce planning should be required to develop a new plan that is based on new models of care that encompass CAM providers (Kreitzer, et al., 2009).



## **CAM Use and Chronic Disease**

The most current findings related to CAM use among adults with chronic diseases in the United States used data from the 2002 NHIS and revealed that adults diagnosed with chronic diseases are more likely to use CAM than those without reported chronic diseases. According to Saydah and Eberhardt (2006), adults with arthritis were most likely to report using CAM (59.6%), followed by adults with cancer or lung disease or two or more chronic diseases (55%), adults with CVD (46.4%), adults with no chronic disease (43.6%), and those with diabetes (26.2%). Fewer than 30% of CAM users reported talking to their health care provider about CAM use. Two articles focused on the potential role of CAM use and chronic disease management. Willison, Williams and Andrews (2007) reported that there are three issues surrounding CAM use and chronic disease management. First, the biomedical health model gives insufficient attention to chronic health needs. Second, the use of CAM may offer an opportunity for some to enhance their efforts to manage chronic disease. Third, our understanding of this potential is limited and further research and practice in CAM and the management of chronic disease is limited (Willison et al., 2007). Studies have found similar CAM usage among Australians with chronic diseases, noting that 69% of the Australian population has reported using broadly defined CAM therapies (Xue, Zhang, Lin, DaCosta & Story, 2007; Williamson, Tudball, Toms, Garden & Grunseit, 2008) for chronic or recurrent conditions (Hasan, Ahmed, Bukhari & Loon, 2009; Lin et al., 2009). Hawk et al. (2012) conducted a study using the 2007 NHIS data to assess the potential role of CAM health care providers in chronic disease prevention and health promotion. Findings revealed that CAM users present with risk factors that are priority public health issues. For example, Fifty-four percent of CAM users were overweight, 22%

physically inactive, 17.4% smokers, 18% hypertensive, 19.6% reported high cholesterol, and 9.1% had prediabetes or diabetes (Hawk et al., 2012).

According to Team, Canaway and Manderson, (2011), diabetes mellitus and CVD are two commonly diagnosed chronic conditions that have specific medical management regimes. Medical management usually consists of extensive dietary and lifestyle modifications and pharmacologic interventions. Changes in diet, lifestyle modification such as stress management and dietary supplements are common CAM therapies that can be used concurrently or as an alternative to conventional treatment plans by people with CVD or DM (Arcury et al., 2006; Bell et al., 2006; Chang et al., 2007; Shah, Engelhardt & Ovbiagele, 2008). Findings show that some individuals with DM and or CVD use CAM therapies such as vitamin, mineral or herbal supplements, acupuncture, massage and chiropractic manipulation to assist with weight loss, regulation of blood glucose, improve blood pressure or assist with stress management (Dickinson et al., 2008; Williamson et al., 2008; Cerritelli et al., 2011). Ruxton and Mason (2012) found that drinking black tea may have a role in lowering the risk of coronary artery disease and type 2 diabetes but further research is needed. In a non-random, pre-test-post-test study the effects of a yoga-based complementary lifestyle training program for diabetic patients and cardiovascular risk factors showed serum total cholesterol, LDL, and total triglyceride levels of patients had reduced and HDL levels increased significantly at the end of the training program (Bijlani, Vempati & Yadav et al., 2005).

### **CAM Use and Diabetes**

A few studies have been published on the use of CAM with those who report having diabetes but none have been published that have used the 2007 NHIS data. Of the studies

that have been published it has been reported that the care of persons with diabetes has been influenced by the growing interest in CAM and a high prevalence of people with diabetes use CAM therapies (Yeh et al., 2002; Birdee & Yeh, 2010; Chang et al., 2007). One study used a cross-sectional survey to identify the factors that predict CAM use in people with type 2 diabetes. Results showed that CAM use in those with diabetes was associated with a previous history of CAM use, a positive attitude towards it, stronger health beliefs about the efficacy of CAM in treating diabetes, a longer duration of diabetes, and a higher degree of self-care activities by the individual rather than demographic characteristics (Chang et al., 2007). A study conducted by Yeh et al. (2002) reported the specific CAM therapies that people with diabetes reported using for their disease. The specific therapies included solitary prayer/spiritual practices (28%), herbal remedies (7%), commercial diets (6%) and folk remedies (3%). In 2010, Birdee and Yeh conducted a clinical review to discuss CAM therapies that were frequently used for patients with diabetes. Findings revealed that CAM modalities that are used for diabetes are biologically based therapies such as herbal and dietary supplements and mind-body practices. Biologically based therapies can affect glucose metabolism and mind-body therapies may offer a healthy lifestyle change for people with diabetes but evidence for the long term effects and safety of these practices is scarce (Birdee & Yeh, 2010).

According to Birdee and Yeh (2010) eight botanical products have been commonly used in those with diabetes. *Allium sativum* (garlic) has been shown to produce modest reduction in total cholesterol with no changes in LDL or HDL levels. Animal studies have suggested that the chemical components of garlic may increase insulin secretion or degradation (Reinhart, Coleman, Tee van, Vachhani & White, 2008;

Stevinson, Pittler & Ernst, 2000). Oral garlic supplementation in patients with type 2 diabetes has not shown significant changes in blood glucose or insulin levels (Ried, Frank, Stocks, Fakler & Sullivan, 2008). Aloe vera plant parts have been used orally may produce hypoglycemic effects through Beta cell stimulation. Two clinical trials found patients with type 2 diabetes who were given Aloe vera juice reported decreases in fasting blood glucose levels over 6 weeks (Ajabnoor, 1990; Ghannam, Kingston, Al-Meshaal, Tariq, Parman & Woodhouse, 1986). However, these studies had weak methodology which led to inconclusive evidence. Aloe latex from the inner lining of the leaf contains a harsh laxative that may be unsafe for some users (Siegers, Von Hertzberg-Lottin, Potte & Schneider, 1993). *Coccinia indica* (ivy gourd) is a plant that is prescribed for the treatment of diabetes and may produce hypoglycemia in a way that is similar to insulin. Studies have suggested that there has been an up to 16% decrease in fasting blood glucose without adverse effects among those with type 2 diabetes (Kamble, Kamalakar, Vaidya & Bambole, 1998; Azad Khan, Akhtar & Mahtab, 1979; Kuriyan, Rajendran, Bantwal & Kurpad, 2008). *Gymnema sylvestre* (gymnema), also known as GS4, is a botanical that has been shown to demonstrate hypoglycemic effects in animal and human studies (Preuss, Jarrell, Scheckenbach, Liberman & Anderson, 1998). Significant improvements in fasting blood glucose and A1C levels were found among patients who received GS4 in two separate studies (Shanmugasundaram, Rajeswarim, Baskaran, Rajesh Kumar, Radha Shanmugasundaram & Kizer Ahmath, 1990; Baskaran, Kizar Ahamath, Radha Shanmugasundaram & Shanmugasundaram, 1990). *Momordica charantia* (bitter melon) is a tropical vegetable that may reduce blood glucose levels in patients with diabetes (Krawinkel & Keding, 2006; Leung Birtwhistle, Kotecha, Hannah, &

Cuthbertson, 2009) however most clinical trials of bitter melon have lacked adequate design (Leung et al., 2009). *Opuntia streptacantha* (prickly pear cactus) has been used in studies to explore acute metabolic effects of this plant for glucose control rather than clinical outcomes (Frati-Munari, Gordillo, Altamirano & Ariza, 1988). *Panax ginseng*, *P. quiquefolius* (ginseng) has been shown to cause hypoglycemia through activity similar to insulin (Shapiro & Gong, 2002). *Trigonella foenum graecum* (fenugreek) has been used in India and China as medicine for diabetes. Mechanisms of action are decreased carbohydrate absorption and increased insulin secretion. Several clinical trials have suggested an effect on those with diabetes but the studies have been of poor quality (Srinivasan, 2005; Yeh, Eisenberg, Kaptchuk & Phillips, 2003).

Birdee and Yeh (2010) also reported five dietary supplements that have been used to treat diabetes. Alpha-lipoic acid (ALA) given intravenously has been reported to improve insulin sensitivity and glycemic control after 12 weeks of therapy (Kamenova, 2006) but the long term effects of ALA use have yet to be determined (Evans, Heymann, Goldfine & Gavin, 2002). Chromium is an essential mineral that plays a role in facilitating glucose metabolism. A meta-analysis of random control trials of patients with type 2 diabetes concluded there were significant changes in glucose metabolism after chromium supplementation. The authors emphasized the studies were of poor quality and further research is needed (Balk, Tatsioni, Lichtenstein, Lau, & Pittas, 2007). Coenzyme Q10 supplementation has been used in two clinical trials of patients with diabetes but neither showed strong evidence for glycemic control with coenzyme Q10 supplementation (Hodgson, Watts, Playford, Burke & Croft, 2002; Eriksson, Forsen, Mortensen & Rohde, 1999). Magnesium deficiency has been associated with poor

glucose control in patients with diabetes (Tosiello, 1996). However, a meta-analysis of nine random control studies showed no significant change in A1C levels in diabetic patients who received 360mg/day of magnesium supplementation (Song, Levitan, Manson & Liu, 2006). Another meta-analysis of seven cohort studies suggested that magnesium supplementation may decrease the risk of type 2 diabetes (Larsson & Wolk, 2007). Omega-3 fatty acid is one of the most common dietary supplements consumed. Random control trials where high intake of omega-3 fatty acid haven't been shown to prevent the onset of type 2 diabetes (Kaushil, Mozaffarian, Spiegelman, Manson, Willett & Hu, 2009). Vanadium is a mineral that has been found to significantly decrease fasting glucose levels in three controlled studies with people who had type 2 diabetes but small sample size and non-randomization of the studies limited their results (Cohen et al., 1995; Goldfine et al., 2000; Halberstam, Cohen, Shlimovich, Rossetti & Shamoon, 1996).

Chronic diseases such as diabetes are associated with decreased quality of life, anxiety and depression. Mind body therapies have behavioral and psychological effects that may help people improve their mood and quality of life. Among patients with diabetes, clinical trials using yoga and tai chi have been shown to improve quality of life and stress levels (Lam, Dennis, Daimond & Zwar, 2008; Kosuri & Sridhar, 2009; Song, Ahn, Roberts, Lee & Ahn, 2009).

### **CAM Use and Cardiovascular Disease**

One study has been published on the use of CAM therapies by individuals with or at risk for CVD, using the NHIS 2007 data. This study compared use of CAM by individuals with CVD or risk factors of CVD and those who reported not having CVD or risk factors. The most common categories of CAM therapies used among those with CVD

risk factors or CVD were natural products and mind body therapies. Results showed that the use of CAM is not only common but significantly greater among patients with CVD and risk factors than those who do not have CVD. It was concluded that the diagnosis of CVD or related risk factors may be associated with the use of CAM (Anderson & Taylor, 2012).

Thirty-eight international research articles on CAM use in CVD have been published over the last 10 years. According to Arslan et al. (2012) the rate of CAM use in the United States among cardiac patients is high. Sixty-one percent of patients with coronary artery disease and atherosclerotic risks and 69.4% of patients with hypertension and advanced age have reported using CAM. The literature revealed that the use of certain dietary supplements have been found to have possible positive effects on associated symptoms of CVD. Ginkgo biloba is purported to have cardioprotective effects through its antioxidant, antiplatelet, antithrombotic, vasodilatory and antihypertensive properties (Rabito & Kaye, 2013). However, a double-blind, placebo controlled, RCT determined that the herb does not reduce blood pressure or the incidence of hypertension in the elderly (Brinkley et al., (2010). Studies have found evidence that the herb may reduce the risk of developing peripheral arterial disease (Kuller et al., 2010) as ginkgo biloba and Padma 28 were found effective in treating patients with intermittent claudication (Pittler & Ernst, 2005). Garlic preparations have been proven to be superior to placebo in reducing blood pressure in patients with hypertension (Ried et al., 2008). These findings have been supported by Stabler, Tejani, Huynh and Fowkes, (2012); Reinhart et al. (2008); and Ried et al. (2008), who suggested that garlic is associated with blood pressure reductions in patients with elevated systolic blood pressure but not in normotensive patients. One study

found that red rice had antihyperlipidemic effects such as decreasing levels of total cholesterol, low density lipoprotein and triglyceride in patients with moderate hypercholesterolemia (Ciceroa, Brancaleoni, Laghl, Donati & Mino, 2005). Benefits of fish oil on hyperlipidemia were found in patients who took a daily dose of 3.25mg which resulted in a significant decrease in the level of triglyceride without a change in total cholesterol (Eslick, Howe, Smith, Priest & Bensoussan, 2009). According to Rabito and Kaye (2013), experts agree that fish rich in omega-3 fatty acids should be included in a heart healthy diet, there is no evidence that omega-3 fatty acids in supplement form protect against heart disease. Antioxidants, which include vitamins C and E, have shown promising results in lab and observational studies. For example, Reshef, Hayari, Goren, Boaz, Madar, and Knobler (2005) found that a mixture of citrus and grapefruit could be effective in the treatment of stage I hypertension. In opposition to these findings, Vivekananthan, Penn, Sapp, Hsu, and Topol (2003) conducted a study that analyzed seven random control studies about preventing CVD by using vitamin E and beta carotenes. The results showed that vitamin E had no positive effects on reducing cardiac mortality and was not recommended for routine use. However, antioxidant vitamins and the intake of vitamin C in high proportion have been found to reduce CVD risk (Knekt, Ritz & Pereira et al., 2004).

Some studies of mind-body techniques of CAM used on those with CVD and or risk factors have shown positive effects. Mental relaxation and slow breathing have been shown to have decreasing effects on systolic and diastolic blood pressure, heart rate and respiratory rate (Kanushik, Kanushik, Mahajan & Rajesh, 2006) and similarly, Yung, French and Leung (2001) found that all relaxation techniques have been found to reduce blood pressure. Yoga has many different styles, some more physically demanding than



others. In general, practicing yoga leads to several cardiovascular benefits such as weight loss, control of blood glucose, control of lipids, reduction in the number of angina episodes in patients with advanced CAD, and improved quality of life (Field, 2011). A randomized clinical trial was performed using postal workers who had an increased risk of CVD comparing two groups. One group was treated with “usual care” and another group was treated with usual care plus naturopathic care. At the end of one year those in the naturopathic group had a reduced adjusted 10-year cardiovascular risk reduction and a lower adjusted frequency of metabolic syndrome. These findings suggested that the addition of naturopathic care to enhanced usual care may reduce the risk of CVD among those at high risk (Seely, Szczurko, Cooley, Fritz, Aberdour, Herrington et al., 2013).

Fewer studies have been conducted using manipulative and body-based therapies, whole medical systems, and energy medicine. Of the studies that have been conducted, Kaye, Kaye, Swinford et al. (2008) found that deep tissue massage resulted in systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate reduction directly after the massage took place. There have been mixed results regarding the effect of acupuncture on the cardiovascular system and according to USDHHS (2011) there is little scientific evidence currently available regarding the effectiveness of acupuncture as a treatment system. Energy medicine is reportedly the least utilized and least studied of the CAM modalities (USDHHS, 2011). A 2010 RCT found in a study of immediate post-acute coronary syndrome inpatients that Reiki significantly increased vagal activity and the magnitude of the effect on heart rate variability seen was similar to that of propranolol (Friedman, Burg, Miles, Lee & Lampert, 2010). A RCT measuring the efficacy of healing touch in coronary artery bypass surgery recovery found significant differences in anxiety

scores and length of stay when compared to the control groups yet there was no significant decrease in use of pain or antiemetic medication or atrial fibrillation (MacIntyre, Hamilton, Fricke, Ma, Mehle & Michel, 2008).

### **Safety and CAM Use**

Herbal medicine (phytomedicine) the science and art of using botanicals to prevent and treat illness is one of the oldest forms of medicine. The overall general consensus is that herbal treatments are considered safe. However with all medications, including herbal treatments a risk benefit should be considered before use. There is the potential of herbs interacting with pharmaceutical drugs. The interaction between herbal products and cardiovascular drugs and drugs used to treat diabetes is a crucial patient safety issue (Arslan et al., 2012). Some herb-drug interactions may be detrimental and may cause dangerous outcomes, where others may be beneficial. The popularity of herbal medicines and increased use means healthcare workers are coming in contact with patients that are taking these medications. Lack of knowledge can lead to detrimental situations with patient safety and negligence (Braun & Cohen, 2010).

The following information was obtained from the USDHHS (2010) publication on the latest research regarding herbal supplements. Interestingly, some of our current medications used are derived from plants and trees. For example, Digitalis is derived from the Foxglove plant, Paclitaxel from the Pacific yew tree, Aspirin from the Willow tree, Quinine from the Cinchona tree, Morphine from the Opium poppy, Galantamine from Daffodil bulbs, Vincristine from the Rosy periwinkle and Reserpine from the Indian snakeroot plant. The following information on herbal supplements and side effects and cautions was discovered. Aloe Vera taken orally can cause diarrhea and lower blood

glucose levels, Bilberry is considered unsafe due to possible toxic side effects if taken in high doses, Bitter Orange contains chemicals that may speed up heart rate and blood pressure and there have been reports of heart attack and stroke in healthy people after taking this with caffeine; therefore this should not be used as a dietary supplement.

Women taking Black Cohosh have reported hepatitis and liver failure. Cat's Claw may interfere with controlling blood pressure before and after surgery. Chamomile and Echinacea use has had reports of allergic reactions including anaphylaxis. People are more likely to experience allergic reactions if they are allergic to plants in the daisy family which includes ragweed, chrysanthemums, marigolds and daisies. Chaste berry may affect the dopamine system of the brain and should not be used by people taking antipsychotic drugs and Parkinson's disease medications. Dandelion should not be taken by people with an infected gallbladder or blocked bile ducts. Ephedra was banned in 2004 by the FDA because of the risk of cardiovascular complications. Mistletoe can cause vomiting, seizures, slowing of the heart and event death and therefore should not be used outside of clinical trials. Garlic can interfere with blood clotting is able to affect plasma lipids, fibrinolytic activity, platelet aggregation, blood pressure and blood glucose (Vogel, Bolling, Costello, Guarneri, Krucoff , Longhurst et al., 2005) and with the effectiveness of saquinavir, a drug used to treat HIV. Ginkgo has been shown to increased bleeding risk and should be used with caution if having surgery or dental procedures. Goldenseal may cause changes in the way the body processes drugs and could alter the effects of many drugs. Hawthorn may interact with a number of different drugs especially heart medications. Horse Chestnut should not be consumed raw as it contains eusulin which is poisonous. Kava has been reported to cause liver damage and

liver failure. Lavender oil may be poisonous if taken by mouth. Licorice root in large amounts can cause high blood pressure, salt and water retention and low potassium levels which can lead to heart problems. Milk thistle should be used with caution with diabetics as it has been shown to lower blood glucose levels. Noni is high in potassium and there have been reports of liver damage from its use. St. John's Wort has been shown to interact with many medications in ways that can interfere with their intended use. For example antidepressants, birth control pills, cyclosporine, digoxin, seizure control drugs, cancer agents and warfarin. Thunder god vine has been used for over 400 years for the treatment of rheumatoid arthritis symptoms. It can cause severe side effects and can be poisonous if not correctly harvested from the plant source and thunder god vine should not be taken as there are no high quality products being manufactured in the U.S. (USDHHS, 2010).

The aforementioned information focused on the herbal therapies that have potentially unsafe side effects. It should be noted that many of our current drugs used in conventional medicine are derived from herbs and plants therefore not all botanicals are unsafe. There is current research taking place and being supported by NCAAM on a variety of herbs in hopes of finding successful uses for the treatment, potential cure of diseases and alleviation of symptoms. For example, Asian Ginseng has been studied for its potential role in treating insulin resistance, cancer and Alzheimer's disease. Astragalus is being studied for its effects on the body's immune system. Black cohosh is being studied for its effects on menopausal symptoms. Chamomile has possibilities of treating anxiety and bowel disorders. Chasteberry has been shown to have benefit for premenstrual symptoms. There is support for the use of cranberry to prevent urinary tract

infections. Echinacea is being studied for its effects on the immune system, particularly upper respiratory infections. Feverfew is currently in the process of being standardized for its use for migraine headaches. Flaxseed is currently under study for its role in prevention of atherosclerosis, breast cancer and ovarian cysts. There is scientific support for horse chestnut seed extract being as effective as wearing compression stockings for the treatment of chronic venous insufficiency (USDHHS, 2010). There are many more studies currently underway investigating the potential health benefits of herbal supplements.

### **Healthcare Costs and CAM**

According to Gritzmacher, Broussard, and Clayton (2003) research about the effectiveness of CAM is being conducted because CAM is less invasive and costs less than traditional western medicine. According to Doran et al. (2010) when conducting an economic evaluation, there are two types of evaluation: partial or full. Partial evaluations focus on costs or consequences and are limited in scope whereas full economic evaluations compare both the costs and outcomes of competing health care interventions and can show whether the new intervention represents value for money. The literature revealed the following information on the current role that economics can and may play in the scientific rigor of CAM.

Research articles regarding the economic evaluation of three of the five domains of CAM therapies were found to include articles on the manipulative and body based practices domain, whole medical systems domain and the biologically based practices domain. No articles were found for the mind-body medicine, alternative medical systems or energy healing domains. Three studies evaluated manipulative and body based practice

costs as measured by the quality-adjusted-life-year (QALY). This type of cost utility analysis the consequence is expressed as an outcomes measure that considers change in both quality and quantity of life as a result of the intervention (Doran et al., 2010). These three studies using cost diaries or clinical records to compare physiotherapy, manual therapy, and general practitioner care for patients with neck pain. Korthals-de Bos, Hoving, vanTulder, Rutten-van Molkenm, Ader, de Vet, Koes, Vondeling, and Bouter (2003) compared costs of physiotherapy, manual therapy, and general practitioner (GP) care for patients with neck pain alongside a randomized controlled trial that measured perceived recovery, intensity of pain, functional disability, and quality of life as the main outcomes measures. This study found manual therapy to be less costly and more effective than either physiotherapy or GP care. Williams, Edwards, Linck, Muntz, Hibbs, Wilkinson, Russell, and Hounsome (2004) assessed the cost-utility of a practice-based osteopathy clinic comparing osteopathy and GP care for patients with spinal pain. This study found that there was a relative improvement in mean QALY for the osteopathy treatment group when compared with usual GP practice care. Van Tubergan, Boonen, Landewe, Rutten-Van Molken, Van Der Heijde, Hidding, and Van Der Linder (2002) compared combined spa therapy, exercise therapy, and usual care in patients with ankylosing spondylitis (AS). Findings showed that combined spa-exercise therapy besides standard treatment is more effective and showed favorable cost effectiveness and cost utility ratios compared with standard treatment alone in patients with AS.

Five studies conducted full economic evaluations using the QALY as the primary economic outcome of all the studies within the domain of whole medical systems. Willich, Reinhold, Selim, Jena, Brinkhaus, and Witt (2006); Wonderling, Vickers,

Grieve, and McCarney (2004) and Witt, Brinkhaus, Reinhold, and Willich (2006) compared acupuncture to usual care in patients with chronic neck pain, chronic headache, chronic pain in multiple sites, and chronic low back pain respectively. For acupuncture treatments all of the authors agreed that acupuncture was cost-effective when compared to usual care and should be considered in the medical care of patients with chronic pain. The fifth study in this section by Guo, Counte, Gillespie, and Schmitz (2003) estimated the cost-effectiveness of the adjunctive use of hyperbaric oxygen in comparison of usual care in the treatment of diabetic ulcers. The findings indicated that hyperbaric oxygen therapy is cost-effective in the treatment of diabetic ulcers, particularly based on long term perspectives.

Seven full economic evaluations were reviewed in the biologically based practices domain. The articles examined a range of treatment alternatives across many countries. Five of the studies used the QALY as the primary economic outcome. Tice, Ross, Coxson, Rosenberg, Weinstein, Hunink, Goldman, Williams, and Goldman (2001) compared folic acid and cyanocobalamin supplementation in women between the ages of 35 and 84 years; Willis (2002) compared calcium and vitamin D3 to usual care in women aged 50 years and over; Hopley, Salkeld, Wang, and Mitchell (2004) compared high dose zinc and antioxidants to no screening in men and women over age 55; Hopley, Salkeld & Mitchell (2004) compared photodynamic care to usual care for the general population; Stothers (2002) compared cranberry products as a preventive measure against urinary tract infections. A consistent finding across all of the studies was that the intervention treatment was cost effective compared to usual care.

## **Theoretical Frameworks**

There were minimal studies that made reference to any theoretical or conceptual framework as a guiding framework for the research studies that were reviewed for the current literature review. Only two studies that specifically looked at CAM in relation to diabetes made reference to a theoretical framework. Two other studies that were found to have relevant theoretical concepts that could be used in CAM research were related to the identification of two distinct types of CAM users and health care costs associated with chronic diseases respectively.

According to Davis et al. (2011) nationally representative studies suggest that CAM utilization is associated with a holistic view of health. Qualitative studies suggest reasons for CAM use vary but generally it is used to complement medical care as a modality to treat illness or for general wellness purposes. This implies that there may be two distinct types of CAM users: those who use CAM to treat an illness and those who use CAM to promote health. Davis et al. (2011) conducted a study using 2007 NHIS data to determine the difference between U.S. adults who used CAM to treat a specific illness and those who used CAM for health promotion. Findings estimated that 17.4% of all U.S. adults used CAM to treat illness and 27.4% used CAM for health promotion, implying the predominant use of CAM were for health promotion. This was the first quantitative study to support the idea that there are two different types of CAM users. The overall findings suggested that there are differences among CAM user types in health status, health behaviors and use of conventional health services that should be considered in future CAM research. For example, CAM use for health promotion could be marketed toward all adults and not just for those who already have a specific disease. This is



crucial when considering the current state of the U.S. health care crisis surrounding the effects of preventable chronic diseases. Therefore, if CAM is used among people for health promotion, then Pender's Health Promotion Model could be an appropriate theoretical framework to guide CAM research that focuses on health risk behaviors associated with CVD and diabetes.

### **Health Promotion Model and CAM Use.**

According to Hill (2003) health promotion (HP) and CAM are both part of a revolution in healthcare that is taking place because HP and CAM share a similar philosophy and could benefit from closer collaboration. An ethnography combining both empirical and theoretical data was conducted to examine the professional interface between HP and CAM from the perspective of five different health promotion models. The five different HP models included the medical model, the behavior change model, the education model, the empowerment model, and the social change model. Hill (2003) concluded that health promotion is a diverse and highly contested area and there are many different models to which practitioners subscribe. Prior to Hill's (2003) research, health promotion had been described as "health education x health public policy" (p. 377) and at the conclusion of the study suggested that health promotion would be defined as "health education x complementary and alternative medicine" (pp. 377-378).

