Determining the Attitudes and Use of Complementary, Alternative, and Integrative Medicine Among Undergraduates

Michael A. Liu, BS,¹ Ngoc-Tram Huynh, BS,¹ Michael Broukhim, MS,² Douglas H. Cheung, MS,³
Tonya L. Schuster, PhD,⁴ and Wadie Najm, MD^{1,5}

Abstract

Objectives: To (1) determine the attitudes, perceptions, and use of complementary, alternative, and integrative medicine among undergraduate students; (2) assess whether these students would benefit from more academic exposure to complementary and alternative medicine (CAM) and promotion of integrative medicine (IM); and (3) gauge the need and desire of undergraduates, particularly pre-health learners, to take courses about CAM/IM.

Methods: This cross-sectional electronic survey study was conducted on the campus of the University of California (UC) Irvine. Selection criteria included being at least 18 years of age and a current undergraduate at UC Irvine. All survey responses were collected between November 20, 2010, and June 1, 2011. The data were analyzed by using Stata software, version 11-SE (Stata Corp., College Station, TX).

Results: Completed surveys were received from 2839 participants (mean age of respondents, 20.2 years). Thirty-five percent had used CAM within the past 12 months, and 92.8% believed CAM to be at least somewhat effective; however, only 31% had prior education on CAM. After adjustment for variables, familiarity and belief in effectiveness were both highly linked to the use of CAM, with ascending odds ratios (ORs; 95% confidence interval [CI]) of 3.9 (3.1–4.9), 8.1 (5.7–11.5), 13.4 (6.0–30.2), 2.1 (1.3–3.4), 4.9 (3.0–7.8), and 12.7 (6.9–23.4) among increasing categories (all $p < 0.01$). Sex (OR, 1.26 [95% CI, 1.01–1.56]; $p < 0.05$), Asian ethnicity (1.46 [1.14–1.88]; $p < 0.01$), and prior education (1.26 [1.01–1.57]; $p < 0.05$) were also significantly correlated to the use of CAM after adjustment. Most respondents indicated that they were likely to take a CAM college course if it fulfilled a graduation requirement (63.6%) or was offered within their major (56.4%).

Conclusions: Overall, this large-scale study supports the ideas that education plays a pivotal factor in the decision to use CAM and that there is a large demand for additional CAM knowledge among college students.

Introduction

INTEGRATIVE MEDICINE REFERS to the holistic practice focusing on health promotion and disease prevention by combining evidence-based complementary and alternative medicine (CAM) treatments with conventional, or Western, treatments. CAM is the phrase used to define medical treatments and techniques that are not part of conventional care. Alternative medicine includes treatments that are used instead of conventional therapies, while complementary medicine includes non-conventional treatments that are used in conjunction with

conventional treatments.¹ The range of CAM treatments include, but are not limited to, acupuncture, yoga, exercise, herbal medicine, massage, chiropractic, mind–body modalities, and homeopathy.² A study conducted by the National Institutes of Health in 2007 showed that 38.3% of adults had used some form of CAM treatment in the past 12 months to treat conditions such as back pain, headaches, colds, arthritis, anxiety, depression, cholesterol problems, and reoccurring pain. Some of the major reasons adults used CAM therapies included the following: the potential for supplementary benefits of CAM alongside conventional medicine, the potential to treat unique illnesses beyond

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¹Susan Samueli Center for Integrative Medicine, affiliated with School of Medicine, University of California, Irvine, Costa Mesa, CA.

²Touro University College of Osteopathic Medicine, Vallejo, CA.

³Department of Epidemiology, School of Public Health, Harvard University, Boston, MA.

⁴Department of Sociology, University of California, Irvine, Irvine, CA.

⁵Department of Family Medicine, School of Medicine, University of California, Irvine, Irvine, CA.

the scope of conventional medicine, the avoidance of unwanted side effects, and the lower relative costs of CAM therapies.³

CAM has become increasingly prevalent in both the medical field and the general population in the United States; this raises concerns for safety, information, and efficacy.⁴ Many medical, nursing, pharmacy, and public health schools in the United States have responded to this growing concern by providing CAM courses for health providers.⁴ Particularly, the number of U.S. medical schools reporting inclusion of CAM into their curricula increased from 46 to 75 schools out of 125 between 1996 and 1999, respectively.⁵

Lack of CAM education in the undergraduate curriculum and data on undergraduate familiarity with CAM

