CAM Attitudes in First- and Second-year Medical Students: A Pre- and Post-course Survey

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Abstract

Objective: This study evaluated a 10-week, introductory elective on complementary and alternative medicine (CAM) therapies offered to first- and second-year medical students in the fall of 2004 by examining students' responses to a variety of teaching methods about CAM treatments and by measuring knowledge obtained by the pre- and post-course evaluations.

Methods: Pre-and post-course survey questionnaires were administered to first- and second-year medical students (N=37). Questionnaires gathered information regarding the student's outlook on CAM such as general attitudes, whether they believed certain CAM approaches were more "mainstream" or not, and to what degree they planned to include CAM in their future practice of medicine.

Limitations: Students were not randomly selected as this was an elective course. Another limitation could have been the quality of the presentations and the teaching ability of the lecturers, which might have influenced student feedback more than the content area itself. Because questionnaires were anonymous, students' pre- and post-responses could not be matched, precluding statistical significance testing.

Results: Students' attitudes towards certain CAM modalities varied by gender, with female students tending towards the negative on post-course general attitudes. Subject material was perceived more positively when presented by an MD than if presented by a non-MD.

Conclusions: This study explored a variety of strategies on how to best impart CAM content in a usable form to medical students, concluding that educational research on curriculum design—including matters such as the credibility and expertise of the presenter—are needed as this material is integrated into medical training. On another note, there has been some fear expressed in medical academia that newer medical students, such as these in their first and second years, lack a sound basis in rigorous medical training and thereby might be too uncritical of CAM therapies. This study shows such a fear may be unfounded due to student's critical thinking skills even in the early years of medical school.

Keywords: complementary and alternative medicine, CAM, attitude(s) toward CAM, gender, medical education, medical students.

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Competing Interests

All named authors have no conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject of our manuscript.

Introduction

In the last hundred years, biomedicine has had considerable success in healing acute injury, illness, and infectious diseases. However, patients as well as their physicians are often faced with the limitations of the biomedical model when it comes to health promotion, disease prevention, and management of chronic illness.[1] This often prompts patients to seek alternatives for their healthcare—whether due to a clash between biomedicine and cultural beliefs, concerns about side effects, costs of medication, or a desire for self determination and autonomy in a healthcare model that is more patient-centered.

The World Health Organization estimates that, according to conventional US standards, 75% of the world's healthcare is

technically "alternative."[2] Despite this, there has been considerable debate over the bringing of CAM information into medical curricula.[3] Until the past decade, alternative therapies were rarely offered at American medical schools. However, this is changing. With the growing body of evidence regarding frequency of use in the United States,[4,5] complementary and alternative medicine (CAM) topics are increasingly being included.[6] Currently, a group of 36 US and Canadian schools with educational, clinical, and research activities in CAM-related areas have formed the Consortium of Academic Health Centers for Integrative Medicine (nicknamed the "Consortium")[7] to share educational resources and expertise. Additionally, federal policy statements originating from the Institute of Medicine[8] and the 2007 White House Commission on CAM[9] have urged broader and more systematic introduction of CAM therapies into healthcare curricula for patient safety.

Nevertheless, the ability to impart usable CAM information into medical curricula can be challenging.[10] Some of the barriers include resistance by faculty, perception that the curriculum is already too full, and a distrust in the ability to present CAM context in an evidence-based way.[11] It is reported that 83% of American medical schools have some type of CAM instruction, but this is mostly in the form of electives,[12] which leaves many students unexposed to CAM information.

The medical student branch of the American Medical Association, the American Medical Student Association, has shown recognition of the importance of CAM education by stating that "schools must recognize the demand and importance of making future doctors aware of new techniques and other paradigms of healing which are used by healthcare providers in other parts of the world."[1] Even with the increasing number of medical schools offering subject matter in CAM topics, the 2006 Association of American Medical College's Medical School Graduation Questionnaire reported that 33.9% of medical students rated their education in CAM to be "inadequate," down from 50% in 2002.[1]

A majority of relevant studies cited in the current literature have indicated that medical students are more open and positive toward CAM practices after exposure to information about the topic.[13-18] One study showed that exposure to even a single lecture on CAM had a significant impact on medical students' views.[19] Such exposure could theoretically increase the likelihood of students discussing CAM in an informed manner with their future patients. In some of these studies, conclusions regarding positive attitudes were derived by identifying increases in "agree/strongly agree" categories[14,20]; others used a full range of data from negative to positive.[17,21]

This paper highlights pre- and post-exposure questionnaire results by first- and second-year medical students taking a 10-week elective course on CAM at Texas A&M Health Science Center College of Medicine (TAMHSC-COM). To analyze these results, our study used a CAM self-assessment tool originally developed by Kreitzer et al[22] at the University of Minnesota and modified for use pertinent to the class.

