Research Article

A Survey of Complementary and Alternative Medicine Knowledge among Health Educators in the United States

Ping Johnson, Jennifer Lewis Priestley, and Roy D. Johnson

Abstract

Background: *Complementary and alternative medicine (CAM) is popular among U.S. health care consumers, but no study has examined how much health educators know about CAM.* ***Purpose:*** *To examine the knowledge of basic CAM concepts and common CAM therapies among health educators in the U.S.* ***Methods:*** *An online survey was conducted among 1,299 health educators with valid e-mails on a professional listserv. The response rate was 39%. The 16-item CAM knowledge scale yielded a Cronbach's alpha of .71.* ***Results:*** *Participating health educators were most knowledgeable about chiropractic and massage therapy, familiar with the general definition of CAM, understood whether acupuncture is beneficial in treating a variety of health conditions, and whether there is sufficient scientific evidence regarding CAM safety and effectiveness. Participants were unclear about the difference between complementary medicine and alternative medicine. CAM knowledge appeared to be influenced by the participants' sex, education level, race/ethnicity, and employment setting.* ***Discussion:*** *Similar to other studies, participating health educators were more familiar with the concepts of commonly used CAM therapies than those of less widely practiced ones.* ***Translation to Health Education Practice:*** *CAM education should be implemented as part of a professional preparation curriculum and in the form of continuing education for health educators in the U.S.*

BACKGROUND

In recent years, complementary and alternative medicine (CAM) has gained popularity in the U.S. due in large part to the increasing demand from individuals outside of the medical community. Published surveys have revealed that the proportion of adults who used at least one of the 16 CAM therapies in a given year increased from 33.8% in 1990 to 42.1% in 1997[1] and to 62% in 2002.[2] CAM use is even more prevalent among individuals who are actively seeking care for a specific medical condition. For example, one study in 1999 reported that up to 72% of cancer patients used at least one form of CAM.[3] According to the 2005 Institute of Medicine Report on Complementary and Alternative Medicine in the United States, the use of CAM is prevalent and will continue.[4]

Although the term "CAM" is broadly used to refer to a group of diverse health care systems, practices, and products that are not considered part of conventional Western medicine, CAM includes two distinctively different concepts: alternative medicine and complementary medicine.[5] When a CAM therapy or product is used in place of conventional medicine—such as trying a special diet to treat cancer instead of undergoing surgery and chemotherapy recommended by a conventional doctor—it is considered alternative medicine. When a CAM therapy or product is used together with conventional medicine, such as using massage therapy to lessen a patient's discomfort following a surgery, it is considered complementary medicine.[5] While there is some scientific evidence regarding the effects for a limited number of CAM practices, therapies, and products, most still need to be examined for their safety and "claimed" efficacy and effectiveness.[5]

To date, a limited number of studies have

Ping Johnson is a visiting scholar in the Department of Biokinetics, Sport, and Leisure Science, University of Pretoria, Pretoria, GT 0001, South Africa; her home institution is Kennesaw State University; E-mail: pjohnso2@kennesaw.edu. Dr. Jennifer Lewis Priestley is a certified SAS professional in the Department of Mathematics and Statistics, Kennesaw State University, 1000 Chastain Road, Kennesaw, GA 30144; E-mail: jpriestl@kennesaw.edu. Prof. Roy D. Johnson is with the Informatics Department at the University of Pretoria; E-mail: roy@up.ac.za.

examined knowledge of CAM therapies among health professionals in the U.S. Those studies primarily examined self-reported knowledge or awareness of specific CAM therapies among various health professionals. For example, several studies asked participants to describe their level of knowledge of common CAM therapies on a Likert scale ranging from "no knowledge" to "a great amount of knowledge."[6-9] Other studies asked participants to state whether they had knowledge of a series of CAM therapies.[10-14] An extensive review of the extant literature identified only one study that objectively measured the actual knowledge of several CAM therapies among health professionals.[15] That study, however, included items primarily assessing knowledge of herbal medicine and two CAM therapies among pharmacists and did not assess general knowledge of basic CAM concepts and common CAM therapies across a wider audience of health professionals.

Although CAM practices have become increasingly popular, many have not been proven to be safe or effective, according to the National Center for Complementary and Alternative Medicine (NCCAM).[5] Therefore, health care providers and other health professionals are increasingly facing the need to develop an adequate level of CAM knowledge to be conversant and accurate when interfacing with their clients. The limited number of studies examining the self-reported level of CAM knowledge among various health professionals revealed that most such individuals do not believe that they possess an adequate level of CAM knowledge.[6-14] According to the areas of responsibilities for professional health educators, a health educator should be able to select valid and reliable sources of information about health needs and interests, to investigate various factors that influence health, to act as a resource person, and to foster effective communication between health care providers and consumers.[16] Although Patterson and Graf[17] proposed a CAM education course for health education professional preparation programs in 2000, there is no research available addressing the number, context, or outcomes (e.g., CAM knowledge) associated with professional health education preparation programs that offer a CAM course.

PURPOSE

The purpose of this study was to develop a baseline measure of how much health educators in the United States know about CAM in an attempt to narrow the gap in the existing literature. Specifically, the following research questions were posed: (1) What is the knowledge level of basic CAM concepts and common CAM therapies among health educators in the United States? (2) Do demographic variables (i.e., sex, education level, race/ethnicity, and employment setting) influence knowledge of CAM among health educators in the United States? Answers to these questions provide insights as to whether CAM education programs are needed for health educators in the United States.

Basic CAM concepts such as the general definition of CAM and whether sufficient scientific evidence exists regarding the safety and effectiveness of CAM therapies examined in this study were based on information obtained from NCCAM.[5] At the time of this study, NCCAM[5] only provided the definitions for 10 common CAM therapies (Table 1) and published surveys have revealed the popularity of their used.[1,2] Therefore, the knowledge of those 10 common CAM therapies was examined in this study.

