American Medical Students' Beliefs in the Effectiveness of Alternative Medicine

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Abstract

Introduction: While the use of complementary and alternative medical therapy (CAM) is common in the U.S., there have been no prior national studies of CAM-related attitudes of U.S. medical students.

Methods: We surveyed the Class of 2003 at freshman orientation, entrance to wards, and senior year in a nationally representative sample of 16 U.S. medical schools. Our primary outcome of interest was students' Likert-scaled responses to the statement "Alternative medicine can often be as effective as traditional medicine."

Results: With 4764 responses overall (a response rate of 80.3%), 9% strongly agreed, 45% agreed, 34% neither agreed nor disagreed, 11% disagreed, and 2% strongly disagreed that alternative medicine could be as effective as traditional medicine. Students became modestly more polarized in their beliefs, moving from 37% of students neither agreeing nor disagreeing with the statement at freshman year to 31% at senior year. Several variables including gender, paternal educational level, ethnicity, religion, political self-characterization, intended specialty, and prevention-orientation were associated with agreement.

Conclusions: U.S. patients commonly use CAM, but newly-minted U.S. physicians' are often skeptical about its efficacy. This disconnect may make it difficult to integrate patients' CAM use into clinical decision-making.

Keywords: Physician, Medical student, Complementary and alternative medicine

Introduction

Over one-third of U.S. adults report using at least one complementary and alternative medical therapy (CAM) in the past year, targeting such common chronic medical conditions as arthritis, cancer, cardiovascular disease, diabetes, cancer, and HIV.[1-4] However, fewer than 40% of patients discuss CAM with their primary care physicians.[5, 6] Even among providers who recognize CAM use as common among their patients, many providers do not routinely ask patients about CAM use, may be uncomfortable about these discussions, and hold negative attitudes toward CAM.[7]

Undergraduate medical education offers an important venue for training physicians with the knowledge, attitudes, and skills to counsel patients about CAM, and increasing numbers of schools offer CAM teaching within the elective or required curricula.[8] In the 2002-2003 Liaison Committee on Medical Education Annual Medical School Questionnaire, 98 of 126 medical schools reported offering CAM curricula, averaging 6 hours of total instruction time during four years.[9] Well-designed curricular interventions require an understanding of the baseline attitudes of medical students, which may serve as barriers or facilitators to learning about CAM during medical training.

Previous studies suggest that certain characteristics of providers are associated with more positive attitudes towards CAM by medical students, residents, and practicing physicians.[7, 10] However, many studies in medical students have been limited to one institution.[11-14]

We know of no national studies examining the CAM-related attitudes of U.S. medical students; we conducted this study to explore the attitudes of U.S. medical students regarding the effectiveness of CAM compared with traditional medical therapies.

Methods

All medical students in the Class of 2003 at 16 U.S. schools were eligible to complete three questionnaire administrations during their medical training: at freshman orientation (summer/fall 1999), entrance to wards, and in their senior year. School participation was encouraged by offering the summary use of school-specific data (in aggregate and without student identifiers).

Our sample of schools reflected all U.S. medical schools in terms of age (freshman average = 24 years old vs. 24 nationally), school size (average students per school = 563 vs. 527 nationally), NIH medical school research ranking (school average = 64 vs. 62 nationally), private/public school balance (51% private schools vs. 41% nationally), under-represented minorities (13% Blacks, Hispanics, and Native Americans, vs. 11% nationally), gender (45% women vs. 43% nationally), and geographic distribution.[15-19] A 17th school was excluded in 2002 for non-adherence to

protocol.

In an IRB-approved protocol, the confidential questionnaires were administered to students outside of formal classroom or training time. Students were instructed that their participation was voluntary, and that they could choose to withdraw from the study at any time. When necessary, we used Dillman's five-stage mailing process to maximize response rates.[20]

Statistical Analysis: To account for the lack of independence between observations due to clustering within schools and students being measured multiple times, we adjusted variance estimates to account for the dependencies. For all analyses, we used SUDAAN[21], a software designed for the analysis of clustered data, treating each school as a cluster and each student's multiple responses as subclusters.