Methods

The following describes the course we reviewed and the evaluation and statistical methods we used.

Course Description

"Complementary and Alternative Medicine: Where is the Science?" was presented in the Fall of 2004 as a humanities elective to first- and second-year (M1 and M2) students of TAMHSC-COM. This was the first for-credit course on CAM offered at this school with the exception of a previous class on evidence-based medicine that utilized CAM as a primary focus.[23] This course was designed as an overview of CAM and selected CAM modalities and utilized various practitioners, both MD and non-MD, to give a summary of their expertise with a particular CAM topic while emphasizing the basic concepts of the most commonly used CAM modalities.[24] All practitioners were requested to provide information on their topics that followed the core competencies identified by the aforementioned Consortium—basic definitions, history, common clinical applications, potential for adverse effects, current research evidence for efficacy, reputable resources for in-depth information, and training/credentialing standards for practitioners.[7]

There were ten 50-minute class segments dealing the with the following topics: (1) CAM in general, eg, what constitutes CAM, its use in the United States, current research, CAM information sources, and certification of CAM practitioners; (2) massage and chiropractic; (3) clinical nutrition; (4) naturopathy; (5) herbal/Chinese medicine; (6) spirituality/meditation; (7) Ayurvedic/herbal (traditional Indian) medicine; (8) folk medicine and midwifery; (9) acupuncture; and (10) energy work/therapeutic touch, along with a wrap up of the course. The 10th class also included a review of legal issues involved with CAM. Of the combined total of 153 M1 & M2 students, 52 (20 males, 32 females; 34% of the total group) completed the elective.

Evaluation Methods

A wide variety of surveys used for analyzing healthcare provider attitudes on CAM were reviewed.[14,15,17,20,22,23,25-29] These studies include those comparing medical students with allied healthcare students[14,22] and general practitioners[27] as well as among other medical students in the United States[20,28] and among medical students in other countries.[17,26] To date, only Forjuoh[23] and Torkelson[20] have published a pre- and post-exposure survey study with the same set of medical students for a specific CAM-based course.

As mentioned, a modification of Kreitzer's University of Minnesota Academic Health Center's *CAM Survey of Knowledge and Attitudes of Health Professions Students* was used to compare students' attitudes pre- and post-course[22] (see survey on page 52). Adaptation was made to better reflect class content and emphasis. As a result, survey data from the sections on "Barriers to CAM Practices" and "Resources for CAM" were not used. The section on "Personal Use" by the students was used to obtain a percentage of CAM usage by the students prior to class only, and was not analyzed otherwise, as personal usage would not be an attitudinal change that would shift in a small amount of time compared to the other measures. The following sections were utilized: (1) "General Attitudes Toward CAM," (2) "CAM Approaches—Alternative or Mainstream?" and (3) "CAM Approaches in Students' Future Practices." The study protocol was approved by the Texas A&M University Office of Research Compliance.

Survey of Knowledge and Attitudes of Health Professional Students

Medical Student: ___ Year I ___ Year II
Your Gender: ___ Male ___ Female
Your Age: ___ Years

Ethnic/Racial Background:
❑ Asian/Pacific Islander ❑American Indian/Alaskan Native
❑ Black/African American ❑ Hispanic ❑ Multi Racial
❑ White/Not Hispanic ❑ Other

1. General Attitudes Toward Complementary and Alternative Medicine (CAM):
For each of the following statements, indicate how closely it represents your general feelings about CAM.

1=Very Strongly Agree; 2=Strongly Agree; 3=Agree; 4=Disagree; 5=Strongly Disagree; 6=Very Strongly Disagree; X=Neutral

___ Clinical care should integrate the best of conventional and CAM practices.
___ CAM includes ideas and methods from which conventional medicine could benefit.
___ While we need to be cautious in our claims, a number of CAM approaches hold promise for treatment of symptoms, conditions, and/or diseases.
___ The results of CAM are in most cases due to a placebo effect.
___ CAM therapies not tested in a scientific manner should be discouraged.
___ While a few CAM approaches may have limited health benefits, they have no true impact on treatment of symptoms, conditions, and/or diseases.
___ CAM is a threat to public health.
___ I hope to have some CAM practices available to patients in my practice or referral network.
___ Health professionals should be able to advise their patients about commonly used CAM methods.
___ CAM practices should be included in my school's curriculum.
___ Knowledge about CAM is important to me as a student/future practicing health professional.