Current undergraduate education on CAM is sparse. Only five universities in the United States offer CAM degrees, and research suggests that the overall percentage of college students who have been exposed to any CAM subject material is minimal in both undergraduate and professional school levels.⁶ A study from San Francisco State University identified a disparity between students' high level of interest in CAM and the low availability of CAM courses. Of the undergraduate students surveyed, 97% favored the creation of a CAM major because CAM courses were closely relevant to the students' lives and helped them reduce their stress levels and because the courses changed their dietary and exercise routines for the better.⁶ Also of note, studies that reported close to 40% of people who completed some college work had used some form of CAM in the past 12 months despite the lack of education on CAM at the undergraduate level.³ Because of the applicable nature of CAM to health professional schools, most research had focused on perception and attitude of CAM in medical, pharmacy, nursing, and public health schools. Currently there is a lack of research on the perceptions and use of CAM among undergraduate college students.⁶

Reasons for CAM education in the undergraduate curriculum

It has been suggested that CAM education in U.S. colleges would increase the effectiveness of the country's health practitioners.⁴ CAM education may be most beneficial in the undergraduate curriculum because it may be too late for students to gain sufficient understanding of CAM or even develop an interest in CAM when first exposed to it at the graduate level in pharmacy, nursing, or medical school.⁴ One likely reason for such a trend is that the compacted curricula of schools for health professions prevent an increase in the course load with topics on CAM. In addition, even with the increased exposure to CAM education in medical school, medical doctors were not found to report increased CAM discussion with their patients.⁷ Perhaps earlier exposure to CAM would encourage medical practitioners to discuss CAM with their patients as an option. Pre-health professionals and other undergraduates will also benefit from education on CAM because the undergraduates may develop healthier lifestyle habits and increase their overall knowledge, self-worth, and well-being.⁶

To address these questions, this study sought to (1) determine the attitudes, perceptions, and use of complementary, alternative, and integrative medicine among undergraduate

students; (2) assess whether they would benefit from more academic exposure to CAM and promotion of integrative medicine (IM); and (3) gauge the need and desire of undergraduates, particularly pre-health learners, to take courses about CAM/IM.

Materials and Methods

Participants and procedures

This cross-sectional electronic survey study was conducted on the campus of the University of California (UC) Irvine in southern California. The campus's undergraduate population consists of 21,976 students with an average age of 21 years.

The UC Irvine Institutional Review Board reviewed and approved the study. The survey in this study collected sociodemographic information, including age, sex, race, birth status, years in the United States, college standing, major, and career interests. Participants were asked about their past and current use of CAM, perceptions of the effectiveness of CAM, and their level of interest in CAM education. A free-response question asked for the conditions that prompted their use of CAM. Several questions labeled "multiple select" allowed students to select for multiple responses among available choices. A definition of CAM derived from the National Center for Complementary and Alternative Medicine was provided, and responses were defined by self-report: "CAM is the phrase used to define medical treatments and techniques that are not part of conventional care. Complementary and Alternative medicine includes treatments that are used instead of or along with conventional therapies such as synthetic/pharmaceutical drugs and surgery." The range of CAM treatments include but are not limited to acupuncture, yoga, tai chi, herbal medicine, massage, chiropractics, Ayurveda, homeopathy, and vitamins/minerals/supplements. Several terms used in the current study, such as *Traditional Chinese Medicine* and *naturopathy*, include multiple modalities. These are defined according to the National Center for Complementary and Alternative Medicine. (See Appendix for detailed survey information and definitions.)

The different schools within UC Irvine granted permission to distribute the survey to their undergraduate students. Selection criteria included being at least 18 years of age and a current undergraduate at UC Irvine. Emails were sent to each individual within their respective academic department, with a link directing the participant to the survey on the university's Electronic Educational Environment (EEE). EEE is a secure and interactive platform that students use to access course materials and conduct course evaluations, among other school-related activities. Participation was voluntary, and 20 randomly selected participants received a \$20 gift card at the end of the process as an incentive, indicated in the consent form. Students were required to log in to their UC Irvine electronic account in order to access the survey; however, the system only provided a participation list, and responses were not linked to individuals. EEE also automatically ensured that none of the students took the survey more than once. All survey responses were collected between November 20th 2010, and June 1, 2011.

Data analysis

Data were processed and analyzed by using Stata software, version 11-SE (Stata Corp., College Station, TX). The data

were summarized primarily through frequency values and valid percentages, and measures of variability were reported by using mean $\pm$ standard deviation. The Pearson chi-squared test was used to compare between pre-health and non-pre-health students on their education preferences. Multi-variable modeling procedures used a combination of forward stepwise selection guided by a priori knowledge based on literature review to assess factors associated with CAM use.

Level of significance was reported at a 5% α level. Non-responses totaling <5% were omitted from the data; otherwise, the number of respondents are indicated in the tables.

