

The need to act a little more ‘scientific’: biomedical researchers investigating complementary and alternative medicine

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Abstract The advent of scientific research on complementary and alternative medicine (CAM) has contributed to the current state of flux regarding the distinction between biomedicine and CAM. CAM research scientists play a unique role in reconfiguring this boundary by virtue of their training in biomedical sciences on the one hand and knowledge of CAM on the other. This study uses qualitative interviews to explore how CAM researchers perceive and negotiate challenges inherent in their work. Our analysis considers eight NIH-funded CAM researchers’: (1) personal engagement with CAM, (2) social reactions towards perceived suspiciousness of research colleagues and (3) strategic methodological efforts to counteract perceived biases encountered during the peer review process. In response to peer suspicion, interviews showed CAM researchers adjusting their self-presentation style, highlighting their proximity to science, and carefully ‘self-censoring’ or reframing their unconventional beliefs. Because of what was experienced as peer reviewer bias, interviews showed CAM researchers making conciliatory efforts to adopt heightened methodological stringency. As CAM researchers navigate a broadening of biomedicine’s boundaries, while still needing to maintain the identity and research methods of a biomedical scientist, this article explores the constant pressure on CAM researchers to appear and act a little more ‘scientific’.

Keywords: alternative medicine, scientists, bias, professional identity, research methodology

Introduction

Historically, a series of ideological principles, epistemological dissimilarities and institutional transformations have served to demarcate a distinct boundary between biomedicine and complementary and alternative medicine (CAM). On the one hand, conventional biomedical models emphasise the fundamental importance of the biological sciences in defining medical care: conceptualising pathology in terms of a bounded physical body, broken down into discrete biological units (Rhodes 1996), and disease as localised

physiological dysfunction caused by external or internal agents of a material nature (Gordon 1988, Kleinman 1995). CAM practices on the other hand, tend to emphasise the notion that ‘natural is better’, the existence of multiple sciences (e.g. acupuncture or chiropractic science), and a ‘spiritual’ refusal to acknowledge the traditional Kantian philosophical demarcation between science and religion (Kaptchuk and Eisenberg 1998). Besides these broad principles, CAM therapies tend to employ vitalist explanatory constructs such as acupuncture ‘chi’, yoga ‘chakras’, chiropractic ‘innate intelligence’, or homeopathic ‘spiritual essence’, which denote pervasive benevolent energy resources purported to influence emotional and behavioural as well as organic disorders. Such CAM concepts sit uneasily within the discourse of normative science (Glucklich 1997, Kaptchuk and Eisenberg 2001a, 2001b, Kaptchuk 2002)¹.

Alongside such epistemological differences, biomedical and CAM therapies similarly diverge in terms of their evidentiary claims. Whereas the former seeks to identify biological and chemical processes underlying treatment outcomes by relying on statistically defined experimental methodologies, such as the randomised controlled clinical trial (RCT), CAM’s evidence base typically derives from canonical texts (e.g. Ayurveda’s *Charaka Samhita*) or appeals to the accumulation of knowledge over long periods of clinical experience, testing and observation. One can also identify a number of significant institutional differences between biomedical and CAM therapies. Where biomedicine consists of conceptually-related therapies with strong centralisation and ties to the state, CAM encompasses a much more heterogeneous range of independently-affiliated professions and therapies (Kaptchuk and Eisenberg 2001a, 2001b).

Despite substantial differences, recent developments have destabilised the seemingly clear-cut boundaries between biomedical and CAM therapies. Most notable of these is the advent of federally-sponsored scientific CAM research. Since the early 1990s, the US government has invested millions of dollars a year into CAM research (Institute of Medicine 2005). In 2008, the budget for the NIH’s National Center for Complementary and Alternative Medicine (NCCAM) totalled \$122 million with a similar amount of CAM funding channelled through other NIH centers, particularly the National Cancer Institute (nccam.nih.gov).

Especially with the founding of NCCAM and the expansion of federally-sponsored CAM research, one finds voices from within the biomedical and scientific research community demanding that these increasingly popular therapies be subjected to scientific investigation — if for no other reason than to prove their inefficacy. Although the boundary separating biomedical practices from CAM therapies had for years seemed self-evident — a boundary that demarcated ‘scientific’, evidence-based medicine from ‘unscientific’ treatments — this research in effect called for a new, empirical definition of the biomedicine-CAM boundary, one based on scientific evidence. Important members of the biomedical community, rejecting the validity of patient testimonies as evidence of effectiveness, demanded rigorous scientific investigations into treatment efficacy. For example, an editorial published in the *New England Journal of Medicine* (Angell and Kassirer 1998) has declared:

It is time for the scientific community to stop giving alternative medicine a free ride. There cannot be two kinds of medicine — conventional and alternative. There is only medicine that has been adequately tested and medicine that has not, medicine that works and medicine that may or may not work.