2. Barriers to Use of CAM Practices in Western Medical Settings Include:
Use scale above.

___ Lack of evidence for practices
___ Unavailability of credentialed providers
___ Lack of reimbursement
___ Too time-consuming
___ Other_____

Institutional concerns about:
___ Legal issues
___ Lack of staff training
___ Lack of appropriate equipment

3. CAM Approaches: "Alternative" or Mainstream?
Historically, some "alternative" approaches reach a point where they are considered "orthodox" or mainstream. For each of the modalities listed below, indicate how you think of each therapy at the present time.

1=Clearly Mainstream, 2=Neither Clearly Mainstream nor Alternative 3=Clearly Alternative, X=No Opinion

___ Acupuncture
___ Bioelectromagnetic therapies, eg, magnets
___ Biofeedback
___ Chiropractic
___ Herbal medicine
___ Homeopathy
___ Hypnosis/guided imagery
___ Massage
___ Nutritional supplements
___ Prayer/spiritual healing
___ Meditation
___ Therapeutic/healing touch

4. Resources:
Using a scale from 0 to 4, where 0=Not At All Useful and 4=Very Useful, please answer the following question.

How useful do you think each of the following methods would be in preparing you to advise patients on the use of alternative medicine therapies?

___ Internet
___ Textbook readings
___ Articles on clinical trials of alternative medicine therapies
___ Lectures
___ Observation of alternative medical therapies
___ Hands-on experience with alternative medicine therapies and patients in clinical settings
___ Case-based learning
___ Using alternative medicine therapies to promote my own health

5. Personal Use:
For each of the following CAM practices, have you used it personally?

1=No, Would Not Consider Using It, 2=No, Would Consider Using It 3=Yes, Have Used It With Positive Outcomes, 4=Yes, Have Used It With Neutral Outcomes, 5=Yes, Have Used It With Negative Outcomes

___ Acupuncture
___ Bioelectromagnetic therapies, eg, magnets
___ Biofeedback
___ Chiropractic
___ Herbal medicine
___ Homeopathy
___ Hypnosis/guided imagery
___ Massage
___ Nutritional supplements
___ Prayer/spiritual healing
___ Meditation
___ Therapeutic/healing touch

6. CAM Approaches in Your Practice:
For each of the following CAM approaches, how do you intend to use it in your practice—by personally providing it or by referring patients to trained providers?

1=Would Not Recommend, 2=Would Endorse but Not Personally Provide or Refer, 3=Would Provide Personally, 4=Would Refer to a CAM Practitioner

___ Acupuncture
___ Bioelectromagnetic therapies, eg, magnets
___ Biofeedback
___ Chiropractic
___ Herbal medicine
___ Homeopathy
___ Hypnosis/guided imagery
___ Massage
___ Nutritional supplements
___ Prayer/spiritual healing
___ Meditation
___ Therapeutic/healing touch

7. Overall Comments:
Any other comments you have on CAM practices or education would be welcome.

_____
_____
_____
_____
_____
_____

For study purposes, students were asked to fill out the 3-page survey instrument on the first day of class before the first lecture started and at the end of the last (10th) class. The 10th class survey was used as a post-class evaluation but, when compared to the pre-class survey, was also used to measure any attitudinal changes of the M1s and M2s toward CAM. Students were also asked on the post-class survey for any comments or suggestions regarding the class. Of the 52 students originally registered for the course, 37 filled out both the pre- and post-evaluation surveys. Of these, 37, 15 were male (75% response rate) and 22 were female (68% response rate).