Students' responses were linked across time using a unique identifier consisting of mother's initials at her birth and father's first two initials. At freshman orientation, 2080 students were eligible to complete the survey and 1846 responded; 1982 were eligible at entry to wards and 1630 responded; 1901 were eligible at senior year and 1469 responded. Of the 2316 students who provided responses, 71.6% (n=1658) did so at more than one time point; 971 responded at three time points, 687 at two, and 658 at one. School response rates were 48%-98%; including responses from the 17th, protocol-noncompliant school, gives a conservative figure of 80.3% responding overall. Not all students were eligible to respond at all three survey points—for example, because of students leaving or returning from pursuing a complementary degree.

Our outcome of interest for this paper was students' Likert-scaled responses to the statement "Alternative medicine can often be as effective as traditional medicine." Responses to the statement were stratified by timepoint in medical school and a chi-square test was conducted. Additionally, independent variables (chosen because of their likelihood to be associated with CAM attitudes, based on prior literature) were tested for association with the primary outcome. These included intended specialty (Primary vs. Non-Primary Care with Undecided excluded), gender, ethnicity (Asian, Black, Hispanic, Native American/ Other, and White), political self-characterization (measured categorically from "Very Liberal" to "Very Conservative"), mother's and father's education (measured categorically from "Not a High School Graduate" to "Medical School"), religious identification (Atheist/None, Buddhist/Hindu/Muslim/Other, Catholic, Jewish, Other Christian, and Protestant), strength of religious identification (measured categorically from "None" to "Very Strong"), Likert-scaled responses (from "Strongly Agree" to "Strongly Disagree") to the statement: "Prevention is less interesting to me than treatment," and yes or no responses to whether the student: was a vegetarian, took calcium supplements, took a multivitamin/mineral supplement, or any other multivitamin/mineral supplement.

Lastly, to assess overall personal health behaviors, a personal health index (PHI) was summed using their smoking, drinking, exercise, and diet habits.[22] For tobacco, subjects who used tobacco products >19 days in the last month or who smoked >10 cigarettes on any day were classified as heavy users and scored as a 1. Other tobacco users were classified as light users (rating 2). Past smokers and never smokers were rated 3 and 4, respectively. For alcohol use, subjects were classified as having "binged" in the previous month if reporting at least one occasion on which they consumed >4 drinks, or averaged >4 drinks in one episode (for males) or three drinks (for females).[23] Subjects who binged >2x/month, or who averaged >2 drinks/day (males) or >1 drink/day (females) were scored as 1. Those who binged 1-2x/month (infrequent bingers) were rated 2. Moderate drinkers, rated 3, averaged 3-4 drinks/episode (males) or 2-3 drinks (females). Light drinkers, rated 4, were those who averaged 1-2 drinks (males) or 1 drink (females) per episode. Non-drinkers were rated 5. Scores were scaled to match the other behavior scores. Sources for the alcohol and smoking questions were the Centers for Disease Control's (CDC) Behavioral Risk Factor Surveillance System, and scales were created in conjunction with the CDC.[24] Exercise was queried as frequency and duration of minimal, moderate, and strenuous exercise, as defined by Godin, and his MET-based scores were calculated.[25] Ratings were based on quartiles of the sample, from 1 (least exercise) to 4 (most). For diet, a validated screener measured fruit and vegetable consumption, ranked by quartiles.[26] PHI scores thus ranged from the relatively worst personal health care practices at a score of 4 to the relatively healthiest personal health care practices at a score of 16.

Using the chi-square test, bivariate associations were tested (stratified by timepoint) between the independent predictor variables and students who "strongly agree" or "agree" with our outcome versus those who "neither agree nor disagree", and those who "strongly disagree" or "disagree". Personal health index was regressed on the outcome variable using simple linear regression. To explore the possibility that CAM attitudes are driven by political or religious values, chi-square tests were run on the outcome with political self-characterization and religious avidity (separately). These analyses were then each stratified by gender and ethnicity.