A separate editorial in the *Journal of the American Medical Association* similarly posited, ‘There is no alternative medicine. There is only scientifically proven, evidence-based medicine supported by solid data or unproven medicine, for which scientific evidence is lacking’

(Fontanarosa and Lundberg 1998). Rather than wholly rejecting CAM as unscientific, such comments signal a degree of willingness to incorporate aspects of alternative therapies into 'medicine', provided one could supply adequate scientific evidence.

Given their scientific training and familiarity with alternative therapies, research scientists studying CAM have emerged as key players in this renegotiation process. Unlike the high-profile media and policy debates surrounding CAM, these researchers are hands-on technicians who work at the contested interface between biomedicine and CAM. To our knowledge, these important participants in the redefinition of the biomedicine-CAM border have never been studied.

Through qualitative, one-to-one interviews with CAM researchers, this study has addressed in the following questions: What motivates biomedical researchers to enter the CAM research field? How do these CAM researchers move between biomedical and CAM paradigms? How do they feel mainstream research colleagues perceive their work? What is their strategy for 'success'? Interviews revealed three main findings relating to CAM researchers: (1) personal engagement with CAM, (2) social reactions towards perceived peer antagonism, and (3) strategic methodological efforts to counteract perceived biases encountered during peer review of their work.

This article will first describe how CAM scientists individually relate to their different topics of research. This discussion will emphasise CAM researchers' diverse background stories, motivations for entering the field, and varying degrees of engagement with traditional CAM epistemologies. As will be shown, all CAM researchers in this cohort experienced some personal connection with CAM and several saw themselves as agents of radical boundary reconfiguration and healthcare transformation. Secondly, CAM researchers' perception of and response to peer antagonism in professional environments will be described. This discussion will address CAM researchers' strategies for negotiating and expressing their identity as scientists in relation to colleagues questioning the scientific credibility of their research.

This article will lastly consider perceived peer reviewer bias and its impact on CAM researchers' process of methodological decision making. When designing experiments, CAM researchers frequently encountered incompatibilities between the practice of CAM and the methodological requirements demanded for a therapy's scientific validation (*i.e.* quantified outcome measures, the standardisation of treatment protocols, and use of placebo controls). This tension necessitated difficult choices for the researchers, who often found themselves conceding methodological decisions in favour of the biomedical status quo — sometimes against their better judgment. By considering firsthand accounts of scientists working to reconfigure the boundaries of biomedicine from within biomedical discourse, this paper will explore the constant pressure on CAM researchers to appear and be a little more 'scientific'.

Methodology

In 2006, a series of qualitative interviews were conducted with CAM researchers working on various federally NCCAM-funded research projects. Subjects were all principal investigators (PIs) recruited from <http://www.clinicaltrials.gov> in the following manner. First, all PIs under the keyword search terms 'tai chi', 'qigong', 'yoga', 'acupuncture', or 'shamanism' were identified. Those currently involved with an ongoing study were emailed an interview request. Out of 24 requests, eight researchers did not respond, six politely declined the invitation citing scheduling difficulties, and ten PIs agreed to participate in the

study. Two of the ten did not reply to a second email request to schedule an interview time, leaving eight researchers who were all interviewed and included in the analysis².

Each researcher held an MD or PhD and had a significant (previous or concurrent) background in conventional fields of scientific research. At the time of the interview, the cohort had collectively published 21 peer-reviewed journal articles on CAM: twelve clinical studies including seven RCTs on chronic pain disorders, immunity, psychiatric conditions, endometriosis, irritable bowel syndrome, heart disease, and balance disorders; and nine basic science mechanistic studies primarily employing functional Magnetic Resonance Imaging (fMRI). Each subject's previous research publications were carefully reviewed.