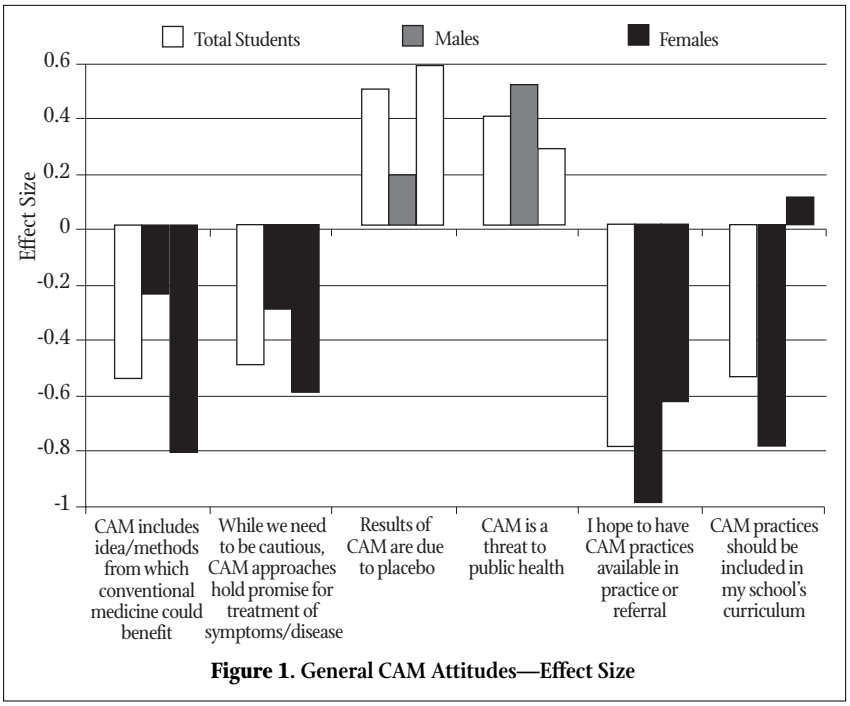

Figure 1. General CAM Attitudes—Effect Size

Statistical Methods

Statistical significance could not be assessed based on the study's individual subject anonymity on pre- and post-exposure questionnaires. Gender was identified in both pre- and post-questionnaires, and attitudinal change was measured between the gender groups. Instead of significance testing, effect size comparison was used. Effect size does not require individual matching and is not sensitive to sample size. Effect size (0.20 small, 0.50 medium, 0.80 large) can be estimated by Cohen's *d*.

Results

Data gathered during the CAM elective at TAMHSC-COM in Fall 2004 utilizing the entire range of scores appeared to show that, in many cases, learning about CAM practices decreased the general acceptance level in M1 and M2s, particularly when separated by gender, and, to a lesser degree, when the subject was taught by a non-MD lecturer. The significance of lecturer type in regard to acceptance of CAM has not been investigated in current peer-reviewed literature prior to this study.

General Attitudes Toward CAM

Scoring criteria for the section on "General Attitudes" was modified to correlate with a Likert scale, with 1 "strongly disagreeing," 4 "neutral," and 7 "very strongly agreeing." Figure 1 exemplifies some of the general downward trend in which positive attitudes toward CAM underwent decline post-exposure. Five statements out of the 11 in this section showed no applicable change in effect between pre- and post-evaluation and were therefore not included in the figure.

The 6 statements that did show substantial effect size change included the comment (1) "CAM includes ideas and methods from which conventional medicine could benefit," which had a large negative effect (-0.82) from pre- to post- in female students compared to a small negative effect in males (-0.3). There was also a moderate negative shift in females (-0.6) but, again, a small negative shift in males (-0.3) to the comment (2) "While we need to be cautious in our claims, a number of CAM approaches hold promise for the treatment of symptoms, conditions, and/or diseases."

Two of these 6 statements showing a moderate-to-large effect change were negatively worded in that positive scores revealed increasing skepticism toward CAM modalities. A small positive effect occurred in males (0.18) and a moderate positive effect in females (0.57) in response to (3) "Results of CAM are in most cases due to a placebo effect." For this statement, percentages of before and after responses indicate a shift in the direction of agreement, particularly for males but also for females, as seen in Figures 2 and 3 (on page 54). These results match what some previous studies have found.[20,23] The other negatively worded statement, (4) "CAM is a threat to public health," caused a moderate positive shift in males (0.51) and a small positive shift in females (0.28).

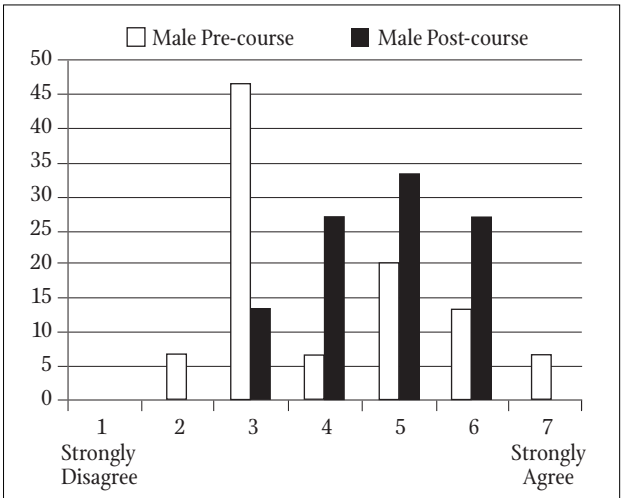

Figure 2. Males' Percentage Response to "Results of CAM Are Due to Placebo"