Schuster et al. (2004) conducted a review of the literature in an effort to propose a new theoretical framework from the sociology of health and illness as a contribution to the broader research methodology for the study of CAM. The authors reviewed the literature on health and wellness emphasizing definitions and distinctions, the health lifestyles literature which focused on life choices, and studies of CAM suggesting

utilization as an aspect of a wellness lifestyle. Their paper presented a theoretical framework for CAM research that emphasized the interrelationship of CAM with health lifestyles, health promotion, and wellness. The theoretical framework was developed to link a broad definition of health and wellness, health and wellness lifestyles, and the dynamics underlying the use and potential benefits of CAM. The authors concluded that empirical evidence suggests that health promotion may be a factor in individual's use of many forms of CAM. The users of CAM practices who consider health promotion may represent a distinct population who could be better understood through research on health lifestyles and likewise, the study of CAM users may contribute to research and theory on health lifestyles (Schuster et al., 2004).

Goldstein (2000) hinted at a relationship between CAM practices and health and wellness lifestyles when the relationship between the fitness culture and the growth of CAM were examined. It was argued that there are six basic assumptions about health and healing that are shared by the fitness movement and CAM which include: health as wellness, personal responsibility for health, the connection of mind, body, and spirit, health as harmony with nature, ambivalence toward science and technology, and transcendence, restraint, and vigilance. Goldstein (2000) hypothesized that participation in CAM is associated with health promotion.

Chen and Lin (2010) conducted a study using the application of self-efficacy as a framework for health behavior, citing that many studies of health behavior have documented that the predictive strength of self-efficacy exceeds that of any other variable. The HPM by Pender indicates that self-efficacy is the individual ability to adopt health promoting behavior and it influences the perceived action barrier. This notion of

the significant role that self-efficacy plays in health promoting behavior was supported by two research articles that looked at predictors of CAM use and health promoting lifestyles among people with pre-diabetes or type 2 diabetes. Chang et al. (2012) concluded that CAM use in people with type 2 diabetes is influenced by their behavior towards disease management rather than demographic characteristics. Likewise, Chen and Lin (2010) found that promoting self-management for pre-diabetic individuals through designing behavior self-regulation protocol; organizations could enhance self-efficacy and delay further development of diabetes.

Yoon and Horne (2004) conducted a longitudinal descriptive study to identify changes in herbal product use in a sample of older women and to explore differences in locus of control and perceived health competence between herbal product users and non-users. Pender's revised HPM and constructs of LOC and self-efficacy were used as the theoretical framework for the study. The purpose of the study was to examine differences between groups of participants who may have perceived the use of herbal products as a health promoting behavior and a group of participants who did not. Findings from the study suggested there was a higher perceived self efficacy in herbal product users, meaning the older women in this study had a high internal LOC and were highly likely to adhere to their own self-care regime (Yoon & Horne, 2004).

According to Lee (2001) behavior is viewed as being affected by five levels of influence. Five levels of influence for health-related behaviors have been identified as intrapersonal or individual factors, interpersonal factors, institutional or organizational factors, community factors, and public policy factors. Most of the models of health behaviors are explaining the personal and interpersonal health behaviors. Other theories

have been developed explaining health behaviors and could be considered for the proposed study. A brief description of each follows.

Bishop, Yardley, and Lewith (2006) studied the reasons why people use CAM and concluded that their findings were in line with the notion that beliefs about health and illness, rather than dissatisfaction with orthodox medicine, have an important role in explaining why people are attracted to the ideas of CAM. This notion was supported by Lindeman's (2011) study that suggested that CAM beliefs largely rest on intuition and its derivatives, paranormal beliefs and core knowledge confusions. This offers an explanation as to why CAM is so popular despite the lack of scientific support. For example, intuitive and deliberate reasoning are independent modes of reasoning and people may have different beliefs about one issue, one based on deliberate processes and the other on intuitions (Lindeman, 2011). De Neys and Glumicic (2008) lend support to this by writing that scientific communication influences deliberate reasoning but intuitions are characteristically resistant to such information. People do not necessarily notice the conflicts between analytical reasoning and their intuitions.

One model that has been used in the majority of research studies investigating health seeking behavior such as disease control and preventative measures is the Health Belief Model (HBM). The HBM assumes that health beliefs determine whether or not an individual engages in any particular health behavior (Chang et al., 2007). The HPM closely relates to a similar theoretical model that could be considered for research surrounding CAM, the Health Belief Model (HBM). HBM assumes that health beliefs determine whether or not an individual engages in a particular health behavior. The HBM has been employed in 64% of research studies investigating health seeking behavior such

as disease control, medication compliance, self-care, and preventive measures for a variety of diseases. According to the HBM health seeking behaviors are influenced by social influences, interpersonal interactions, demographic characteristics and psychological factors. Each of these factors plays a part in one's decision –making process related to health seeking behavior. HBM predictors of health promoting behavior include perceived susceptibility, severity, action benefits and action barriers. Some studies indicate that the perceived threat of an illness positively correlates with healthy behavior and other studies report the perceived threat negatively correlates with healthy behavior. Inconsistencies show that the factors affecting health promotion behavior are unclear.

According to Lee (2001) social cognitive theories developed as models to explain and modify behavior and were derived from two major learning theory sources; stimulus response theory and cognitive theory. In Skinner's theory concepts such as reasoning are not required to explain behavior. Cognitive theorists emphasize the role of subjective expectation and behavior is a function of the subjective value of an outcome. Social cognitive theory including theory of self-efficacy and health locus of control address both the psychosocial dynamics influencing health behavior and the methods of promoting behavioral changes. Social cognitive theory includes operant conditioning and a cognitive branch that emphasizes how a person's imparted meaning about an event affects his or her performance or expectation.

The theory of self-efficacy proposes that if the outcome expectation is desirable, a person will more likely be motivated to change his or her behavior. Four sources of information lead to self-efficacy and are the focus of interventions. The first factor relates

to one's successful mastery of performance through personal experience. The second factor relates to one's observing successful performance with positive reward through vicarious experiences. The third factor includes verbal persuasion and the fourth factor concerns emotional and physiological arousal with an emphasis on conditions of low adverse arousal. Self-efficacy has been shown to be a predictor of both short term and long term success in the management of behavior related to smoking, weight control, alcohol abuse and exercise (Lee, 2001).

The theory of reasoned action and theory of planned behavior are theories in which behavioral intentions and behavior result from a rational process of decision making (Fishbein & Ajzen, 1975). These two theories have been used to intervene in many health behaviors to include smoking cessation, controlling weight, preventing AIDS, and having mammograms. These theories purport that individuals consider their actions before they decide to perform or not perform a behavior. Triandis (1980) expanded this theory to suggest that as a behavior becomes more habitual, attitude and intention become relatively less important in determining behavior.

The transtheoretical model was developed by Prochaska and DiClemente in 1993 and has been accepted by researchers and practitioners in health behavior over a relatively short period of time (Lee, 2001). The model proposes the individuals engaging in a behavior move through stages such as precontemplation, contemplation, preparation, action, and maintenance. According to the model, individuals are considered to be in a maintenance stage of a behavior when the behavior is sustained for 6 months or longer (Lee, 2001).

One other conceptual model that could be used to guide CAM research as it relates to chronic disease is the systems model. For example, a study conducted by Kuman & Nigmatullin (2010) developed a detailed closed loop business framework for systems modeling on chronic disease prevention. The study looked at the interactions among diabetes and lung cancer related to health risk factors, preventive programs and associated costs. Causal behavior of chronic disease in relation to preventive measures was analyzed to determine the financial implications on health care costs. The closed loop systems model as presented by Kumar and Nigmatullin (2010) could be an appropriate framework to guide studies regarding interactions between chronic diseases and health risk factors such as CVD and DM and their associated risk factors.

### **Critique of Research Studies**

The literature review revealed a high level of CAM use in people with diabetes and cardiovascular disease. The comparison of CAM use prevalence and effectiveness data between the studies is difficult because the studies differ markedly in their definitions of CAM, research design, methods of data collection, time-frames of the studies and response rates. Analysis and synthesis of the current literature led to the conclusion that there are challenges in interpreting the published literature regarding CAM for the following reasons. First, the definition of CAM is inconsistent among studies. Studies varied in their operational definitions of CAM and there were differences between the specific types of therapy included as CAM, which therapies were classified into which subcategory and the number of therapies that were investigated. For example, the studies by Ryan, Pick, and Marceau (2001), Yeh et al. (2002), Garrow and Egede (2006) and Bell, Suerken, Grzywacz, Lang, Quandt, and Arcury (2006) used different

criteria to determine whether vitamin or mineral supplementation were considered a form of CAM and included in the surveys. A second challenge is that different researchers categorize CAM using different operational definitions. Not all researchers used the NCCAM's five domains. For example, Lee, Lim, and Moon (2004) further categorized biologically based therapies in terms of the origin of the CAM product such as plant derived, animal materials and miscellaneous. A third challenge arose when comparing what CAM therapies were used in each study. Some studies focused on biologically based therapies such as vitamins and minerals and then others focused on a whole spectrum of CAM therapies. Then other studies were vague in their descriptions of what CAM interventions were used. For example, Seely et al. (2013) defined naturopathic care as those who received health promotion counseling, nutritional medicine and dietary supplementation. Therapies in the study included specific diet and lifestyle recommendations and the prescription of selected natural health products. "Because a range of interventions were recommended to participants in the naturopathic group, the frequency and composition of each recommendation as well as participant adherence are not reported" (Seely et al., 2013, p. E410). A lack of consistency in categorization of CAM therapies and a lack of consensus about which type and how many therapies were examined.

A variety of research designs and methodologies have been used to study CAM, ranging from self-report questionnaires to telephone interviews. The length of and difficulty of the survey questions varied among studies. Existing studies on the use of CAM have produced diverse results due in part to variations in the measurement of CAM (Quandt, Verhoef, Arcury, Lewith, Steinsbekk, Kristoffersen, Wahner-Roedler &



Fonnebo, 2009). When reviewing the literature on CAM use in diabetes and CVD it is important to consider that each study used different selection criteria, timeframes and sample sizes which added to the difficulty of comparing the body of research articles on CAM.

### **Summary**

In summary, the current literature showed that CAM use in the United States is growing at an astronomical rate along with the prevalence of chronic diseases such as CVD and diabetes. Health care costs are spiraling out of control and the largest percentage of health care costs in the U.S. is related to chronic diseases. A review of economic methods that have been used in CAM research have suggested that CAM interventions are cost effective when compared to their respective conventional care interventions (Doran, et al., 2010). Many people are turning to CAM in an attempt to manage their chronic diseases and increase their quality of life. The most common CAM modalities that are being reported are mind-body therapies and biologically based products. There is a paucity of knowledge regarding the extent to which those who use CAM also engage in positive health behaviors or exhibit fewer health risk factors that are associated with CVD and diabetes. Existing methods for assessing CAM use make comparisons across populations difficult and have resulted in contradictory findings on prevalence of use. Some of the difficulties arise from sampling, measurement issues, differing definitions of CAM and the timeframe of response. All of these issues suggest that the use of a well-established survey representing a large portion of the U.S. population that uses standardized definitions of CAM will facilitate more meaningful results that can be further tested. This study addressed these issues with CAM research by using the NHIS as the source of data

collection, and subsequently increased the knowledge in this area using solid research methodology.

## CHAPTER 3

### **Overview of Study**

Costly, debilitating and largely preventable chronic diseases are among the key contributors to the increased health care costs in our nation. Seven out of ten deaths among Americans each year are from chronic diseases. Two of the most common, costly and preventable problems in the United States are CVD and DM. The chronic and complex diseases of modern times require movement away from the current medical model from one of focus on cure to focus on prevention and promotion. It has been suggested that people who have chronic diseases may be more likely to use CAM, but the extent to which those who use CAM and also engage in positive health behaviors or exhibit fewer risk factors is unknown. The aim of this study was to determine the use of CAM among people who reported having CVD or CVD risk factors as well as those who reported having DM or DM risk factors with the general United States population. Secondary data analysis of the 2007 National Health Interview Survey (NHIS) data, the most recent to include CAM use was conducted. Statistical analyses of the data were performed using Statistical Product and Service Solutions (SPSS). Findings from this study provide a knowledge base regarding the use of CAM therapies and their potential effects on the chronic diseases of CVD and DM. Findings can lead to intervention research on the effects of CAM therapies and their role in health promotion and disease prevention.

## Methodology

According to Bell, Onwuegbuzie, Ferron, Jiao, Hibbard, and Kromney (2012) secondary data analysis of nationally representative health surveys can be extremely useful to health science researchers when they are investigating risk and protective factors associated with health related outcomes, therefore a secondary data analysis of NHIS data was used as the research method for this study. This design was best for the research study because the purpose of this secondary data analysis was statistical analyses on the 2007 NHIS database to determine whether the use of CAM is associated with health behaviors or risk factors known to impact CVD and diabetes.

This study was a secondary data analysis of the NHIS 2007 publically available data, the most recent NHIS to include a subsample of CAM use in adults and children in the United States. Data from 23,345 adult respondents included in the 2007 NHIS were used as the basis for the analyses in the current study. The NHIS is an annual nationally representative survey designed by the National Center for Health Statistics of the Center for Disease Control and Prevention to provide data on health in the United States (Anderson & Taylor, 2012). The basic purpose of the NHIS is to obtain national information about the amount and distribution of illness and its effects in terms of disability and chronic impairments and, and the types of health services and practices people use. The NHIS is part of the National Health Survey, which began in May 1957. Although individual diseases had been studied extensively prior to 1957, the data were not able to be used as “health statistics” because requirements for reporting illnesses were limited to only certain hospitalized illnesses and contagious diseases. The United States government recognized that health statistics are essential and current information on the

nation's health was inadequate, Congress authorized a continuing National Health Survey (Public Law 652 of the 84<sup>th</sup> Congress). Since 1957, the U.S. has regularly collected health statistics under Congressional authority. In 2002 and 2007, CAM supplement surveys were included to provide extensive data on the use of CAM. The 2007 supplement included 35 CAM therapies, 81 diseases treated with CAM, 45 CAM products, and whether these products were used in the last 30 days or 12 month period.

According to Alvarez, Carduela, and Raeside (2012) the purpose of undertaking research is to add to existing knowledge, create knowledge or verify accepted knowledge. These authors purport that creativity is essential in each step of the scientific method. However, when it comes to research design, creativity vanishes as many researchers resort to creating a questionnaire or survey that is used to collect data. Many researchers do not realize the great deal of time, preparation, and resources required to produce a survey. The literature suggested that inconsistent findings in CAM research may be attributable to problems related to the design and methods that have been used in the conduction of some studies. According to Kimberlin and Winterstein (2008) key indicators of the quality of a measuring instrument are the reliability and validity of the measures. Despite the research interest in CAM there are no established conventions for recording its use (Quandt, 2012) and this poses a major problem to the validity and reliability of the data that have been collected on CAM use. The existing methods for assessing CAM use are probably at the root of many seemingly contradictory findings on the prevalence of its use.

Groves et al. (2009) wrote that "a survey is a systematic method for gathering information from a sample of entities for the purpose of constructing quantitative

descriptors of the attributes of the larger population of which the entities are members” (p. 4). Ensuring a representative sample is difficult and often weighting is required. This is problematic at times because of the complex nature of the sample and many times, weighting and the design effects are ignored and random sampling is assumed. Therefore, Alvarez et al. (2012) suggests that the need for undertaking the creation of a survey should be questioned as there exists in the public and academic domain a wealth of surveys conducted by national agencies. These resources give the researcher access to large samples of responses from carefully conducted well-designed surveys. Secondary data sources allow the researcher to focus on formulation of research questions and the analysis of the data. Secondary data resources are under used and should be referenced more because they are exemplars of good design (Alvarez et al., 2012).

There is a wealth of literature advocating the use of secondary data (Elger et al., 2010; Kiecolt & Nathan, 1985; Rew, Koniak-Griffin, Lewis, Miles, and Sullivan, 2000; Wunsch, Harrison & Rowan, 2005) because it is cost effective, efficient, convenient, and saves time and money. Secondary analyses are also good for exploratory studies such as the proposed CAM study. According to Windle (2010) secondary data analysis can be useful for nurse researchers and is defined as further analysis of an existing dataset to address a different research question or to conduct research with data that were not collected for research purposes. Secondary analyses uncover aspects of a research study that need further elaboration or exploration. As the volume of available data has increased through online resources over the last two decades, interest in using various data libraries has grown. Professional practitioners and government agencies have

recognized the value of large national databases to explore issues and vary analyses of information to learn more about the issues within populations that are of interest to them.

According to Quandt (2012) the literature documents the widespread use of diverse forms of complementary and alternative medicine (CAM) across many countries. Despite the research interest in CAM there are no established conventions for recording its use. Quandt et al. (2009) claim that while a growing body of literature exists documenting CAM use among populations it is difficult to compare findings across studies and across populations because of the differences in the way CAM use is measured. For example, some difficulties arise from sampling because different studies focus on different types of populations. These sampling problems are compounded by measurement issues. Some studies have used open ended response type questions and others have presented respondents with a list of a sample of the many CAM treatments that are available. Another difficulty in comparing prevalence rates of CAM use is that studies differ in their definition of CAM. A final aspect of measurement that hinders cross study comparisons is the time frame for response. Some studies ask if respondents have “ever used” CAM and others specify CAM use within the last 12 months (Quandt et al., 2009).

Therefore, in order to avoid problems related to the use of inadequate surveys, this research study used data that were collected by the National Health Interview Survey (NHIS). The National Health Interview Survey (NHIS) is the principle source of information on the health of the civilian noninstitutionalized population of the United States. The HNIS is one of the major data collection programs for the National Center for Health Statistics (NCHS) which is part of the Centers for Disease Control and Prevention

(CDC). The purpose of the NHIS is to provide data that can be used to monitor the health of the United States population through the collection and analysis of data on a broad range of health topics. NHIS data are used widely by the public health research community and the Department of Health and Human Services (DHHS) to monitor trends in illness, track progress toward achieving national health objectives, characterize those with various health problems, determining barriers to accessing health care, and evaluating federal health programs. The NHIS has been conducted continuously since 1957, with the content of the survey updated every 10-15 years.

### **Risk Prediction Models**

According to Betihavis, Newton, and Davidson (2012) nurses are compelled to identify individuals at risk and implement appropriate strategies. A risk prediction model is a tool that describes the association between factors, to calculate the outcome of an event. According to Cui (2009) a risk prediction model is a statistical regression model that relates the disease outcome with certain characteristics of an individual. A number of risk factors or predictors, which are associated with the disease outcome, are included in a risk prediction model. The association between a risk factor and the disease outcome is evaluated based on the magnitude of the relative risk factor in the population rather than in an individual. From a risk prediction model a risk score can be calculated for each individual and a larger risk score indicates a higher risk of developing the disease. The risk score can be used to classify individuals into groups with varying levels of risk of the disease. Therefore, risk estimates can theoretically be used to raise population awareness of diseases, such as CVD (Lloyd-Jones & Tian, 2006) and diabetes, that cause a significant burden of morbidity and mortality, to communicate knowledge about that risk



to individuals, and to motivate adherence to recommended lifestyle changes (Lloyd-Jones & Tian, 2006). People in high risk groups can be the target for intervention strategies (Cui, 2009).

Many risk prediction models have been developed for CVD and diabetes during the past few decades. To this author's knowledge there are no risk prediction models that have been developed to assess the risk of those who have risk behaviors associated with CVD and diabetes who also use CAM and the likelihood of those who use CAM developing the diseases. Therefore, risk prediction models will be built for those at risk for developing and or having CVD, diabetes and the use of CAM. Despite the many risk prediction models that have been developed for CVD and diabetes, the challenge has been to develop reliable and effective assessment tools with clinical utility and predictive validity. Therefore, this study used two predictive models with a strong history of validity and reliability as the foundation for the proposed models that incorporated CAM. The first foundational predictive model was The Heart Attack Risk Calculator published by the American Heart Association (AHA, 2014) and the second foundational predictive model was the Diabetes Risk Test published by the American Diabetes Association (ADA, 2014).

The two aforementioned predictive models served as the foundation for building the model for the current study, meaning many of the same variables used in the Heart Attack Risk Calculator and the Diabetes Risk Test were included as variables in the current study. Inclusion and exclusion criteria for each of the variables were based on whether the variables were assessed during the 2007 NHIS. Gender, age, race, smoking, high blood pressure, high cholesterol, poor circulation, coronary heart disease, angina,

heart condition, diabetes, pre-diabetes, body mass index (BMI), and frequency of physical activity were the variables of interest.

### **Data Source**

The data for this study was obtained from public-use files available from the U.S. federal government. The data files were located on the Centers for Disease Control and Prevention website. Links to the 2007 NHIS documents and data files was accessed using the internet because public use data files are released on an annual basis.

The findings from this study were based on data from the Adult Complementary and Alternative Medicine supplement and the Sample Adult Core components of the 2007 NHIS. The 2007 Complementary and Alternative Medicine supplement included 36 types of CAM therapies used in the United States. These therapies included 26 CAM therapies for which the services of a provider are not required and 10 types of provider – based CAM therapies.

### **Description of Variables**

The NHIS Sample Person File collected information on participants' gender, race, and age. The Sample Adult File collected information on participant's status regarding, smoking, hypertension, high cholesterol, poor circulation, coronary heart disease, angina, heart condition, diabetes, pre-diabetes, BMI, and frequency of physical activity. The variables of interest were continuous and categorical. Age, BMI, and race are continuous variables and were placed according to the following parameters. Age was grouped according to whether the participant was less than 30 years of age, 30-39 years, 40-49 years, 50-64 years, and greater than or equal to 65 years. Race was grouped according to whether the participant identified as white, African American, Native American, Asian,

Hispanic, or multiple race. BMI was grouped according to whether the participant was underweight (BMI below 18.5), normal (BMI 18.5-24.9), overweight (BMI 25-29.9), or obese (BMI 30 or higher). The remaining variables are categorical because each was assessed according to a “yes” or “no” response regarding the survey participant’s answer to the survey questions that assessed the variables of interest.

The Adult Complementary and Alternative Medicine Supplement collected information on sample adult’s use of 36 non-conventional health care practices. The CAM variables were categorized as to whether one had ever used any one of 20 modalities for a specific health problem or condition. The modalities included in the survey included acupuncture, Ayurveda, biofeedback, chelation therapy, chiropractic or osteopathic manipulation, energy healing therapy, hypnosis, massage, naturopathy, traditional healers, movement therapies, herbal and non-vitamin supplements, vitamins and minerals, homeopathy, special diets, yoga, relaxation techniques, prayer, meditation, and deep breathing exercises. The aforementioned CAM variables as well as the following variables from the Adult Sample file were used in the data analysis: age, gender, race/ethnicity, family history of DM, body mass index, physical activity, smoking, hypertension, high cholesterol, CVD, diabetes or prediabetes. The author examined the association of CAM use and CVD and DM in relation to a number of potentially associated factors. Age was categorized in groups of less than 30 years of age, 30-39 years, 40-49 years, 50-64 years, and 65 years and older. Family history of DM was defined as one having a mother, father, sister or brother with diabetes. Physical activity was categorized as whether one participated in light, moderate, or vigorous physical activity once per week or more. Smoking was categorized as whether one has ever

smoked 100 cigarettes. Hypertension was categorized as whether one has ever been told they had high blood pressure. High cholesterol was categorized as whether one has ever been told they had high blood cholesterol. Cardiovascular disease was categorized as to whether one has ever been told they had coronary heart disease, angina, a heart attack, or poor circulation. Diabetes was categorized as to whether one has ever been told they had diabetes or high blood sugar. Prediabetes was categorized as to whether one had ever been told they had prediabetes. Descriptions of each variable as defined by the 2007 NHIS is as follows.

**Hypertension**, also called high blood pressure, is elevated blood pressure resulting from an increase in the amount of blood pumped by the heart or from increased resistance to the flow of blood through the small arterial blood vessels (arterioles).

**Diabetes** is a chronic disorder of carbohydrate metabolism involving insulin.

Symptoms include elevated sugar in the urine and the blood, excessive urination, thirst, hunger, weakness, weight loss, and itching.

**Prediabetes** describes a state of impaired carbohydrate metabolism that places a person at risk for later developing diabetes. Blood glucose levels that are higher than normal but not high enough for a diagnosis of diabetes characterize this condition.

The two forms of prediabetes are **Impaired Fasting Glucose** and **Impaired Glucose Tolerance**.

**Borderline Diabetes** is a former term used for type 2 diabetes or impaired glucose tolerance.

**High Blood Sugar** is an excessive amount of glucose found in the blood, also called hyperglycemia.

A **cigarette** is anything the respondent reports except cigars or any kind of Marijuana.

**Smoking regularly** is respondent defined. If asked about what this means, say that "It is whatever you consider as first starting to smoke fairly regularly."

**Exercise, sports, or physically active hobbies** are respondent defined.

**Vigorous activities** might include fast walking, fast bicycling, jogging, strenuous swimming or sports play, vigorous aerobic dance, and strenuous gardening.

**Light or moderate activities** include such activities as moderate paced or leisurely walking or bicycling, slow swimming or dancing, and simple gardening.

**Strengthening activities** are activities that require strenuous muscular contractions such as weight lifting, resistance training, push-ups, sit-ups, etc.

**Alcohol** includes all types of beer (including stout, ale, malt liquor, or light beer, but does not include alcohol-free beer), wine (including port, sherry, sangria wine coolers, and champagne), and liquor (including brandy, liqueurs, scotch, whiskeys, tequila and gin).

An **Alternative Provider or Practitioner** is someone who is knowledgeable about a specific alternative health practice. This person provides care or gives advice about its use, and usually receives payment for his or her services. For some practices, the provider may have received formalized training and has been certified by a licensing board or related professional association. For example, a practitioner of biofeedback (biofeedback therapist) has usually received training

in psychology and physiology and may be certified by the Biofeedback Certification Institute of America.

**Acupuncture** (AK-you-punk-chur) describes a family of procedures involving stimulation of anatomical points on the body by a variety of techniques. American practices of acupuncture incorporate medical traditions from China, Japan, Korea, and other countries. The acupuncture technique that has been most studied scientifically involves penetrating the skin with thin, solid, metallic needles that are manipulated by the hands or by electrical stimulation.