METHODS

Design and Sample

This study employed a cross-sectional survey design. The approval of research involving human participants was obtained from the Institutional Review Board at the institution where the authors were employed. The study sample was the entire population of U.S. health educators listed on a professional health educator listserv based in the United States.[18] This listserv is for health educators in various settings, including medical care facilities, professional preparation, colleges and universities, community and public health agencies, public and private schools (grades K–12), and business and industry.

Data Collection

Data was collected via an online survey. The survey instrument included 16 Likert measurement items, developed based on the definition provided by NCCAM[5] to examine health educators' knowledge of basic CAM concepts (6 items) and common CAM therapies (10 items). A panel of five experts in CAM research and practice examined the instrument's content validity. Based on feedback from the expert panel, the instrument was revised and pilot-tested among 35 health education professionals and then further revised to reflect additional feedback.

A cover letter with the survey URL was sent to 1,881 members listed on the professional health educator listserv[18] on February 4, 2005. Of those, 582 were nondeliverable, non-health educators, or non-U.S. health educators, resulting in 1,299 valid e-mail addresses. After the initial mailing, 253 responded within one week. A follow-up e-mail was sent to the nonresponding health educators at the beginning of weeks three, four, and five, yielding 120 additional responses after the first e-mail, 75 after the second, and 53 after the third. Overall, a total of 501 listserv members responded, generating an overall response rate of 39%.

Although this response rate is substantive, ultimately a majority of individuals who received the survey did not respond. This raised the question of whether the respondents were significantly different from the nonrespondents. Clearly, if the answer is "yes," the study results would have limited generalizability. To address any potential issues related to bias generated by nonresponse, a series of chi-square tests was conducted on the responses to the demographic questions of sex, ethnicity, education, and employment setting relative to the four waves of responses (initial response, response after the first, second, or third follow-up communication). All four chi-square tests generated insignificant results (p-values>.10), indicating that nonresponse bias was not an issue, because individuals

Table 1. Common CAM Therapies Defined by NCCAM5

CAM Therapy	Definition
Ayurveda	An alternative medical system that has been practiced primarily in the Indian subcontinent for 5,000 years. It includes diet and herbal remedies and emphasizes the use of body, mind, and spirit in disease prevention and treatment.
Chiropractic	An alternative medical system focusing on the relationship between bodily structure (primarily that of the spine) and function, and how that relationship affects the preservation and restoration of health. Chiropractors use manipulative therapy as an integral treatment tool.
Dietary supplement	A product (other than tobacco) taken by mouth that contains a "dietary ingredient" intended to supplement the diet. Dietary ingredients may include vitamins, minerals, herbs or other botanicals, amino acids, and substances such as enzymes, organ tissues, and metabolites. Under DSHEA (Dietary Supplement Health and Education Act) of 1994, dietary supplements are considered foods, not drugs.
Homeopathic medicine	An alternative medical system based on the idea that "like cures like," meaning that small, highly diluted quantities of medicinal substances are given to cure symptoms, when the same substances given at higher or more concentrated doses would actually cause those symptoms.
Massage	The therapists manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and well-being.
Naturopathic medicine, or naturopathy	An alternative medical system that proposes that there is a healing power in the body that establishes, maintains, and restores health. Practitioners work with the patient with the 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.
Osteopathic medicine	A form of conventional medicine that, in part, emphasizes diseases arising in the musculoskeletal system. There is an underlying belief that all of the body's systems work together, and disturbances in one system may affect function elsewhere in the body. Some osteopathic physicians practice osteopathic manipulation to alleviate pain, restore function, and promote health and well-being.
Qi Gong	A component of traditional Chinese medicine that combines movement, meditation, and regulation of breathing to enhance the flow of qi (an ancient term given to what is believed to be vital energy) in the body, improve blood circulation, and enhance immune function.
Reiki	A Japanese word representing "universal life energy," based on the belief that when spiritual energy is channeled through a Reiki practitioner, the patient's spirit is healed, which in turn heals the physical body.
Therapeutic touch	Derived from an ancient technique, it is based on the premise that it is the healing force of the therapist that affects the patient's recovery; healing is promoted when the body's energies are in balance; and, by passing their hands over the patient, healers can identify energy imbalances.

responding in later waves were considered to be similar to nonrespondents.[19,20] In addition, because the entire population of the listserv was included in the study, sampling bias was also not considered to have been an issue.[21] Demographic characteristics of the respondents can be found in Table 2.

Data Analysis

All analyses were conducted using SAS® 9.1 for Windows®. Specifically, descriptive statistics, chi-square test, t-test, and analysis of variance (ANOVA) were conducted to analyze the data.

RESULTS

The measurement items were evaluated for reliability using Cronbach's alpha.[22] Nun-

Table 2. Demographic Characteristics of Survey Respondents

Characteristic	Value	N[1]	Percentage
Gender			
	Male	353	76.08%
	Female	111	23.92%
Education			
	Bachelor's	51	10.99%
	Master's	210	45.26%
	PhD.	203	43.75%
Race/Ethnicity			
	Asian/Pacific Islander	15	3.25%
	Black	30	6.49%
	Hispanic	17	3.68%
	Multiracial	4	.87%
	Native American	6	1.30%
	White	390	84.42%
Employment Setting			
	College/university	254	54.74%
	Community	40	8.62%
	Government health agency or organization[2]	94	20.26%
	School	23	4.96%
	Worksite/business	26	5.60%
	Self-employed	11	2.37%
	Health care facility[3]	7	1.51%
	Student	4	.86%
	Retired	3	.65%
	Military	2	.43%

Notes: [1] The total number of respondents was 501. However, because respondents could skip questions, not all questions received 501 responses.
[2] Includes federal, state. and local governments.
[3] Includes hospitals, nursing homes, clinics.

nally[23,24] recommends an alpha threshold of .50 for exploratory work and a threshold of .70 for mature constructs and previously used scales. The measurement items for the current study generated an alpha value of .71. It should also be noted that all measurement items were retained, because all items achieved satisfactory inter-item correlations.