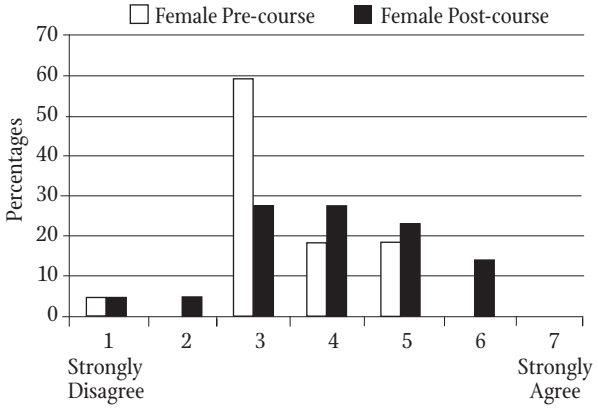

Figure 3. Females' Percentage Response to "Results of CAM Are Due to Placebo."

The last 2 of the 6 statements regarded intent to include CAM in future practice (Figure 1). Item (5) "I hope to have some CAM practices available to patients in my practice or referral network" showed a large negative effect in males (-1.0) and a moderate effect in females (-0.68). Item (6) "CAM practices should be included in my school's curriculum" showed a large negative effect in males (-0.8) but a weakly positive shift in females (0.1).

CAM: Alternative or Mainstream?

Historically, some "alternative" approaches reach a point where they are considered "orthodox" or "mainstream." For each of the modalities listed in Item 3 of the questionnaire, students were asked to indicate how they thought of each therapy. Effect size was again used to determine any attitude shift after exposure to specific CAM therapies between mainstream and alternative (Figure 4). For each specific therapy, students marked it as either 1 "clearly mainstream," 2 "neither clearly mainstream nor alternative," 3 "clearly alternative," or X "no opinion." Using mean ratings for pre- and post-exposure attitudes regarding a particular therapy, females tended to have more of a shift from alternative toward mainstream post-exposure to information, as indicated by negative values. Specific female results for all therapies presented in the class were acupuncture, -0.68; chiropractic, -0.41; herbal medicine, -0.98; massage, -0.18; prayer, -0.45; nutritional support, -0.25. These shifts were not necessarily reflected by males.

As to nutritional support, males post-exposure showed a moderate positive shift toward alternative, with a score of 0.45; males also shifted in a slight-to-moderate way toward alternative in their post-exposure attitude toward prayer, with a score of 0.30. For both males and females, the largest change post-exposure was in the category of therapeutic touch, which had the highest tendency toward alternative (0.77) and the least tendency toward acceptance in both groups. One comment, in particular, stated, "No more healing touch lectures, it was *ridiculous.*" For females only, herbal medicine showed the greatest tendency toward being considered a mainstream therapy after exposure (-0.98); men's attitudes appeared largely unaffected by this exposure (-0.18). For females, the strongest 2 shifts toward mainstream occurred in classes taught by MDs.

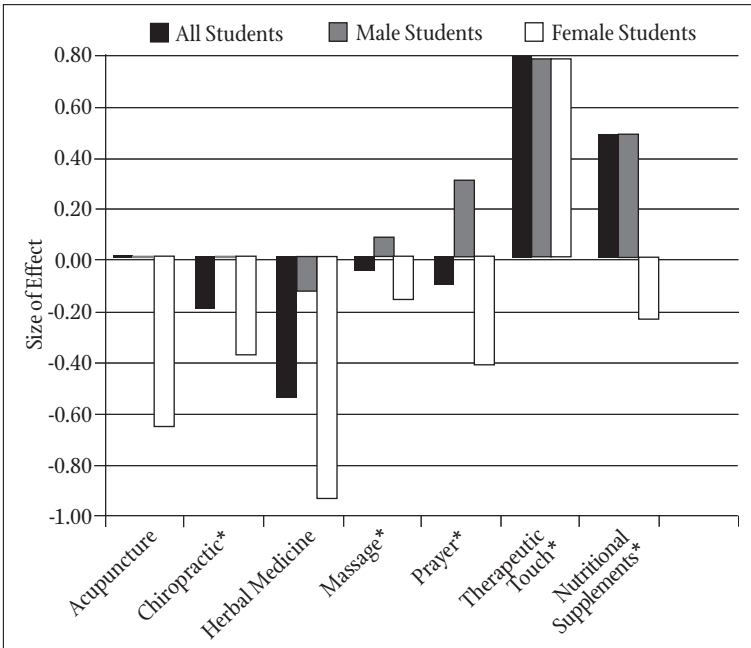

Figure 4. Effect Size of Attitude Shift From Mainstream to Alternative After Exposure to Individual CAM Therapies