**Alexander technique** is a practice that uses guidance and education on ways to improve posture and movement. The intent is to teach a person how to use muscles more efficiently in order to improve the overall functioning of the body. Examples of the Alexander technique as CAM are using it to treat low-back pain and the symptoms of Parkinson's disease.

The **Atkins diet** emphasizes a drastic reduction in the daily intake of carbohydrates (40 grams or less), countered by an increase in protein and fat.

**Ayurveda** (eye-yur-VAY-duh) is a system of medicine that originated in India several thousand years ago. In the United States, Ayurveda is considered a type of CAM and a whole medical system. As with other such systems, it is based on theories of health and illness and on ways to prevent, manage, or treat health problems. Ayurveda aims to integrate and balance the body, mind, and spirit (thus, some view it as "holistic"). This balance is believed to lead to contentment and health and to help prevent illness. However, Ayurveda also proposes treatments for specific health problems, whether they are physical or mental. A

chief aim of Ayurvedic practices is to cleanse the body of substances that can cause disease, and this is believed to help reestablish harmony and balance.

**Biofeedback** uses simple electronic devices to teach clients how to consciously regulate bodily functions, such as breathing, heart rate, and blood pressure, in order to improve overall health. Biofeedback is used to reduce stress, eliminate headaches, recondition injured muscles, control asthmatic attacks, and relieve pain.

**Botanicas** (boh-TAN-ik-ahs) are suppliers of healing products, sometimes associated with spiritual interventions.

**Chelation** (key-LAY-shun) **therapy** is a chemical process in which a substance is used to bind molecules, such as metals or minerals, and hold them tightly so that they can be removed from a system, such as the body. In medicine, chelation has been scientifically proven to rid the body of excess or toxic metals. For example, a person who has lead poisoning may be given chelation therapy in order to bind and remove excess lead from the body before it can cause damage.

**Chiropractic** (kye-row-PRAK-tik) **manipulation** is a form of health care that focuses on the relationship between the body's structure, primarily of the spine, and function. Doctors of chiropractic, who are also called chiropractors or chiropractic physicians, use a type of hands-on therapy called manipulation (or adjustment) as their core clinical procedure.

**Complementary and Alternative Medicine (CAM)** refers to therapies not usually taught in U.S. medical schools or generally available in U.S. hospitals. They include a broad range of practices and beliefs such as acupuncture,

chiropractic care, relaxation techniques, massage therapy, and herbal remedies. They are defined by NCCAM as a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine.

**Conventional medical treatments** are those normally practiced by medical doctors (MD) or doctors of osteopathy (DO), some of whom may also practice alternative techniques included in this supplement.

A **Curandero** (kuhr-ran-DEH-roh) is a type of traditional folk healer. Originally found in Latin America, Curanderos specialize in treating illness through the use of supernatural forces, herbal remedies, and other natural medicines.

To induce relaxation, **deep breathing** involves slow and deep inhalation through the nose, usually to the count of 10, followed by slow and complete exhalation for a similar count. The process may be repeated five to ten times, several times a day.

**Energy Healing Therapy** involves the channeling of healing energy through the hands of a practitioner into the client's body to restore a normal energy balance and, therefore, health. Energy healing therapy has been used to treat a wide variety of ailments and health problems, and is often used in conjunction with other alternative and conventional medical treatments.

**Espiritistas** (esp-ee-ree-TEE-stas) a person who assesses a patient's condition and recommend herbs and/or religious amulets in order to improve physical or mental health or to help overcome a personal problem.



**Feldenkrais** (FELL-den-krice) **method** is a method of education in physical coordination and movement. Practitioners use verbal guidance and light touch to teach the method through one-on-one lessons and group classes. The intent is to help the person become more aware of how the body moves through space and to improve physical functioning.

Used for healing or health maintenance, **guided imagery** involves a series of relaxation techniques followed by the visualization of detailed images, usually calm and peaceful in nature. If used for treatment, the individual will visualize their body free of the specific problem or condition. Sessions are typically 20 to 30 minutes in length, and may be practiced several times a week.

A **Hierbero** (yair-BAIR-roe) or **Yerbera** (yehr-BEH-ra) is a practitioner with knowledge of the medicinal qualities of plants.

**Homeopathy** (hoh-mee-AH-puh-thee) is a system of medical practices based on the theory that any substance that can produce symptoms of disease or illness in a healthy person can cure those symptoms in a sick person. For example, someone suffering from insomnia may be given a homeopathic dose of coffee.

Administered in diluted form, homeopathic remedies are derived from many natural sources, including plants, metals, and minerals.

**Hypnosis** is an altered state of consciousness characterized by increased responsiveness to suggestion. This hypnotic state is attained by first relaxing the body, then shifting attention toward a narrow range of objects or ideas as suggested by the hypnotist or hypnotherapist. The procedure is used to effect

positive changes and to treat numerous health conditions including ulcers, chronic pain, respiratory ailments, stress, and headaches.

A **macrobiotic diet** is low in fat, emphasizes whole grains and vegetables, and restricts the intake of fluids. Of particular importance is the consumption of fresh, non-processed foods.

**Massage therapists** manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and wellbeing.

**Meditation** refers to a group of techniques, most of which started in Eastern religious or spiritual traditions. In meditation, a person learns to focus his attention and suspend the stream of thoughts that normally occupy the mind. This practice is believed to result in a state of greater physical relaxation, mental calmness, and psychological balance. Practicing meditation can change how a person relates to the flow of emotions and thoughts in the mind.

Like Shamans, **Native American Healers/Medicine Men** use information from “the spirit world” in order to benefit the community. People see Native American healers for a variety of reasons, especially to find relief or a cure from illness or to find spiritual guidance.

**Naturopathy** (nay-chur-AH-puh-thee) is an alternative medical system.

Naturopathic medicine proposes that there is a healing power in the body that establishes, maintains, and restores health. Practitioners work with the patient with a goal of supporting this power through treatments such as nutrition and lifestyle counseling, dietary supplements, medicinal plants, exercise, homeopathy, and treatments from traditional Chinese medicine.

The **Ornish diet** is a high fiber, low-fat vegetarian diet that promotes weight loss and health by controlling what one eats, not by restricting the intake of calories. Fruits, beans, grains, and vegetables can be eaten at all meals, while non-fat dairy products such as skim milk, non-fat cheeses, and egg whites are to be consumed in moderation. Products such as oils, avocados, nuts and seeds, and meats of all kind are avoided.

**Osteopathic Manipulation** is a full-body system of hands-on techniques to alleviate pain, restore function, and promote health and well-being.

**Pilates** (pi-LAH-teez) is a method of physical exercise used to strengthen and build control of muscles, especially those used for posture. Awareness of breathing and precise control of movements are integral components of Pilates. Special equipment, if available, is often used.

While meat is allowed, the **Pritikin diet** (or **Pritikin Principle**) is low-fat and emphasizes the consumption of foods with a large volume of fiber and water, including many vegetables, fruits, beans, and natural, unprocessed grains.

**Progressive relaxation** is used to relieve tension and stress by systematically tensing and relaxing successive muscle groups.

**Qi gong** (chee-KUNG) is an ancient Chinese discipline combining the use of gentle physical movements, mental focus, and deep breathing directed toward specific parts of the body. Performed in repetitions, the exercises are normally performed two or more times a week for 30 minutes at a time.

**Reiki** (ray-key): Reiki is an energy medicine practice that originated in Japan. In Reiki, the practitioner places his hands on or near the person receiving treatment, with the intent to transmit ki, believed to be a life-force energy.

**Shamans** (SHAH-mans) are said to act as mediums between the invisible spiritual world and the physical world. Most gain knowledge through contact with the spiritual world and use the information to perform tasks such as divination, influencing natural events, and healing the sick or injured.

A **Sobador** (soh-bah-DOOR) uses massage and rub techniques in order to treat patients.

**South Beach diet** distinguishes between “good” and “bad” carbohydrates and fats. “Good” carbohydrates are those that are digested relatively slowly, and “bad” fats include saturated and trans fats. Although the program does not require one to count calories or limit portions, dieters are encouraged to eat whole grain foods and an abundant amount of vegetables.

**Support groups** usually meet on a regular basis and are managed by either a professional or volunteers who are members. During meetings, participants provide each other with nonprofessional advice and support in dealing with a problem common to all members. Support groups are found in a variety of venues, and can be associated with a hospital, treatment program, or can even take the form of an online community in which participants exchange e-mail or post on a message board.

**Stress management** refers to a variety of techniques used to cope with and reduce psychological stress and the body’s reaction to it. These techniques can

include anything from controlling one's diet and exercise habits to using stress balls.

**Tai chi** (tie-CHEE) is a mind-body practice that originated in China as a martial art. A person doing tai chi moves his body slowly and gently, while breathing deeply and meditating (tai chi is sometimes called "moving meditation"). Many practitioners believe that tai chi helps the flow throughout the body of a proposed vital energy called "qi." A person practicing tai chi moves her body in a slow, relaxed, and graceful series of movements. One can practice on one's own or in a group. The movements make up what are called forms (or routines).

**Traditional healers** use methods based on native theories, beliefs, and experiences handed down from generation to generation. Seven specific types of healers include: Curandero, Espiritista, Hierbero, Shaman, Botanica, Native American Healer or Medicine man, and Sobador.

**Trager** (TRAY-gur) **Psychophysical Integration** is a therapy in which practitioners apply a series of gentle, rhythmic rocking movements to the joints. They also teach physical and mental selfcare exercises to reinforce the proper movement of the body. The intent is to release physical tension and increase the body's range of motion. An example of Trager Psychophysical Integration as CAM is using it to treat chronic headaches.

**Vegetarian diets** are those totally devoid of meat, red or white. There are, however, numerous variations on the non-meat theme. For example, some vegetarian diets are restricted to plant products only, while others may include eggs and dairy products. Another variation limits consumption to raw fruit,

sometimes supplemented with nuts and vegetables. Finally, a number of vegetarian diets prohibit alcohol, sugar, caffeine, or processed foods.

**Yoga** combines breathing exercises, physical postures, and meditation to calm the nervous system and balance body, mind, and spirit. Usually performed in classes, sessions are conducted once a week or more and roughly last 45 minutes.

With the **Zone diet**, each meal consists of a small amount of lowfat protein, fats, and fiber-rich fruits and vegetables. The basic goal is to alter the body's metabolism by controlling the production of key hormones. (National Health Interview Survey, Field Representatives Manual, 2007, pp. 164, 165, 174, 218-224).

### **Data Analysis**

The ASCII data sets of the Adult Sample (SAMADULT), Person (PERSON), and Adult Complementary and Alternative Medicine (ADULTCAM) files were imported into the Statistical Product and Service Solutions (SPSS). Descriptive statistics were computed for the variables of interest. Data on respondents' risk factors related to the chronic conditions of CVD and diabetes were obtained from the SAMADULT file. The following variables were included in the data analysis: age, gender, race, body mass index, smoking, hypertension, high cholesterol, poor circulation, coronary heart disease, angina, heart condition, CVD, diabetes, pre-diabetes, and frequency of physical activity. Statistical analyses of the NHIS data require appropriate weighting of variables to ensure that the resulting statistics are representative of the national sample. Statistical significance was determined by 95% confidence intervals and  $p$  values  $< .05$ . Risk

prediction models were built using SPSS statistical software. Statistical analyses of the data were conducted using SPSS to answer the following research questions.

- 1) What are the characteristics of CAM users who participated in the NHIS 2007 survey?
- 2) Is there a relationship between CVD risk behaviors and CAM use?
- 3) Is there a relationship between DM risk behaviors and CAM use?
- 4) Is there a relationship between CVD prevalence and CAM use?
- 5) Is there a relationship between DM prevalence and CAM use?
- 6) Does CAM use affect the presence of CVD risk factors?
- 7) Does CAM use affect the presence of DM risk factors?
- 8) Does CAM use affect the presence of CVD?
- 9) Does CAM use affect the presence of DM?

It was hypothesized that individuals who have fewer health risk behaviors for CVD and DM are more likely to use one or more of 22 different CAM modalities than those who have higher health risk behaviors. It was also hypothesized that individuals who use one or more of 22 CAM modalities have less severe complications of CVD and DM. In order to examine the modalities that were so numerous the CAM therapies were grouped into four groups (see Figure 3) to include alternative medical systems: acupuncture, Ayurveda, homeopathy, naturopathy, and traditional healers; biologically based therapies: chelation, herbal, vitamins, minerals, and special diets; manipulative and body based therapies: chiropractic, massage, and movement therapies; mind body based therapies: biofeedback, energy healing, hypnosis, yoga, relaxation, prayer, meditation, and deep breathing exercises. A description of the statistical analyses and null and

alternative hypotheses (if applicable) for each of the proposed study's research questions follow.

Question 1) What are the characteristics of CAM users who participated in the NHIS 2007 survey?

Frequency distributions of the demographic variables including age, gender, race, ethnicity, employment status, partner status and region were conducted and analyzed in order to identify the characteristics of CAM users who participated in the NHIS 2007 survey.

Question 2) Is there a relationship between CVD risk behaviors and CAM use?

Null Hypothesis: There is no relationship between CVD risk behaviors and CAM use.

Alternative Hypothesis: There is a relationship between CVD/DM risk behaviors and CAM use.

Question 3) Is there a relationship between DM risk behaviors and CAM use?

Null Hypothesis: There is no relationship between DM risk behaviors and CAM use.

Alternative Hypothesis: There is a relationship between DM risk behaviors and CAM use.

Question 4) Is there a relationship between CVD prevalence and CAM use?

Null Hypothesis: There is no relationship between CVD prevalence and CAM use.

Alternative Hypothesis: There is a relationship between the prevalence of CVD and CAM use.

Question 5) Is there a relationship between DM prevalence and CAM use?

Null Hypothesis: There is no relationship between DM prevalence and CAM use.



Alternative Hypothesis: There is a relationship between the prevalence of DM and CAM use.

Use of CAM was compared by CVD and DM using chi-square tests. Chi-square test was an appropriate statistical test to answer the second, third, fourth, and fifth research questions because the researcher was trying to determine if the numbers suggested there was a relationship between CVD/DM risk behaviors and CAM use and if there was a relationship between the prevalence of CVD/DM and CAM use. In order to answer questions 2 and 4, subsets of individuals were created based on a yes or no response to CAM use, and whether the individual(s) had any of the risk behaviors known to be associated with CVD ( gender, age, race, smoking, hypertension, high cholesterol, poor circulation, coronary heart disease, angina, heart condition, physical inactivity, and being overweight). In order to answer questions 3 and 5, subsets of individuals were created based on a yes or no response to CAM use, and whether the individual(s) had any of the risk behaviors known to be associated with DM (age, gender, family history of DM, hypertension, physical inactivity, and BMI). Subsets of individuals were created based on a yes or no response to CAM use and presence of CVD/DM.

After the subsets were created the data were analyzed first to ensure that the assumptions that were specific to the chi-square test were met, meaning that the observations must be from a random sample, the scores associated with the observation are independent of each other, and the chi-square test yielded a test statistic that is approximately distributed as a chi-square when the sample size is relatively large (Green & Salkind, 2011). After these assumptions were met the chi-square tests was calculated and analyzed for meaning.

Question 6) Does CAM use affect the presence of CVD risk factors?

Null Hypothesis: CAM use does not affect the presence of CVD risk factors.

Alternative Hypothesis: CAM use does affect CVD risk factor presence.

Question 7) Does CAM use affect the presence of DM risk factors?

Null Hypothesis: CAM use does not affect the presence of DM risk factors.

Alternative Hypothesis: CAM use does affect DM risk factor presence.

Question 8) Does CAM use affect the presence of CVD?

Null Hypothesis: CAM use does not affect the presence of CVD.

Alternative Hypothesis: CAM use does affect the presence of CVD.

Question 9) Does CAM use affect the presence of DM?

Null Hypothesis: CAM use does not affect presence of DM.

Alternative Hypothesis: CAM use does affect the presence of DM.

According to Field (2009) regression analysis is a way of predicting an outcome variable(s) from one or more predictor variables. Therefore, logistic regression was an appropriate statistical test to answer the sixth through ninth research questions because the researcher was trying to determine if the data suggested the use of CAM was associated with a decrease in the development of risk factors for CVD/DM and whether there was an association between CAM use and the presence of CVD/DM. Assumptions that are specific to logistic regression were met. First, the dependent variable was binary, second, logistic regression assumes that  $P(Y=1)$  is the probability of the event occurring therefore the dependent variable was coded accordingly, third, the model was fitted correctly meaning only meaningful variables were included, fourth each observation was independent, fifth linearity of independent variables and log odds was assumed, and the

sample size was large (Statistics Solutions, 2014). After the assumptions were met, then logistic regression statistical analyses were calculated and analyzed.

### **Validity and Reliability**

Conclusion validity is the degree to which conclusions about relationships in the data are credible. This is of extreme importance and in many ways is the most important type of validity (Trochim & Donnelly, 2008). Threats to conclusion validity are any factors that can lead one to reach an incorrect conclusion about a relationship in observations. There are two types of errors that can be made. Type I error is when a relationship is found when there is not one and Type II error is not finding a relationship when in fact there is one.

Methods to improve conclusion validity in a study include first; establish an effective level of statistical power. The acceptable value in social research is for statistical power to be greater than 0.8 in value (Polit, 2010). Several factors interact to affect power. One is sample size. A larger sample size will increase the power. The sample size for the current study was determined by the requirements imposed by the complex sampling process used by the NHIS. The second way to increase power is to increase the risk of making a Type I error. Increasing the chance that you will find a relationship when there is not one can do this. This can be done statistically by raising the alpha level. A standard alpha level that is used in research studies is .05. The current study had an alpha level of .01 when determining sample size. Raising the alpha level decreases the chance of making a Type II error (Polit, 2010). A second way to improve conclusion validity is to improve the reliability in the study by constructing better measurement instruments. The author of this study used established measurement tools

with pre-established validity and reliability. The author of this study controlled for Type I and Type II errors as much as possible considering the non-experimental design of the study. Errors were controlled for by having a high statistical power, raising the alpha level, using data that were assessed using reliable instruments, and using data from a government regulated agency that used highly trained individuals for implementation.

### **Procedures for Collection and Treatment of Data**

This study was a secondary data analysis comprised of data that were collected by the U.S. Census Bureau. According to the CDC (2008) the U.S. Census Bureau is the data collection agent for the NHIS. The NHIS uses 600 interviewers who are trained by health survey supervisors in the 12 U.S. Census Bureau Regional Offices. Interviewers are known as Field Representatives and are selected through examination and testing processes. After the interviewers are selected they receive thorough training in basic interviewing procedures that are unique to the NHIS. All members of the household 18 years and older who are at home at the time of the interview can participate and respond for themselves. For the Sample Adult Questionnaire, one adult per family is randomly selected to respond for him or herself. If they are unable to respond to the questions for mental or physical reasons, a proxy is allowed to answer for the adult.

The NHIS is conducted using computer-assisted personal interviewing guided by computer software that presents the questionnaire on a computer screen to each interviewer. The computer program guides the interviewer through the questionnaire while survey responses are entered directly into the computer. The program determines if the selected responses are within the allowable range, checks for consistency against

other data collected during the interview, and saves the responses into a data file. This data collection ensures the accurate flow of the questionnaire (CDC, 2008).

Permission to use the data was granted as the NHIS data files are public use files, meaning that the data collected by the CDC may be used for the purpose of health statistical reporting and analysis. Public use data files are prepared and disseminated to provide access to the full scope of the data which allows researchers to manipulate the data in a format that is appropriate for their analyses (CDC, 2008). Protection of human subject confidentiality was ensured through federal rules governing public use files and the oversight of Kennesaw State University Institutional Review Board (IRB) (see Appendix). Data collection did not begin until IRB approval had been granted. Confidentiality was guaranteed by the U. S. Public health Service for the NHIS, meaning that any information collected in the survey that would permit identification of an individual was held in strict confidence, was only used for the purposes stated in the study, and was not disclosed or released to others.

### **Setting**

The mode of data collection for the NHIS was face-to-face interviews in the location of the participant's home.

### **Population and Sample**

According to Bell et al. (2012) methodological skills are needed by researchers who conduct research using nationally representative health surveys in order to effectively access and use such data. Traditional statistical methods and software analysis programs assume that data were generated through simple random sampling, with each person having equal probability of being selected. However, with large, nationally

representative health surveys, this is often not the case. Instead, data from these complex sample surveys, such as the NHIS, differ from those obtained via simple random sampling in four respects. First, the probabilities of selection of the observations are not equal. Oversampling of certain subgroups in the population is employed to allow reasonable precision in the estimation of parameters. For example, in the proposed study, the NHIS oversamples black, Hispanic and Asian subgroups. Second, multistage sampling yields clustered observations in which the variance among units within each cluster is less than the variance among units in general. Third, stratification in sampling ensures appropriate sample representation on the variables and fourth, unit nonresponse and other post stratification adjustments are applied to the sample to allow unbiased estimates of population characteristics.

The NHIS methodology uses a multistage sampling design that is representative of the U.S. “civilian non-institutionalized population” (Barnes et al., 2008, p. 2). Over the course of a year, a sample of approximately 63,000 is selected and a total of almost 33,000 households are interviewed, which are located in all 50 states as well as the District of Columbia. All of the counties in the U.S. are examined for similarities and are grouped accordingly. From each group, one or more counties are selected to represent all of the counties in a group. The selected counties are known as primary sampling units (PSU). Within each PSU sample segments of housing units are selected for inclusion in the survey (NHIS 2007).

The sample for the NHIS is redesigned and redrawn every ten years to better measure the changing U.S. population and to meet changing survey objectives. Oversampling of the black, Hispanic and Asian populations were included in the 2007

survey in order to allow for more precise estimation of health characteristics of these growing minorities. The sample selection is chosen using a methodology that allows each person in the covered population to have a known non-zero probability of selection (CDC, 2008). According to the NHIS (2007) user guide, since the NHIS uses a multistage sample, it is necessary to utilize the person's basic weight for proper analysis of person record data. Design and ratio adjustments are included in the calculation of the Person-Level file's basic weights. The person's weights are further modified by adjusting them to Census control totals for sex, age, and race/ethnicity populations (post stratification).

For the current study, data were obtained from the 2007 NHIS interview sample. According to Barnes et al. (2008) in 2007, NHIS interviews were completed in 29,266 households, which yielded 75,764 persons in 29,915 families and a household response rate of 87.1%. Of the 23,393 completed interviews with sample adults aged 18 years and over included in the NHIS 2007 dataset, a sample of 301 participants was drawn randomly using complex sampling methodology.

Based on the type of design a study must have an adequate sample size, relative to the goals and variabilities of the study. The sample must be large enough to produce an effect of scientific significance. A fundamental step in the design of clinical research is the computation of power and sample size. Power is the probability of rejecting the null hypothesis that sample estimates (means) do not statistically differ between study groups. Large values of power, at least 80% are desirable. Power increases as the sample size for the study increases. The statistical power of a study is the probability of detecting a

predefined clinical significance; therefore ideal studies have higher power (Suresh & Chandrashekara, 2012).

Statistical power is positively correlated with the sample size; therefore, a larger sample size gives greater power. In research, statistical power can be calculated before data collection based on information from previous studies or it can be calculated after data have been collected. The power was calculated after the data had been collected in this study because the study was a secondary data analysis using data that was collected in 2007. In order to calculate the needed sample size for a study four factors are considered; the alpha level, variance or standard deviation, the effect size and the power (Suresh & Chandrashekara, 2012).

Data files were merged into a single data set and only variables specific to the analysis were included. Sociodemographic variables were obtained from the PERSON file to include race, age, marital status, and employment status. Protection of human subject confidentiality was ensured through federal rules governing public-use files and the oversight of the Kennesaw State University Institutional Review Board.

### **Instruments**

The NHIS is a personal visit survey, not a telephone survey. This means that the interviewers personally visit the selected households to conduct the interviews. However, telephone contacts can be used in certain circumstances such as the respondent requests a telephone interview, when follow-up information is needed, or if travel issues would make a visit difficult. The NHIS instrument has four major core parts: Household Composition and Demographic Section, Family Questionnaire, Sample Child Questionnaire, and Sample Adult Questionnaire. CAM supplements were expanded in the



2007 NHIS based on the results of the 2002 NHIS that found one-third of adults used some form of CAM. The expanded questions for adults should provide additional detail about CAM use by adults.

### **Validity and Reliability**

Stussman, Bethell, Gray, and Nahin (2013) published the first and only article describing the multi-faceted and qualitative processes that were undertaken to develop the NHIS. The author's intent for the in-depth description of the survey's development is to enable researchers and policy makers to better judge the content validity and utility of the questionnaires and their resultant publications. The development of the NHIS CAM questionnaires followed the protocol that is published by the National Center on Health Statistics (NCHS). The NCHS protocol included four phases: planning, exploratory studies, developmental methods, and testing methods. For each questionnaire, development began 18-24 months prior to data collection in collaboration with NHIS survey methodologists.

The NHIS CAM surveys were constructed, edited and refined by NHID and NCCAM staff. Cognitive interviewing is a technique that is used to learn respondents' thought processes as they answer survey questions and according to Willis (2002), has become standard practice for survey development. Cognitive interviewing was used in the questionnaire development process which made it fluid and iterative so that changes were made and the questionnaires were re-tested throughout the development process (Stussman et al., 2013). Thirty-two cognitive interviews were conducted on seven different versions of the 2007 draft questionnaire. Subsequent changes were made until the final survey was developed.

### **Limitations**

Limitations of this study were related to the questions of the adult alternative health survey and the NHIS. First, data were dependent on a respondent's knowledge of CAM and a willingness to report its use. Second, the survey did not report information about culturally relevant CAM use according to ethnicity. Third, the sampling strategy used random digit dialing which may not have accurately reflected the U.S. population because this sampling technique required the use of a landline (Anderson & Taylor, 2012).