Results

Of medical students across all three years, 9% reported "Strongly agree", 45% reported "Agree", 34% reported "Neither agree nor disagree", 11% reported "Disagree", and 2% reported "Strongly disagree" to the statement that alternative medicine could be as effective as traditional medicine (Table 1). The fewest number of students agreeing with the statement were at freshman year, while the most students who agreed with the statement were at orientation to wards. Over time, students became somewhat more polarized in their beliefs, moving from 37% of students neither agreeing nor disagreeing with the statement at freshman year to 31% at senior year.

Due to the similarity of the results over time, in the data in Table 2 were condensed over all time points, leaving the simplified dichotomous analyses between the outcome and the independent variables. These observations may represent the same person up to three times or different people over three time points. Overall, 54% of students either "strongly agreed" or "agreed" that alternative medicine could be as effective as traditional medicine. Being female, intending to specialize in primary care, being Asian or Hispanic, being increasingly liberal, having a father who had either minimal education or was highly educated, being not of Jewish descent, taking a calcium supplement, and strongly disagreeing that "Prevention is less interesting to me than treatment" were all associated with a higher percentage of students agreeing that alternative medicine could be as effective as traditional medicine (Table 2). Having weaker religious identification, being a vegetarian, and taking a multivitamin/mineral supplement were also positively associated with the outcome variable ($\alpha = 0.05$). Neither mother's education nor taking any other multivitamin/mineral supplement seemed to be related to student opinion about alternative medicine. Personal health behaviors, as indicated by the personal health index, were positively associated ($\alpha = 0.05$) with attitudes about CAM.

Political self-characterization had a significant association with beliefs about the effectiveness of CAM in analyses that were stratified by gender and ethnicity (data in this paragraph not shown in tables). In analyses stratified by gender, political self-characterization and CAM beliefs had significant relationship among women (p= 0.0001) and marginally among men (p=0.057). The relationship was also significant among Asians (p=0.0015), Native Americans/Other (p=0,006), and Whites (p=0.0002), though less so for Hispanics (p=0.07) or African-Americans (p=0.7). This association did not hold for religious avidity, however. The association between strength of religious identification and belief in the effectiveness of CAM became much weaker when adjusted for gender (p=0.054 among women and 0.048 among men), and for ethnicity (among Hispanics p=0.001, Whites p=0.002, Blacks p=0.04, Native American/Other p=0.08, and Asian p=0.4).

Conclusions

In this multi-institutional study, about half of medical students agreed that CAM can often be as effective as traditional medicine. Our findings are comparable to surveys of practicing physicians in the U.S., where 44-66% of providers had favorable opinions toward CAM.[7, 27, 28] Moreover, like a recent study at one medical school, the proportion of students with this positive attitude toward CAM remained consistent throughout three stages of allopathic medical training.[29]

Our study also amplifies results from smaller studies of associations between CAM attitudes and students' personal characteristics. In multiple smaller studies of practicing physicians and students, women have had more positive attitudes toward CAM, including personal use and referral of patients to CAM providers.[7, 27, 28, 30, 31] In our cohort, Asian or Hispanic ethnic backgrounds were associated with increased

belief in CAM's effectiveness. Studies of patients have revealed variable patterns of CAM use by ethnicity, with some evidence that reasons for CAM use differ by cultural background.[32-35]

In our study, students with primary care and preventive orientations were more likely to agree that CAM could be as effective as traditional medicine. Similarly, students with self-care practices that may be preventive in motivation – such as the use of vitamins/supplements and vegetarian diets – also felt positively toward CAM. This finding is consistent with a recently developed survey instrument linking attitudes towards holistic health care with attitudes toward the effectiveness of CAM.[31] A recent survey designed to examine attitudes toward mind-body interventions of primary care and specialty physicians did not report differences by specialty, but may have been limited by a low response rate (27%).[36]

Finally, our study contributes a novel finding in CAM research, suggesting that political self-characterization is associated with belief in the effectiveness of CAM, an effect which remains significant for most sub-groups even after controlling for gender and ethnicity. A 1993 survey of 599 first-year medical students found differences by political party affiliation in some attitudes towards health promotion and prevention, including "access to routine health maintenance, role of the physician in providing these services, and importance of health promotion counseling and preventive health measures as compared with curative medicine."[37] Our findings build on this preliminary literature, suggesting an additional avenue for inquiry in future research related to CAM attitudes and behaviors.