*Taught by a non-MD

CAM Approaches in Practice

Personal involvement with CAM was rated on a scale of 1 to 4, with 1 corresponding to "Would not recommend," and 4 to "Would provide personally." Rating on a graduated scale, medium negative effect was found in females regarding use of herbal therapy (-0.67) (see Figure 5 (on page 55), which reflects pre- and post-exposure levels of intended CAM involvement for women) and in males regarding massage (-0.67) (see Figure 6 (on page 55), which reflects pre- and post-exposure levels of intended CAM involvement for men). Strong negative effect was seen in males for prayer (-0.81). In fact, median levels of desired involvement decreased for males in four areas: herbal medicine, massage, prayer, and therapeutic touch. Both males and females were strongly against future incorporation into practice of therapeutic touch (males -1.49; females -1.04).

For all remaining items, effect size for females and males were negligible. One male's comment exhibited some of the caution, but also some acceptance, brought about by exposure. He stated, "I think it is purely inevitable for CAM practices to become a definite block of medicine. Although not scientifically proven, the ultimate ability to heal our patients should warrant further openness and careful examination by physicians and other healthcare practitioners. If it benefits the patients, it would be ridiculous for physicians not to try it. I personally am an undivided advocate for CAM and will probably use it in my practice."

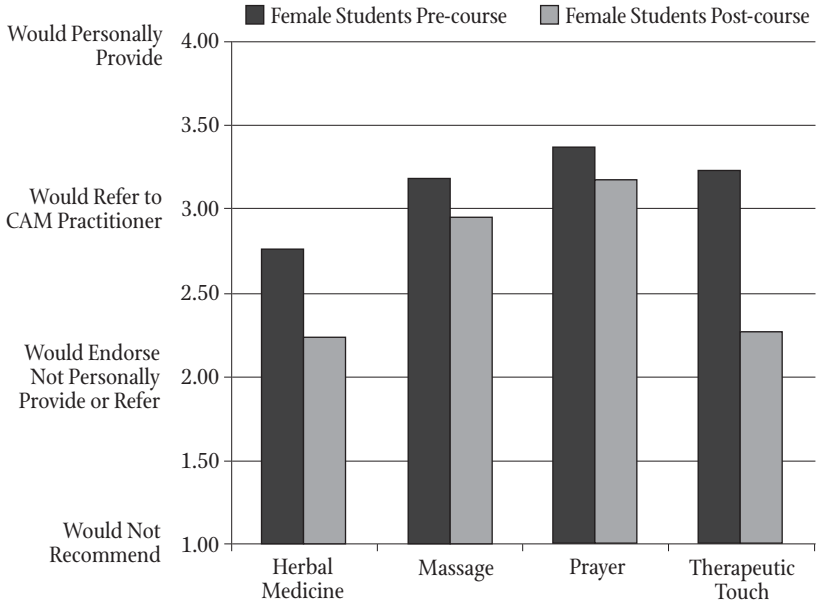

Figure 5. Female Median Levels of Desired Involvement With CAM Pre- and Post-course

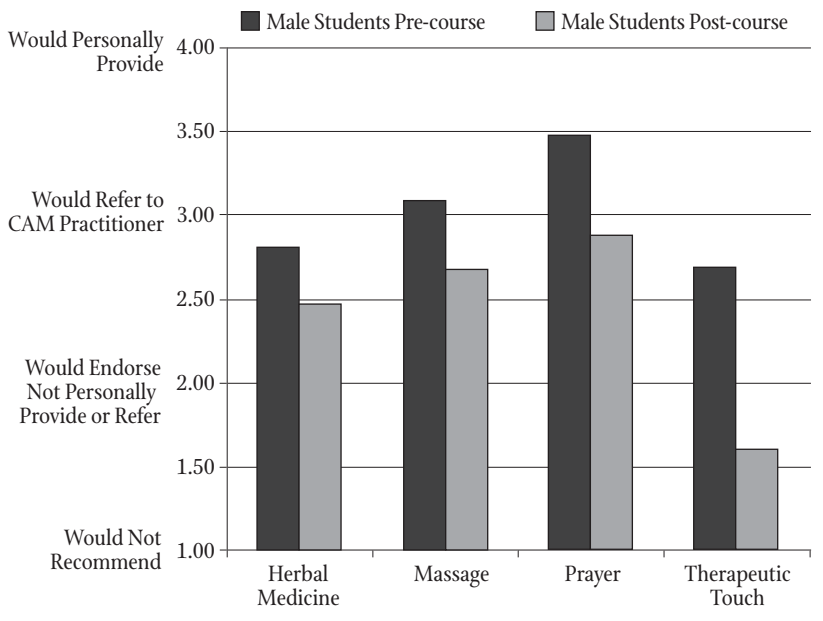

Figure 6. Male Median Levels of Desired Involvement With CAM Pre- and Post-course

Commentary

Students were welcomed to add any comments on CAM practices or education at the end of each questionnaire. Comments included the following:

One of the post-class comments about general attitudes toward CAM, "A lot of CAM practices seem to evoke healing due to the patient's belief that it is working. A successful clinician should be able to convince his patients of the healing properties of hope and adherence to treatment regimens, not necessarily invoking extra spending."