For the eight participating subjects, five personal and three phone interviews were conducted by the same investigator trained in anthropological research methods. Consent was provided verbally. Interviews followed a semi-structured guide used to steer conversation towards specific themes within the context of the ongoing discussion, while still allowing for the emergence and engagement of new questions and ideas (Ryan and Bernard 2003, Strauss and Corbin 1990). Broad topics of discussion included: personal experiences with CAM; attitudes towards CAM therapy and research; perceived social connotations of CAM research; epistemological understandings of CAM; and methodological concerns and experimental obstacles in studying CAM therapies. Interviews were audio-recorded and transcribed. Coding was performed by the same investigator conducting the interviews. Texts were assessed by hand and grouped into pre-defined and emergent themes. Coded data were rechecked against non-coded data prior to synthesis. Verbatim quotations were maintained for manuscript use and approved for publication by research subjects.

Working at the boundary

During interviews, CAM researchers disclosed diverse background stories and motivations for pursuing research in the field. Although all were committed to their research careers, they simultaneously articulated varying degrees of engagement with traditional CAM epistemologies. Each of these discussions took shape amidst a complex interplay of circumstances, relationships, and sentiments informing CAM researchers' technical roles in reconfiguring the boundary between biomedicine and CAM.

Intertwining of the personal and professional

All researchers participating in this study had at some point either practised or used some form of CAM. This experience was significant enough to initially inspire six researchers to begin conducting CAM research. Two of the six had begun investigating CAM following a long-term interest in an alternative therapy. One was a tai chi instructor whose initial scientific training was in field biology. When the opportunity presented itself mid-career, he changed fields to study tai chi clinically. Another researcher, after having received his PhD and training in bioengineering, switched careers to scientifically pursue his longtime personal interest in acupuncture.

Four others entered the field following a positive experience with a CAM therapy. Tied into this decision was the desire to improve a therapy's public image. One researcher, a former geneticist now studying yogic breathing, described his early yoga experiences which brought him to a 'bliss-like state' and induced 'profound health benefits'. By providing scientific evidence to support yoga's health benefits, he also hoped to increase awareness of it. A second researcher, a former biologist, sought yoga for rehabilitation and improved

flexibility after a sports injury. To her surprise, yoga not only healed her muscles, but also helped pacify an irritable temperament. This ensuing psychological transformation inspired her adoption of yoga and meditation as permanent research interests and intention to 'get people thinking about and practising' yoga and meditation.

Another researcher described starting a tai chi practice following diagnosis of a serious illness. After noticing a positive correspondence between her tai chi training and disease trajectory, she changed the focus of her career to alternative medicine with additional hopes of spreading the word about mind-body medicine:

I care about the mind-body connection and that we don't understand it. I want people to realise that somatic symptoms and the mind are much more mutually intertwined than people realise, especially for people with serious illnesses.

These researchers had made dramatic career changes with the aim of significantly transforming the boundary separating CAM from biomedicine. They endeavoured to bring alternative therapies into the mainstream through their scientific research, thereby making the mainstream more inclusive of therapeutic modalities they personally found valuable.

Several researchers additionally felt their personal experience with a CAM therapy benefited their professional work as CAM researchers, improving their sense of a patient's or research subject's perspective. A tai chi researcher, for example, stressed the importance of 'knowing what it feels like to practise [a CAM therapy]', and 'how the patients might experience it'. Another considered it a 'matter of credibility' to 'have some personal understanding of the interventions you are offering'. According to these researchers, first-hand, phenomenologically grounded experience improved their operationalisation of a therapy and analysis of experimental results.

The remaining two researchers in this cohort appeared to approach their CAM research more ambivalently. In their minds, the investigative nature of research held far more significance than the choice of a particular research topic. As one researcher remarked, 'I just want to study scientifically significant questions'. For these two scientists, conventional research was their primary focus and CAM was more or less a side project. As an interesting side note, each of these researchers' professional work in CAM had subsequently inspired them to begin practising or using CAM. 'I started doing tai chi after the study. I think partly based on my research findings', stated one researcher. As such, all researchers interviewed in this cohort possessed some type of personal connection to CAM.

A place for 'chi' and 'chakras'

To address the ways that researchers conceptually navigated discrepant paradigms, researchers were asked how they *individually* or *personally* understood a particular CAM therapy to work. While responses predominantly involved concepts from biomedicine and the biosciences, five researchers also incorporated terms and concepts derived from or inspired by CAM epistemologies. One researcher, for instance, described 'chi' or vital energy experientially:

If I want chi to enter the top of my head, I need to put my attention or intention in the sky. If I want it to flow through my hands, I actually need to put it out here. [She spreads out her hands.] Eventually, I should be able to lead it all the way up my arm.