Limitations to the approach used to develop the CAM questionnaires is considered a limitation. First, due to time constraints, cognitive testing was not always continued until saturation was reached, meaning interviewing continues until no new data are emerging and all the concepts are well defined and explained. This limitation could reduce the generalizability and validity. Second, the individuals that were selected for cognitive testing may not have been representative of the U.S. population in all respects, which could limit generalizability. Third, there is no universal list of what constitutes a complementary medicine approach and as a result, there is no definitive list of which therapies should be included in the questionnaire. Despite these limitations, the NHIS complementary medicine datasets remain the primary national source of data on complementary medicine use in the United States and it is expected that quantitative analyses on the validity and reliability of the questionnaires will supplement the qualitative development approaches that were previously described and inform future survey design and guidance to users of existing survey data (Stussman et al., 2013). A fourth limitation is that not all variables that might influence CVD or DM development or

the risk for either condition could be included in the publicly available data in the NHIS or the current study. One such example is the degree to which media campaigns influence learning about and use of CAM or use of other risk prevention strategies.

### **Summary**

The current study of the use of complementary therapies by individuals with or at risk for CVD and or DM was a secondary data analysis of the NHIS 2007 publically available data. The literature supported secondary data analysis of nationally representative health surveys as an appropriate methodology when researchers are interested in investigating risk and protective factors associated with health related outcomes. The research study looked at the potential risk behaviors and factors to include BMI, physical activity levels, smoking, use of alcohol, hypertension, high cholesterol and the presence of CVD and or DM and their relation to the use of CAM.

An Institutional Review Board (IRB) approval request was submitted and response from the IRB indicated that no approval was needed (See Appendix), statistical analyses of the data, using SPSS software, were conducted. The data were analyzed first to ensure that methodological assumptions were met. After the assumptions were met chi-square and logistic regression analyses were performed. After the statistical tests were run, an in depth analysis of the data was completed to look for meaning.

The current study had significance to nursing practice, research and education because the study used a scientifically sound methodology to conduct research related to CAM. Existing studies on the use of CAM have produced varied results due in part to weak methodology. This issue suggested that the use of a well-established survey representing a large portion of the U. S. population that uses standardized definitions of

CAM and operationally defined variables would facilitate meaningful results that can be further tested.

## CHAPTER 4

### **Overview of Study**

Costly, debilitating and largely preventable chronic diseases are among the key contributors to the increased health care costs in the United States. Seven out of ten deaths among Americans each year are from chronic diseases. Two of the most common, costly and preventable problems in the United States are CVD and DM. The chronic and complex diseases of modern times require movement away from the current medical model from one of focus on cure to focus on prevention and promotion. People who have chronic diseases may be more likely to use complementary and alternative medicine (CAM) (Saydah & Eberhardt, 2006), but the extent to which those who use CAM and also engage in positive health behaviors or exhibit fewer risk factors is unknown. The aim of this study was to determine whether the use of CAM was associated with health behaviors or risk factors known to impact CVD and diabetes. Secondary data analysis of the 2007 National Health Interview Survey (NHIS) the most recent to include CAM use provided the sample for analyses. Findings from this study provide knowledge regarding the use of CAM therapies and the potential effects on the chronic diseases of CVD and DM. Findings may lead to future research such as interventional studies on the effects of CAM therapies and their role in health promotion and disease prevention.

This chapter begins with an overall description of the participants followed by a sequential presentation of statistical results answering each of the nine research questions which were:

- 1) What are the characteristics of CAM users who participated in the NHIS 2007 survey?
- 2) Is there a relationship between CVD risk behaviors and CAM use?
- 3) Is there a relationship between DM risk behaviors and CAM use?
- 4) Is there a relationship between CVD prevalence and CAM use?
- 5) Is there a relationship between DM prevalence and CAM use?
- 6) Does CAM use affect the presence of CVD risk factors?
- 7) Does CAM use affect the presence of DM risk factors?
- 8) Does CAM use affect the presence of CVD?
- 9) Does CAM use affect the presence of DM?

The chapter concludes with a summary of the overall results.

## **Findings**

### **Description of Participants**

To better understand the findings of this study, the characteristics of the NHIS participants were examined using frequency distributions. The sample for the current study of adult participants was drawn from the NHIS nationally representative sample of the non-institutionalized population in the U.S. Of the 23,393 adults in the total population sample were drawn using the complex samples process and based on their response to whether they had ever used one of the 21 CAM treatments included in the NHIS data.

## Question 1

Question1) What are the characteristics of CAM users who participated in the NHIS 2007 survey?

Frequency distributions of the socio-demographics and health risk factors were examined for the sample population that was drawn from the NHIS participants who used CAM.

The socio-demographic characteristics of CAM users who participated in the 2007 NHIS revealed the majority (mean 86.5%,  $n= 23,393$ ) of participants in all age groups, both genders, all races, ethnicities, employment status, marital status, and region of the U.S. had used CAM in one form or another (see Table 1).

### Age

Age was grouped into five levels, 18-29, 30-39, 40-49, 50-64, and 65 or older. Over 80% of participants in each age group reported ever using CAM. Those in the 65 and older group had the highest percentage of CAM use (90.2%,  $n=4,134$ ) while 80.1% ( $n=3,691$ ) of the participants in the 18-29 year age group reported ever using CAM. In each of the increasing age groups, the percentage of CAM use increased.

### Gender

While both males and females reported using CAM, more females, 89.5% ( $n=11,650$ ) than males, 83% ( $n=8647$ ) reported using CAM. In examining the differences within each gender by the four groups of CAM therapies females had a higher usage of all four groups of therapies when compared to males; alternative medical systems

Table 1  
Sociodemographic Characteristics of Respondents

Characteristic	Used CAM Percentage	Has not Used CAM Percentage
<b>Age</b>		
18-29	80.1% (n=3691)	19.9% (n=853)
30-39	86.0% (n=3717)	14.0% (n=603)
40-49	86.8% (n=3806)	13.2% (n=619)
50-64	89.9% (n=4949)	10.1% (n=572)
≥65	90.2% (n=4134)	9.8% (n=449)
<b>Gender</b>		
Male	83.3% (n=8647)	16.7% (n=1728)
Female	89.5% (n=11650)	10.5% (n=1368)
<b>Race</b>		
White	86.5% (n=15555)	13.5% (n=2383)
Black/African American	88.1% (n=3357)	11.9% (n=450)
Indian (American), Alaska native	87.4% (n=239)	12.6% (n=31)
Asian Indian	18.1% (n=187)	81.9% (n=40)
Chinese	78.4% (n=218)	21.6% (n=57)
Filipino	87.2% (n=254)	12.8% (n=32)
Multiple Race	76.9% (n=59)	23.1% (n=7)
<b>Ethnicity</b>		
Hispanic	83.1% (n=376)	16.9% (n=90)
Non-Hispanic	78.1% (n=1275)	21.9% (n=309)
<b>Employment Status</b>		
Employed	85.7% (n=11780)	14.3% (n=1954)
Unemployed	81.8% (n=537)	18.2% (n=111)
<b>Partner Status</b>		
Married	88.3% (n=9168)	11.7% (n=1236)
Widowed	91.5% (n=2063)	8.5% (n=199)
Divorced	89.2% (n=2655)	10.8% (n=331)
Separated	87.5% (n=684)	12.5% (n=116)
Cohabiting (Living with partner)	83.4% (n=1033)	16.6% (n=192)
Never Married	80.1% (n=4304)	19.6% (n=912)
<b>Region</b>		
Northeast	84.6% (n=3327)	15.4% (n=594)
Midwest	88.0% (n=4595)	12.0% (n=627)
South	86.1% (n=7558)	13.9% (n=1159)
West	86.8% (n=4817)	13.2% (n=716)

Note. Prevalence n (weighted %)



(females 5.8%, males 3.7%), biologically based therapies (females 26.7%, males 23.1%), body based therapies (females 10.4%, males 7.7%), and mind body therapies (females 65.1%, males 51.6%).

### **Race/Ethnicity**

Few differences were seen among overall CAM use when examined by race/ethnicity. Participants who reported their race/ethnicity as Black or African American had the highest percentage of CAM use (88.1%,  $n=3,357$ ), while those who reported their race as American Indian (87.4%,  $n=239$ ), Filipino (87.2%,  $n=254$ ), White (86.5%,  $n=15,555$ ) Hispanic (83.1%,  $n=376$ ), and Chinese (78.4%,  $n=218$ ) were slightly less. The one group that did not report similar usage patterns for CAM in the study participants were those who listed their racial/ethnicity as Asian Indians. The Asian Indians had the lowest percentage of CAM use among all race/ethnic groups at 18.1% ( $n=187$ ).

In examining the differences within each race by the four groups of CAM therapies, results varied among races. Asian Indians (15.0%) had a higher use of alternative medical systems, Chinese (31.3%) had a higher use of biologically based therapies, American Indians (11.1%) had a higher use of body based therapies, and Blacks (72.6%) had a higher usage of mind body therapies when compared to other races.

### **Employment Status**

Results regarding employment status showed 85.7% of those employed used CAM and 81.8% of those unemployed used CAM. In examining the differences With employment status by the four groups of CAM therapies employed participants had higher usage of alternative medical systems (4.9%), biologically based therapies (63.1%), and body based therapies (9.8%) than unemployed participants. Conversely,

unemployed (66.3%) participants had a higher usage of mind body therapies than employed.

### **Marital Status**

Results regarding marital status showed 88.3% ( $n=9168$ ) of married, 91.5% widowed ( $n=2063$ ), 89.2% ( $n=2655$ ) divorced, and 87.5% ( $n=684$ ) separated participants used CAM. In addition, 83.4% ( $n=1033$ ) of participants living with someone, and 80.4% ( $n=4304$ ) of never married participants also reported using CAM. In examining the differences within marital status groups by the four groups of CAM therapies divorced participants had higher usage of biologically based therapies (29.0%) and body based therapies (11.4%) than other participants whereas participants living with someone (5.7%) had higher usage of alternative medical systems than others and widowed (74.7%) participants had higher usage of mind body therapies than other marital status groups.

### **Geographic Location**

Geographic location results showed 84.6% ( $n=3327$ ) of participants from the Northwest, 88% ( $n=4595$ ) of participants from the Midwest, 86.1% ( $n=7558$ ) from the South, and 86.8% ( $n=4817$ ) from the West reported ever using CAM. Less than 20% of participants from all geographic locations denied ever using CAM.

### **Health Characteristics: Risk Factors for CVD or DM**

Participants who used CAM (86.6%,  $n=19026$ ) also reported having one or more CVD risk factors and/or CVD. Additionally, 87.0% ( $n=18292$ ) participants who used CAM reported having one or more DM risk factors and/or DM. See Tables 2 and 3.

Table 2  
*CVD and CAM Use*

	Used CAM	Not Used CAM
Presence of Risk Factors or CVD	86.6% (n=19026)	13.4% (n=2876)
No Risk Factors or CVD	84.9% (n=1271)	15.1% (n=220)

*Note.* Weighted Percentage

Table 3  
*DM and CAM Use*

	Used CAM	Not Used CAM
Presence of Risk Factors or DM	87.0% (n=18292)	13.0% (n=2695)
No Risk Factors for DM	82.2% (n=2005)	17.8% (n=401)

*Note.* Weighted Percentage

### Questions 2-5

Question 2) Is there a relationship between CVD risk behaviors and CAM use?

Question 3) Is there a relationship between DM risk behaviors and CAM use?

Question 4) Is there a relationship between CVD prevalence and CAM use?

Question 5) Is there a relationship between DM prevalence and CAM use?

### Analytic Methods

International Business Machines (IBM) SPSS Complex Samples 21 software was used to run statistical analyses of the data. Variables were grouped according to whether they were defined as a risk factor/behavior for CVD and or DM and whether they were

defined as belonging to one of four CAM categories. After the data were grouped, contingency tables, Chi Square, and odds ratios were the methods used for analysis.

For questions 2, 3, 4, and 5, two-way contingency tables were used to evaluate the relationship between CAM use and CVD and the risk factors for CVD, and DM and the risk factors for DM. CAM modalities were grouped into four groups (see Figure 3) to include alternative medical systems: acupuncture, Ayurveda, homeopathy, naturopathy, and traditional healers; biologically based therapies: chelation, herbal, vitamins, minerals, and special diets; manipulative and body based therapies: chiropractic, massage, and movement therapies; mind body based therapies: biofeedback, energy healing, hypnosis, yoga, relaxation, prayer, meditation, and deep breathing exercises. Findings are reported in Tables 4 and 5.

**Figure 3. CAM Therapy Groups**

Alternative Medical Systems	Biologically Based Therapies	Body Based Therapies	Mind Body Therapies
Acupuncture	Chelation	Chiropractic	Biofeedback
Ayurveda	Herbal	Massage	Energy Healing
Homeopathy	Vitamins and Minerals	Movement Therapies	Hypnosis
Naturopathy	Special Diets		Yoga
Traditional Healers			Relaxation
			Prayer
			Meditation
			Deep Breathing Exercises

**Table 4**  
**CVD Risk Factors/Prevalence and CAM Use**

Risk Factor	Alternative Medical Systems						Biologically Based Therapies						Body Based Therapies						Mind Body Therapies								
	Chi Square		p value		OR		95% CI		Chi Square		p value		OR		95% CI		Chi Square		p value		OR		95% CI				
	Value	df			LL	UL	Value	df			LL	UL	Value	df			Value	df			LL	UL	Value	df			
Hypertension	1.002	.458	1.07	.891	1.291	37.878	.000	.815	.748	.887	.036	.869	.990	.882	1.112	335.015	.000	.568	.529	.610							
High Cholesterol	2.145	.224	.903	.765	1.065	163.77	.000	.650	.603	.702	30.86	.000	.756	.675	.848	283.424	.000	.583	.542	.627							
Male	54.513	.000	1.587	1.359	1.853	40.660	.000	1.213	1.130	1.303	51.182	.000	1.390	1.252	1.544	435.234	.000	1.746	1.628	1.872							
Smoking	12.946	.003	.802	.682	.930	78.147	.000	.763	.710	.821	14.638	.002	.839	.753	.935	.710	.514	1.023	.955	1.097							
Poor Circulation	2.419	.196	.854	.672	1.086	13.144	.003	.831	.735	.939	.000	.990	1.001	.833	1.203	302.28	.000	.405	.357	.460							
Angina	1.250	.322	.796	.507	1.252	13.031	.001	.691	.551	.867	1.992	.200	.805	.577	1.123	76.639	.000	.371	.281	.491							
Heart Condition	3.925	.118	.803	.610	1.058	76.571	.000	.621	.551	.702	33.412	.000	.641	.531	.774	172.223	.000	.472	.407	.547							
Pre-Diabetes	13.980	.001	.589	.425	.817	82.828	.000	.496	.411	.598	36.499	.000	.533	.420	.676	57.297	.000	.533	.444	.640							
DM	7.630	.013	1.439	1.079	1.917	1.400	.315	1.070	.937	1.222	14.826	.001	1.455	1.168	1.811	135.831	.000	.538	.471	.614							
Physical Activity (Light/Mod Activity)	1.457	.338	1.172	.846	1.623	18.686	.000	1.325	.984	1.322	7.890	.023	1.331	1.039	1.705	31.280	.000	1.343	1.168	1.545							
Physical Activity (Vigorous)	.292	.641	1.068	.809	1.409	4.747	.081	1.140	.984	1.322	2.42	0.231	.877	.707	1.088	26.473	.000	1.298	1.139	1.480							
Coronary Heart Disease	.078	.825	1.044	.712	1.531	5.726	.038	.841	.715	.991	.179	.690	.954	.756	1.203	84.316	.000	.519	.444	.607							
Age >40	88.868	.000	*	*	*	172.08	.000	*	*	*	107.34	.000	*	*	*	441.276	.000	*	*	*							
BMI >25	23.303	.001	*	*	*	14.845	.021	*	*	*	4.125	.372	*	*	*	30.146	.000	*	*	*							

Note. \*OR not applicable, continuous variable

**Table 5**  
**DM Risk Factors/Prevalence and CAM Use**

Risk Factor	Alternative Medical Systems			Biologically Based Therapies			Body Based Therapies			Mind Body Therapies										
	Chi Square	p value	OR	95% CI	LL	UL	Chi Square	p value	OR	95% CI	LL	UL	Chi Square	p value	OR	95% CI	LL	UL		
Hypertension	1.002	.458	1.07	.891	1.291	37.878	.000	.815	.748	.887	.036	.869	.990	.882	1.112	335.015	.000	.568	.529	.610
Smoking	12.946	.003	.802	.682	.930	78.147	.000	.763	.710	.821	14.638	.002	.839	.753	.935	.710	.514	1.023	.955	1.097
DM	7.630	.013	1.439	1.079	1.917	1.400	.315	1.070	.937	1.222	14.826	.001	1.455	1.168	1.811	135.831	.000	.538	.471	.614
Physical Activity (Light/Mod Activity)	1.457	.338	1.172	.846	1.623	18.686	.000	1.325	.984	1.322	7.890	.023	1.331	1.039	1.705	31.280	.000	1.343	1.168	1.545
Physical Activity (Vigorous)	.292	.641	1.068	.809	1.409	4.747	.081	1.140	.984	1.322	2.42	0.231	.877	.707	1.088	26.473	.000	1.298	1.139	1.480
Age >40	88.868	.000	*	*	*	172.08	.000	*	*	*	107.34	.000	*	*	*	441.276	.000	*	*	*
BMI >25	23.303	.001	*	*	*	14.845	.021	*	*	*	4.125	.372	*	*	*	30.146	.000	*	*	*

Note. \*OR not applicable, continuous variable

**Question 2)** Is there a relationship between CVD risk behaviors and CAM use?

Twelve CVD risk factors were grouped together to form the CVD risk factor variable. The risk factors consisted of: 1) ever being told they had hypertension, 2) being told they had high cholesterol, 3) being male, 4) over the age of 40, 5) ever having smoked 100 cigarettes, 6) having poor circulation, 7) having angina, 8) having a heart condition, 9) having DM, 10) having ever been told they had prediabetes, 11) BMI>25, and 12) not participating in light, moderate, or vigorous physical activity once per week or more.

**CAM use and CVD risk factors.**

Among participants who answered yes to having one or more risk factors for CVD, 86% reported having used CAM. Among participants who reported no risk factors for CVD 84.9% reported having used CAM. Findings are reported in Table 2.

**Relationship between CAM use by types and risk factors.**

Further analyses were then conducted to examine the relationship between each risk factor and CAM therapy use by type of CAM. Findings are reported in Table 4. Smoking, (Chi square 12.94,  $p < .05$ , odds ratio .802, 95% CI .692-.930), having been told one had prediabetes; (Chi square 13.98,  $p < .05$ , odds ratio .589, 95% CI .425-.817); and DM, (Chi square 7.63,  $p < .05$ , odds ratio 1.439, 95% CI 1.079-1.917) were variables found to be significantly related to the use of alternative medical systems. The overall results for this question regarding the use of alternative medical systems were: the odds of being a smoker were .802 higher in participants who used alternative medical systems, the odds of having prediabetes were .589 times higher in participants who used alternative medical systems, and the odds of having DM were 1.4 times higher for participants who used alternative medical systems than participants who did not use alternative medical systems. This suggests alternative medical systems may have a health promoting effect on

participants with DM, may be used by healthier individuals (nonsmokers), and may be beneficial in the prevention of prediabetes.

Hypertension, (Chi square 37.87,  $p < .05$ , odds ratio .815, 95% CI .748-.887), high cholesterol, (Chi square 163.73,  $p < .05$ , odds ratio .650, 95% CI .603-.702), smoking, (Chi square 78.4,  $p < .05$ , odds ratio .763, 95% CI .710-.821), and participating in light to moderate activity once per week or more, (Chi square 18.68,  $p < .05$ , odds ratio 1.32, 95% CI 1.140-1.541) were variables found to be significantly related to the use of biologically based therapies. The overall results for this question regarding the use of biologically based therapies were: the odds of hypertension were .815 times higher, the odds of high cholesterol were .650 times higher, the odds of smoking were .763 times higher, and the odds of participating in physical activity were 1.32 times higher for participants who used biologically based therapies than participants who did not use biologically based therapies. This suggests biologically based therapies may be beneficial in the prevention of hypertension and high cholesterol and may be used by healthier individuals (nonsmokers and those who exercise) as part of health promotion practices.

High cholesterol, (Chi square 30.86,  $p < .05$ , odds ratio .756, 95% CI .675-.848), smoking, (Chi square 14.63,  $p < .05$ , odds ratio .839, 95% CI .753-.935), and participating in light to moderate activity once per week or more, (Chi square 7.89,  $p < .05$ , odds ratio 1.33, 95% CI 1.039-1.705) were variables found to be significantly related to the use of body based therapies. The overall results for this question regarding body based therapies were: the odds of having high cholesterol were .756 times higher, the odds of smoking were .839 times higher, and the odds of participating in light to moderate physical activity were 1.33 times higher in participants who used body based therapies than participants who did not use body based therapies. This suggests body based therapies



may be beneficial in the prevention of high cholesterol and may be used by healthier individuals (nonsmokers and those who exercise) as part of health promotion practices.

Hypertension, (Chi square 335.01,  $p < .05$ , odds ratio .568, 95% CI .529-.60), high cholesterol (Chi square 283.42,  $p < .05$ , odds ratio .583, 95% CI .542-.627), participating in light to moderate activity once per week or more, (Chi square 31.28,  $p < .05$ , odds ratio 1.34, 95% CI 1.139-1.480), and participating in vigorous activity once per week or more, (Chi square 26.47,  $p < .05$ , odds ratio 1.29,) were variables found to be significantly related to the use of mind body therapies. The overall results for this question regarding mind body based therapies were: the odds of having hypertension were .568 higher, the odds of having high cholesterol were .583 times higher, the odds of participating in light to moderate physical activity were 1.34 times higher, and the odds of participating in vigorous activity were 1.29 times higher in participants who used mind body therapies than participants who did not use mind body therapies. This suggests mind body therapies may be beneficial in the prevention of hypertension and high cholesterol and may be used by healthier individuals (those who exercise) as part of health promotion practices.

**Question 3)** Is there a relationship between DM risk behaviors and CAM use?

Six DM risk factors were grouped together to form the DM risk factor variable. The risk factors consisted of: 1) ever been told they had hypertension, 2) over the age of 40, 3) ever having smoked 100 cigarettes, 4) having prediabetes, 5) BMI >25, and 6) not participating in light, moderate, or vigorous physical activity once per week or more. Statistical analyses revealed relationships between DM risk behaviors and all four groups of CAM.

**CAM use and DM risk factors.**

Participants who answered yes to having the presence of one or more risk factors for DM 87% reported having used CAM. Participants who reported no risk factors for CVD 82.2% reported having used CAM. Findings are reported in Table 3.

**Relationship between CAM use by types and risk factors.**

Further analyses were then conducted to examine the relationship between each risk factor and CAM therapy use by type of CAM. Findings are reported in Table 5. Smoking, (Chi square 12.94,  $p < .05$ , odds ratio .802, 95% CI .692-.930) was found to be significantly related to the use of alternative medical systems. Overall results for this question regarding the use of alternative medical systems were: the odds of smoking were .802 times higher in participants who used alternative medical systems than participants who did not use alternative medical systems. This suggests alternative medical systems may be used by healthier individuals (nonsmokers) as part of health promotion practices.

Hypertension, (Chi square 37.87,  $p < .05$ , odds ratio .815, 95% CI .748-.887); smoking, (Chi square 78.4,  $p < .05$ , odds ratio .763, 95% CI .710-.821), and participation in light to moderate activity, (Chi square 18.68,  $p < .05$ , odds ratio 1.32, 95% CI 1.140-1.541) were found to be significantly related to the use of biologically based therapies.

The overall results for this question regarding the use of biologically based therapies were: the odds of having hypertension were .815 times higher, the odds of smoking were .763 times higher, and the odds of participating in light to moderate physical activity were 1.32 times higher in participants who used biologically based therapies than participants who did not use biologically based therapies. This suggests biologically based therapies may be beneficial in the prevention of hypertension and may be used by healthier individuals (nonsmokers and those who exercise) as part of health promotion practices.

Smoking, (Chi square 14.63,  $p < .05$ , odds ratio .839, 95% CI .753-.935), and participating in light to moderate activity once per week or more, (Chi square 7.89,  $p < .05$ , odds ratio 1.33, 95% CI 1.039-1.705) were variables found to be significantly related to the use of body based therapies.

The overall results for this question regarding body based therapies were: the odds of smoking were .839 times higher and the odds of participating in light to moderate physical activity were 1.33 times higher in participants who used body based therapies than participants who did not use body based therapies. This suggests body based therapies may be used by healthier individuals (nonsmokers and those who exercise) as part of health promotion practices.

Hypertension, (Chi square 335.01,  $p < .05$ , odds ratio .568, 95% CI .529-.60), and participating in light to moderate activity once per week or more (Chi square 31.28,  $p < .05$ , odds ratio 1.34, 95% CI 1.139-1.480), and participating in vigorous activity once per week or more, (Chi square 26.47,  $p < .05$ , odds ratio 1.29) were variables found to be significantly related to the use of mind body therapies.

The overall results for this question regarding mind body based therapies were: the odds of having hypertension were .568 higher, the odds of participating in light to moderate physical activity were 1.34 times higher, and the odds of participating in vigorous activity were 1.29 times higher in participants individuals who used mind body therapies than participants who did not use mind body therapies. This suggests mind body therapies may be beneficial in the prevention of hypertension and may be used by healthier individuals (those who exercise) as part of health promotion practices.

Prediabetes was the only variable found to be significantly related to the use of all four groups of CAM therapies. Alternative medical systems, (Chi square 13.98,

$p < .05$ , odds ratio .589, 95% CI .425-.817), biologically based therapies (Chi square 82.82,  $p < .05$ , odds ratio .496, 95% CI .411-.598), body based therapies (Chi square 36.49  $p < .05$ , odds ratio .533, 95% CI .420-.676), and mind body therapies (Chi square 57.29,  $p < .05$ , odds ratio .533, 95% CI .444-.640).

The overall results for this question were: the odds of prediabetes were .589 times higher in participants who used alternative medical systems than participants who did not use alternative medical systems, the odds of prediabetes were .496 times higher in participants who used biologically based therapies than participants who did not use biologically based therapies, the odds of prediabetes were .533 times higher in participants who used body based therapies than in participants who did not use body based therapies and the odds of having prediabetes were .533 times higher in participants who used mind body therapies than participants who did not use mind body therapies. This suggests all four CAM categories may be beneficial in the prevention of developing pre-diabetes.

**Question 4)** Is there a relationship between CVD prevalence and CAM use?

Angina, a heart condition, and coronary heart disease were the three variables used to determine CVD prevalence. Statistical analyses revealed relationships between angina, a heart condition, and coronary heart disease prevalence and biologically based, body based, and mind body based CAM groups. Findings are reported in Table 4.