In regard to placebo effect, "CAM has a place! I do not believe the majority is due to a placebo effect, but believe a good percentage is. I think CAM providers lose credibility when they support practices that are purely anecdotal. However, I do realize that absence of proof is not proof of absence."

Responding to the topic of CAM in the curriculum, 1 enthusiastic student (female) stated, "This was a great class and should have been implemented in the curriculum sooner! I hope we will be able to have a rotation in CAM practices 4th year. These practices are becoming mainstream and I believe we should have them as part of our course. . . if not for the students that want to use it, then for the students that will be asked about them by their future patients."

Discussion

There is paucity in the medical literature regarding gender and undergraduate medical education. One study on attitudes in medical students without CAM instruction showed that females were more positive about CAM and perceived it as more effective than males.[26] Another study found female residents tend to engage in more preventative care and communicate differently than do male residents, which at first glance should suggest a trend towards more openness about CAM.[32] Only 2 studies on CAM attitudes with in-curricula exposure to medical students has suggested a difference in receptivity based on gender.[33,34] Contrary to our findings, other studies have found a correlation between female gender in medical students and positive attitudes towards CAM.[33-35]

Our findings that after CAM exposure both male and female students made more negative attitudinal statements regarding CAM echoes a previous study's conclusion that, in the early years of medical study, students are more attracted to the theory than the practice of CAM.[33] That is to say, they like the idea of it until exposed to it and able to witness how it is used. Results of our study and comments from the students indicated that even though they desire information about CAM, skepticism arose with increasing knowledge of CAM. This replicated results from another US medical school's 4th-year CAM elective.[36]

The post-exposure negative change could be due to information gained by CAM classes being presented in as much of an

evidence-based manner as possible. Such presentations highlighted the competencies for "knowledge of a graduating physician" as defined by the Consortium in its 2003 Education Working Group—in particular, emphasizing current research evidence for efficacy and knowledge of the potential for adverse effects.[7]

In other words, students going into the class had only an idea about what some of the particular therapies involved and, after getting to know them better, identified what they perceived as foundational or evidence-based problems. For our particular study, this could also relate back to the way the material was presented, somewhat differently from the science-based classes that first- and second-year students are heavily inundated with. There is also the possibility that students in the preclinical first and second years have shown to have more idealistic and positive views, which diminish from the 3rd year on.[37]

Along these lines, information provided by the class in our study appeared to coincide with previous findings that medical school decreased (1) perceived effectiveness of CAM therapies even if nothing specific on the topic was given (as Items 3, 5, and 6 listed topics that were not covered in this class, but were still rated by the students pre- and post-exposure) (2) the desire to train in CAM, (3) the tendency to refer patients for CAM, and (4) the belief that CAM should be taught as part of the curriculum, while it *increased* disagreement on the safety of CAM.[29] In fact, this post-exposure negative change reflects previous studies showing that, specifically regarding safety and efficacy, positive CAM attitudes decreased with increased time in medical school.[29,38] However, the findings with this particular group are in direct contradiction to the majority of literature that shows that exposure to CAM generally increases acceptance in medical school students.

This attitude was, perhaps, most specifically demonstrated by the pre-exposure perception that herbal therapy showed greatest tendency towards being mainstream, but, post-exposure, students reconsidered using it in their own personal practices.

Other possibilities for the tendency towards negativity post-exposure is a given school's geographical location[34,35] and the uniqueness of its culture—in particular when the school has a historical lack of programs and electives offered in topic area of CAM. A prior study investigating this possibility found marked regional variation in the 40% of American schools that offered CAM in the mid '90s, with the south central portion of the country having the least offerings.[39]

On another note, the positive tendencies for pre-class exposure could be rooted in the fact that the medical students (81% in this study), like a growing proportion of Americans,[4] are using or have used CAM modalities (a listing of which includes prayer as a category of CAM). Thus, their experience was more positive until the class put them in another mind set.