Responses for each of the 16 measurement items ranged from 1 (definitely true) to 4 (definitely false). The "correct" score for each measurement item (according to NCCAM[5]) was compared to the average score for each measurement item. These differences can be seen in Table 3.

Among the six basic CAM concepts (Table 3), the concepts generating the largest difference between mean score and correct score (absolute value), and hence the largest gap in knowledge, included questions regarding the concepts of complementary medicine (1.16) and alternative medicine (2.36). The basic CAM concepts which produced the smallest differences between mean score and correct score (i.e., smaller knowledge gap) included items assessing whether acupuncture is beneficial in treating a variety of health conditions (.64), the general definition of CAM (.79), and whether there exits sufficient scientific evidence regarding CAM safety and effectiveness (.68 and .65, respectively). The proportion of participants who selected "don't know" to basic CAM concepts were 5% for the NCCAM's definition of CAM, 8% for acupuncture's effectiveness, 9% and 10% for concepts of alternative medicine versus complementary medicine, and 11% for scientific evidence regarding CAM safety and effectiveness.

Among the common CAM therapies (Table 3), the concepts generating the largest knowledge gaps included questions regarding the concepts of osteopathy (2.10), Qi Gong (2.01), Reiki (1.77), naturopathy (1.69), and therapeutic touch (1.10). Alternatively, differences for CAM therapies such as massage therapy and chiropractic

were very small (.22 and .26, respectively), indicating a minimal gap in knowledge. Other CAM therapy items that had relatively small differences included the concepts of dietary supplements (.58), homeopathy (.70), and Ayurveda (.98). The proportion of participants who selected "don't know" for the CAM therapies differed widely, ranging from a low of less than 1% (massage therapy) to a high of 60% (Ayurveda).

The scores for each measurement item were segmented by sex (Table 4), education level (Table 5), ethnicity (Table 6), and primary employment setting (Table 7). In assessing CAM knowledge by sex, a series of t-tests was conducted across the 16 measurement items (Table 4). When compared with male scores, female scores were statistically closer to the correct value (i.e., smaller knowledge gap) on concepts dealing with whether acupuncture is beneficial in treating a variety of health conditions (1.60 vs. 2.02, $p<.01$) and the concept of alternative medicine (2.10 vs. 2.38, $p<.05$). Both concepts had a correct score of 1.0 ("definitely true"). Alternatively, when compared with female scores, male scores were statistically closer to the correct value (i.e., smaller knowledge gap) on concepts dealing with complementary medicine (3.63 vs. 3.38, $p<.01$) and dietary supplements (3.27 vs. 2.94, $p<.05$). These two items had a correct score of 4.0 ("definitely false").

In assessing CAM knowledge by education level, a series of ANOVA tests was conducted (Table 5). As might be expected, analyses revealed that participants with a doctoral degree had a mean score that was significantly closer to the correct score (i.e., smaller knowledge gap) than those with a bachelor's degree ($p<.05$) for items assessing the general definition of CAM (1.68 vs. 2.02, with 1 being the correct score), scientific evidence regarding CAM safety and effectiveness (3.42 and 3.46 vs. 3.09, respectively, with 4 being the correct score), the concept of homeopathy (1.61 vs. 2.08, with 1 being the correct score), and the concept of Reiki (2.50 vs. 1.87, with 4 being the correct score). Similarly, participants who had a doctoral degree had a mean score that was significantly closer to the correct score (i.e., smaller knowledge gap) than those who had a master's degree for the item examining what Reiki is (2.50 vs. 2.07, with 4 being the correct score, $p<.05$). It was interesting to note that the mean score of participants with a master's degree were statistically closer to the correct score (i.e., smaller knowledge gap) than those with a doctoral degree for the item assessing whether acupuncture is beneficial in treating a variety of health conditions (1.52 vs. 1.69, with 1 being the correct score, $p<.05$). The mean scores for other items were not significantly different among participants with different education levels.

Given the unbalanced numbers of responding health educators by ethnicity, ANOVA tests provided little indication of significant differences among the groups (Table 6). Therefore, values for these responses are considered to be directionally indicative rather than statistically significant. Of the respondents, Asian health educators (n=15) appeared to have the largest relative knowledge gap in the concept of Qi Gong. Black participants (n=30) appeared to have the largest relative knowledge gaps in the concepts of chiropractic, Reiki, and therapeutic touch. Participants of Hispanic origin (n=17) appeared to have the largest relative knowledge gaps in whether there is sufficient scientific evidence regarding the safety and effectiveness of CAM therapies, as well as the concepts of Ayurveda, complementary medicine, homeopathic medicine, massage therapy, and naturopathic medicine. Participating White health educators (n=390) appeared to have the largest relative knowledge gaps in the definition of CAM and osteopathic medicine. Both Asian and White respondents seemed to have the largest relative knowledge gap in whether acupuncture is beneficial in treating a variety of health conditions. Both Black and Hispanic respondents seemed to have the largest relative knowledge gap regarding the concept of dietary supplements. Again, given the very small number of Asian, Black, and Hispanic respondents, these numbers are intended to be directional rather than an indication of statistical significance.

As with the analyses by ethnicity, small sample sizes for some respondent groups by employment setting resulted in directional rather than statistically significant results (Table 7). One finding from the analysis by employment setting was that respondents employed in college/university settings (n=254) appeared to exhibit the largest relative knowledge gap in only one item (whether acupuncture is beneficial in treating a variety of health conditions) as compared to multiple items by participants in other employment settings. This could be meaningful, as the largest percentage of participating health educators are employed in a collegiate setting (54.74%). It was found that respondents working in a community setting (n=40) appeared to have the largest knowledge gaps regarding the concepts of Reiki and therapeutic touch, whereas respondents working in governmental agencies or health organizations (n=94) appeared to have the largest relative knowledge gaps regarding the concepts of massage therapy, Ayurveda, and naturopathic medicine. Those participating health educators working in a school environment (n=23) appeared to have the largest relative knowledge gaps regarding the general definition of CAM, whether there is sufficient scientific evidence regarding the safety and effectiveness of CAM therapies, and the concept of complementary medicine. Those participants working in worksite or business settings (n=26) appeared to have the largest relative knowledge gaps regarding the concepts of alternative medicine, chiropractic, dietary supplements, homeopathic medicine, osteopathic medicine, and Qi Gong. Again, these numbers are intended to be directional, rather than an indication of statistical significance.