Results

Characteristics of sample

Of a population of 21,976 undergraduates at UC Irvine during the year 2010–2011, completed surveys were received from 2839 participants with a mean sample age of 20.2 ± 2.40 years. The study sample is representative of the overall UC Irvine undergraduate population, with the exception of a higher proportion of women (69% in study sample versus

53% overall) (Table 1). The majority of surveyed participants were Asian (53.1%), reflecting UC Irvine's student body, and had at least some familiarity with CAM (64.3%); 92.8% believed CAM to be at least somewhat effective, but only 31% had prior education on CAM (Table 2).

CAM use

Women were more prominent users of CAM than men, and those familiar with CAM or with strong beliefs in its effectiveness were much more likely to use CAM (Table 3). A total of 1265 (45.2%) surveyed participants reported prior use of some form of CAM in the past in response to a general question (Table 2). However, given a list of CAM treatments, 1806 (63.4%) respondents indicated using at least one type of treatment. Of these respondents, the most widespread treatments used were supplements (60.8%), massage (50.1%), body movement (38.5%), herbal medicine (35.4%), and Traditional Chinese Medicine (30.1%). The least commonly used treatments included Ayurveda (3.0%), hypnosis (2.0%), and naturopathy (1.1%) (Table 4). Of the 1587 students who indicated reasons for using CAM, friend/relative recommendation was the top justification (53.8%), followed by efficiency/effectiveness of treatment (37.1%), curiosity (36.2%), and personal philosophy (33.0%). The most major reasons for not using CAM from the 1384 respondents were having been healthy (55.8%), lack of familiarity (49.5%), and lack of physician recommendation (37.1%) (Table 5).

In stepwise logistic regression analysis, sex (odds ratio [OR], 1.26; 95% confidence interval [CI], 1.01–1.56; $p < 0.05$), Asian ethnicity (OR, 1.46; 95% CI, 1.14–1.88; $p < 0.01$), and prior education (OR, 1.26; 95% CI, 1.01–1.57; $p < 0.05$) were significantly correlated to the use of CAM after adjustment for variables in our study (Table 6). Being pre-health or a 5th-year student was only significantly associated with use of CAM

TABLE 1. SAMPLE DEMOGRAPHICS VERSUS UNIVERSITY OF CALIFORNIA, IRVINE DEMOGRAPHICS

Characteristic	Total responses	University of California, Irvine campus
Mean age $\pm$ SD (y)	20.2 $\pm$ 2.4 (n = 2788)	21 (n = 21,976)
Sex		
Male	30 (852)	46.0 (10,067)
Female	68.6 (1948)	54.0 (11,766)
Declined to state	1.3 (39)	1.0 (143)
Ethnicity		
Asian	53.1 (1497)	52.0 (11,412)
African American	2.1 (58)	2.3 (521)
Chicano/Latino	12.7 (357)	15.2 (3,348)
Native American	0.2 (6)	0.5 (107)
White/Caucasian	24.2 (682)	21.6 (4,750)
Missing/other/declined	7.8 (219)	5.5 (1,212)
International	NA	2.8 (626)
College standing		
Freshman	22.7 (638)	20 (4,298)
Sophomore	18.1 (510)	17 (3,804)
Junior	28.4 (800)	27 (6,020)
Senior	26.3 (741)	36 (7,941)
5+ years	4.5 (126)	NA
School (multiple select)		
Arts	3.9 (110)	4.0 (875)
Biological Sciences	23.8 (676)	20.0 (4,456)
Business	4.6 (132)	2.0 (405)
Engineering	9.4 (268)	12.0 (2,579)
Health Sciences	9.7 (276)	5.0 (1,118)
Humanities	11.2 (318)	9.0 (2,015)
Information/Computer Science	2.6 (74)	4.0 (834)
Physical Sciences	6.9 (196)	5.0 (1,167)
Social Ecology	15.1 (428)	10.0 (2,135)
Social Sciences	26.2 (745)	25.0 (5,464)
Undecided/Undeclared	2.5 (73)	4.0 (928)

Unless otherwise stated, values are the percentage (number). SD, standard deviation; NA, not available.

TABLE 2. SAMPLE CHARACTERISTICS

Characteristic	Total responses, % (n)
U.S. heritage	
Born in United States	82.2 (2311)
Born outside United States	17.8 (502)
Future profession	
Health care related	44.4 (1240)
Non-health care related	55.6 (1551)
Used CAM	
Yes (within lifetime)	45.2 (1265)
Yes (past 12 months)	35.1 (978)
Previous CAM education	
Yes	31.0 (798)
Familiarity with CAM	
Very familiar	2.8 (79)
Familiar	13.8 (383)
Somewhat familiar	47.7 (1327)
Not familiar	35.7 (995)
Belief in effectiveness of CAM	
Very effective	9.8 (249)
Effective	37.8 (961)
Somewhat effective	45.2 (1149)
Not effective	7.2 (182)

CAM, complementary and alternative medicine.