Overall, our study suggests that medical students' beliefs about the effectiveness of CAM do not change substantively during the course of their undergraduate medical education, despite efforts to have CAM curricula in schools, and a growing literature evaluating and substantiating the effectiveness of some modalities, and highlighting its importance to patients.[8, 38, 39] In addition, our study lends further support to the association between students' personal characteristics and their attitudes toward CAM's effectiveness. These findings should be considered by educators designing educational interventions for undergraduate trainees. For example, elective courses in CAM may be subject to self-selection by those with already positive attitudes toward CAM, such as women.[27] Alternatively, integrating CAM themes throughout a required four-year curriculum may reach a greater diversity of students representing multiple backgrounds and pre-existing opinions toward CAM. This approach may maximize opportunities for all students to develop the knowledge, attitudes, skills, and behaviors necessary for providing patients with counseling about CAM.

Our study has limitations that should be considered. Our survey contained one item to measure students' attitudes regarding CAM effectiveness. Other studies have suggested that providers' attitudes vary among the different types of CAM therapies, such as acupuncture, biofeedback, and homeopathy.[40, 41] Although our study sample is multi-institutional and selected to be nationally representative, the schools and their students were not randomly selected. Finally, our study did not assess the availability of or student participation in CAM curricula at these medical schools.

In summary, our study found that about half of medical students throughout medical school agreed that CAM can often be as effective as traditional medicine, and this attitude was associated with such personal characteristics as gender, ethnicity, preventive orientation, and political self-characterization. Our findings should inform future curricular interventions to instill in medical students the knowledge, attitudes, skills, and behaviors necessary to effectively counsel patients regarding CAM.

Conflict of Interest

The authors state there are no conflicts of interest related to the research reported in the manuscript**.**

Author Contribution

Erica Frank, MD, MPH: originated the concept, designed the project, supervised data collection, wrote most of the first draft, contributed to subsequent drafts, devised the survey tool, supplied data, and collected data.

Neda Ratanawongsa, MD, MPH: Wrote some of the first draft, contributed to subsequent drafts, and performed the literature review.

Jennifer Carrera, MS: Wrote some of the first draft, contributed to subsequent drafts, and performed the statistical analyses.

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Table 1. US medical students' (Class of 2003) opinion about the effectiveness of alternative medicine, by timepoint

	Total Observations all Timepoints	Overall (n=4,764)		Freshman Year (n=1,814)		Orientation to Wards (n=1,569)		Senior Year (n=1,381)	
		%	(SE)	%	(SE)	%	(SE)	%	(SE)
Alternative medicine can often be as effective as traditional medicine (p-value=0.0009)*									
Strongly agree	411	9	(0.6)	8	(1)	9	(0.7)	9	(0.6)
Agree	2,137	45	(1)	43	(2)	47	(1)	45	(2)
Neither agree nor disagree	1,600	34	(1)	37	(2)	32	(1)	31	(2)
Disagree	510	11	(0.8)	9	(1)	10	(0.9)	13	(0.9)
Strongly disagree	106	2	(0.4)	2	(0.5)	2	(0.5)	2	(0.5)

* Chi-square test

Table 2. US medical students' opinion about the effectiveness of alternative medicine by demographic and personal health behavior characteristics