DISCUSSION

The results of this study reveal that health educators surveyed were more familiar with the common CAM therapies, such as massage therapy, chiropractic, and dietary supplements, but were unfamiliar with the less widely used therapies, including Ayurveda, osteopathy, Qi Gong, and Reiki. Many par-

Table 3. Results of Basic CAM Knowledge

Measurement Item	N	Mean Score	Std Dev.	Correct Score[1]—Mean Score	% "Don't Know"[2]
Basic CAM Concepts					
Research shows that acupuncture is beneficial in treating a variety of health conditions. (True=1)	465	1.64	.67	.64	7.92%
CAM is a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. (True=1)	477	1.79	.81	.79	5.54%
Sufficient scientific evidence exists regarding the safety of all CAM therapies. (False=4)	450	3.32	.81	.68	10.89%
Sufficient scientific evidence exists regarding the effectiveness of all CAM therapies. (False=4)	450	3.35	.83	.65	10.89%
Using a special diet to treat cancer instead of undergoing surgery, radiation, or chemotherapy that has been recommended by a conventional doctor is an example of alternative medicine. (True=1)	440	2.16	1.03	1.16	9.84%
Using aromatherapy to help lessen a patient's discomfort following surgery is an example of alternative medicine. (False=4)	458	1.64	.75	2.36	9.31%
Common CAM Therapies					
Massage therapists manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and well-being. (True=1)	474	1.22	.42	.22	.84%
Chiropractors use hands-on manipulative therapy as an integral treatment tool. (True=1)	475	1.26	.49	.26	2.66%
Under the Dietary Supplement Health and Education Act (DSHEA) of 1994, dietary supplements are considered drugs and, therefore, their labeling requirement is the same as that for drugs. (False=4)	427	3.42	.88	.58	12.50%
In homeopathic medicine, there is a belief that small, highly diluted quantities of medicinal substances are given to cure symptoms, and when the same substances are given at higher or more concentrated doses, they would actually cause those symptoms. (True=1)	283	1.70	.81	.70	40.79%
Ayurveda has been practiced primarily in Japan for 5,000 years. (False=4)	194	3.02	1.08	.98	60.25%
In naturopathic medicine, there is a belief that "like cures like." (False=4)	216	2.31	1.06	1.69	55.74%
Osteopathic medicine practices may include dietary modifications, massage, exercise, acupuncture, minor surgery, and various other interventions. (False=4)	393	1.90	.80	2.10	17.78%
Reiki is a component of traditional Chinese medicine. (False=4)	258	2.23	.98	1.77	46.03%
Qi Gong is based on the belief that when spiritual energy is channeled through a Qi Gong practitioner, the patient's spirit is healed, which in turn heals the physical body. (False=4)	223	1.99	.80	2.01	53.35%
Therapeutic touch is based on the premise that it is the healing force of the therapist that affects the patient's recovery. (True=1)	379	2.10	.91	1.10	20.71%

Notes: [1] The correct score would either be a 1–True or a 4–False. Differences reported as absolute values.
[2] Scores for individuals who responded "don't know" were not included in the mean scores.

Table 4. Comparison of Responses by Gender[1]

Measurement Item	Male Mean	Female Mean	t statistic
Basic CAM Concepts			
Research shows that acupuncture is beneficial in treating a variety of health conditions. (True=1)	2.02	1.60	-4.76**
CAM is a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. (True=1)	1.70	1.79	1.02
Sufficient scientific evidence exists regarding the safety of all CAM therapies. (False=4)	3.40	3.30	-1.13
Sufficient scientific evidence exists regarding the effectiveness of all CAM therapies. (False=4)	3.41	3.34	-.72
Using a special diet to treat cancer instead of undergoing surgery, radiation, or chemotherapy that has been recommended by a conventional doctor is an example of alternative medicine. (True=1)	2.38	2.10	-2.31*
Using aromatherapy to help lessen a patient's discomfort following surgery is an example of alternative medicine. (False=4)	1.83	1.58	-2.91**
Common CAM Therapies			
Massage therapists manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and well-being. (True=1)	1.24	1.21	-.63
Chiropractors use hands-on manipulative therapy as an integral treatment tool. (True=1)	1.22	1.26	.77
Under the Dietary Supplement Health and Education Act (DSHEA) of 1994, dietary supplements are considered drugs and, therefore, their labeling requirement is the same as that for drugs. (False=4)	3.63	3.38	-2.52*
In homeopathic medicine, there is a belief that small, highly diluted quantities of medicinal substances are given to cure symptoms, and when the same substances are given at higher or more concentrated doses, they would actually cause those symptoms. (True=1)	1.70	1.69	.85
Ayurveda has been practiced primarily in Japan for 5,000 years. (False=4)	3.27	2.94	-1.77
In naturopathic medicine, there is a belief that "like cures like." (False=4)	2.47	2.26	.21
Osteopathic medicine practices may include dietary modifications, massage, exercise, acupuncture, minor surgery, and various other interventions. (False=4)	1.82	1.92	1.03
Reiki is a component of traditional Chinese medicine. (False=4)	2.40	2.19	-1.29
Qi Gong is based on the belief that when spiritual energy is channeled through a Qi Gong practitioner, the patient's spirit is healed, which in turn heals the physical body. (False=4)	1.96	2.01	.70
Therapeutic touch is based on the premise that it is the healing force of the therapist that affects the patient's recovery. (True=1)	2.10	2.10	.04

* p<.05
**p<.01
Note: [1] Scores for individuals who responded "don't know" were not included in the mean scores.