All three variables; angina, (Chi square 13.03,  $p < .05$ , odds ratio .691, 95% CI .551-.867) a heart condition (Chi square 76.57,  $p < .05$ , odds ratio .621, 95% CI .55-.702);, and coronary heart disease (Chi square 5.72,  $p < .05$ , odds ratio .841, 95% CI .715-.991) were found to have a significant relationship to biologically based therapies; Ever being told one had a heart condition, (Chi square 33.4,  $p < .05$ , odds ratio .641, 95% CI .531-.774) was found to have a significant relationship with body based therapies, and angina,

(Chi square 76.63,  $p < .05$ , odds ratio .371, 95% CI .281-.491); a heart condition (Chi square 172.22,  $p < .05$ , odds ratio .472, 95% CI .407-.547), and coronary heart disease; (Chi square 84.31,  $p < .05$ , odds ratio .519, 95% CI .444 -.607) were all found to have a significant relationship to mind body therapies.

The overall results for this question were: the odds of angina were .691 times higher in participants who used biologically based therapies than participants who did not use biologically based therapies, the odds of angina were .371 times higher for participants who used mind body therapies than participants who did not use mind body therapies. The odds of having a heart condition were .621 times higher in participants who used biologically based therapies than participants who did not use biologically based therapies, the odds of having a heart condition were .641 times higher in participants who used body based therapies than participants who did not use body based therapies, and the odds of having a heart condition were .472 times higher in participants who used mind body therapies than participants who did not use mind body therapies. The odds of having coronary heart disease were .841 times higher in participants who used biologically based therapies than participants who did not use biologically based therapies, and the odds of having coronary heart disease were .519 times higher in participants who used mind body therapies than participants who did not use mind body therapies. This suggests biologically based and mind body therapies may be beneficial in the prevention of angina, biologically based, body based, and mind body based therapies may be beneficial in the prevention of developing a heart condition, and biologically based and mind body therapies may be beneficial in the prevention of coronary heart disease.

**Question 5)** Is there a relationship between DM prevalence and CAM use?

DM was the variable used to determine DM prevalence. Statistical analyses revealed there were relationships between DM prevalence and alternative medical systems, body based, and mind body CAM groups. Findings are reported in table 5.

DM was found to be significantly related to the use of alternative medical systems, (Chi square 7.63,  $p < .05$ , odds ratio 1.43, 95% CI 1.079-1.917); body based therapies, (Chi square 14.82,  $p < .05$ , odds ratio 1.45, 95% CI 1.168-1.811); mind body therapies, (Chi square 135.83,  $p < .05$ , odds ratio .538, 95% CI .471-.614). The overall results for this question were: the odds of having DM were 1.43 times higher in participants who used alternative medical systems than participants who did not use alternative medical systems, the odds of having DM were 1.45 times higher in participants who used body based therapies than participants who did not use body based therapies, and the odds of having DM were .538 times higher in participants who used mind body therapies than participants who did not use mind body therapies. This suggests alternative medical systems and body based therapies may have a health promoting effect on participants with DM and mind body therapies may be beneficial in the prevention of DM.

### **Questions 6-9**

Question 6) Does CAM use affect the presence of CVD risk factors?

Question 7) Does CAM use affect the presence of DM risk factors?

Question 8) Does CAM use affect the presence of CVD?

Question 9) Does CAM use affect the presence of DM?

### **Analytic Methods**

The analytic methods to answer questions 6, 7, 8, and 9 were the same as described in chapter 3. To answer questions 6, 7, 8 and 9 logistic regression analysis, odds ratios, Wald statistic, and Nagelkerke's R<sup>2</sup> were used to predict whether using CAM significantly

increased or decreased CVD or CVD risk factor presence and whether CAM use significantly increased or decreased DM or DM risk factor presence. Results for questions 6-9 are reported in Tables 6 and 7.

**Question 6)** Does CAM use affect the presence of CVD risk factors?

Results for question 6 are reported in Table 6. Logistic regression results examining CAM and CVD risk factor presence indicated that only two groups of CAM therapies significantly ( $p < .01$ ) contributed to the model. Nagelkerke's  $R^2$  of .005 indicated a weak relationship between CAM use and CVD risk factor presence. Biologically based therapies ( $p = .001$ ) and mind body therapies ( $p = .000$ ) contributed to the presence of CVD risk factors. Alternative medical systems and body based therapies were not significant predictors.

The model used in the analysis was:

$$1) \text{Log} (P (\text{CVD} = 1)) = \alpha + \beta (\text{CAM})$$

The results indicated the odds of having one or more CVD risk factors were .750 (95% CI .637 - .884) times higher for participants who used biologically based therapies and .770 (95% CI .674 - .880) times higher for participants who used mind body therapies than participants who did not use biologically based or mind body therapies. This suggests biologically based and mind body therapies may be beneficial in the prevention of CVD. Each of the risk factors is described in further detail to aid in understanding the results for question #6.

**Table 6**  
**CVD Risk Factors/Prevalence and CAM Use**

*Use- Logistic Regression*

Risk Factor	Alternative Medical Systems					Biologically Based Therapies					Body Based Therapies					Mind Body Therapies				
	Wald	p value	Exp (B)	95% CI L	95% CI U	Wald	p value	Exp (B)	95% CI L	95% CI U	Wald	p value	Exp (B)	95% CI L	95% CI U	Wald	p value	Exp (B)	95% CI L	95% CI U
Hypertension	4.630	.032	1.23	1.018	4.159	14.368	.000	.843	.772	1.492	1.194	.275	1.070	.947	1.208	232.197	.000	.573	.533	.616
Smoking	1.143	.286	.918	.784	1.075	44.500	.000	.775	.719	.836	2.828	.094	.908	.784	1.017	2.148	.144	1.054	.982	1.130
Physical Activity (Light/Mod Activity)	.038	.846	.968	.694	1.349	9.234	.003	1.256	1.084	1.456	2.486	.116	1.220	.952	1.562	14.175	.000	1.308	1.137	1.505
Physical Activity (Vigorous)	.026	.871	1.023	.773	1.355	2.566	.110	1.130	.973	1.312	.000	.000	.000	.000	.000	14.689	.000	1.292	1.133	1.474
Pre-Diabetes	0.161	0.69	.929	.649	1.331	30.580	.000	.565	.461	.692	9.278	.003	.674	.523	.870	33.615	.000	.580	.482	.698
Angina	.008	.928	1.024	.615	1.706	4.197	.041	.768	.597	.990	.087	.769	.946	.652	1.373	45.636	.000	.382	.289	.506
High Cholesterol	4.112	.043	1.201	1.005	1.434	80.396	.000	.688	.633	.747	5.804	.017	.862	.763	.973	179.006	.000	.604	.561	.651
Coronary Heart Disease	.701	.403	1.192	.789	1.800	1.805	.180	.886	.742	1.058	.040	.841	1.026	.797	1.321	67.046	.000	.522	.447	.611
Heart Condition	.668	.414	1.135	.836	1.541	32.811	.000	.689	.606	.783	7.815	.006	.749	.611	.918	85.582	.000	.494	.425	.574
Poor Circulation	.066	.797	.967	.747	1.252	2.209	.138	.907	.796	1.032	1.481	.225	1.129	.928	1.373	192.61	.000	.407	.359	.463
DM	4.574	.033	1.385	1.026	1.869	1.009	.316	.000	.000	.000	11.433	.001	1.458	1.171	1.816	92.967	.000	.524	.459	.598
Male	12.511	.000	1.357	1.145	1.608	3.284	.071	1.071	.994	1.153	14.302	.000	1.240	1.109	1.386	234.053	.000	1.709	1.595	1.831



**Table 7**  
**DM Risk Factors/Prevalence and CAM Use**  
*Use- Logistic Regression*

Risk Factor	Alternative Medical Systems					Biologically Based Therapies					Body Based Therapies					Mind Body Therapies				
	Wald F	p value	Exp (B)	95% CI L	95% CI U	Wald F	p value	Exp (B)	95% CI L	95% CI U	Wald F	p value	Exp (B)	95% CI L	95% CI U	Wald F	p value	Exp (B)	95% CI L	95% CI U
Hypertension	4.630	.032	1.23	1.018	4.159	14.368	.000	.843	.772	1.492	1.194	.275	1.070	.947	1.208	232.197	.000	.573	.533	.616
Smoking	1.143	.286	.918	.784	1.075	44.500	.000	.775	.719	.836	2.828	.094	.908	.784	1.017	2.148	.144	1.054	.982	1.130
Physical Activity (Light/Mod Activity)	.038	.846	.968	.694	1.349	9.234	.003	1.256	1.084	1.456	2.486	.116	1.220	.952	1.562	14.175	.000	1.308	1.137	1.505
Physical Activity (Vigorous)	.026	.871	1.023	.773	1.355	2.566	.110	1.130	.973	1.312	.000	.000	.000	.000	.000	14.689	.000	1.292	1.133	1.474
Pre-Diabetes	0.161	0.69	.929	.649	1.331	30.580	.000	.565	.461	.692	9.278	.003	.674	.523	.870	33.615	.000	.580	.482	.698

## Hypertension

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of hypertension. Nagelkerke's R<sup>2</sup> of .02 indicated a weak relationship between CAM use and CVD risk factor presence. The use of alternative medical systems ( $p = .032$ ), biologically based therapies ( $p = .000$ ), and mind body therapies ( $p=.000$ ) contributed as predictors of hypertension. Body based therapies were not significant predictors.

The model used in the analysis was:

$$2) \text{Log (P (Hypertension = 1))} = \alpha + \beta (\text{CAM})$$

Results indicated the odds of hypertension were 1.2 times higher for participants who used alternative medical systems (95% CI 1.018-1.492), .843 times higher for participants who used biologically based therapies (95% CI .772-.921), and .573 times higher for participants who used mind body therapies (95% CI .533-.616) than participants who did not use alternative medical systems, biologically based therapies, or mind body therapies.

The overall results suggest that participants with hypertension used alternative medical systems (acupuncture, Ayurveda, homeopathy, and traditional healers) more than any of the three remaining types of CAM. Participants with hypertension used alternative medical systems more than participants who did not have hypertension. Participants with hypertension used biologically based and mind body therapies less than participants without hypertension. This suggests that alternative medical systems may have a health promoting effect on participants with hypertension and biologically based and mind body therapies may be beneficial in the prevention of hypertension.

### High Cholesterol

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of high cholesterol. Nagelkerke's R<sup>2</sup> of .027 indicated a weak relationship between CAM use CVD risk factor presence. Alternative medical systems ( $p = .043$ ), biologically based therapies ( $p = .000$ ), body based therapies ( $p=.017$ ), and mind body therapies ( $p=.000$ ) contributed to whether participants had high cholesterol.

The model used in the analysis was:

$$3) \text{Log (P (High Cholesterol} = 1) = \alpha + \beta \text{ (CAM)}$$

Results indicated the odds of high cholesterol were 1.2 times higher for participants who used alternative medical systems (95% CI 1.005-1.434), .688 times higher for participants who used biologically based therapies (95% CI .633-.747), .862 times higher for participants who used body based therapies (95% CI .763-.973), and .604 times higher for participants who used mind body therapies (95% CI .561-.651) than participants who did not use alternative medical systems, biologically based therapies, body based therapies, or mind body therapies.

The overall results suggest that participants with high cholesterol used alternative medical systems more than participants without high cholesterol and used biologically based, body based, and mind body CAM therapies less than participants without high cholesterol. This suggests alternative medical systems may have a health promoting effect on participants with high cholesterol and biologically based, body based, and mind body therapies may be beneficial in the prevention of high cholesterol.

### **Smoking**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of smoking. Nagelkerke's R<sup>2</sup> of .005 indicated a weak relationship between CAM use CVD risk factor presence. Biologically based therapies ( $p = .000$ ) contributed to whether participants smoked.

The model used in the analysis was:

$$4) \text{Log (P (Smoking = 1) = } \alpha + \beta \text{ (CAM))}$$

Results indicated the odds of having smoked 100 cigarettes were .775 higher for participants who used biologically based therapies (95% CI .79-.836) than participants who did not use biologically based therapies. Alternative medical systems, body based therapies and mind body therapies were not significant predictors.

The overall results suggest that smokers used biologically based therapies less than nonsmokers. This suggests healthier people (those who do not smoke) may use biologically based CAM therapies as part of health promotion.

### **Participation in Light to Moderate Physical Activity**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of participating in light/moderate or vigorous physical activity more than once per week. Nagelkerke's R<sup>2</sup> of .005 and .004 respectively, indicated a weak relationship between CAM use CVD risk factor presence. Biologically based therapies ( $p=.003$ ) and mind body therapies ( $p=.000$ ) contributed to whether participants participated in light/moderate activity and mind body therapies contributed to whether participants participated in vigorous activity ( $p= .000$ ).

The model used in the analysis was:

$$5) \text{Log (P (Participating in Light to Moderate Physical Activity = 1) = } \alpha + \beta \text{ (CAM))}$$

Results indicated the odds of participating in light to moderate physical activity more than once per week were 1.2 times (95% CI 1.084-1.456) higher for participants who used biologically based therapies and 1.30 (95% CI 1.137-1.505) times higher for participants who used mind body therapies than participants who did not use biologically based or mind body therapies. The odds of participating in vigorous activity more than once per week were 1.2 (95% CI 1.13-1.47) times higher for participants who used mind body therapies than participants who did not use mind body therapies.

The overall results suggest participants who participated in physical activity more than once per week used biologically based and mind body therapies more than participants who did not exercise. This suggests healthier people (participants who participate in physical activity) may use biologically based and mind body therapies as part of health promotion.

**Question 7) Does CAM use affect the presence of DM risk factors?**

Results are reported in Table 7. Logistic regression results examining CAM and DM risk factor presence indicated that only two groups of CAM therapies significantly ( $p < .01$ ) contributed to the model. Nagelkerke's  $R^2$  of .011 indicated a weak relationship between CAM use and DM risk factor presence.

The model used in the analysis was:

$$6) \text{Log} (P (DM = 1)) = \alpha + \beta (\text{CAM})$$

The results indicated the odds of having one or more DM risk behaviors were .771 (95% CI .674-.883) times higher for participants who used biologically based therapies and were .681 times higher for participants who used mind body therapies (95% CI .607-.764) than participants who did not use biologically based or mind body therapies.

This suggested participants with DM risk factors used biologically based and mind body therapies less than participants who did not have DM risk factors.

Each of the risk factors is described in further detail to aid in understanding the results for question #7.

### **Hypertension**

Further analyses were conducted to determine which DM risk factors could be predicted as being present in participants who use biologically based or mind body CAM therapies. Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of hypertension. Nagelkerke's  $R^2$  of .02 indicated a weak relationship between CAM use and DM risk factor presence.

Three groups of CAM therapies contributed to whether participants had DM, alternative medical systems ( $p = .032$ ), biologically based therapies ( $p = .000$ ), and mind body therapies ( $p=.000$ ). Body based therapies were not significant predictors.

The model used in the analysis was:

$$7) \text{ Log (P (Hypertension = 1))} = \alpha + \beta (\text{CAM})$$

Results indicated the odds of hypertension were 1.2 times higher for individuals who used alternative medical systems (95% CI 1.018-1.492), .843 times higher for individuals who used biologically based therapies (95% CI .772-.921), and .573 times higher for individuals who used mind body therapies (95% CI .533-.616) than participants who did not use alternative medical systems, biologically based therapies, or mind body therapies.

The overall results suggest that participants with hypertension used alternative medical systems (acupuncture, Ayurveda, homeopathy, and traditional healers) more than

any of the three remaining types of CAM. Participants with hypertension used alternative medical systems more than participants who did not have hypertension. Participants with hypertension used biologically based and mind body therapies less than participants without hypertension. This suggests that alternative medical systems may have a health promoting effect on participants with hypertension and biologically based and mind body therapies may be beneficial in the prevention of hypertension.

### **Participation in Physical Activity**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of participating in light/moderate or vigorous physical activity more than once per week. Nagelkerke's R<sup>2</sup> of .005 and .004, respectively, indicated a weak relationship between CAM use and DM risk factor presence. Biologically based therapies ( $p=.003$ ) and mind body therapies ( $p=.000$ ) significantly contributed to whether one participated in light/moderate activity and mind body therapies made a significant contribution to whether one participated in vigorous activity ( $p= .000$ ).

The model used in the analysis was:

$$8) \text{Log (P (Participating in Light to Moderate Physical Activity} = 1) = \alpha + \beta \text{ (CAM)}$$

Results indicated the odds of participating in light to moderate physical activity more than once per week were 1.2 times (95% CI 1.084-1.456) higher for participants who used biologically based therapies and 1.30 (95% CI 1.137-1.505) times higher for participants who used mind body therapies than participants who did not use biologically based or mind body therapies. The odds of participating in vigorous activity more than

once per week were 1.2 (95% CI 1.13-1.47) times higher for participants who used mind body therapies than participants who did not use mind body therapies.

The overall results suggested participants who participated in physical activity more than once per week used biologically based and mind body therapies more than participants who did not exercise. This suggests healthier people (participants who participate in physical activity) may use biologically based and mind body therapies as part of health promotion.

### **Smoking**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of smoking. Nagelkerke's R<sup>2</sup> of .005 indicated a weak relationship between CAM use and DM risk factor presence. The one group of CAM therapies that significantly contributed to whether or not participants smoked was biologically based therapies ( $p = .000$ ).

The model used in the analysis was:

$$9) \text{Log} (P (\text{Smoking} = 1)) = \alpha + \beta (\text{CAM})$$

Results indicated the odds of having smoked 100 cigarettes were .775 higher for individuals who used biologically based therapies (95% CI .79-.836) than participants who did not use biologically based therapies. Alternative medical systems, body based therapies and mind body therapies were not significant predictors. The overall results suggest that smokers used biologically based therapies less than nonsmokers. This suggests healthier people (participants who do not smoke) may use biologically based CAM therapies as part of health promotion.



### **Prediabetes**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of prediabetes. Nagelkerke's R<sup>2</sup> of .025 indicated a weak relationship between CAM use and DM risk factor presence.

Biologically based therapies ( $p=.000$ ), body based therapies ( $p=.003$ ), and mind body therapies ( $p=.000$ ) significantly contributed to whether participants had prediabetes.

The model used in the analysis was:

$$10) \text{Log} (P (\text{Prediabetes} = 1)) = \alpha + \beta (\text{CAM})$$

Results indicated the odds of having prediabetes were .565 times higher for individuals who used biologically based therapies (95% CI .461-.692), .674 times higher for participants who used body based therapies (95% CI .523-.870), and .580 times higher for participants who used mind body therapies (95% CI .482-.698) than participants who did not use biologically based, body based, or mind body therapies. The overall results suggest participants having prediabetes used biologically based, body based and mind body CAM therapies less than participants without prediabetes. This suggests biologically based, body based, and mind body therapies may be beneficial in the prevention of developing prediabetes.

### **Question 8) Does CAM use affect the presence of CVD?**

A logistic regression analysis was conducted to evaluate whether CAM use predicts the presence of CVD. Results are reported in Table 6. The presence of CVD was defined as one who responded yes to ever having been told they had angina, poor circulation, a heart condition, or coronary heart disease. Each of the risk factors is described in further detail to aid in understanding the results for question #8.

### **Angina**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of angina. Nagelkerke's R<sup>2</sup> of .023 indicated a weak relationship between CAM use and CVD presence. Biologically based therapies ( $p=.041$ ) and mind body therapies ( $p=.000$ ) significantly contributed whether participants had angina.

The model used in the analysis was:

$$11) \text{Log} (P (\text{Angina} = 1)) = \alpha + \beta (\text{CAM})$$

Results indicated the odds of angina were .768 times higher for individuals who used biologically based therapies (95% CI .597-.990) and .382 times higher for participants who used mind body therapies (95% CI .289-.506) than participants who did not use biologically based or mind body therapies. This suggests biologically based and mind body therapies may be beneficial in the prevention of developing angina.

### **Coronary Heart Disease**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of coronary heart disease. Nagelkerke's R<sup>2</sup> of .013 indicated a weak relationship between CAM use and CVD presence. Mind body therapies ( $p=.000$ ) significantly contributed to whether participants had coronary heart disease.

The model used in the analysis was:

$$12) \text{Log} (P (\text{Coronary Heart Disease} = 1)) = \alpha + \beta (\text{CAM})$$

Results indicated the odds of coronary heart disease were .522 higher for individuals who used mind body therapies (95% CI .447-.611) than participants who did

not use mind body therapies. This suggests mind body therapies may be beneficial in the prevention of coronary heart disease.

### **Heart Condition**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of a heart condition. Nagelkerke's R<sup>2</sup> of .026 indicated a weak relationship between CMA use and CVD presence. Biologically based therapies ( $p=.000$ ), body based therapies ( $p=.006$ ) and mind body therapies ( $p=.000$ ) significantly contributed to whether participants had a heart condition.

The model used in the analysis was:

$$13) \text{Log (P (Heart Condition = 1))} = \alpha + \beta (\text{CAM})$$

Results indicated the odds of having a heart condition were .689 higher for participants who used biologically based therapies (95% CI .606-.783), .749 higher for participants who used body based therapies (95% CI .611-.918), and .494 times higher for participants who used mind body therapies (95% CI .425-.574) than participants who did not use biologically based, body based, or mind body therapies. This suggests biologically based, body based, and mind body therapies may be beneficial in the prevention of developing a heart condition.

### **Poor Circulation**

Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of poor circulation. Nagelkerke's R<sup>2</sup> of .031 indicated a weak relationship between CAM use and CVD presence. Mind body therapies ( $p=.000$ ) significantly contributed to whether participants had poor circulation.

The model used in the analysis was:

$$14) \text{Log (P (Poor Circulation = 1))} = \alpha + \beta (\text{CAM})$$

Results indicated the odds of having poor circulation were .407 times higher for participants who used mind body therapies (95% CI .349-.463) than participants who did not use mind body therapies. The overall results suggested there is an association between CAM use and the presence of CVD. This suggests mind body therapies may be beneficial in the prevention of developing poor circulation.

**Question 9)** Does CAM use affect the presence of DM?

A logistic regression analysis was conducted to evaluate whether CAM use predicts the presence of DM. The results are reported in Table 7. The presence of CVD was defined as one who responded yes to ever having been told they had DM. Tests of model effects were statistically significant indicating that the predictors as a set reliably distinguished the presence of DM. Nagelkerke's R<sup>2</sup> of .018 indicated a weak relationship between CAM use and DM development. Alternative medical systems ( $p=.033$ ), body based therapies ( $p=.001$ ) and mind body therapies ( $p=.000$ ) significantly contributed whether participants had DM.

The model used in the analysis was:

$$15) \text{Log (P (DM = 1))} = \alpha + \beta (\text{CAM})$$

Results indicated the odds of having DM were 1.38 times higher in participants individuals who used alternative medical systems (95% CI 1.026-1.869), 1.458 times higher in participants who used body based therapies (95% CI 1.171-1.816), and .524 higher in participants who used mind body therapies (95% CI .459-.598) than participants who did not use alternative medical systems, body based therapies, or mind body therapies.

The overall results suggest alternative medical systems and body based therapies may have a health promoting effect on participants who have DM and mind body therapies may be beneficial in the prevention of DM.

### **Summary of Findings**

Secondary data analysis of the 2007 NHIS data was performed to determine the use of CAM among survey participants who reported having the presence of CVD, DM and or associated risk factors. The variables that were determined to be significant predictors of the presence of CVD, DM, and or risk factors were analyzed using SPSS Complex Samples 21. A sampling plan was created and referenced for each statistical analysis due to the fact that the NHIS uses a probability-based complex sample design. The IBM SPSS Complex Samples procedure allowed for all sampling design elements, stratification, clusters, and weights.

The Chi Square test was used to determine statistical significance of all categorical variables as well as the odds ratio for variables with 2 level outcomes. The variables that were determined to be significant were analyzed using logistic regression. Statistical significance was determined by 95% confidence levels and  $p$  values  $<.05$ .

There were a total of 23,393 participants in the study of which 86.5% reported having either one or more risk factors for CVD or the presence of CVD. Likewise 87.0% reported having either one or more risk factors for DM or the presence of DM. Over 80% of all survey participants regardless of age, race, gender, employment status, marital status, or geographic location reported having used some type of CAM.

The null hypotheses for each of the research questions were rejected based on the results of the statistical tests. There were weak relationships among participants who had

risk behaviors for CVD (Nagelkerke .005) or DM (Nagelkerke .011) and CAM use. Pseudo R squared values are reported with respect to being thorough however, low R<sup>2</sup> values in logistic regression are the norm and this may present a problem when reporting to an audience accustomed to seeing linear regression values, therefore routine publishing of R<sup>2</sup> values with results from fitted logistic models is not recommended (Hosmer & Lemeshow, 2000). The results of this study suggested there is a relationship between CVD and DM risk behaviors and CAM use, there is a relationship between CVD and DM prevalence and CAM use, and CAM use contributes to the presence of CVD, DM, and or associated risk factors. These findings suggested two important points to consider in health promotion and disease prevention. First, CAM therapies may have health promoting effects for those who have CVD and or DM and second, CAM therapies may be beneficial in the prevention of CVD and DM.

## CHAPTER 5

### **Overview of Study**

Costly, debilitating and largely preventable chronic diseases are among the key contributors to the increased health care costs in the United States. Seven out of ten deaths among Americans each year are from chronic diseases. Two of the most common, costly and preventable problems in the United States are CVD and DM. The chronic and complex diseases of modern times require movement away from the current medical model which is one with a focus on cure to one with a focus on prevention and promotion. People who have chronic diseases may be more likely to use CAM (Saydah & Eberhardt, 2006), but the extent to which those who use CAM and also engage in positive health behaviors or exhibit fewer risk factors is unknown. The aim of this study was to determine whether the use of CAM was associated with health behaviors or risk factors known to impact CVD and diabetes. Secondary data analysis of the 2007 NHIS data, the most recent to include CAM use was conducted. Statistical analyses of the data were performed using Statistical Product and Service Solutions (SPSS). Findings from this study provide knowledge regarding the use of CAM therapies and their potential effects on the chronic diseases of CVD and DM. Findings may lead to the development of interventions which can be empirically tested regarding the effects of CAM therapies and their role in health promotion and disease prevention.

This chapter will begin with a brief description of the methodology and limitations and then explore how knowledge from this study can be used to profoundly

affect National Healthcare Expenditures by facilitating movement away from the current U.S. medical model of cure to one of prevention by using CAM therapies.