TABLE 3. CURRENT USES OF COMPLEMENTARY AND ALTERNATIVE MEDICINE

<i>Characteristic</i>	<i>Used CAM in the past 12 months, % (n)</i>
Sex	
Male	27.7 (236)
Female	38.1 (742)
Ethnicity	
African American	36.2 (21)
Native American	50.0 (3)
Asian	33.8 (507)
Chicano/Latino	38.2 (123)
White/Caucasian	34.5 (258)
Missing/other/declined	31.0 (68)
U.S. heritage	
Born in United States	35.4 (817)
Born outside United States	33.1 (166)
College standing	
Freshman	31.8 (203)
Sophomore	31.2 (159)
Junior	34.4 (275)
Senior	38.0 (282)
5+ years	50.8 (64)
Future profession	
Health care related	36.9 (458)
Previous CAM education	
Yes	51.4 (410)
Familiarity with CAM	
Very familiar	75.9 (60)
Familiar	61.6 (236)
Somewhat familiar	40.8 (542)
Not familiar	15.1 (144)
Belief in effectiveness of CAM	
Very effective	74.7 (183)
Effective	49.9 (480)
Somewhat effective	25.6 (294)
Not effective	10.4 (19)

TABLE 4. USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE

<i>CAM Modalities (Multiple Select)</i>	<i>Data (n=18060)</i>
	n = 1806
Supplements	60.8 (1098)
Massage	50.1 (904)
Body movement	38.5 (695)
Herbal medicine	35.4 (639)
Traditional Chinese Medicine	30.1 (543)
Meditation	26.6 (480)
Dietary supplement	24.0 (434)
Chiropractic	23.1 (418)
Prayer for health reasons	19.3 (349)
Acupuncture	16.6 (300)
Energy medicine	8.1 (146)
Homeopathy	7.1 (129)
Biofeedback	3.2 (57)
Ayurveda	3.0 (55)
Hypnosis	2.6 (47)
Naturopathy	1.1 (20)
Other	0.6 (10)

TABLE 5. REASONS FOR USING/NOT USING COMPLEMENTARY AND ALTERNATIVE MEDICINE

<i>Reasons</i>	<i>Total responses, % (n)</i>
For using CAM (multiple select) (n = 1587)	
Friend/relative recommendation	53.8 (854)
Efficiency/effectiveness of treatment	37.1 (589)
Curiosity	36.2 (574)
Personal philosophy	33.0 (523)
Fewer side effects	24.5 (389)
Financially affordable	17.4 (276)
Recommended by a doctor	17.3 (275)
Conventional medicine did not help	16.3 (258)
Other	4.0 (64)
For not using CAM (multiple select) (n = 1384)	
Have been healthy	55.8 (772)
Not familiar with CAM	49.5 (685)
Not recommended by doctor	37.1 (513)
More trust in conventional medicine	21.6 (299)
Other	1.5 (21)

before adjustment. Familiarity and belief in effectiveness were both highly linked to the use of CAM after adjustment, with ascending ORs of 3.87 (95% CI, 3.08–4.88), 8.09 (95% CI, 5.69–11.48), 13.44 (95% CI, 5.99–30.17), 2.11 (95% CI, 1.32–3.38), 4.87 (95% CI, 3.03–7.82), and 12.70 (95% CI, 6.91–23.36), respectively, among increasing categories ($p < 0.01$).

CAM education

Among the respondents, 798 had prior education in CAM modalities (Table 7). Most students attained education on CAM through reading a book (61.2%), taking a college course (33.2%), or attending a seminar (15.7%). Over half of those with prior education cited an interest in further CAM use (54.0%) or a future career involving CAM (52.0%). Among those with prior education, pre-health students were significantly more likely than non-pre-health students to pursue further education ($p < 0.01$), further CAM use ($p < 0.05$), or a future career involving CAM ($p < 0.01$). Furthermore, most of the 2783 respondents indicated that they were likely to take a CAM college course if it fulfilled a graduation requirement (63.6%) or was offered within their major (56.4%). Only 20.5% were not interested in taking a CAM course, with significant differences ($p < 0.01$) observed between pre-health (9.1%) and non-pre-health students (29.6%). Almost one third (36.5%) of surveyed students were interested in a CAM major, also with a statistically significant difference ($p < 0.01$) between pre-health (53.2%) and non-pre-health students (23.9%).