Another discussed disease etiology through a CAM construct:

[The patient's] heart is not broken and busted, but there is an imbalance. Tai chi can slowly coax a body into a better level of balance. The body is an energetic system. The more free-flowing and balanced those energies, the healthier the person.

A yoga researcher describing CAM epistemologies as 'vital' explained:

Mantras guide and correct our consciousness and they can help people balance their chakras and become awakened, and restructure their thought processes. Usually different diseases and disorders are related in part to one chakra more than another.

Other researchers offered explanations that while not directly derived from CAM epistemologies, were clearly inspired by them. Sometimes hybridised constructs were employed. For instance, one CAM researcher attributed the salubrious effects of yoga to 'subconscious jumps' in the mind. A second scientist described the benefits of shamanic ritual as follows:

The objective of shamanic healing is to address spiritual losses or intrusions. [A patient] may have some bit of him or herself that is somehow departed because of some sort of injury or trauma or distress. The spiritual loss can be manifested by physical symptoms.

Three other CAM scientists strictly utilised scientific terms to describe CAM. An acupuncture researcher accounted for efficacy solely in terms of nerve stimulation, hormone release, and specific brain activation patterns. He mentioned the term 'chi' only facetiously. Two other tai chi researchers explained the therapy's effectiveness by breaking it down into component biological mechanisms. One researcher described:

Tai chi has an aerobic physical activity component. We know from lots of data that physical activity especially in older adults has salutatory effects. Second, it has a component of meditation. And being able to meditate has also been linked to decreases in blood pressure and other physiological changes. Thirdly, there is a social component. You practise it mostly in a group, and bringing people together in a group can also be beneficial.

In this account, the concept of 'chi' had been excised and tai chi translated into discrete variables within a biomedical model of therapeutic efficacy.

Overall, CAM researchers proved knowledgeable in multiple domains. All researchers participating in this study were using or had used some form of CAM and several expressed valuation of select CAM epistemologies. As will be demonstrated below, however, CAM researchers' willingness to disclose personal experience with CAM and terms such as 'chi', 'balanced energy', and 'chakra' were largely limited to interviews. Otherwise, these personal accounts were typically kept off record and apart from their professional interactions, public image, or publications.

Constructing credibility in a suspicious environment

During interviews, all CAM researchers described attempts to distance themselves from CAM and reposition themselves nearer to the norms of the mainstream biosciences. To

enhance their image, CAM researchers reported carefully selecting and editing the language they employed when describing their work to colleagues. This self-conscious attempt to temper peer aversion and build more credible reputations can be understood as an important dimension of their larger work of renegotiating the boundary between biomedicine and CAM.

Social repercussions of working 'on the fringe'

CAM researchers perceived a prevailing negativity towards CAM amongst the scientific communities in which they worked. A meditation researcher described how scientists generally acted as though '[alternative medicine] is just a crock', or 'totally crazy, all in your head'. A qigong researcher felt conventional researchers opposed CAM research for being 'weird' or 'on the fringe'. A researcher of acupuncture reflected, 'We are studying something that for the mainstream, is on the edge. It is not like studying the heart. You are going to get strong opinions'. And a tai chi researcher deciphered the sceptical amusement of colleagues as, 'just a smile that you see somebody have'.

Researchers also described more offensive comments. Colleagues involved in conventional scientific research were said to repeatedly ask a CAM researcher, 'Why are you doing this weird stuff?' A biologist who had just begun a study on tai chi recounted, 'One of my colleagues from Europe told me that she hoped I had stopped doing this stupid work. She didn't invite me to the next meeting'. And another researcher recalled the offending words of his institute's president who told him, 'I wish you would stop doing this. I wish you would be a scientist again'. As these examples begin to suggest, CAM researchers experience significant resistance to their research from colleagues who are not involved in the study of CAM. In response to these criticisms, both experienced and anticipated, CAM researchers have developed a number of strategies for renegotiating their scientific credibility.

Translating the 'woo-hoo' into scientific terms

CAM researchers regularly censored their discussion of less orthodox ideas around colleagues engaged in conventional scientific research. For example, after explaining her views on the dichotomy of the 'mind' and 'brain' during an interview, a meditation researcher noted the unlikelihood of this discussion occurring at work. She remarked, 'Most [of those ideas] can't be brought up without most scientists thinking I'm a little loony, so I usually don't'. Along comparable lines, after describing his traditional understanding of tai chi, a researcher commented, 'but I just never have that in my research. I keep it out'.