In regard to student concerns about the topics presented, Furnham's study[29] surmised that students were concerned about diagnoses possibly being missed if patients went exclusively to CAM practitioners. In our group of students, there was concern about the "advocacy" stance taken by some CAM practitioner lecturers in place of presentation of evidence-based facts. That said, it would be hard for any professional who enjoys his or her career to present without bias of advocacy, but it is important to temper advocacy with good evidence.

No other studies to date have suggested a difference in acceptance based on credentialing of the teacher, although various articles have questioned what type of teacher is appropriate to present unbiased CAM information within a medical curriculum.[6,7,40,41] In our study, females showed positive shifts ranging from slight to large toward "mainstream" in 6 of 10 individual CAM practices presented, particularly in those 2 presented by an MD. Those teachers more heavily schooled in evidence-based learning techniques (in this particular case, MDs) had the potential to be more effective.

However, some aspects of CAM (particularly healing systems, traditional Chinese medicine, Ayurveda, homeopathy, naturopathy, and various energy techniques such as therapeutic touch) do not lend themselves well to the scientific method. As such, not many traditional allopathic providers have the tools by which to present the material effectively. Team teaching by different types of practitioners, as was done with this class, could provide good balance between the two. A possible limitation to this finding could have been the quality of the presentations and the teaching ability of the lecturers, which might have influenced student feedback more than the content area itself.

On a more generalized scale, the negative shifts in effect at the end of the class left the majority of attitudes in the general "agree" or "disagree" category in which they began. Shifts of both genders consistently moved away from the extremes of "strongly agree" or "strongly disagree" areas towards the more central "no opinion," "agree" or "disagree." This appears to expand on previous studies' findings regarding positive shifts (particularly in those falling in the "strongly disagree" categories) to CAM post-exposure.[14,20]

The volume of students selecting a CAM elective in the difficult first and second years of medical school illustrates that students value learning about CAM and anticipate it will be relevant to their future practices. Further investigation is needed into what makes an effective, efficient instruction in CAM within already crowded medical school curricula.[42] From comments obtained post-class, this first pass for TAMHSC-COM of a CAM survey class was generally appreciated by the students, the majority of whom offered comments on ways to improve CAM education. Many of these suggestions involved strategies already implemented at other medical schools such as Creighton and University of Texas Medical Branch, including a 4th-year elective or rotation in CAM and role playing in class.[43,44]

The downside with electives is that they do not include the majority of medical students, who, we believe, need to have some knowledge of which nontraditional healing activities their patients are experiencing and why. In addition, CAM topics might be integrated into an evidence-based medicine class,[23] and proposed competencies in integrative medicine for medical students[7] could be woven into various blocks in a traditional medical curriculum, thereby providing such exposure.[3,45]

Stated Limitations

As previously mentioned, students were not randomly

selected as this was an elective course. Because questionnaires were anonymous, students' pre- and post-responses could not be matched, precluding statistical significance testing. Other possible limitations of this study include the fact that the students did self select for the course, potentially with previous bias favoring acceptance of CAM, and as such, the results may not be able to be generalized to all medical students. Another limitation could have been the quality of the presentations and the teaching ability of the lecturers, which might have influenced student feedback more than the content area itself. Lastly, the fact that first- and second-year students are heavily inundated with science-based classes means that if CAM therapies are not presented in a scientific manner to which students are accustomed, the perception of CAM could be negatively impacted.

Conclusion

Due to America's burgeoning ethnic and cultural diversity, it is increasingly important for future clinicians to have some knowledge about the issues of CAM efficacy and safety as well as regulation of CAM providers so that they may better address their patients' healthcare needs. Providing medical students with cultural competency skills to effectively communicate with patients about CAM and to critically evaluate evidence for various CAM therapies is imperative in the increasingly diverse practice of medicine.[42] As students become more knowledgeable and skilled at evaluating CAM therapies, their likelihood of referring patients to CAM providers or providing some of these therapies themselves could change. Additional studies will be needed to compare and contrast what makes effective teaching methods of CAM, whether an MD presenter is truly the most effective presenter of CAM information, and why gender might make a difference regarding acceptance of some types of CAM information.

Author's Contributions

Charles Sanders obtained permission, coordinated, collected data, and was faculty liaison for the CAM class from which acquisition of data was obtained. Victor S. Sierpina participated in the CAM class, provided input during the writing of the paper, and made substantial revisions prior to publication. Marcy Halterman-Cox conceived the study, developed the format for the class, and wrote the MPH thesis on the findings that became this paper. As primary author, she had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Mark Sadoski provided statistical analysis and revisions to both the original work and the current paper. All authors read and approved the final manuscript.

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