Table 5. Comparison of Responses by Education Using ANOVA[1]

Measurement Item	Bachelor's (N=51)	Master's (N=210)	PhD. (N=203)
Basic CAM Concepts			
Research shows that acupuncture is beneficial in treating a variety of health conditions. (True=1)	1.76	1.52+	1.69+
CAM is a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. (True=1)	2.02+	1.80	1.68+
Sufficient scientific evidence exists regarding the safety of all CAM therapies. (False=4)	3.09+	3.28	3.42+
Sufficient scientific evidence exists regarding the effectiveness of all CAM therapies. (False=4)	3.09+	3.30	3.46+
Using a special diet to treat cancer instead of undergoing surgery, radiation, or chemotherapy that has been recommended by a conventional doctor is an example of alternative medicine. (True=1)	2.20	2.15	2.18
Using aromatherapy to help lessen a patient's discomfort following surgery is an example of alternative medicine. (False=4)	1.56	1.63	1.68
Common CAM Therapies			
Massage therapists manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and well-being. (True=1)	1.27	1.22	1.21
Chiropractors use hands-on manipulative therapy as an integral treatment tool. (True=1)	1.22	1.30	1.22
Under the Dietary Supplement Health and Education Act (DSHEA) of 1994, dietary supplements are considered drugs and, therefore, their labeling requirement is the same as that for drugs. (False=4)	3.33	3.38	3.52
In homeopathic medicine, there is a belief that small, highly diluted quantities of medicinal substances are given to cure symptoms, and when the same substances are given at higher or more concentrated doses, they would actually cause those symptoms. (True=1)	2.08+	1.71	1.61+
Ayurveda has been practiced primarily in Japan for 5,000 years. (False=4)	2.46	2.94	3.17
In naturopathic medicine, there is a belief that "like cures like." (False=4)	2.00	2.30	2.38
Osteopathic medicine practices may include dietary modifications, massage, exercise, acupuncture, minor surgery, and various other interventions. (False=4)	1.84	1.88	1.92
Reiki is a component of traditional Chinese medicine. (False=4)	1.87+	2.07#	2.50+/#
Qi Gong is based on the belief that when spiritual energy is channeled through a Qi Gong practitioner, the patient's spirit is healed, which in turn heals the physical body. (False=4)	2.05	1.99	2.00
Therapeutic touch is based on the premise that it is the healing force of the therapist that affects the patient's recovery. (True=1)	2.25	2.05	2.11

+/# indicate differences between education levels at p<.05

Note: [1] Scores for individuals who responded "don't know" were not included in the mean scores.

Table 6. Comparison of Responses by Ethnicity

Measurement Item	Asian (n=15)	Black (n=30)	Hispanic (n=17)	White (n=390)
Basic CAM Concepts				
Research shows that acupuncture is beneficial in treating a variety of health conditions. (True=1)	1.64	1.43	1.56	1.64
CAM is a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. (True=1)	1.47	1.65	1.71	1.80
Sufficient scientific evidence exists regarding the safety of all CAM therapies. (False=4)	3.07	3.13	2.94	3.36
Sufficient scientific evidence exists regarding the effectiveness of all CAM therapies. (False=4)	3.14	3.22	2.82	3.40
Using a special diet to treat cancer instead of undergoing surgery, radiation, or chemotherapy that has been recommended by a conventional doctor is an example of alternative medicine. (True=1)	1.71	2.17	2.75	2.17
Using aromatherapy to help lessen a patient's discomfort following surgery is an example of alternative medicine. (False=4)	1.62	1.65	1.60	1.64
Common CAM Therapies				
Massage therapists manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and well-being. (True=1)	1.20	1.29	1.35	1.21
Chiropractors use hands-on manipulative therapy as an integral treatment tool. (True=1)	1.23	1.41	1.25	1.25
Under the Dietary Supplement Health and Education Act (DSHEA) of 1994, dietary supplements are considered drugs and, therefore, their labeling requirement is the same as that for drugs. (False=4)	3.08	3.00	3.00	3.49
In homeopathic medicine, there is a belief that small, highly diluted quantities of medicinal substances are given to cure symptoms, and when the same substances are given at higher or more concentrated doses, they would actually cause those symptoms. (True=1)	1.71	2.18	2.44	1.61
Ayurveda has been practiced primarily in Japan for 5,000 years. (False=4)	3.25	3.00	2.57	3.02
In naturopathic medicine, there is a belief that "like cures like." (False=4)	2.29	1.90	1.75	2.34
Osteopathic medicine practices may include dietary modifications, massage, exercise, acupuncture, minor surgery, and various other interventions. (False=4)	2.08	2.16	1.87	1.86
Reiki is a component of traditional Chinese medicine. (False=4)	2.50	1.81	2.00	2.25
Qi Gong is based on the belief that when spiritual energy is channeled through a Qi Gong practitioner, the patient's spirit is healed, which in turn heals the physical body. (False=4)	1.64	1.86	1.86	2.05
Therapeutic touch is based on the premise that it is the healing force of the therapist that affects the patient's recovery. (True=1)	1.92	2.22	1.69	2.11

ticipating health educators were not familiar with the concept of naturopathic medicine even though there are several accredited naturopathic medical schools in the United States[25] that have trained many practitioners over the past 25 years.[26] These findings are similar to those of other studies that assessed the self-reported knowledge levels of various CAM therapies among different health professionals.[6-14]

The small proportion of participants who reported that they did not know the six basic CAM concept items indicates that most participating health educators were confident about their knowledge of those basic CAM concepts. The relatively small differences between mean scores and correct scores (i.e., knowledge gaps) for items assessing whether acupuncture is beneficial in treating a variety of health conditions, the general definition of CAM, and whether there is sufficient scientific evidence regarding CAM safety and effectiveness indicate that the participating health educators do possess an adequate level of knowledge regarding those basic CAM concepts.