Discussion

To date, this is the largest comprehensive study of attitudes and use of CAM of undergraduate students in the United States. Our study population included approximately 35.1% current CAM users, which is similar to the results described by a recent undergraduate study in Houston (35.8%)⁸ and the National Health Interview Survey of 2007 (38%).³ However, other college studies reported high variations in use, from 58%⁹ to 78%,¹⁰ probably due to differences among CAM

TABLE 6. CORRELATES OF REPORTED USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE IN PAST 12 MONTHS: HIERARCHICAL LOGISTIC REGRESSION

Variable	Step 1 (n=2670)		Step 2 (n=2435)		Step 3 (n=2182)	
	OR (95% CI)	p-Value	OR (95% CI)	p-Value	OR (95% CI)	p-Value
Sex						
Male (Reference)						
Female	1.41 (1.19–1.68)	<0.01	1.34 (1.12–1.61)	<0.01	1.26 (1.01–1.56)	0.04
Ethnicity						
White (Reference)						
African American	0.84 (0.47–1.48)	0.54	0.76 (0.41–1.39)	0.37	0.60 (0.30–1.21)	0.15
Asian	1.06 (0.88–1.29)	0.54	1.12 (0.92–1.38)	0.26	1.46 (1.14–1.88)	<0.01
Hispanic	0.89 (0.68–1.16)	0.38	0.89 (0.67–1.19)	0.43	0.87 (0.62–1.21)	0.40
Other	1.23 (0.84–1.81)	0.29	1.17 (0.78–1.75)	0.44	1.40 (0.85–2.29)	0.18
Born in United States						
Yes (Reference)						
No	0.95 (0.77–1.17)	0.61	1.00 (0.81–1.25)	0.96	1.05 (0.81–1.36)	0.72
Age	1.03 (0.99–1.07)	0.10	1.03 (0.99–1.08)	0.09	1.01 (0.97–1.06)	0.60
Pre-health track						
No (Reference)						
Yes	1.34 (1.15–1.58)	<0.01	1.24 (1.04–1.47)	0.01	1.07 (0.88–1.31)	0.49
Class standing						
Freshman (Reference)						
Sophomore	0.96 (0.75–1.23)	0.78	0.93 (0.72–1.21)	0.59	0.97 (0.71–1.32)	0.84
Junior	1.18 (0.94–1.49)	0.15	1.11 (0.87–1.42)	0.39	0.95 (0.71–1.28)	0.75
Senior	1.26 (0.99–1.60)	0.06	1.14 (0.88–1.48)	0.31	0.86 (0.63–1.17)	0.35
5+ years	1.94 (1.25–3.00)	<0.01	1.84 (1.15–2.95)	0.01	1.41 (0.80–2.49)	0.23
Prior education						
No (Reference)						
Yes			2.23 (1.86–2.68)	<0.01	1.26 (1.01–1.57)	0.04
Familiarity						
Not familiar (Reference)						
Somewhat familiar					3.87 (3.08–4.88)	<0.01
Familiar					8.09 (5.69–11.48)	<0.01
Very familiar					13.44 (5.99–30.17)	<0.01
Belief in effectiveness						
Not effective (Reference)						
Somewhat effective					2.11 (1.32–3.38)	<0.01
Effective					4.87 (3.03–7.82)	<0.01
Very effective					12.70 (6.91–23.36)	<0.01

OR, odds ratio; CI, confidence interval.

definitions/interpretations and limited samplings. Although only 45.2% of the students in the current study stated “yes” to using CAM during their lifetime, 63.4% selected at least one answer choice in a follow-up question for the specific types of CAM modality they had used. This inconsistency demonstrates the confusion among many students regarding what constitutes CAM, despite being provided a general definition.

Of the CAM treatments indicated in our study, the most used therapies, consisting of supplements, massage, body movement techniques, Traditional Chinese Medicine, herbal medicine, and chiropractic, were consistent with the 2007 National Health Interview Survey data and other similar studies.^{3,9–11} This may be due to the widespread commercialization and marketing of these treatments and insurance coverage of several of these therapies.^{12,13} Among the findings was a disparity between the high use of herbal medicine and the low use of naturopathy, which is inclusive of herbal medicine, probably due to confusion over the term

naturopathy, which was not addressed in our survey. The most commonly reported conditions for CAM included cold/flu, musculoskeletal conditions, muscle pain, stress and anxiety, and headaches/migraines, which paralleled the current literature; however, participants did not report arthritis or cholesterol problems, probably because college students do not usually experience those symptoms.^{3,9} Students’ most common reasons for using CAM stemmed from friend/relative recommendations and beliefs in efficiency, similar to those of the Houston undergraduate study,⁸ and the high influence of a specific personal philosophy was similar to the results of Astin’s national study.¹⁴ The current study additionally found that curiosity contributed to the decision to use CAM for many respondents. This study simultaneously examined the reasons students did not use CAM, and good health and lack of knowledge were the most cited causes. While good health was consistent with another study targeting the disuse of CAM among a private California institution, lack of knowledge was not a major factor