	Total Observations all Timepoints	Alternative medicine can often be as effective as traditional medicine						Chi-square p-value
		Strongly agree/ Agree		Neither agree nor disagree		Strongly disagree/ Disagree		
		%	(SE)	%	(SE)	%	(SE)	
Total	4,764	54	(2)	34	(1)	13	(1)	--
Specialty**								0.001
Primary care	1,386	57	(3)	33	(2)	10	(2)	
Non-primary care	2,656	52	(1)	33	(1)	15	(1)	
Gender								0.0003
Female	2,195	56	(2)	35	(2)	9	(0.9)	
Male	2,564	51	(2)	32	(1)	17	(1)	
Ethnicity								<0.0001
Asian	903	61	(2)	32	(2)	7	(1)	
Black	374	53	(3)	40	(3)	8	(0.8)	
Hispanic	199	58	(5)	32	(2)	10	(4)	
Native American/Other	231	51	(4)	35	(5)	14	(4)	
White	3,043	51	(2)	33	(1)	15	(1)	
Political self-characterization								0.0003
Very conservative	225	38	(5)	31	(3)	31	(3)	
Conservative	1,023	43	(3)	38	(2)	19	(2)	
Moderate	1,568	53	(2)	36	(2)	11	(1)	
Liberal	1,483	60	(2)	31	(2)	9	(0.9)	
Very liberal	447	67	(3)	25	(2)	9	(1)	
Mother's education								0.1
Not a high school graduate	178	49	(4)	38	(3)	12	(4)	
High school graduate	534	49	(3)	38	(3)	13	(2)	
Some college	650	52	(3)	32	(2)	16	(2)	
College graduate	1,451	54	(2)	34	(1)	12	(1)	
Graduate school	1,233	54	(3)	33	(2)	13	(2)	
Medical school	125	54	(6)	35	(5)	10	(3)	
Father's education								0.002
Not a high school graduate	180	51	(6)	34	(4)	15	(4)	
High school graduate	394	47	(3)	39	(3)	14	(2)	
Some college	380	52	(4)	35	(3)	13	(3)	
College graduate	973	51	(3)	35	(2)	14	(2)	
Graduate school	1,562	57	(2)	32	(2)	12	(1)	
Medical school	671	52	(3)	34	(3)	14	(1)	

	Total Observations all Timepoints	Alternative medicine can often be as effective as traditional medicine						Chi-square p-value
		Strongly agree/ Agree		Neither agree nor disagree		Strongly disagree/ Disagree		
		%	(SE)	%	(SE)	%	(SE)	
Religious identification								<0.0001
Atheist/None	846	55	(2)	33	(2)	12	(1)	
Buddhist/Hindu/Muslim/Other	632	59	(3)	33	(3)	8	(1)	
Catholic	1,080	52	(2)	34	(2)	14	(2)	
Jewish	310	48	(4)	37	(4)	15	(2)	
Other Christian	796	54	(2)	35	(2)	11	(1)	
Protestant	1,071	52	(4)	33	(2)	16	(3)	
Strength of religious identification								0.02
Very strong	926	49	(3)	36	(1)	15	(2)	
Strong	1,196	54	(3)	31	(2)	15	(2)	
Moderate	1,262	54	(2)	35	(1)	11	(0.9)	
Low	821	56	(2)	34	(2)	11	(1)	
None	535	56	(3)	33	(3)	11	(1)	
Prevention is less interesting to me than treatment								0.008
Strongly agree	181	51	(4)	22	(4)	27	(5)	
Agree	849	49	(2)	32	(1)	19	(2)	
Neither agree nor disagree	1,056	45	(3)	44	(3)	11	(1)	
Disagree	1,927	57	(2)	32	(2)	12	(1)	
Strongly disagree	672	64	(2)	28	(1)	9	(1)	
Do you consider yourself a vegetarian?								0.03
Yes	442	62	(3)	28	(2)	10	(2)	
No	4,307	53	(2)	34	(1)	13	(1)	
Takes a calcium supplement								0.008
Yes	1,170	57	(2)	34	(1)	10	(0.9)	
No	3,373	53	(2)	34	(1)	14	(1)	
Takes a multivitamin/mineral supplement								0.02
Yes	2,580	56	(2)	33	(1)	11	(1)	
No	1,957	51	(3)	34	(2)	15	(1)	
Takes any other multivitamin/mineral supplement								0.05
Yes	1,105	58	(2)	32	(2)	10	(1)	
No	3,425	52	(2)	34	(1)	14	(1)	
Mean personal health index	4,025	11.2	(0.2)	11.1	(0.2)	11.0	(0.1)	0.02†

    ** "Undecided" students are excluded

    †   Linear regression (in Sudaan) p-value