### **Methodology**

The household, sample adult, and adult alternative medicine data files from the 2007 NHIS were merged and sorted. Variables were recoded into dichotomous variables where necessary. The current study used two well-established risk prediction models as the foundation for choosing which variables were included in the study. The variables were grouped as to whether one answered yes or no regarding whether they had ever been told they had each risk factor or the presence of CVD and or DM. Variables were grouped according to whether the variables were risk factors for CVD and or DM and whether the participants had the presence of CVD or DM. CAM therapies were grouped into one of four categories based on the NCCAM groupings that were used in the 2007 NHIS; alternative medical systems, biologically based therapies, body based therapies, and mind body based therapies. Alternative medical systems included acupuncture, Ayurveda, homeopathy, naturopathy, and traditional healers. Traditional healers use methods based on native theories, beliefs, and experiences handed down from generation to generation. Seven specific types of healers were included in the 2007 NHIS: Curandero, Espiritista, Hierbero, Shaman, Botanica, Native American Healer or Medicine man, and Sobador (Barnes et al., 2008). Biologically based therapies included chelation, herbs, vitamins, minerals, and special diets. Manipulative and body based therapies included chiropractic, massage, and movement therapies. Mind body based therapies



included biofeedback, energy healing, hypnosis, yoga, relaxation, prayer, meditation, and deep breathing exercises.

Once the variables were re-coded a plan file was created which was used in all subsequent statistical analyses. This file creation was necessary due to the nature of the NHIS data which required appropriate weighting of variables to ensure that the resulting statistics were representative of the national sample. All statistical analyses were conducted using SPSS Complex Samples 21. Although statistical analyses yielded small values, significant ( $p < .05$ , 95% confidence intervals) relationships among variables were identified.

### **Limitations**

Limitations of the current study were related to the survey questions and the NHIS methods. Data were dependent on a respondent's memory, knowledge of CAM, understanding of CAM terms, and a willingness to report its use accurately. While there are more than 1800 CAM therapies, the number included in the survey was limited to 38 and did not include all practices that may have been used by individuals in the U.S. population (Berman & Snyder, 2010). The current study was limited by the inability to control for other variables that might result in the development of chronic diseases such as exposures, drugs, and other lifestyle risk behaviors that were not included in the current study.

The sampling strategy for the NHIS used random digit dialing to set up the interviews which required the use of a landline (CDC, 2008) and because of the current use of cell phones, may not have been an accurate reflection of the U.S. population, which limits the external validity of the conclusions. Complex data analysis technique

was used because the NHIS data were obtained using a complex multistage sampling design. Oversampling of small groups provided necessary estimates of variability within small groups. Use of weights correctly estimates population means and frequency from the sample but weighting alone leads to inappropriate population estimates of variability because they are computed as if the measures were taken from the entire population as opposed to a sample from the data set (Saylor, Friedman, & Lee, 2012). SPSS Complex Samples procedure was used to improve external validity of the current study because the procedure allowed inclusion of all sampling design elements, stratification, clusters, and weights. Caution was used when comparing the current study's findings with other studies because of the variance in sampling techniques and survey designs.

The CAM therapies were grouped into four categories consistent with the method used by the NHIS (Barnes et al., 2008) with the inclusion of prayer as a mind body therapy. Prayer was not included in one of the four CAM categories at the time of the 2007 NHIS data collection even though data related to prayer were collected. Since 2007 NCCAM has added prayer to the mind body CAM category (NIH, 2008) therefore prayer was included in the mind body category of CAM therapies in the current study. Grouping the therapies increased the risk of a type I error in the current study because some of the individual CAM therapies were obscure. Ayurveda, for example, has minimal use among the population (NIH, 2008). The number of comparisons made in the analyses may have led to statistical significance that might not have existed. Replicating this study using NHIS data from other years is recommended to compare and possibly strengthen the current study's findings.

## **Conclusions**

Examination of the relationship between CAM therapies in general, risk factors for CVD and DM, and the four major categories of CAM therapy revealed: 1) alternative medical systems; 2) biologically based therapies; 3) body based therapies; and 4) mind body therapies offer insights into the effects of CAM therapy on chronic disease of CVD and DM.

### **Sociodemographics**

The results of the study regarding sociodemographics of CAM users were similar to previous findings ( Saydah & Eberhardt, 2006, Arslan et al., 2012, Chang et al., 2007, Nahin et al., 2007) that noted the majority of CAM users are female, live in the western U.S., and have a chronic disease (CVD and or DM in this case).

### **Hypertension**

Participants with hypertension were more likely to use alternative medical systems and less likely to use biologically based and mind body therapies than those without hypertension. This finding suggests alternative medical systems may have a health promoting effect on those with hypertension and biologically based and mind body therapies may be beneficial in the prevention of hypertension.

### **High Cholesterol**

Participants with high cholesterol were more likely to use alternative medical systems and less likely to use biologically based, body based, and mind body therapies than those without high cholesterol. This finding suggests alternative medical systems may have a health promoting effect on those with high cholesterol and biologically based,

body based, and mind body therapies may be beneficial in the prevention of high cholesterol.

### **Smoking**

Smokers were less likely to use biologically based therapies than non-smokers. This suggests healthier people (those who do not smoke) may use biologically based CAM therapies as part of health promotion.

### **Participation in Light to Moderate Physical Activity**

Participants who participated in physical activity more than once per week were more likely to use biologically based and mind body therapies than those who did not participate in exercise. This finding suggests healthier people (those who participate in physical activity) may use biologically based and mind body therapies as part of health promotion.

### **Prediabetes**

Participants having prediabetes were less likely to use biologically based, body based, and mind body therapies than participants without prediabetes. This finding suggests biologically based, body based, and mind body therapies may be beneficial in the prevention of developing prediabetes.

### **Angina**

Participants who reported having angina were less likely to use biologically based and mind body therapies than participants without angina. This finding suggests biologically based and mind body therapies may be beneficial in the prevention of angina.

**Coronary Heart Disease**

Participants who reported having coronary heart disease were less likely to use mind body therapies than participants who did not have coronary heart disease. This finding suggests mind body therapies may be beneficial in the prevention of coronary heart disease.

**Heart Condition**

Participants who reported having a heart condition were less likely to use biologically based, body based, and mind body therapies than participants who did not have a heart condition. This finding suggests biologically based, body based, and mind body therapies may be beneficial in the prevention of developing a heart condition.

**Poor Circulation**

Participants who reported having poor circulation were less likely to use mind body therapies than participants who did not have poor circulation which suggests mind body therapies may be beneficial in the prevention of developing poor circulation.

**DM**

Participants who reported having DM were more likely to use alternative medical systems and body based therapies than those who did not have DM. Conversely, those who reported having DM were less likely to use mind body therapies than participants who did not have DM. This finding suggests alternative medical systems and body based therapies may have a health promoting effect on those who have DM and mind body therapies may be beneficial in the prevention of DM.

## Discussion

The results of this study regarding sociodemographics of CAM users were similar to previous findings (Saydah & Eberhardt, 2006, Arslan et al., 2012, Chang et al., 2007, Nahin et al., 2007) that noted the majority of CAM users are female, live in the western U.S., and have a chronic disease (CVD and or DM in this case). Findings suggested that participants of the 2007 NHIS who had risk behaviors for CVD or DM were less likely to use CAM therapies than those who did not have risk behaviors. Conversely, participants who had healthy behaviors such as not smoking and participation in physical activity at least once per week were more likely to use CAM, specifically biologically based, body based, and mind body based CAM therapies. The use of biologically based, body based, and mind body based CAM therapies may indicate healthier individuals use CAM therapies suggesting a possible connection between CAM therapy use and overall health and wellness. This finding was consistent with Davis and Weeks (2012) who determined that individuals who use CAM are more likely to take an active role in health maintenance. CAM use for wellness and disease prevention may greatly impact the prevention of CVD and DM. Participants who had DM were more likely to use alternative medical systems and body based CAM therapies whereas participants who had CVD were less likely to use any CAM therapies. Finally, participants who reported having hypertension and high cholesterol, two of the risk factors for CVD, were more likely to use alternative medical systems. Findings suggest alternative medical systems and body based therapies may have a health promoting effect on those with DM and may be beneficial in the prevention of CVD. Findings point to the significance for inclusion of

CAM training focused on alternative medical systems and body based therapies in health promotion counseling as part of nursing and health education.

The current study found a significant number of CAM users had CVD risk factors or CVD (86.6%) or DM risk factors or DM (87 .0%) and was consistent with Hawk, Ndetan and Evans (2012) who published CAM users present with risk factors which are priority public health issues. The fact that so many patients present with serious risk factors, implies a need to train health care providers in health promotion counseling. CAM counseling as part of a health promotion and disease prevention strategy could be included as part of clinical healthcare encounters. It is possible that utilizing CAM encounters to amplify health promotion and prevention messages could contribute to more effective health behavior change. Based on the findings of this current study CAM training for healthcare providers should be focused on all four CAM groups with particular attention to alternative medical systems and body based therapies to include: acupuncture, Ayurveda, homeopathy, naturopathy, traditional healers, chiropractic, massage, and movement therapies.

Findings from this study suggest the use of CAM is associated with risk factors and health behaviors known to impact CVD and DM. The knowledge of CAM therapy's value as a prevention for chronic disease may be a springboard for future intervention research on the effects of CAM therapies and CAM therapy's role in health promotion and disease prevention. CAM therapies have been shown to be cost effective when compared to usual care (Herman et al., 2005). This fact coupled with the current study's findings, show a relationship between CAM use and better health, and lay the foundation for dramatically decreasing National Healthcare Expenditures. CAM is an untapped

source of cost effective therapy which may potentially decrease morbidity and mortality associated with CVD and DM as well become a key health promotion measure for the prevention of chronic diseases. Dissemination of knowledge from this study may be the beginning of movement away from the current, failing U.S. healthcare model of cure to a model of prevention. Findings from this study and meanings in relation to the impact on health care costs can influence nursing research, practice, education, and theory.

### **CAM and Healthcare Costs**

The most intense consumers of health expenditures and health services in the U.S. are considerably less healthy than the general population (Davis & Weeks, 2012). Therefore it is important to focus on strategies to reduce the costs associated with preventable diseases such as CVD and DM. Research has shown staggering medical costs are associated with type 2 diabetes complications and morbidities and of this population; those who had coronary heart disease were associated with 70% to 150% higher costs (Miller & Washington, 2013). Many of the U.S. population believe CAM therapies have a reputation for good value among health conscious consumers (Herman et al., 2005). Knowledge from this study can transform the current health care system design from one of treating acute illness to one of preventing chronic disease in a cost effective way through integrating the use of CAM modalities into traditional medical care. Findings from the current study provide beginning knowledge of how CAM therapies may be used to decrease the staggering healthcare costs associated with CVD and diabetes.

Additionally, findings from this study reveal that participants who had healthy behaviors were more likely to use biologically based, body based, and mind body based CAM therapies. It was also found than those who had DM were more likely to use



alternative medical systems. These findings are significant because they encompass all four groups of CAM therapies which were used for either health promotion or disease prevention.

A relationship between one's use of CAM and overall health was seen and supports previous studies that indicated CAM therapies such as acupuncture, manual manipulation, guided imagery, relaxation therapy, self-administered stress management; oral nutrition supplementation, biofeedback, and homeopathy have better health effects and lower costs when compared to traditional health care (Herman et al., 2005). The current study's findings also provide support for further research on CAM therapies and their relation to CVD and DM prevention. According to Doran et al. (2010) CAM therapies are cost effective when compared to conventional medical treatments. However, the literature is vague in covering cost effectiveness of CAM; as a result, further research on the cost effectiveness of CAM treatments is needed.

The current study additionally suggests a relationship exists between one's use of CAM and the presence of CVD and DM risk factors. Only one study was found that compared use of CAM by individuals with CVD risk factors using 2007 NHIS data. Anderson and Taylor (2012) concluded the most common CAM therapies used among those with CVD risk factors were natural products and mind body therapies which is dissimilar to the current study's findings that linked CVD risk factors to the use of alternative medical systems. To this author's knowledge no other studies have examined the relationships between CAM and DM risk factors. Therefore, further research should be conducted to identify which specific CAM therapies are used among healthier individuals, followed by cost benefit analyses on the identified CAM therapies. In turn

the cost effective CAM therapies can be used as the basis for health care system design based on prevention rather than cure. Such re-design could have a profound effect on decreasing total national health expenditures.

### **Recommendations for CAM and Nursing Research, Practice and Education**

#### **Research.**

The current study aids in meeting one of the NCCAM strategic objectives to “increase understanding of ‘real world’ patterns and outcomes of CAM use and its integration into health care and promotion...there is a need for descriptive information examining the frequency of and reasons for CAM use in disease and symptom treatment and in promoting improved health and wellbeing...” (Hawk, Ndetan & Evans, 2012, pp. 18-19). This study contributes to nursing research by providing foundational research using a national data set that can serve as a springboard for future research on CAM and CVD and DM. Findings from this study help fill the gap in nursing knowledge related to CAM and its potential effect on two costly and debilitating diseases, cardiovascular disease and diabetes. According to Hawk et al. (2012) guidelines on the role of CAM in prevention of chronic diseases are lacking. Results of the current study could guide researchers in conducting intervention studies of CAM therapies most commonly used by patients with CVD and DM, i.e. alternative medical systems and body based therapies. For example, a comparison study could be conducted using current NHIS data on CAM therapies as it becomes available later in 2014 to determine which specific CAM treatments were used most often by those with CVD and or DM.

Knowledge from this study can be used to fill the gap of knowledge regarding the extent to which those who use CAM also engage in positive health behaviors or exhibit

fewer health risk factors associated with CVD and diabetes. Insight gained from the current study has identified CAM categories currently being used among those with CVD and DM and or had risk factors for either disease. For example, participants in the study who had DM were more likely to use alternative medical systems and body based therapies which suggest alternative medical system CAM therapies and body based therapies may have a health promoting effect on those with DM. Participants in the study who had hypertension and high cholesterol were more likely to use alternative medical systems which may indicate alternative medical system CAM therapies may have a health promoting effect in those with hypertension and high cholesterol. Participants who demonstrated the healthy behavior of participation in physical activity at least once per week were more likely to use biologically based, body based, and mind body based therapies than those who did not exercise. Findings suggest healthier people (those who exercise) use three of the four CAM groups. Biologically based, body based, and mind body based CAM therapies may be beneficial in health promotion.

Findings additionally suggest further research is needed to address specific alternative medical system and body based therapies being used among those with DM, hypertension, and high cholesterol and the subsequent effects on the diseases and or risk factors. Once these modalities are identified they can expand the interventions that nurses can independently incorporate into their practice to provide cost effective holistic care. Findings from this study lend further support to the well- known fact that physical activity has health benefits. Nurses can incorporate this knowledge into teaching clients about the benefits of physical activity in relation to the prevention of CVD and DM.

The current study examined the results of the NHIS, a well-established national survey that interviewed a large portion of the U.S. population. The NHIS used standardized definitions of CAM that were the basis for the current study. One previous study examined the use of complementary therapies and CVD using data from the 2007 NHIS (Anderson & Taylor, 2012) with a focus on only three (coronary heart disease, hypertension, and high cholesterol) of the many variables shown to be related to CVD. Anderson and Taylor (2012) found similar results to those of the current study in that those individuals who reported having hypertension and or high cholesterol used CAM; however, the results of the current study revealed an increased use of alternative medical systems such as acupuncture, Ayurveda, homeopathy, naturopathy, and traditional healers opposed to an increased use of natural products and mind body therapies. The difference in results may be attributed to the difference in methodology between the two studies; or, the difference may be attributed to the survey participants' understanding, or lack thereof, of the definitions of each CAM therapy.

For example, in the current study alternative medical systems include homeopathy and naturopathy. These two alternative medical systems could easily be construed as including biologically based or natural products. Also, in the aforementioned study, it was noted that statistical analyses were completed using SAS with weighting of variables (Anderson & Taylor, 2012). The study used Chi square tests looking for an association between categorical variables and reported descriptive statistics which is a different procedure from the logistic regression used in the current study. This alone could explain the variance in results of the two studies. Logistic regression required the use of complex sample data analysis. According to Saylor et al.

(2012), it is important to use complex data analysis techniques for data obtained with complex multistage sampling design because weighting alone leads to inappropriate population estimates of variability. This variability occurs because complex sampling techniques are computed as if the measures were from the entire population rather than a sample. In contrast, in the current study the SPSS Complex Samples procedure was used which allowed inclusion of all sampling design elements, stratification, clusters, and weights.

### **Practice.**

It is vital that nurses develop and disseminate research findings about CAM. Nurses have an ethical duty to facilitate CAM therapies within their practice if patients request such care (Norton, 1995) as well as offering information on CAM therapies even if patients do not request such care because study results offered insight for applications of CAM modalities to practice in an effort to aid in health promotion, prevention, and effective treatment for patients with CVD and DM. There is a gap in the literature in regard to CAM use prevalence and effectiveness with chronic diseases due to lack of controlled studies and inconsistency in definitions of CAM, research design, methods of data collection, time frames of the studies, and response rates (Quandt et al., 2009). The current study lends support to the potential for CAM therapies to aid in preventing chronic diseases. Findings demonstrating a relationship between use of CAM and lower rates of CVD or DM may offer new ideas for decreasing national healthcare expenditures through use of CAM therapies. Further research examining specific CAM therapies, the reasons individuals choose to use CAM therapies and the overall success of CAM

therapy in the prevention of CVD and DM could provide direction into ways to cut health care spending in the United States.

Most CAM users consult doctors who know little about CAM and when patients sense an impression of disinterest or negativity from their health care provider, they hold back information that could be vital for their health (Eisenberg, 1997; Gulla & Singer, 2000). Patient disclosure of the use of alternative treatments to their healthcare providers is lacking and leads to safety issues regarding possible adverse interactions between mainstream pharmacological treatments and some CAM therapies such as herbal treatments. Nurses are an important safety link between the patient and physician (Moore, 2010) and patients value the input of the nurse (Armeen, 2010). Findings from this study provided valuable knowledge about CAM therapies the U.S. population used to treat CVD and DM. Disseminating these findings to nurses will increase their knowledge about CAM and may lead to more open discussion with patients regarding CAM use, thereby addressing the issue of patient disclosure.

Despite the remarkable achievements in both science and medicine humans are still faced with many life threatening diseases. Western medicine and synthetic drugs alone cannot meet all of the health care needs of those with chronic diseases. Nurses are at the forefront of providing patient care (O'Reagan et al., 2010) and complementary therapies have the potential to complement and enhance current nursing practice because complementary therapies focus on the holistic care of the client with an emphasis on patient involvement. Findings from this study provided information on CAM therapies that may be effective in the prevention and treatment of CVD and DM. This knowledge

has the potential to impact nursing practice because CAM modalities that may be effective in the prevention and treatment of CVD and DM have been identified.

### **Education.**

Investing in health and healing oriented education will enhance health care delivery by decreasing costs (Rakel et al., 2008). Education in CAM has triggered a deeper understanding of what is needed to shift the U.S. healthcare delivery model toward facilitating health instead of treating disease. Nurses are at the forefront of providing patient care, and health education (O'Reagan et al., 2010). Findings from this study suggested healthier individuals use biologically based, body based, and mind body based CAM therapies. Knowledge of this use may have a significant impact on the direction and focus of nursing education. CAM therapies encompass holistic care. A holistic nursing approach incorporates many practices that address all aspects of being human that need to be included for one to be truly healed. Health is a frequently articulated goal of nursing yet the definition of health varies. Health promotion as a central strategy for improving health has shifted the paradigm from defining health in the current biologically based model to a multidimensional definition of health which opens up many options for improving health (Pender et al., 2010) such as CAM. Incorporating the findings from this study into nursing education will help develop a better understanding of how the body develops health, its influences, and how to reproduce those (Rakel et al., 2008) and further develop the concept of healing.

Nursing education prepares professionals for licensure who can deliver a wide spectrum of cost effective complementary therapies within the scope of their practice. To cure humanity does not require something new it requires a renewed commitment in

nursing academia to focus on that which has been a part of holistic nursing since nursing practice began. This study was an assessment of the CAM resources, potentials, and capabilities alternative therapies may have on those at risk for CVD and DM. The four CAM categories; alternative medical systems, biologically based therapies, body based therapies, and mind body therapies encompass nursing interventions which have always been part of the art of holistic nursing practice. Complementary and alternative medicine is the essence of independent nursing practice. Nursing academia should begin to scientifically explore the notion of healing through the use of CAM therapies and work to incorporate such notions into nursing education curricula.

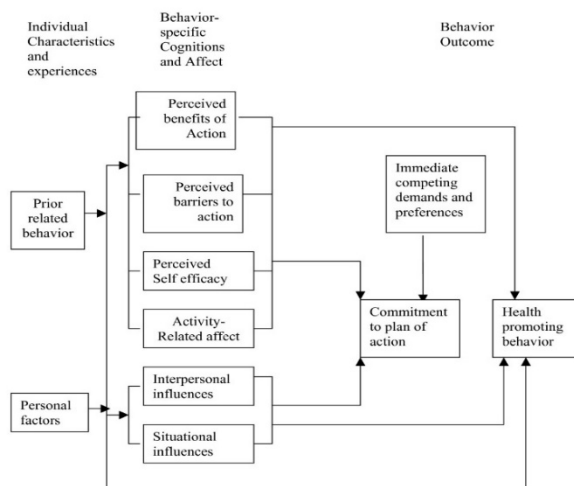
Findings from this study can be disseminated to nursing academia with the twofold goal of preparing graduating nurses for successfully passing licensure exams as well as equipping practicing nurses with the knowledge they need about alternative treatments in order to provide educational counseling and safe care to patients. Findings from this study provide information that can be disseminated to nurses to prepare them to be informed members in the healthcare team regarding CAM. Findings from this study suggest that participants in this study who had DM, hypertension or high cholesterol were more likely to use alternative medical systems and body based therapies. Therefore, nursing education curricula should include content on the specific CAM therapies that comprise alternative medical systems and body based therapies. This information will enable nurses to be better prepared to provide safe care to patients. Disseminating these findings to nurses will increase their knowledge base on which CAM modalities are more likely to be used among those with CVD and or DM which can lead to more open discussions with patients regarding CAM use and improve patient disclosure.



## Theory

### CAM Therapies and the Health Promotion Model

The aim of this descriptive research study was to describe CAM therapies in the context of prevention of illness and maintenance of health. The study's focus was on the extent to which those who use CAM also engage in positive health behaviors and exhibit fewer health risk factors. The HPM theoretical framework was used to guide this study (See *Figure 4*). The HPM requires a thorough assessment of clients in the areas of physical fitness, nutrition, life stress, spiritual health, and lifestyle. Each of these assessment areas correlated with one of the four groups of CAM therapies that were analyzed in this study. Findings from this study provided data for identifying characteristic health behaviors related to CAM use that are effective in improving health and preventing diseases and comorbidities associated with CVD and DM (See *Figure 5*).

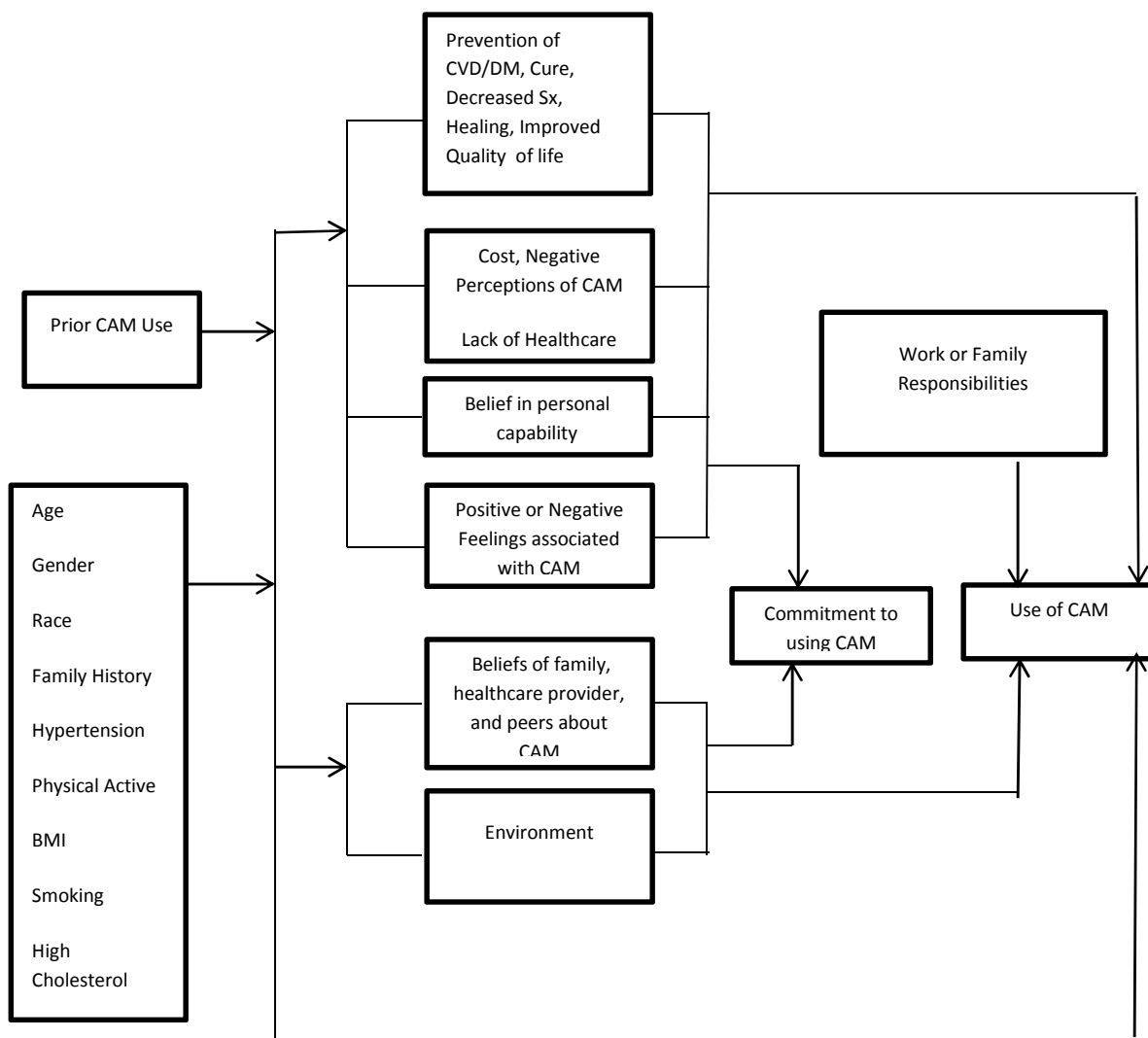


*Figure 4.* Revised Health Promotion Model

Individuals who had healthy behaviors such as participation in physical activity at least once per week were more likely to use biologically based, body based, and mind body based CAM therapies. These findings provided further support for the three main

components of the HPM (Yoon & Horne, 2004). For example, the first major component of the HPM asserts that individual characteristics affect subsequent actions. Findings revealed that individuals who participated in physical activity at least once per week were more likely to use CAM therapies. The second major component of the HPM asserts that behavior-specific cognitions and affect, including perceived benefits of action determine whether an individual participates in a certain health promoting behavior or practice. This study's findings demonstrated that individuals who participated in physical activity at least once per week or more seemed to perceive the use of biologically based, body based, and mind body based CAM therapies as beneficial to their health because they were more likely to use these therapies than those who did not participate in physical activity. And the third major component of the HPM asserts that the previous two components influence whether an individual achieves the desired behavioral outcome which in this case was the avoidance of CVD and or DM.