TABLE 7. RESPONSES TO EDUCATION-BASED QUESTIONS

<i>Question</i>	<i>Total responses</i>	<i>Pre-health track</i>	<i>Non-pre-health track</i>
Education type (multiple select)			
College course	33.2 (265)	39.4 (166)**	26.6 (97)
Certification course	5.4 (43)	6.9 (29)*	3.0 (11)
Online course	2.9 (23)	2.9 (12)	2.5 (9)
Reading book	61.2 (488)	56.8 (239)**	66.3 (242)
Seminar	15.7 (125)	17.8 (75)	12.9 (47)
Other	8.8 (70)	6.9 (29)*	11.2 (41)
Education sparks:			
Interest in more education	57.0 (420)	68.4 (269)**	44.6 (148)
Interest in future CAM use	54.0 (396)	58.1 (227)*	50.3 (167)
Interest in future CAM career	52.0 (374)	69.7 (267)**	30.8 (100)
Interest in CAM college course if (multiple select)			
Fulfilled requirement for graduation	63.6 (1770)	70.8 (865)**	57.7 (882)
Offered within major	56.4 (1570)	72.2 (882)**	44.0 (672)
Not offered within major	18.6 (517)	22.0 (269)**	15.7 (240)
Not interested	20.5 (571)	9.1 (111)**	29.6 (452)
Interest in major/minor in CAM			
Yes	36.5 (1008)	53.2 (652)**	23.9 (367)

Some individuals did not associate as either pre-health or non-pre-health.

* $p < 0.05$ between pre-health and non-pre-health.

** $p < 0.01$ between pre-health and non-pre-health.

in that study; those participants instead attributed their disuse of CAM primarily to the lack of provider support.¹⁵ This suggests that people in different age groups may have differing values and reasons regarding their choice to use CAM.

Past findings have shown that those with higher education are associated with higher uses of CAM;¹⁶ the current study also found that prior familiarity was correlated with higher CAM use. While Asians and whites typically have the highest percentages of CAM use, studies have shown variation between the two groups. Some have shown Asians as more likely users of CAM than whites,^{17,18} as equally likely,¹⁹ or as less likely.³ In part, these differences may be attributed to the heterogeneity within Asian subgroups with regard to culture, lifestyle, and behavior.²⁰ After adjustment for demographic and educational factors, Asians in the current study were the only ethnic group that significantly differed from whites and were more likely to use CAM. However, whereas age has positively correlated with use of CAM in other studies,^{8,9} this was not a major impact after adjustment in the current study. This is probably due to the inclusion of class standing as a covariate, which, while significant initially, was no longer significant after adjustment for education variables. Therefore, this study suggests that the differences associated with age or increased class level are primarily due to educational factors. Prior CAM education was a strong predictor of CAM use, and it appears that at least some of this relationship can be explained by increases in familiarity and beliefs in effectiveness. Consistent with other studies, women were more likely to use CAM than were men.^{8,10,16} Enrollment in a pre-health track was significantly associated with CAM use before adjustment of education factors but was insignificant after adjustment, indicating that pre-health students may be more likely to seek knowledge of CAM. Overall, belief in effectiveness and familiarity were the strongest predictors of CAM use.

This study has a few limitations. First, because the study was cross-sectional, causation cannot be directly established. Second, survey responses were based on self-reported data, so recall bias may have affected the results. Additionally, any potential confounders not included in the survey data would not have been controlled for in this study. Because this was a voluntary study, there may also have been response bias from those who chose to participate in the survey. As discussed earlier, ambiguity over the definition of CAM and its modalities among students may have influenced the CAM use data; this reflects the lack of clarity in the definitions/terms understood by undergraduates. The strength of this study is the large sample representative of the undergraduate population at this major university. Future studies should consider a nationally representative sample of undergraduates because there has not been such a study to date. Additionally, studies may consider the timing and duration of undergraduate CAM use as well as the specific conditions prompting their use. Furthermore, future studies should investigate the communication between undergraduates and their physicians or CAM practitioners.

With such a substantial portion of the undergraduate population using CAM therapies, it may be advantageous for universities to provide more resources in health centers on the proper use of these treatments. In addition, a substantial portion of undergraduates who use CAM are entering the healthcare field, and including CAM in undergraduate education would provide a strong foundation given the lack of appropriate CAM education in health professional schools. Because many of these students will become future physicians and healthcare providers and given the increased interest and use of CAM among the general population, providing a good foundation would allow for better responsiveness to patient's interest and practice. If health professional schools are not able to educate future health

professionals sufficiently on CAM, then it may be useful to have more introductory courses on CAM at the undergraduate level so that when these students enter professional/graduate school, they can focus on the clinically applicable aspects of CAM.