It was interesting to note that although less than 10% of the participants selected the "don't know" option for items assessing the concepts of alternative medicine versus complementary medicine, the average scores for those two items were far from accurate. This phenomenon indicates that although the majority of the respondents believed that they knew the concepts, they were unclear about the difference between them in practice. For example, they failed to recognize that aromatherapy or any nonconventional therapy used in addition to conventional medicine (e.g., surgery) is an example of complementary medicine, whereas using a special diet or any nonconventional method to treat cancer instead of undergoing surgery, radiation, or chemotherapy recommended by a conventional doctor is an example of alternative medicine.

The very small knowledge gaps for items assessing the concepts of massage therapy and chiropractic, together with the small proportion (less than 3%) of participants who indicated that they did not know those concepts, show that the participating health educators were familiar with the definitions of those two CAM therapies. Although a relatively small proportion of participants answered "don't know" to items assessing the concepts of dietary supplements (13%), osteopathy (18%), and therapeutic touch (21%), the knowledge gaps for those items varied broadly. The small knowledge gap for dietary supplements reveals that most participants who were confident of their knowledge of the concept did identify its definition correctly. The large knowledge gaps for therapeutic touch and osteopathic medicine show that most participants who were confident of their knowledge of the concepts failed to recognize those same definitions correctly.

Although over 40% of the respondents did not know the answer to the item assessing the basic definition of homeopathy, the relatively small knowledge gap indicates that most of those who thought they knew the answer did actually identify the answer correctly. Similarly, although the majority of the participants (60%) reported not knowing the concept of Ayurveda, the relatively small knowledge gap indicates that many of those who believed that they knew the concept actually identified the item correctly. A large proportion of participants who reported not knowing the answers to items that assessed the basic knowledge of Reiki (46%), Qi Gong (53%), and naturopathy (56%), combined with the large knowledge gaps for those items, reveals that most participating health educators were not familiar with the concepts of those CAM therapies.

This study revealed that female and male health educators participating in the survey had similar levels of knowledge regarding the basic CAM concepts and the common CAM therapies except in certain areas. Female participants were significantly more knowledgeable regarding whether acupuncture is beneficial in treating a variety of health conditions and what is considered complementary medicine. At the same time, the male participants were significantly more knowledgeable regarding the concept of alternative medicine and dietary supplements. It is possible that female respondents might be more likely to have used "touch-based" therapies such as acupuncture whereas male participants might be more likely to use traditional pharmaceutical options such as dietary supplements. A study of the use of CAM therapies among health educators would help clarify this difference between female and male health educators.

It appears that participants with a doctoral degree were significantly more knowledgeable than those with a bachelor's degree regarding the general definition of CAM, scientific evidence regarding CAM safety and effectiveness, and the concepts of homeopathy and Reiki. This could be explained by the fact that level of knowledge usually correlates with level of education and experience. The exception was that participants with a master's degree had a significantly smaller knowledge gap than those with a doctoral degree concerning whether acupuncture is beneficial in treating a variety of health conditions. Although participants with a master's degree had fewer years of formal academic preparation, they might have more years of experience or have been in contact with CAM, which might have made them more knowledgeable regarding the benefits of acupuncture.

Although the comparisons of results by ethnicity and primary employment setting are somewhat limited by the small number of respondents in several segments, directional differences were detected. It appeared that Asian and White participants were least knowledgeable regarding whether acupuncture is beneficial in treating a variety of health conditions. Furthermore, Asian participants appeared to be least knowledgeable concerning the concept of Qi Gong. This finding could suggest that the participants identifying themselves as "Asian" might not have East Asian backgrounds, because both acupuncture and Qi Gong originated in China, and people from East Asia would at least be aware of their concepts. It is also possible that those participants were not raised in an East Asian country, which might lessen their exposure to those therapies.

It was interesting to note that White

Taable 7. Comparison of Responses by Employment Setting

Measurement Item	College (n=254)	Community (n=40)	Government (n=94)	School (n=23)	Worksite/ Business (n=26)
Basic CAM Concepts					
Research shows that acupuncture is beneficial in treating a variety of health conditions. (True=1)	1.69	1.61	1.51	1.60	1.46
CAM is a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. (True=1)	1.70	1.89	1.79	1.95	1.87
Sufficient scientific evidence exists regarding the safety of all CAM therapies. (False=4)	3.38	3.18	3.30	2.89	3.48
Sufficient scientific evidence exists regarding the effectiveness of all CAM therapies. (False=4)	3.41	3.05	3.37	2.85	3.36
Using a special diet to treat cancer instead of undergoing surgery, radiation, or chemotherapy that has been recommended by a conventional doctor is an example of alternative medicine. (True=1)	2.13	2.05	2.29	2.09	2.30
Using aromatherapy to help lessen a patient's discomfort following surgery is an example of alternative medicine. (False=4)	1.65	1.73	1.70	1.38	1.59
Common CAM Therapies					
Massage therapists manipulate muscle and connective tissue to enhance function of those tissues and promote relaxation and well-being. (True=1)	1.22	1.20	1.24	1.23	1.09
Chiropractors use hands-on manipulative therapy as an integral treatment tool. (True=1)	1.26	1.18	1.25	1.22	1.28
Under the Dietary Supplement Health and Education Act (DSHEA) of 1994, dietary supplements are considered drugs and, therefore, their labeling requirement is the same as that for drugs. (False=4)	3.51	3.37	3.27	3.60	3.00
In homeopathic medicine, there is a belief that small, highly diluted quantities of medicinal substances are given to cure symptoms, and when the same substances are given at higher or more concentrated doses, they would actually cause those symptoms. (True=1)	1.67	1.71	1.65	1.64	1.92
Ayurveda has been practiced primarily in Japan for 5,000 years. (False=4)	3.01	3.00	2.94	3.17	3.30
In naturopathic medicine, there is a belief that "like cures like." (False=4)	2.38	2.31	2.05	2.17	3.38
Osteopathic medicine practices may include dietary modifications, massage, exercise, acupuncture, minor surgery, and various other interventions. (False=4)	1.89	1.79	1.95	1.82	1.72
Reiki is a component of traditional Chinese medicine. (False=4)	2.35	1.89	2.12	1.92	2.21
Qi Gong is based on the belief that when spiritual energy is channeled through a Qi Gong practitioner, the patient's spirit is healed, which in turn heals the physical body. (False=4)	2.01	2.00	2.03	2.13	1.92
Therapeutic touch is based on the premise that it is the healing force of the therapist that affects the patient's recovery. (True=1)	2.12	2.20	2.08	1.85	2.06

Notes: [1] "Self-Employed," "Health Care Facility," "Student," "Retired," and "Military" categories were not included in the analysis because of the limited numbers of respondents (11, 7, 4, 3, and 2, respectively).