According to the HPM, each person has unique characteristics and experiences that affect subsequent actions and persons engage in behaviors from which they expect to derive personally valued benefits. Health seeking behaviors, such as the use of CAM, are influenced by the individual's perceived perceptibility to illness and perceived severity of illness, and by the evaluation of benefits and barriers to action. Findings from this study support this theory. For example, the results of this study showed that individuals who had DM were more likely to use alternative medical systems, body based, and mind body based CAM therapies than those individuals who had not been diagnosed with DM. This finding suggests that individuals who have DM turn to CAM for some perceived benefit. A possible explanation of the results of this study is the HPM.



*Figure 5.* Substruction of current study

For example, the results of the current study could be explained by findings reported by others who showed that CAM use in those with diabetes was associated with a previous history of CAM use, a positive attitude toward it, stronger health beliefs about the efficacy of CAM in treating diabetes, and a higher degree of self-care activities by the individual rather than demographic characteristics (Chang, Wallis & Tiralongo, 2011). Interestingly, those individuals who had pre-diabetes or some risk factors for the disease did not use CAM therapies. However, those individuals who had already been diagnosed

with the disease did turn to CAM therapies. These findings support a previous study that reported that CAM may offer an opportunity for individuals to enhance their efforts to manage chronic disease (Andrews, 2007).

Conversely, findings from this study revealed that individuals who had CVD were less likely to use any CAM therapies and those who had CVD risk factors of hypertension and high cholesterol were more likely to use alternative medical systems. Placing these findings within the context of the HPM would suggest first, that those who have the risk factors of hypertension and high cholesterol perceive a potential health benefit to using alternative medical systems in relation to having an effect on their blood pressure and cholesterol levels and second that once an individual has been diagnosed with CVD they do not view CAM as being helpful in curing their disease.

In summary, according to the HPM, individuals who participate in physical activity at least once per week view CAM therapies as a positive factor in health promotion and disease prevention. Individuals who have been diagnosed with DM view some CAM therapies as having a benefit to improving their health. Individuals who have the risk factors of hypertension and high cholesterol view some CAM therapies as having a potential positive effect on disease prevention. Individuals who have been diagnosed with CVD do not view CAM therapies as being a potential therapy for curing their disease.

Findings from this study support the major components of the HPM by providing a beginning knowledge base of which health promoting behaviors and lifestyles lead to the prevention of CVD and DM. Overall findings revealed that people who have risk behaviors for CVD or DM are less likely to use CAM therapies. Conversely, those people

who do not have risk factors or behaviors are more likely to use CAM. This finding suggests that people who use CAM therapies are healthier individuals than those who do not use CAM. To this extent, these findings are consistent with the findings of Nahin et al. (2007) and Davis et al. (2011).

The findings of the current study support findings from the literature (Davis et al., 2011) that are in line with the notion that beliefs about health and illness have an important role in explaining why people are attracted to the idea of CAM. Therefore, nurses can initiate conversations with patients regarding patients' beliefs about health and illness and attempt to integrate information on CAM therapies into patient care. Further development of the HPM model could occur by examining the relationship between self-efficacy and CAM use. Further research is needed to examine changing individuals' beliefs toward CAM and what specifically can be found in healthier people's belief systems that lead them to use CAM therapies as part of health promotion and disease prevention.

Findings from this study strengthen concepts of the HPM as it relates to complementary and alternative medicine. Respondents reported conditions (CVD and DM risk factors and or behaviors) amenable to health promotion counseling such as hypertension, high cholesterol, prediabetes, being overweight, physical inactivity, and smoking. Participants who had healthy behaviors as well as those who had risk factors and or the presence of CVD or DM reported using CAM therapies. These findings strengthen the three components of HPM. First, individual characteristics (those with or without risk factors for CVD and or DM) affect subsequent actions (whether one uses CAM). Second, behavior-specific cognitions and perceived benefit of action (whether

one views CAM in a positive light) determine whether an individual participates in a certain health promoting behavior or practice (CAM use). Third, the previous two components influence whether an individual achieves the desired behavioral outcome (the avoidance of CVD or DM). Health care providers' encouragement for CAM use for treatment of health problems and health promotion may facilitate patient's health behavior change. Further research is needed to determine whether positive messages about CAM received from healthcare providers will affect patient's use of CAM and effective behavior change in relation to health promotion.

### **Recommendations for Future Research**

The need to further study CAM use among patients with chronic diseases is needed. With respect to disease prevention and health promotion and the modification of personal health behavior, CAM may be an untapped cost effective resource. This study identified several areas where CAM use could make a considerable contribution to nursing research, practice, education and theory. Studies that provide a controlled, rigorous, methodology may be able to establish evidence to guide education and practice with CAM as an instrument to combat chronic diseases such as CVD and DM.

Further research is needed to examine changing individuals' beliefs toward CAM and what specifically can be found in healthier people's belief systems that lead them to use CAM therapies as part of health promotion and disease prevention. Further research should be conducted to identify which specific CAM therapies are used among healthier individuals, along with research to determine whether positive messages about CAM received from healthcare providers effect patient's use of CAM and effective behavior change in relation to health promotion. And finally, further research examining specific

CAM therapies, the reasons why certain individuals choose to use CAM therapies and their overall success of CAM therapy in the prevention of CVD and DM could provide insights into ways to cut health care spending in the United States.

### **Summary**

This secondary data analysis of the 2007 NHIS data was conducted to determine whether the use of CAM was associated with health behaviors or risk factors known to impact CVD and diabetes. Statistical analyses of the data were performed using SPSS Complex Samples 21. Crosstabs and logistic regression functions were used to look at the relationships between risk factors for CVD and DM and the four major categories of CAM therapy: alternative medical systems, biologically based, body based, and mind body therapies. This exploratory research study provides a beginning knowledge base on the use of CAM therapies and their potential effects of the chronic diseases of CVD and DM. Findings from this study are significant because they add to the existing knowledge of nursing research, education, practice, and theory.

## References

- Ajabnoor, M. A. (1990). Effect of aloes on blood glucose levels in normal and alloxan diabetic mice. *Journal of Ethnopharmacology*, 28, 215-220.
- Alvarez, J., Canduela, J. & Raeside, R. (2012). Knowledge creation and the use of secondary data. *Journal of Clinical Nursing*, 21, 2699-2710.
- American Diabetes Association (2014). Type 2 diabetes risk test. Retrieved from <http://www.diabetes.org/are-you-at-risk/diabetes-risk-test/>
- American Heart Association (2014). Heart attack risk assessment. Retrieved from [http://www.heart.org/HEARTORG/Conditions/HeartAttack/HeartAttackToolsResources/Heart-Attack-Risk-Assessment\\_UCM\\_303944\\_Article.jsp](http://www.heart.org/HEARTORG/Conditions/HeartAttack/HeartAttackToolsResources/Heart-Attack-Risk-Assessment_UCM_303944_Article.jsp)
- Anderson, J. G., & Taylor, A. G. (2012). Use of complementary therapies by individuals with or at risk for cardiovascular disease: results of the 2007 National health interview survey. *Journal of Cardiovascular Nursing*, 27 (2), 96-102.
- Arcury, T. A., Bell, R. A., Snively, B. M., Smith, S. L. Skelly, A. H., Wetmore, L. K., & Quandt, (2006). Complementary and alternative medicine use as health self-management: rural older adults with diabetes. *The Journals of Gerontology*, 6, S62-S70.
- Armeen. (2010). Integrating complementary alternative medicine: a nurse's challenge. Retrieved from <http://voices.yahoo.com/integrating-complementary-alternative-medicine...>



- Arslan, I. O., Zeynep, C. O., & Kulakac, O. (2012). Use of complementary and alternative medicine in cardiovascular diseases: a literature review. *HealthMed*, 6 (6), 2190-2199.
- Astin, J. A., Marei, A., Pelletier, K. R., Hansen, E., & Haskell, W. L. (1998). A review of the incorporation of complementary and alternative medicine by mainstream physicians. *Archives of Internal Medicine*, 158, 2302-2310.
- Avino, K. (2011). Knowledge, attitudes, and practices of nursing faculty and students related to Complementary and alternative medicine: a statewide look. *Holistic Nursing Practice*, 25 (6), 280-288.
- Azad Khan, A. K., Akhtar, S., & Mahtab, H. (1979). Coccina indica in the treatment of patients with diabetes mellitus. *Bangladesh Medical Research Council Bulletin*, 5, 60-66.
- Balk, E. M., Tatsioni, A., Lichtenstein, A. H., Lau, J., & Pittas, A. G. (2007). Effect of chromium supplementation on glucose metabolism and lipids: a systemic review of randomized control trials. *Diabetes Care*, 30, 2154-2163.
- Barnes, P. M., & Bloom, B., & Nahin, R. L. (December 10, 2008). Complementary and Alternative medicine use among adults and children: United States 2007. *National Health Statistics Reports* (12), 1-24.
- Baskaran, K., Kizer Ahamath, B., Radha Shanmugasundarem, K., & Shanmugasundarem, E. R. (1990). Antidiabetic effect of a leaf extract from *gymnema sylvestre* in non-insulin-dependent diabetes mellitus patients. *Journal of Ethnopharmacology*, 30, 295-300.

- Bell, B.B., Onwuegbuzie, A.J., Ferron, J., Qun, G.J., Hibbard, S.T. & Kromrey, J.D. (2012). Use of design effects and sample weights in complex health survey Data: a review of published articles using data from 3 commonly used adolescent Health surveys. *American Journal of Public Health, 102* (7), 1399-1405.
- Bell, R., Suerken, C., Grzywacz, J., Lang, W., Quandt, S., & Arcury, T. (2006). Complementary and alternative medicine use among adults with diabetes in the United States. *Alternative Therapies in Health and Medicine, 12*, 16-22.
- Berman, A., & Snyder, S. (2012). *Kozier & Erb's fundamentals of nursing: Concepts, process, and practice (9<sup>th</sup> Ed.)*. Upper Saddle River, NJ: Pearson.
- Betihavis, V., Newton, P.J., & Davidson, P.M. (2012). An overview of risk prediction models and the implications for nursing practice. *British Journal of Cardiac Nursing, 7* (6), 259-265.
- Bijlani, R. L., Vempati, R. P., Yadav, R. K. et al., (2005). A brief but comprehensive lifestyle education Program based on yoga reduces risk factors for cardiovascular disease and diabetes mellitus. *Journal of Alternative and Complementary Medicine, 11* (2), 267-274.
- Birdee, G. S., & Yeh, G. (2010). Complementary and alternative medicine therapies for diabetes: a clinical review. *Clinical Diabetes, 28* (4), 147-155.
- Bishop, F. L., Yardley, L. & Lewith, G. T. (2006). Why do people use different forms of complementary medicine? Multivariate associations between treatment and illness beliefs and complementary medicine use. *Psychology & Health, 2* (5), 683-698.

- Blanks, R. (2009). Reorganizational healing: A health change model whose time has come. *Journal of Alternative and Complementary Medicine*, 5, 461-464.
- Braun, L., & Cohen, M. (2010). *Herbs and natural supplements: An evidenced based guide (3<sup>rd</sup> Ed.)*. Australia: Elsevier.
- Brinkley, T. E., Lovato, J. F., Arnold, et al., (2010). Effect of ginkgo biloba on blood pressure and incidence of hypertension in elderly men and women. *American Journal of Hypertension*, 23 (5), 528-533.
- Burns, N., & Grove, (2001). *The practice of nursing research: Conduct, critique & utilization (4<sup>th</sup> Ed.)*. Philadelphia: W. B. Saunders Company.
- Centers for Disease Control and Prevention, (2008). About the national health interview survey. Retrieved from [http://www.cdc.gov/nchs/nhis/about\\_nhis.htm#procedures](http://www.cdc.gov/nchs/nhis/about_nhis.htm#procedures)
- Centers for Disease Control and Prevention (2009). The power of prevention: chronic disease...the public health challenge of the 21<sup>st</sup> century. Retrieved from: [www.cdc.gov](http://www.cdc.gov)
- Cerritelli, F., Carinci, F. Pizzolorusso, G., Turi, P. Renzetti, C., Pizzolorusso, F. Orlando, F, Cozzolino, V., & Barlafante, G. (2011). Osteopathic manipulation as a complementary treatment for the prevention of cardiac complications: 12-months follow-up of intima media and blood pressure on a cohort affected by hypertension. *Journal of Bodywork and Movement Therapies*, 15, 68-74.
- Chang, H. A., Wallis, M., & Tiralongo, E. (2012). Predictors of complementary and alternative medicine use by people with type 2 diabetes. *Journal of Advanced Nursing*, 68(6), 1256-1266.
- Chang, H. A., Wallis, M. & Tiralongo, E. (2007). Use of complementary and alternative

- medicine among people living with diabetes: literature review. *Journal of Advanced Nursing*, 58, 307-319.
- Chen, S., & Lin, C. (2010). The predictors of adopting a health-promoting lifestyle among work site adults with prediabetes. *Journal of Clinical Nursing*, 19, 2713-2719.
- Ciceroa, A. F. G., Brancaloni, M., Laghi, L., Donati, F., & Mino, M. (2005). Antihyperlipidaemic effect of a *Monascus purpureus* brand dietary supplement on a large sample of subjects at low risk for cardiovascular disease: A pilot study. *Complementary Therapies in Medicine*, 13, 273-278.
- Clark, C. S. (2012, March/April). Beyond holism: Incorporating an integral approach to support caring-healing-sustainable nursing practices. *Holistic Nursing Practice*, 92-102.
- Cockerham, W. C. (2010). Health lifestyles: Bringing structure back. In WC (Ed.) *The new blackwell companion to medical sociology*. Malden, MA: Wiley-Blackwell, 159-183.
- Cohen, N., Halberstam, M., Shlimovich, P, Chang, C. J., Shamon, H., & Rossetti, L. (1995). Oral vanadyl sulfate improves hepatic and peripheral sensitivity in patients with non-insulin-dependent diabetes mellitus. *Journal of Clinical Investigations*, 95, 2501-2509.
- Cui, J. (2009). Overview of risk prediction models in cardiovascular disease research. *Annals of Epidemiology*, 19 (10), 711-717.

- Davis, M. A., & Weeks, W. B. (2012). The concentration of out-of-pocket expenditures on Complementary and alternative medicine in the United States. *Alternative Therapies, 18* (5), 36-42.
- Davis, M. A., West, A. N., Weeks, W. B., & Sirovich, B. E. (2011). Health behaviors and utilization among users of complementary and alternative medicine for treatment versus health promotion. *Health Services Research, 46* (5), 1402-1416.
- Dayhew, M., Wilkinson, J. M., & Simpson, M. D. (2009). Complementary and alternative medicine and the search for knowledge by conventional health care practitioners. *Contemporary Nurse, 33* (1), 41-19.
- De Neys, W. & Glumicic, T. (2008). Conflict monitoring in dual process theories of thinking. *Cognition, 106* (30), 1248-1299.
- Dickinson, H. O., Beyer, F. R., Ford, G. A., Nicolson, D., Campbell, F., Cook, J. V., & Mason, J. (2008). Relaxation therapies for the management of primary hypertension in adults. *Cochrane Database of Systematic Reviews (Online) 1* CD00493518254065.
- Doran, C. M., Chang, D, H-T., Kiat, H., & Bensoussan, A. (2010). Review of economic methods used in complementary medicine. *The Journal of Alternative and Complementary Medicine, 16* (5), 591-595.
- Dossey, B. M., & Keegan, L. (2009). *Holistic nursing: A handbook for Practice (5th Ed.)*. Sudbury, MA: Jones and Bartlett Publishers.
- Eisenberg, D. M., Davis, R. B., Ettner, S. L., Appel, S., Wilkey, S., Van Rompay, M.,... Kessler, R. C. (1998). Trends in alternative medicine use in the U. S. 1990-1997:

- results of a follow-up national survey. *Journal of American Medical Association*, 280 (8), 1569-1575.
- Eisenberg, D. M., Kessler, R. C., Van Rompay, M. I., Kaptchuk, T. J., Wilkey, S. A., Appel, S., & Davis, R. B. (2001). Perceptions about complementary therapies relative to conventional therapies among adults who use both: results from a national survey. *Annals of Internal Medicine*, 135, 344-351.
- Elger, B. S., Iavindrasana, J., Lo Iacoano, L., Muller, H., Roduit, N., Summers, P., & Wright, J. (2010). Strategies for health data exchange for secondary, cross-institutional clinical research. *Computer Methods and Programs in Biomedicine*, 99, 230-251.
- Eriksson, J. G., Forsen, T. J., Mortensen, S. A., & Rohde, M. (1999). The effect of coenzyme Q10 administration on metabolic control in patients with type 2 diabetes mellitus. *Biofactors*, 9, 35-38.
- Eslick, G. D., Howe, P. R. C., Smith, C., Priest, R., & Bensoussan, A. (2009). Benefits of fish oil supplementation in hyperlipidemia: a systematic review and meta-analysis. *International Journal of Cardiology*, 136 (1), 4-16.
- Evans, J. L., Heymann, C. J., Goldfine, I. D., & Gavin, L. A. (2002). Pharmacokinetics, tolerability, and fructosamine-lowering effect of a novel controlled-release formulation of alpha lipoic acid. *Endocrine Practice*, 8: 29-35.
- Fenton, M. V., & Morris, D. L. (2003). The integration of holistic nursing practices and complementary and alternative modalities into curricula of schools of nursing. *Alternative Therapies in Health and Medicine*, 9 (4), 62-67.

- Field, A. (2009). *Discovering Statistics Using Spss (3<sup>rd</sup> Edition)*. Los Angeles, CA: Sage.
- Field, T. (2011). Yoga clinical research review. *Complementary Therapies in Clinical Practice, 17* (1), 1-8.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: an introduction to theory and research*. Reading, MA: Addison-Wesley.
- Frati-Munari, A. C., Gordillo, B. E., Altamirano, P., & Ariza, C. R. (1988). Hypoglycemic effect of opuntia streptacantha lemaire in NIDDM. *Diabetes Care, 11*, 63-66.
- Freedman, D. H. (2011, July/August). The triumph of new-age medicine. *The Atlantic*, 90-100.
- Friedman, R. S. C., Burg, M. M., Miles, P., Lee, F., & Lampert, R. (2010). Effects of Reiki on autonomic activity early after acute coronary syndrome. *Journal of the American College of Cardiology, 56* (12), 995-996.
- Garrow, D., & Egede, L. E. (2006). National patterns and correlates of complementary and alternative medicine use in adults with diabetes. *Journal of Alternative & Complementary Medicine, 12*(9), 895-902.
- Gauche, J., Bailey, R., Burt, V. et al. (2011). *Dietary supplement use among U.S. adults has increased since NHANES III (1988-1994)*. NCHS data brief, no 61. Hyattsville, MD: National Center for Health Statistics.
- Ghannam, N., Kingston, M., Al-Meshaal, I. A., Tariq, M., Parman, N. S., & Woodhouse, N. (1986). The antidiabetic activity of aloes: preliminary clinical and experimental observations. *Hormonal Research, 24*, 288-294.

- Goldfine, A. B., Patti, M. E., Zuberi, L., Goldstein, B. J., LeBlanc, R. Landaker, E.J., Willsky, G. R., & Kahn, C. R. (2000). Metabolic effects of vanadyl sulfate in humans with non-insulin-Dependent diabetes mellitus: in vivo and in vitro studies. *Metabolism*, *49*, 400-410.
- Goldstein, M. S. (2000). The culture of fitness and the growth of CAM. In M. Kelner, B. Wellman, B. Pescosolido, & M. Saks (Eds.), *Complementary and alternative medicine: challenge and change* (pp. 27-38). Amsterdam, The Netherlands: Harwood Academic Publishers.
- Goldszmidt, M., Levitt, C., Duarte-Franco, E., & Kaczorowski, J. (1995). Complementary health care services: A survey of general practitioners' views. *Canadian Medical Association Journal*, *153*, 29-35.
- Gordon, J. S. (2004). The White House Commission on complementary and alternative medicine policy and the future of healthcare. *Alternative Therapies*, *10* (4), 20-23.
- Green, S.B. & Salkind, N.J. (2011). *Using SPSS for Windows and Macintosh: Analyzing And Understanding Data*. Boston, MA: Prentice Hall.
- Gritzmacher, D. Broussard, A., & Clayton, D. C. (2003). The new realities of money and politics in complementary/alternative medicine. *Clinical Research and Regulatory Affairs*, *20* (40), 517-524.
- Groves, R., Fowler, F., Couper, M., Lepkowski, J., Singer, E. & Tourangeau, R. (2009). *Survey Methodology*. Hoboken, NJ: John Wiley & Sons.
- Gulla, J. & Singer, A. J. (2000). Use of alternative therapies among emergency department patients. *Annals of Emergency Medicine*, *35* (30), 226-228.
- Guo, S., Counte, M. A., Gillespie, K. N., & Schmitz, H. (2003). Cost effectiveness of



- adjunctive hyperbaric oxygen in the treatment of diabetic ulcers. *International Journal of Technology Assessment in Health Care*, 19 (4), 73-737.
- Halberstam, M., Cohen, Shlimovich, P., Rosetti, L., & Shamoon, H. (1996). Oral vanadyl sulfate improves insulin sensitivity in NIDDM but not in obese nondiabetic subjects. *Diabetes*, 45, 659-666.
- Hann, D. M., Baker, F., & Denniston, M. M. (2003). Oncology professionals' communication with cancer patients about complementary therapy: A survey. *Complementary Therapies in Medicine*, 11, 184-190.
- Hasan, S. S., Ahmed, S. I., Bukhari, N. I., & Loon, W. C. W. (2009). Use of complementary and alternative medicine among patients with chronic diseases at outpatient clinics. *Complementary Therapies in Clinical Practice*, 15, 152-157.
- Hawk, C., Ndetan, H., & Evans, M. W. (2012). Potential role of complementary and alternative health care providers in chronic disease prevention and health promotion: An analysis of National Health Interview Survey data. *Preventive Medicine*, 54 (1), 18-22.
- Health Promotion Model (2012). Retrieved from [http://nursingplanet.com/health\\_promotion\\_model.html](http://nursingplanet.com/health_promotion_model.html)
- Herman, P. M., Craig, B. M., & Caspi, O. (2005). Is complementary and alternative medicine (CAM) cost effective? A systematic review. *Biomedical Central Complementary and Alternative Medicine*, 5 (11), 1-15.
- Hill, F. J. (2003). Towards a new model for health promotion? An analysis of complementary and alternative medicine and models of health promotion. *Health Education Journal*, 62 (4), 369-380.
- Hodgson, J. M., Watts, G. F., Playford, D. A., Burk, V., & Croft, K. D. (2002).

- Coenzyme Q10 improves blood pressure and glycemic control: a controlled trial in subjects with type 2 diabetes mellitus. *European Journal of Clinical Nutrition*, 56, 1137-1142.
- Hopley, C., Salkeld, G., Wang, J. J., & Mitchell, P. (2004). Cost utility screening and treatment for early age related macular degeneration with zinc and antioxidants. *British Journal of Ophthalmology*, 88 (4), 450-454.
- Hopley, C., Salkeld, G., & Mitchell, P. (2004). Cost utility of photodynamic therapy for predominately classic neovascular age related macular degeneration. *British Journal of Ophthalmology*, 88 (4), 982-987.
- Horrigan, B. J. (2008). New NHIS survey reveals that 38% of American adults use CAM. *Explore*, 5 (2), 71-73.
- Hosmer, D. W. & Lemeshow, S. (2000). *Applied logistic regression*. New York: John Wiley & Sons, Inc.
- Hudson, K., Duke, G., Haas, B., & Varnell, G. (2008). Navigating the evidence based practice maze. *Journal of Nursing Management*, 16, 409-416.
- Hyman, M. (2010). The failure of risk factor treatment for primary prevention of chronic disease. *Alternative Therapies*, 3, 60-63.
- Institute of Medicine, National Academies of Science, Committee on the Use of Complementary and Alternative Medicine by the American Public: Complementary and Alternative Medicine (CAM) in the United States. Washington, D.C., National Academies Press, 1-12-2005.
- Jonas, W. (2001). Advising patients on the use of complementary and alternative medicine. *Applied Psychophysiology and Biofeedback*, 26, 205-214.