In conclusion, this large-scale study supports the idea that education plays a pivotal factor in one's decision to use CAM, and that there is a large demand for additional CAM knowledge among college students. Because many of the findings reflect national adult CAM characteristics, the undergraduate level may be the ideal source of implementation to address these demands.

Author Disclosure Statement

No competing financial interests exist.

References

1. National Center for Complementary and Alternative Medicine. Complementary, alternative, or integrative health: what's in a name? [homepage on the Internet]. Online document at: <http://nccam.nih.gov/health/whatiscom>. Accessed September 12, 2010.
2. Filshie J, Rubens CNJ. Complementary and alternative medicine. *Anesthesiol Clin* 2006;24:81–111, viii.
3. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. *Natl Health Stat Rep* 2008;(12):1–23.
4. Burke A, Peper E, Burrows K, Kline B. Developing the complementary and alternative medicine education infrastructure: baccalaureate programs in the United States. *J Altern Complement Med*. 2004;10:1115–1121.
5. Lie D, Boker J. Development and validation of the CAM Health Belief Questionnaire (CHBQ) and CAM use and attitudes amongst medical students. *BMC Med Educ* 2004;4:2.
6. Burke A. Characteristics of college students enrolled in an alternative health/complementary and alternative medicine course: a cross-sectional comparison. *Explore (NY)* 2009;5:45–50.
7. Astin JA, Marie A, Pelletier KR, Hansen E, Haskell WL. A review of the incorporation of complementary and alternative medicine by mainstream physicians. *Arch Intern Med* 1998;158:2303–2310.
8. Mhatre S, Artani S, Sansgiry S. Influence of benefits, barriers and cues to action for complementary and alternative medicine use among university students. *J Complement Integr Med* 2011;8.
9. Johnson SK, Blanchard A. Alternative medicine and herbal use among university students. *J Am Coll Health* 2006;55:163–168.
10. LaCaille RA, Kuvaas NJ. Coping styles and self-regulation predict complementary and alternative medicine and herbal supplement use among college students. *Psychol Health Med* 2011;16:323–332.
11. Lamarine, RK, Fisher J, Sbarbaro V. Alternative medicine attitudes and practices of US College students: an exploratory study. *Calif J Health Promot* 2003;4:24–29.
12. Wolsko PM, Eisenberg DM, Davis RB, Ettner SL, Phillips RS. Insurance coverage, medical conditions, and visits to alternative medicine providers: results of a national survey. *Arch Intern Med* 2002;162:281–287.
13. Lafferty WE, Tyree PT, Bellas AS, et al. Insurance coverage and subsequent utilization of complementary and alternative medicine providers. *Am J Manag Care* 2006;12:397–404.
14. Astin JA. Why patients use alternative medicine: results of a national study. *JAMA* 1998;279:1548–1553.
15. Jain N, Astin JA. Barriers to acceptance: an exploratory study of complementary/alternative medicine disuse. *J Altern Complement Med* 2001;7:689–696.
16. Bishop FL, Lewith GT. Who uses CAM? A narrative review of demographic characteristics and health factors associated with CAM use. *Evid Based Complement Alternat Med*. 2010;7:11–28.
17. Upchurch DM, Wexler Rainisch BK. Racial and ethnic profiles of complementary and alternative medicine use among young adults in the United States: findings from the National Longitudinal Study of Adolescent Health. *J Evid Based Complement Altern Med* 2012;17:172–179.
18. Nahin RL, Dahlhamer JM, Taylor BL, et al. Health behaviors and risk factors in those who use complementary and alternative medicine. *BMC Public Health* 2007;7:217.
19. Mehta DH, Phillips RS, Davis RB, McCarthy EP. Use of complementary and alternative therapies by Asian Americans. Results from the National Health Interview Survey. *J Gen Intern Med* 2007;22:762–767.
20. Islam NS, Trinh-Shevrin C, Rey MJ. Toward a contextual understanding of Asian American Health. In: *Asian American Communities and Health: Context, Research, Policy Action*. San Francisco, CA: John Wiley & Sons, Inc., 2009: 3–22.