[2] Scores for individuals who responded "don't know" were not included in the mean scores.

respondents appeared to be least knowledgeable about the definition of CAM and osteopathic medicine, whereas Black respondents appeared to be least knowledgeable regarding chiropractic, Reiki, and therapeutic touch. Hispanic respondents seemed to lack knowledge on more items than other ethnicities. The items that were least familiar to Hispanic respondents included whether there is sufficient scientific evidence regarding CAM safety and effectiveness as well as the concepts of alternative medicine, Ayurveda, complementary medicine, homeopathic medicine, massage therapy, and naturopathic medicine.

These directional differences suggest that race/ethnicity appear to have influenced the knowledge of CAM among participating health educators. Because most CAM therapies are originated from cultures outside the United States, it would seem reasonable to expect that people with an Asian background were more knowledgeable of CAM than Blacks, Hispanics, and Whites. However, such hypotheses could not be confirmed in this study because of the small sample size of Asians (n=15). The directional differences detected in this study are interesting and suggest the need for future studies to employ stratified sampling methods to include more participants of non-White racial/ethnic origins. Such studies would reveal whether there are significant differences among participants of different ethnic origins.

It appears that employment setting might have influenced participants' knowledge level as well. For example, participants from college and university settings appeared to be least knowledgeable on only one item as compared to two items for participants from community settings, three for those from government agencies and organizations, and five for those from schools and worksite and business settings. In other words, participants from colleges and universities appeared to be most knowledgeable, whereas participants working in a school setting or worksite/business appeared to have the least amount of knowledge. This could be the case because participants working in colleges and universities have taught the subject in one of their courses. Moreover, school health educators might not need CAM knowledge on the job because they deal with school-age children who are least likely to use any form of CAM on their own, while health educators in worksite/business settings may not have the opportunity to have contact with CAM therapies. As CAM use is becoming more prevalent, health educators working in all settings need to have an adequate knowledge to discuss these topics with their students and/or clients.

Limitations and Recommendations

The response rate of this study is below the recommended 60% for mail surveys in health education research,[27] which might have threatened the external validity due to response bias. One factor that might have contributed to a lower response rate is that some health educators might not have checked their e-mails during the time when the survey took place. However, it has been reported that online survey response rates can be up to 80% lower than those for paper-pencil surveys.[28] The 39% response rate from this online survey is much higher than the reported response rates of between 14.8% and 31.5% in other published online surveys.[29-31] Furthermore, the chi-square tests find this study to be free from response bias.[19-20] Although the responding health educators were similar to nonresponding health educators in this study, not all health educators in the United States appeared on the listserv for professional health educators.[18] Therefore, the generalization of the study results should be limited to the listserv members. Any generalization of the results to the entire health education population in the U.S. needs to be approached with caution. With the cost and convenience of administering online surveys, more researchers will be using them to collect data. This study provided evidence that such surveys can be effective data collection tools in health education research.

Second, the attempt to quantify the influence of ethnicity and employment setting was hampered by the small number of respondents in several population groups. Future studies might employ stratified sampling methods to include more non-White participants as well as those from non-academic settings.

Third, not all of the common CAM therapies were examined in this study, and the knowledge of each concept and therapy was assessed with only one item. Given the lack of objective measurement of CAM knowledge among health professionals, the focus of this study was to develop an instrument to assess the actual knowledge of several basic CAM concepts and therapies. Additional studies could further refine this instrument using multiple items for each CAM concept or therapy so that the actual knowledge of a particular CAM concept or therapy can be validated. Results from such studies would offer specific information for designing a CAM course or program for health educators.

Based on the experience from this study, two or more follow-up e-mail reminders did not increase the response rate significantly. Although it is convenient to provide reminder notices with internet-based surveys, one follow-up reminder appears to be adequate.

TRANSLATION TO HEALTH EDUCATION PRACTICE

The findings from this study, along with an article published in the *Journal of Health Education,*[17] strongly suggest the need for providing CAM education for health educators in the United States. Although nearly all of the health educators surveyed were aware of the concepts of chiropractic and massage therapy, many health educators surveyed did not have adequate knowledge of other common CAM concepts or therapies. As more Americans wish to take charge of their personal health and the U.S. population becomes more diverse, more individuals will turn to CAM therapies for their health care and wellness needs. Therefore, it is important for health educators to have adequate knowledge of basic CAM concepts and common CAM therapies.

The 2005 Institute of Medicine Report on Complementary and Alternative Medicine in the United States[4(p248)] recommends

that "health profession schools incorporate sufficient information about CAM into the standard curriculum at the undergraduate, graduate, and post-graduate levels to enable licensed professionals to competently advise patients about CAM." Although health educators are not yet licensed professionals, it is imperative for the professional health education preparation programs to provide their students with adequate training in basic knowledge of common CAM therapies as well as their safety, efficacy, and cost-effectiveness. Future health educators need to be better prepared to face the dynamic challenges of CAM in the health care arena. To accomplish this, professional health education preparation programs might include a CAM course, such as the one proposed by Patterson and Graf,[17] in their curricula to prepare future health educators. At the same time, professional organizations, such as the American Association of Health Education, could offer CAM continuing education programs for professional health educators. An example of such programs would be workshops that provide certified health education specialist (CHES) certification credits.