- Jump, J., Yarbrough, L., Kilpatrick, S., & Cable, T. (1998). Physicians 'attitudes toward complementary and alternative medicine. *Integrative Medicine*, 1, 149-153.
- Kamble, S. M., Kamlakar, P. L., Vaidya, S., & Bambole, W. D. (1998). Influence of *Coccinia Indica* on certain enzymes in glycolytic and lipolytic pathway in human diabetes. *Indian Journal of Medical Science*, 52, 143-146.
- Kamenova, P. (2006). Improvement of insulin sensitivity in patients with type 2 diabetes mellitus after oral administration of alphasialic acid. *Hormones*, 5, 25-258.
- Kamerow, D. (2010). Prevention and the new U.S. health reform act. *British Medical Journal*, 340, c2116.
- Kanushik, R. M., Kanushik, R., Mahajan, S. K., & Rajesh, V. (2006). Effects of mental relaxation and slow breathing in essential hypertension. *Complementary Therapies in Medicine*, 14, 120-126.
- Kaushil, M., Mozaffarian, D., Spiegelman, D., Manson, J.E., Willett, W. C., & Hu, F. B. (2009). Long chain omega-3 fatty acids, fish intake, and the risk of type 2 diabetes mellitus. *American Journal of Clinical Nutrition*. 90, 613-620.
- Kaye, A.D., Kaye, A. J., Swinford, J. et al., (2008). The effect of deep-tissue massage therapy on blood pressure and heart rate. *Journal of Alternative and Complementary Medicine*, 14 (2), 125-128.
- Kessler, R. C., Davis, R. B., Foster, D. F., Van Rompay, M. I., Walters, E. E., Wilkey, S.S, ...Eisenberg, D. M. (2001). Long-term trends in the use of complementary and alternative medical therapies in the United States. *Annals of Internal Medicine*, 135: 262-268.
- Kiecolt, K. J., & Nathan, L. E. (1985). *Secondary Analysis of Survey Data*. Sage Publications, Newbury Park, CA.

- Kimberlin, C. L., & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health System Pharmacy*, *65*, 2276-2284.
- Knekt, P., Ritz, J., Pereira, M. A., et al., (2004). Antioxidant vitamins and coronary heart disease risk: a pooled analysis of 9 cohorts. *American Journal of Clinical Nutrition*, *80*, 1508-1520.
- Ko, G. D., & Berbrayer, D. (2000). Complementary and alternative medicine: Canadian psychiatrists' attitudes and behavior. *Archives of Physical Medicine and Rehabilitation*, *81*, 662-667.
- Korthals-de Bos, I. B. C., Hoving, J. L., van Tulder, M. W., Rutten-van Molkenm, M. P., Ader, H. J., de Vet, H. C., Koes, B. W., Vondeling, H., & Bouter, L. M. (2003). Cost effectiveness of physiotherapy, manual therapy, and general practitioner care for neck pain: economic evaluation alongside a randomized controlled trial. *British Medical Journal*, *326*, 911.
- Kosuri, M., & Sridhar, G. R. (2009). Yoga practice in diabetes improves physical and psychological outcomes. *Metabolic Syndrome Related Disorders*, *7*, 515-517.
- Kraft, K. (2009). Complementary /Alternative medicine in the context of prevention of disease and maintenance of health. *Preventive Medicine*, *49*, 88-92.
- Krawinkel, M. B., & Keding, G. B. (2006). Bitter gourd: a dietary approach to hyperglycemia. *Nutrition Review*, *64*, 33-337.
- Kreitzer, M. J., Kligler, B., & Meeker, W. C. (2009). Health professions education and integrative medicine. *Explore*, *5* (4), 212-227.
- Kuller, L. H., Ives, D. G., & Fitpatrick, A. L. et al., (2010). Does ginkgo biloba reduce the risk cardiovascular events? *Circulation*, *3* (1), 41-47.

- Kumar, S., & Nigmatullin, A. (2010). Exploring the impact of management of chronic illnesses through prevention on the U.S. healthcare delivery system- A closed loop system's modeling study. *Information Knowledge Systems Management, 9*, 127-152.
- Kuriyan, R., Rajendran, R., Bantwal, G., & Kurpad, A. V. (2008). Effect of supplementation of coccinia cordifolia extract on newly detected diabetic patients. *Diabetes Care, 3*, 26-220.
- Kurtz, M. E., Nolan, R. B., & Rittinger, W. J. (2003). Primary care physicians' attitudes and practices regarding complementary and alternative medicine. *Journal of the American Osteopathic Association, 103*, 597-602.
- Lam, P., Dennis, S. M., Daimond, T. H., & Zwar, N. (2008). Improving glycemic and BP control in type 2 diabetes: the effectiveness of tai chi. *Australian Family Physician, 37*, 884-887.
- Landis, B. J. (1997). Healing and the human spirit. In P. B. Kritek (Ed.) *Reflections on healing: A central nursing construct* (pp. 72-80). Boston, MA: Jones & Bartlett.
- Larsson, S. C., & Wolk, A. (2007). Magnesium intake and risk of type 2 diabetes: a meta-analysis. *Journal of Internal Medicine, 262*, 208-214.
- Lee, E. O. (2001). Health promotion for chronic patients. *OITA-NHS.AC. JP, 2* (2), 25-31.
- Lee, M. S., Lim, H. J., & Moon, S. R. (2004). Survey of the use of complementary and alternative medicine among Korean diabetes mellitus patients. *Pharmacoepidemiology and Drug Safety, 13*, 167-1711.
- Leung, L., Birtwhistle, R., Kotecha, J., Hannah, S., & Cuthbertson, S. (2009). Anti-diabetic and hypoglycaemic effects of momordica charantia: a mini review.

*British Journal of Nutrition*, 102, 1703-1708.

- Levine, S. M., Weber-Levine, M. L., & Mayberry, R. M. (2003). Complementary and alternative medical practices: training experience, and attitudes of a primary medical school faculty. *Journal of the American Board of Family Practice*, 16, 318-326.
- Li, R., Bilik, D., Brown, M. B., Zhang, P., Ettner, S. L., Ackerman, R. T.,...Herman, W. H. (2013). Medical costs associated with type 2 diabetes complications and comorbidities. *The American Journal of Managed Care*, 19 (5), 42-430.
- Lin, V., McCabe, P., Bensoussan, A., Myers, S. P., Cohen, M. Hill, S., & Howsw, G. (2009). The practice and regulatory requirements of naturopathy and western herbal medicine in Australia. *Risk Management and Healthcare Policy*, 21-33.
- Lind, B. K., Lafferty, W. E., Tyree, P. T., & Diehr, P. K. (2010). Comparison of health Care expenditures among insured users and nonusers of complementary and alternative medicine in Washington state: A cost minimization analysis. *The Journal of Alternative and Complementary Medicine*, 16 (4), 411-417.
- Lindeman, M. (2011). Biases in intuitive reasoning and belief in complementary and alternative Medicine. *Psychology and Health*, 26 (3), 371-382.
- Lloyd-Jones, D.M., & Tian, L. (2006). Predicting cardiovascular risk: so what do we do now? *Archives of Internal Medicine*, 166(13), 1342-1344.
- MacIntyre, B., Hamilton, J., Fricke, T., Ma, W., Mehle, S. & Michel, M. (2008). The efficacy of healing touch in coronary bypass surgery: a randomized clinical trial. *Alternative Therapies in Health and Medicine*, 14 (4), 24-32.
- McCabe, H. (2007). Nursing involvement in euthanasia: a nurse-as-healing-praxis approach. *Nursing Philosophy*, 8 (3), 176-186.

- McEwen, M., & Wills, E. M. (2011). *Theoretical Basis for Nursing* (3<sup>rd</sup> Ed.). Philadelphia: Wolters Kluwer Health.
- Miller, R. K., & Washington, K. (2013). *Healthcare business market research handbook*, Loganville, GA: Richard K. Miller & Associates.
- Montbriand, M. J. (2000). Alternative therapies: Health professionals' attitudes. *The Canadian Nurse*, 22-26.
- Moore, K. (2010). Rationale for complementary and alternative medicine in nursing school curriculum. *The Journal of Complementary and Alternative Medicine*, 16 (6), 611-612.
- Nahin, R., Barnes, P. M., Stussman, B. J., & Bloom, B. (2009). Costs of complementary and alternative medicine (CAM) and frequency of visits to CAM practitioners: United States, 2007. *National Health Statistics Report*, 18, 1-14.
- Nahin, R. L., Dahlhamer, J.M., Taylor, B. L., Barnes, P. M., Stussman, B. J., Simile, C. M., Blackman, M. R., Chesney, M. A., Jackson, M., Miller, H., & McFann, K. K. (2007). Health behaviors and risk factors in those who use complementary and alternative medicine. *BioMed Central Public Health*, 7 (217), 1-9.
- National Council of State Boards of Nursing (2013). NCLEX-RN Detailed Test Plan. National Institutes of Health, National Center for Complementary and Alternative Medicine, What is complementary and alternative medicine? Retrieved from: <http://nccam.nih.gov/health/whatiscam>
- Norton, L. (1995). Complementary therapies in practice: the ethical issues. *Journal of Clinical Nursing*, 4, 343-348.

Nurse Link (n.d.). Complementary and alternative medicine (CAM)- an introduction.

Retrieved from <http://nursinglink.monster.com/training/articles/230-complementary-and-alternative-medicine>

O'Reagan, P., Wills, T. & O'Leary, A. (2010). Complementary therapies: a challenge for nursing practice. *Nursing Standard*, 24 (21), 35-39.

Pan, S. Y., Gao, S. H., Zhou, S. F., Tang, M. K., Yu, Z. L., & Ko, K. M. (2012). New perspectives on complementary and alternative therapy. *Alternative Therapies in Health and Medicine*, 18 (4), 20-30.

Patient Protection and Affordable Care Act. H.R. 3590. Retrieved from [www.opencongress.org/bill/111-h3590/text](http://www.opencongress.org/bill/111-h3590/text)

Pender, N. J. (1996). *Health promotion in nursing practice* (3<sup>rd</sup> ed.). Stamford, CT: Appleton & Lang.

Pender, N., Murdaugh, C., & Parsons, M. A. (2011). *Health promotion in nursing practice* (6<sup>th</sup> Ed.). Upper Saddle River, NJ: Pearson Education.

Pittler, M. X., & Ernst, E. (2005). Complementary therapies for peripheral artery disease: systematic review. *Atherosclerosis*, 181, 1-7.

Polit, D. F. (2010). *Statistics and data analysis for nursing research* (2<sup>nd</sup> Ed.). Upper Saddle River, New Jersey: Pearson.

Preuss, H. G., Jarrell, S. T., Scheckenbach, R., Lieberman, S., & Anderson, R. A. (1998). Comparative effects of chromium, vanadium and gymnema sylvestre on sugar-Induced blood pressure elevations in SHR. *Journal of American College of Nutrition*, 17, 116-123.

Quandt, S. (2012). Comparing two questionnaires for eliciting CAM use in a multi-



- Ethnic U.S. population of older adults. *European Journal of Integrative Medicine*, 4(2), e205-e211.
- Quandt, S.A., Verhoef, M. J., Arcury, T. A., Lewith, G. T., Steinsbekk, A., Kritoffersen, A. E.; Wahner-Roedler, D. L., & Fonnebo, V. (2009). Development of an international questionnaire to measure use of complementary and alternative medicine (I-CAM-Q), *The Journal of Alternative and Complementary Medicine*, 15 (4), 331-339.
- Rabito, M. J., & Kaye, A. D., (2013). Complementary and alternative medicine and cardiovascular disease: An evidenced-based review. *Evidenced- Based Complementary and Alternative Medicine*, 2013 (2013), 1-10.
- Rakel, D. P., Guerrero, M. P., Bayles, B. P., Gautman, J. D., & Ferrara, E. (2008). CAM education: Promoting a salutogenic focus in health care. *The Journal of Alternative and Complementary Medicine*, 14 (1), 87-93.
- Redwood, D. (2010). Health reform, prevention, and health promotion: Milestone moment on a long journey. *Journal of Alternative and Complementary Medicine*, 5, 521-523.
- Reinhart, K. M., Coleman, C. I., Tee van, C., Vachhani, P., & White, C. M. (2008). Effects of garlic on blood pressure in patients with and without systolic hypertension: a meta-analysis. *Annals of Pharmacotherapy*, 42 (12), 1766-1771.
- Reshef, N., Hayari, Y., Goren, C., Boaz, M., Madar, Z., & Knobler, H. (2005). Antihypertensive effect of sweetie fruit in patients with stage I hypertension. *American Journal of Hypertension*, 18 (10), 1360-1363.
- Rew, I., Koniak-Griffin, D., Lewis, M. A., Miles, M., & O'Sullivan, A., (2000).

- Secondary data analysis: new perspective for adolescent research. *Nursing Outlook*, 48, 223-229.
- Richardson, S. F. (2003). Complementary health and healing in nursing education. *Journal of Holistic Nursing*, 21 (1), 20-35.
- Ried, K., Frank, O. R., Stocks, N. P., Fakler, P., & Sullivan, T. (2008). Effect of garlic on blood pressure: A systematic review and meta-analysis. *BMC Cardiovascular Disorders*, 8, 13.
- Riley, D. (2010). Prevention, health, and wellness: Foundation of an effective health care system. *Alternative Therapies*, 3, 50-51.
- Rose, J. H., O'Toole, E. E., Skeist, R., Pfeiffer, B., & Carlsen, W. R. (1998). Complementary therapies for older adults: An exploratory survey of primary care physicians' attitudes. *Clinical Gerontologist*, 19, 3-19.
- Ruxton, C. H. S., & Mason, P. (2012). Is black tea consumption associated with a lower risk of cardiovascular disease and type 2 diabetes?. *Nutrition Bulletin*, 37(1), 4-15.
- Ryan, E. A., Pick, M. E., & Marceau, C. (2001). Use of alternative medicines in diabetes mellitus. *Diabetes Medicine*, 18, 242-245.
- Saydah, S. H., & Eberhardt, M. S. (2006). Use of complementary and alternative medicine among adults with chronic diseases: United States 2002. *The Journal of Alternative and Complementary Medicine*, 12 (8), 805-812.
- Saylor, J., Friedmann, E. & Lee, H. J. (2012). Navigating complex sample analysis using national survey data. *Nursing Research*, 61 (3), 231-237.
- Schuster, T, Dobson, M., Jauregui, B., & Blanks, R. (2004). Wellness lifestyles I: A

- theoretical framework linking wellness, health lifestyles, and complementary and alternative medicine. *The Journal of Alternative and Complementary Medicine*, *10*, 349-356.
- Seely, D., Szczurko, O., Cooley, K., Fritz, H., Aberdour, S., Herrington, C.,... & Guyatt, G. (2013). Naturopathic medicine for the prevention of cardiovascular disease: a randomized clinical trial. *Canadian Medical Association Journal*, *185* (9), E409-E46.
- Senzon, M. A. (2011). Five keys to real transformation in health care. *The Journal of Alternative and Complementary Medicine*, *17* (11), 1085-1089.
- Sha, S. H., Engelhardt, R., & Ovbiagele, B. (2008). Patterns of complementary and alternative medicine use among United States stroke survivors. *Journal of Neurological Sciences*, *271*, 180-185.
- Shanmugasundarem, E. R., Rajeswarim G., Baskaran, K, Rajesh Kumar, B. R., Radha Shanmugasundarem, K., & Kizar Ahmath, B. (1990). Use of gymnema sylvestre leaf extract in the control of blood glucose in insulin dependent diabetes mellitus. *Journal of Ethnopharmacolog*, *30*, 281-194.
- Shapiro, K., & Gong, W. C. (2002). Natural products used for diabetes. *Journal of the American Pharmacists Association*, *42*(2), 217-226.
- Siegers, C. P., Von Hertzberg-Lottin, E., Potte, M., & Schneider, B. (1993). Anthranoid laxative abuse: a risk for colorectal cancer? *Gut*, *34*, 1099-1101.
- Smith, G. (2009). Editorial: The need for complementary and alternative medicine in undergraduate nurse education. *The Journal of Clinical Nursing*, *18*, 2113-2115.
- Smith, G. (2008). Editorial: The practice and research of complementary and

- alternative medicine in nursing. *The Journal of Clinical Nursing*, 17, 252-2523.
- Smith, S. (2009). NCHS dataline: The use of complementary and alternative medicine. *Public Health Reports*, 124 (3), 463-465.
- Song, Y., He, K., Levitan, E. B., Manson, J. E. & Liu, S. (2006). Effects of oral magnesium supplementation on glycaemic control in type 2 diabetes: a meta-analysis of Randomized double-blind controlled trials. *Diabetes Medicine*, 23, 1050-1056.
- Song, R., Ahn, S., Roberts, B. L., Lee, E. O., & Ahn, Y. H. (2009). Adhering to a tai chi program to improve glucose control and quality of life for individuals with type 2 diabetes. *Journal of Alternative and Complementary Medicine*, 15, 627-632.
- Sparber, A. (2001). State boards of nursing and scope of practice of registered nurses performing complementary therapies. *Online Journal of Issues in Nursing*, 6 (3), 10.
- Spinks, J., Hollingsworth, B., Manderson, L., Lin, V., & Canaway, R. (2013). Costs and drivers of complementary and alternative medicine (CAM) use in people with type 2 diabetes or cardiovascular disease. *European Journal of Integrative Medicine*, 5, 44-53.
- Srinivasan, K. (2005). Plant foods in the management of diabetes mellitus: spices as Beneficial antidiabetic food adjuncts. *International Journal of Food Science Nutrition*, 56, 399-414.
- Stabler, S. N., Tejani, F., Huynh, F., & Fowkes, C. (2012). Garlic for prevention of cardiovascular morbidity and mortality in hypertensive patients. *Cochrane Database of Systematic Reviews*, August 15 (8); doi: 10.

1002/14651858.CD007653.pub.2

- Statistical Solutions. (2014). Assumptions of logistic regression. Retrieved from [www.statisticssolutions.com/assumptions-of-logistic-regression/](http://www.statisticssolutions.com/assumptions-of-logistic-regression/)
- Stevinson, C., Pittler, M. H., & Ernst, E. (2000). Garlic for treating hypercholesterolemia: a meta-analysis of randomized clinical trials. *Annals of Internal Medicine*, *133*, 420-429.
- Stothers, L. (2002). A randomized trial to evaluate effectiveness and cost effectiveness of naturopathic cranberry products as prophylaxis against urinary tract infection in women. *Canadian Journal of urology*, *9*, 1558-1562.
- Stussman, B. J., Bethell, C. D., Gray, C. & Nahin, R. L. (2013). Development of the Adult and child complementary medicine questionnaires fielded on the national health interview survey. *BMC Complementary and Alternative Medicine*, *13*(328), 1-18.
- Suresh, K.P. & Chandrashekar, S. (2012). Sample size estimation and power analysis for clinical research studies. *Journal of Human Reproductive Sciences*, *5* (1), 7-13.
- Team, V., Canaway, R., & Manderson, L. (2011). Integration of complementary and alternative medicine information and advice in chronic disease management guidelines. *Australian Journal of Primary Health*, *17* (20), 142-149.
- Tice, J. A., Ross, E., Coxson, P. G., Rosenberg, I., Weinstein, M. C., Hunink, M. G., Goldman, P. A., Williams, L., & Goldman, L. (2001). Cost effectiveness of vitamin therapy to lower plasma homocysteine levels for the prevention of coronary heart disease: effect of grain fortification and beyond. *Journal of American Medical Association*, *286* (8), 936-943.

- Tindle, H. A., Davis, R. B., Phillips, R. S., & Eisenberg, D. M. (2005). Trends in use of complementary and alternative medicine in U.S. adults: 1997-2002. *Alternative Therapies in Health and Medicine*, 11, 42-49.
- Tosiello, L. (1996). Hypomagnesaemia and diabetes mellitus: a review of clinical implications. *Archives of Internal Medicine*, 156, 1143-1148.
- Triandis, H. C. (1980). Values, attitudes, and interpersonal behavior. Nebraska Symposium on motivation, 27, 195-259.
- Trochim, W.M.K., & Donnelly, J.P. (2008). *The Research Methods Knowledge Base* (3<sup>rd</sup> ed.), Mason, OH: Atomic Dog/Cengage Learning.
- United States Department of Health & Human Services Agency for Healthcare Research and Quality, (2008). Cardiovascular disease – primary prevention. Retrieved from <http://www.Guideline.gov/content.aspx?id=14258>
- United States Department of Health and Human Services. Centers for Disease Control And Prevention. National Center for Health Statistics. National Health Interview Survey, 2007. ICPSR27201-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2010-08-26.  
doi:10.3886/ICPSR27201.v2
- United States Department of Health and Human Services, National Institutes of Health, National Center for Complementary and alternative Medicine (2013). Complementary, alternative and integrative health: what's in a name?. (NCCAM Publication No D347). Retrieved from <http://www.nccam.gov/health/whatiscom>
- United States Department of Health and Human Services, National Institutes of Health, National Center for Complementary and alternative Medicine (2010). Herbs at a glance. (NIH Publication No 10-6248).

United States Department of Health and Human Services, National Institutes of Health, National Center for Complementary and alternative Medicine (2011). What is Complementary and alternative medicine? Retrieved from:

<http://nccam.nih.gov/health/whatiscam>

Van Tubergen, A., Boonen, A., Landewe, R., Rutten-Van Molken, M., Van Der Heijde, D., Hidding, A., & Van Der Linder, S. (2002). Cost effectiveness of combined spa-exercise therapy in ankylosing spondylitis: a randomized controlled trial. *Arthritis Rheum*, 115 (47), 459-467.

Ventegodt, S., & Merrick, J. (2011). Integrative medicine: What is good for you? *Journal of Alternative Medicine Research*, 3 (3), 247-254.

Vivekananthan, D. P., Penn, M. S., Sapp, S. K., Hsu, A., & Topol, E. J. (2003). Use of antioxidant vitamins for the prevention of cardiovascular disease: meta-analysis of randomized trials. *Lancet*, 361, 2017-2023

Vogel, J. H., Bolling, S. F., Costello, R. B., Guarneri, E. M., Krucoff, M. W., Longhurst, J. C., ...& Winters, W. L. (2005). Integrating complementary medicine into cardiovascular medicine: A report of the American College of Cardiology Foundation Task Force on Clinical Expert Consensus Documents (Writing Committee to Develop an Expert Consensus Document on Complementary and Integrative Medicine). *Journal of the American College of Cardiology*, 46(1), 184-221.

Weil, A. (2013). Integrative medicine. Retrieved from

<http://www.drweil.com/drw/u/ART02054/Andrew-Weil-Integrative-Medicine.html>

- White House Commission on Complementary and Alternative Medicine Policy (2002, March). Final Report. Retrieved from <http://www.whccamp.hhs.gov/finalreport.html>
- Wilber, K. (2006). *Integral spirituality: A startling new role for religion in the modern and post modern world*. Boston: Shambhala.
- Williams, N. (2012). Critical elements of theory. Retrieved from <http://nolapender.weebly.com/critical-elements.html>
- Williams, N. H, Edwards, R. T., Linck, P., Muntz, R., Hibbs, R., Wilkinson, C., Russell, I., & Hounsome, B. (2004). Cost-utility analysis of osteopathy in primary care: results from a pragmatic randomized controlled trial. *Family Practice*, 2 (6), 643-650.
- Williamson, M., Tudball, J., Toms, M., Garden, F., & Grunseit, A. (2008). *Information use and needs of complementary medicine users*. Sydney: National Prescribing Service.
- Willich, S. N., Reinhold, T., Selim, D., Jena, S., Brinkhaus, B., & Witt, C. M. (2006). Cost effectiveness of acupuncture treatment in patients with chronic neck pain. *Pain*, 125 (1-2), 107-113.
- Willis, M. S. (2002). The health economics of calcium and vitamin D3 for the prevention of osteoporotic hip fractures in Sweden. *International Journal Technology Assessment in Health Care*, 18, 791-807.
- Willison, K. D., Williams, P. & Andrews, G. J. (2007). Enhancing chronic disease management: a review of key issues and strategies. *Complementary Therapies in Clinical Practice*, 13 (4), 232-239.



- Windle, P. E. (2010). Secondary data analysis: is it useful and valid? *Journal of PeriAnesthesia Nursing*, 25 (5), 322-324.
- Winslow, C. L., & Shapiro, H. (2002). Physicians want education about complementary and alternative medicine to enhance communication with their patients. *Archives of Internal Medicine*, 162, 1176-1181.
- Witt, C. M., Brinkhaus, B., Reinhold, T., & Willich, S. N. (2006). Efficacy, effectiveness, safety and costs of acupuncture for chronic pain- results of a large research initiative. *Acupuncture in Medicine*, 24, 33-39.
- Wonderling, D., Vickers, A. J., Grieve, R., & McCarney, R. (2004). Cost effectiveness analysis of randomized trial of acupuncture for chronic headache in primary care. *British Medical Journal*, 328 (7442), 747.
- World Health Organization. (2014). Chronic diseases and health promotion. Retrieved from: [www.who.int/chp/en/](http://www.who.int/chp/en/)
- Wunsch, H., Harrison, D. A., & Rowan, K. (2005). Health service research in critical care using administrative data. *Journal of Critical Care*, 20, 264-269.
- Xue, C. C. L., Zhang, A. L., Lin, V., Da Costa, C., & Story, D. F. (2007). Complementary and alternative medicine use in Australia: a national population-based survey. *Journal of Alternative and Complementary Medicine*, 13, 643-650.
- Yeh, G. Y., Eisenberg, D. M., Davis, R. B., & Phillips, R. S. (2002). Use of complementary and alternative medicine among persons with diabetes mellitus: results of a national survey. *American Journal of Public Health*, 92 (10), 1648-1652.
- Yeh, G. Y., Eisenberg, D. M., Kaptchuk, T. J., & Phillips, R. S. (2003). Systematic

review of herbs and dietary supplements for glycemic control in diabetes.

*Diabetes Care*, 26, 1277-1294.

Yoon, S. L. & Horne, C. H. (2004, July). Perceived health promotion practice by older women: use of herbal products. *Journal of Gerontological Nursing*, 9-15.

Yung, P., French, P., & Leung, B. (2001). Relaxation training as complementary therapy for mild hypertension control and the implications of evidenced-based medicine. *Complementary Therapies in Nursing Midwifery*, 7 (2), 59-65.

## Appendix

## Institutional Review Board Approval

4/2/2014

Katrina Embrey, RN  
KSU WellStar School of Nursing

RE: Your application dated 4/2/2014 regarding Study Number 14-383: Use of Complementary Therapies by Individuals With or at Risk for Cardiovascular Disease and Diabetes: Results of the 2007 National Health Interview Survey

Dear Ms. Embrey:

This email is your official notification that your protocol listed above does not meet the definition of human subject research under the Code of Federal Regulations Title 45 Part 46.102(d). Data will be provided to you in a de-identified manner in which all direct identifiers, as well as any characteristics that might lead to identification, will be omitted from the files prior to data being provided to you; therefore, this project is not subject to review by the Institutional Review Board.

Thank you for keeping the board informed of your activities. Contact the IRB at (678) 797-2268 or [irb@kenesaw.edu](mailto:irb@kenesaw.edu) if you have any questions or require further information.

Sincerely,

Paula Strange, Assistant Director for Research Compliance  
KSU Institutional Review Board Administrator