Address correspondence to:

Michael A. Liu, BS

Susan Samueli Center for Integrative Medicine
affiliated with School of Medicine
University of California, Irvine
1202 Bristol Street, 2nd Floor
Costa Mesa, CA 92626

E-mail: mauliu08@gmail.com

Appendix follows →

Appendix

1. Definition of Complementary and Alternative Medicine: CAM is the phrase used to define medical treatments and techniques that are not part of conventional care. Complementary and alternative medicine includes treatments that are used instead of or along with conventional therapies, such as synthetic/pharmaceutical drugs and surgery. The range of CAM treatments include but are not limited to acupuncture, yoga, tai chi, herbal medicine, massage, chiropractic, Ayurveda, homeopathy, and vitamins/minerals.
- Did you read the definition of Complementary and Alternative Medicine above?
Yes ☐ No ☐
2. Age
3. What is your gender?
Male ☐ Female ☐ Other
4. What do you consider to be your primary ethnicity?
African American ☐ American Indian/Alaska Native ☐ Asian ☐ Hispanic/Latino ☐ Non-Hispanic White ☐ Pacific Islander ☐ Other
5. Were you born in the United States?
Yes ☐ No ☐
6. If not born in the United States, which country are you from? How long have you been in the United States?
7. What is your college standing?
Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ 5+ years
8. What is your school of discipline? (Check all that apply)
Arts ☐ Biological Sciences ☐ Business ☐ Engineering ☐ Health Sciences (includes Nursing and Public Health) ☐
Humanities ☐ Information and Computer Sciences ☐ Interdisciplinary Studies ☐ Physical Sciences ☐ Social Ecology ☐
Social Sciences ☐
9. Are you planning on pursuing a healthcare-related career (i.e., medicine, nursing, pharmacy, hospital administration)?
Yes ☐ No ☐
10. Have you had any of the following forms of education on Complementary/Alternative Medicine?
College Course ☐ Certification Course ☐ Online Course ☐ Reading a book for your personal knowledge ☐ Seminar ☐
☐ N/A ☐ Other
 - a. Did your education help spark an interest in undertaking further education on CAM?
Yes ☐ No ☐
 - b. Did your education on CAM help increase your use of CAM?
Yes ☐ No ☐
 - c. Did your education of CAM help spark an interest in incorporating any amount of CAM into your future career?
Yes ☐ No ☐
11. Would you enroll in a college course which incorporates CAM if the class: (Please check all that apply)
Fulfilled a requirement for graduation ☐ Was offered within your major ☐ Was not offered within your major ☐ Not interested in taking a college course on CAM ☐
12. If offered at UCI, would you consider majoring/minoring in CAM?
Yes ☐ No ☐
13. How would you rate your familiarity with CAM?
Very familiar ☐ Familiar ☐ Somewhat familiar ☐ Not familiar ☐
14. Have you ever been personally treated with or used CAM?
Yes ☐ (If yes, please skip to question 16) No ☐
15. If no, why haven't you considered using CAM in the past? (please check all that apply and afterwards skip to question 20)
Not recommended/referred by doctor ☐ Have been healthy ☐ More trust in conventional medicine ☐ Not familiar with CAM ☐ N/A ☐ Other

16. What types of CAM have you been treated with or used for yourself? (Check all that apply)
 Acupuncture ☐ Ayurveda ☐ Biofeedback ☐ Body Movement, Tai Chi, Yoga ☐ Chinese/ Oriental Medicine ☐
 Chiropractic ☐ Dietary Supplement, Diet-Based Therapies ☐ Energy Healing, Energy Medicine, Reiki, Therapeutic
 Touch ☐ Herbal Medicine ☐ Homeopathy ☐ Hypnosis ☐ Massage ☐ Meditation ☐ Naturopathy ☐ Prayer for
 Health Reasons ☐ Vitamins/Minerals ☐ Other ☐
17. Have you been treated with or used CAM in the last 12 months?
 Yes ☐ No ☐
18. What are your primary reasons for using CAM? (Please check all that apply)
 Conventional medicine did not help ☐ Financially Affordable ☐ Curiosity ☐ Doctor/Practitioner Recommendation ☐
 Efficiency/ Effectiveness ☐ Friend/Relative Recommendation ☐ Less side effects ☐ Personal philosophy ☐ N/A ☐ Other ☐
19. What illnesses/ conditions did you use CAM for in the past? ☐
20. How effective do you think CAM is in treating various conditions? Very effective ☐ Effective ☐ Somewhat effective
☐ Not effective ☐
21. If there is any additional information regarding your use of, interest, or education in CAM, please provide it below: ☐

Definitions, quoted from National Center for Complementary and Alternative Medicine Web site:

Traditional Chinese Medicine – Traditional Chinese medicine (TCM) originated in ancient China and has evolved over thousands of years. TCM practitioners use herbal medicines and various mind and body practices including Chinese herbal medicine, Tai Chi, and Acupuncture.

Naturopathy – Naturopathy is a medical system guided by a philosophy that emphasizes the healing power of nature. Treatments include: nutrition counseling, including dietary changes (such as eating more whole and unprocessed foods) and use of vitamins, minerals, and other supplements; herbal medicines; homeopathy; hydrotherapy; physical medicine, such as therapeutic massage and joint manipulation; exercise therapy; and lifestyle counseling.