Other researchers described the need to be constantly vigilant about one's use of scientific language. 'When trying to understand something, it is more credible to Western medicine if we can come up with some sort of pathophysiological mechanism understood in Western terms', one researcher explained. A researcher of shamanism expressed a similar view:

At the end of it a lot of people would say, 'well we don't know if it was just because of all the voodoo that goes around, the ritual and the expectations and we want to know if this is the real thing'. [Scientists] need to have [CAM] framed in certain language, so they think, 'oh okay, it is not something completely woo-hoo that makes shamanism work, it is because it relaxes the body and decreases salivary cortisol levels, so immunity goes up'. Then they say, 'okay, I could buy that'.

Further illustrating the ways that CAM researchers used scientific concepts to legitimate their research, one scientist referred to the meditation system he studied as an 'ancient science' and 'ancient technology of the mind'. Another researcher explicitly likened CAM

to biomedical epistemologies saying, 'In many ways alternative medicine is based on science, based on the scientific method. There is a methodology there — objective, careful cataloguing, testing of hypotheses'. In each of these instances, CAM researchers strategically employed a scientific vocabulary in an effort to give unconventional research a more conventional guise.

An important component of this boundary work was the way that researchers positioned their own research within the spectrum of available CAM therapies. As one meditation researcher explained:

I would never do anything, at least at this point in my career, that is entirely wacky and out there. I've heard of some really wacky [research], but most that I heard about was back in the seventies when they were measuring auras. I haven't heard about anything super wacky these days, but I'm sure it's out there.

Although fellow scientists may see her study of meditation as unconventional, this researcher responds by asserting the conventionality of her research in relation to even less mainstream scientific investigations.

CAM researchers also responded to professional scepticism by definitively asserting their scientific credentials. Many eagerly stressed their academic and professional training and listed scientific awards and distinctions they had earned. One researcher reflected on the importance of legitimating institutions in her decision to study meditation:

At first I was like, 'oh my god, no one is going to take me seriously'. But the fact that NCCAM came into the system, that I knew the NIH thought about it seriously enough, I thought, 'okay, it is not that crazy an idea'.

CAM researchers were also quick to explicitly identify themselves as *scientists*, recurrently prefacing or concluding their claims with such phrases as, 'as a scientific researcher', or 'as a scientist'. Such remarks affirmed their belonging to the broader, mainstream research community.

Alongside efforts to emphasise the scientific nature of their research, CAM researchers also positively reframed their anomalous status as unique and even desirable. Juxtaposing conventional and unconventional research, CAM researchers favourably depicted the latter and themselves as more congruent with the exploratory goals of science. A tai chi researcher portrayed his interest in CAM as an expression of originality and a progressive character saying, 'I am very attracted to innovative thinking, always pushing the envelope to find areas which are not developed'. One scientist noted the repercussions of a conformist approach, 'If you follow the typical pathway, everything is probably going to work just fine. Not probably a discovery though'. Others reflected on CAM's ability to challenge current theoretical models, such as the one tai chi researcher who touted CAM's potential to lead a Kuhnian paradigm shift.

As demonstrated, CAM researchers actively responded to the biases of colleagues by carefully regulating how and what they choose to publically express about their research. To override peer criticism and counter the disparaging connotations of their work, researchers carefully de-emphasised certain aspects of their research and highlighted their proximity to science. Professional pressures impinge upon more than just the words CAM researchers speak, however. As will now be shown, these biases can also impact the design of CAM research experiments.

Methodological stringency and clinical distortions

CAM researchers perceived professional biases to plague the process of peer review as well as their laboratory work. This antagonism incited even more tangible responses, ultimately influencing how some CAM researchers designed their experimental studies. Though CAM researchers aspired to properly bridge the world of biomedicine and CAM through research, this frequently turned out to be more of a hope than a reality. Paradigm incompatibilities often negated the possibility of simultaneously preserving utmost scientific rigour and the full complexity of a CAM theory and therapy in a single experiment.

Biased reviewers and methodologically strategic responses

One CAM researcher described biased peer reviewers and journal editors as follows, 'I get reviewers on papers who come back with things that are really like personal attacks — like 'acupuncture is a bunch of crap'.' A second CAM scientist recalled:

The tone of the words [the reviewer] used was very negative, very critical and you could just tell that it could have been the best study in the world and he would find something wrong with it. He was just looking for stuff to dig.