Based on the findings from this study, future CAM education programs could teach not only the basic concepts and commonly used therapies, but also the less widely used therapies such as Ayurveda, osteopathy, naturopathy, Qi Gong, Reiki, and therapeutic touch. If the differences in CAM knowledge among health educators of different sexes, education levels, racial/ethnic backgrounds, and employment settings detected in this study hold true, future CAM education programs could be designed to meet the specific needs of health educators with different backgrounds. Such programs would provide opportunities for health educators to learn about CAM and be able to perform according to the areas of responsibilities for professional health educators.[16]

A quote from an article published in the *Journal of Health Education* underscores this need: "In an era of increased competition for resources and clients within the health and medical care forums, it is imperative that health educators become educated about CAM and begin to carve out their niche in educating consumers, planning and evaluating programs, conducting research on consumers' and health professionals' usage, knowledge and attitudes about CAM, and determine[ing] the efficacy of CAM approaches. … If we, as a profession, fail to become actively engaged [in CAM], others will define our role or exclude us altogether."[17(pp350-351)]

REFERENCES

1. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997. *J Am Med Assoc.*1998;280:1569-1575.

2. Barnes PM, Powell-Griner E, McFann K, Nahin RL. Complementary and alternative medicine use among adults: United States, 2002. *Advance Data from Vital and Health Statistics.* 2004;343. Available at: http://www.cdc.gov/nchs/data/ad/ad343.pdf. Accessed August 2005.

3. Adler SR, Fosket JR. Disclosing complementary and alternative medicine use in medical encounter. *J Fam Pract.* 1999;48(6):453-458.

4. Institute of Medicine Committee on the Use of Complementary and Alternative Medicine by the American Public, Board on Health Promotion and Disease Prevention. *Institute of Medicine Report on Complementary and Alternative Medicine in the United States.* Washington, DC: The National Academies Press; 2005.

5. National Center of Complementary and Alternative Medicine. What Is Complementary and Alternative Medicine (CAM)? Available at: http://nccam.nih.gov/health/whatiscam/#1. Accessed October 28, 2005.

6. DeKeyser FG, Cohen BB, Wagner N. Knowledge levels and attitudes of staff nurses in Israel towards complementary and alternative medicine. *J Adv Nurs.* 2001;36(1):41-48.

7. Lee S, Khang YH, Lee MS, & Kang W. Knowledge of, attitudes toward, and experience of complementary and alternative medicine in western medicine—and oriental medicine—trained physicians in Korea. *Am J Public Health.* 2002;92(12):1994-2000.

8. Rosenbaum ME, Nisly NL, Ferguson KJ, et al. Academic physicians and complementary and alternative medicine: an institutional survey. *Am J Med Qual.* 2002;17(1):3-9.

9. Sohn PM, Loveland Cook CA. Nurse practitioner knowledge of complementary alternative health care: foundation for practice. *J Adv Nurs.* 2002;39(1):9-16.

10. Baugniet J, Boon H, Ostbye T. Complementary/alternative medicine: comparing the views of medical students with students in other health care professions. *Fam Med.* 2000;32(3):178-184.

11. Fearon J. Complementary therapies: knowledge and attitudes of health professionals. *Paediatr Nurs.* 2003;15(6):31-35.

12. Furnham D, McGill C. Medical students' attitudes about complementary and alternative medicine. *J Altern Complement Med.* 2003;9(2):275-284.

13. Milden SP, Stokols D. Physcians' attitudes and practices regarding complementary and alternative medicine. *Behav Med.* 2004;30(2):73-82.

14. Uzun O, Tan M. Nursing students' opinions and knowledge about complementary and alternative therapies. *Complement Ther Nurs Midwifery.* 2004;10:239-244.

15. Koh HL, Teo HH, Ng HL. Pharmacists' patterns of use, knowledge, and attitudes toward complementary and alternative medicine. *J Altern Complement Med.* 2003;9(1):51-63.

16. National Commission for Health Education Credentialing. *A Competency-Based Framework for Health Educators.* New York, NY: Author; 2006.

17. Patterson SM, Graf HM. Integrating complementary and alternative medicine into the health education curriculum. *J Health Educ.* 2000;31(6):346-357.

18. HEDIR. The International Electronic Mail Directory for Health Educators. Available at: http://www.hedir.org/directory/directory.html. Accessed February 2005.

19. Ferber R. The problem of bias in mail returns—a solution. *Public Opin Q Winter.* 1948-1949: 669-676.

20. Pace CR. Factors influencing questionnaire returns from former university students. *Journal of Applied Psychology.* 1939;23:388-397

21. Price JH, Dake JA, Murnan J, Dimmig J, Akanudo S. Power analysis in survey research: importance and use for health educators. *Am J*

*Health Educ.*2005;36(4):202-207.

22. Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrica.*1951;16:297-334.

23. Nunnally JC. *Psychometric Theory*, 1st ed. New York, NY: McGraw Hill; 1967.

24. Nunnally JC. *Psychometric Theory*, 2nd ed. New York: McGraw Hill; 1978.

25. Council on Naturopathic Medical Education. Accredited Naturopathic Medicine Programs. Available at http://www.cnme.org/links.html. Accessed March 21, 2006.

26. Bastyr University. About Bastyr. Available at http://www.bastyr.edu/default.asp. Accessed March 21, 2006.

27. Price JH, Murnan J, Dake JA, Mimmig J, Hayes M. Mail survey return rates published in health education journals: an issue of external validity. *Am J Health Educ.* 2004;35(1):19-23.

28. Morrel-Samuels P. Web survey hidden hazards. *Harv Bus Rev*. 2003;81(7):16-17.

29. Sax LJ, Gilmartin SK, Lee JJ, Hagedorn LS. Using web surveys to reach community college students: an analysis of response rates and response bias. Tampa, Fla: 43rd Annual Meeting of the Association of Institutional Research. 2003. ERIC Document Reproduction Service ED477915.

30. Kaplowitz MD, Hadlock TD, Levine R. A comparison of web and mail survey response rates. *Public Opin Q*. 2004;68(1):94-101.

31. Porter SR, Whitcomb ME. The impact of contact type on web survey response rates. *Public Opin Q.* 2003;67(4):579-588.