Another researcher lamented that the reviewers' 'emotional reactions' were overshadowing the merit of his work. 'Reviewers will try to kill the paper if they don't want the topic for some reason', he explained. Three researchers claimed it was more difficult to publish CAM studies in the same tier of journals that had previously published their mainstream work. 'The bar of quality for CAM articles has to be raised in order for people to buy it', one researcher surmised³.

Over time, these same researchers came to realise that ideological biases could be eased at least partially through sound methodological design. Their daily interactions with other, non-CAM researchers confirmed the authoritative power of rigorous methodology. One shamanism researcher recalled colleagues' reactions to her presentation at a formal meeting, 'People were kind of looking at me with crossed eyes, about what in the world is this?' But after explaining in detail the care she took in methodological design, she reported initially sceptical colleagues appeared much more enthusiastic and receptive.

Just as they had responded to professional biases in the lab, CAM researchers proactively countered these prejudices as well. 'If people recognise and know what you are doing is well done and scientific, they will find some merit in it', one researcher stated. Another reflected, 'Sometimes in research you have to dig in and be methodologically strategic to figure out how to persuade people of things'. Methodological rigour carried a special potency for these scientists, one extending beyond what is typical for more conventional scientific research.

Costs of methodological stringency

While on the one hand, stringent application of the RCT promised a chance to establish scientific credibility, on the other hand, CAM researchers questioned the suitability of such inflexible rigour. Suspecting there may be better and more appropriate ways to investigate CAM, these researchers found methodological requirements of the RCT to be constraining. 'It's like you signed a contract with the NIH', one researcher vented, 'You have to solve [the research question] the scientific way'. Researchers in this study cited issues over treatment standardisation, a narrow set of acceptable outcome measurements, a bias

towards quantitative over qualitative research methods, and placebo controls as most trying. Though often opposing their better judgment, CAM researchers considered these methodological concessions necessary to their professional success.

Standardisation and outcome measurements

The RCT's demand for standardised treatment protocols was particularly frustrating for many CAM researchers. As these CAM researchers point out, CAM treatments are usually highly individualised. As a tai chi researcher explained, outside the laboratory setting an instructor would customarily inquire about a patient's medical background, social and psychological health, and daily behaviours before devising a unique and flexible treatment which may be amended throughout the course of treatment. But the demand for standardisation within the RCT prohibited such flexibility, and to get his experiment funded, this researcher had decided to standardise the treatment protocol across all of his subjects.

CAM researchers conducting clinical studies typically investigated a single CAM therapy's effect on a biomedically-defined disease. Accordingly, when selecting outcome measurements, CAM researchers felt pressured to focus on biomedical endpoints. For example, they would thus select immune and hormone markers as outcome indicators rather than those associated with CAM's own intended treatment goals. Demonstratively, a mind-body researcher rationalised his choice of outcome measurements in terms of their having been 'used in other [published] studies on other heart patients'.

CAM researchers also described a particularly intense bias for quantitative over qualitative methods. A tai chi researcher asserted 'In research there is an emphasis in the scientific method on objectivity, on quantification. Capturing data on serum markers or oxygen uptake is really great and is what sells this to the majority of our colleagues'. Another recognised the importance of always choosing the 'hard science' way of doing things that the 'conventional research institutions support'.

Preference for quantitative measures also burdened CAM researchers who felt that qualitative, psychosocial changes were some of the most significant benefits an alternative treatment could offer. One researcher commented, 'Some of the things that we get from [qualitative exit interviews] is really the richest, coolest stuff, but it doesn't fit an instrument'. Another surmised, 'Sometimes there may be things that are not clinically significant, like 'I just feel more centered or more open', something that you really can't chart in a medical or a scientific way, but it is a very significant and salient point to the patient'. She continued, 'But these qualitative changes are important only to a person, and not to biomedical research publications'. As with other CAM researchers, she has not published her qualitative data.

Context of therapeutic delivery and placebo controls

Several CAM researchers mentioned the RCT's demand for placebo controls as another obstacle to their work. These researchers affirmed the complex contextual sources of CAM's efficacy — in the way that it affects patients' expectations, emotions, and willpower for example — and expressed concern that the placebo arms of their studies would factor out these psychosocial benefits⁴.

The pressure to identify singular 'active ingredients' of a CAM therapy through use of placebo controls also frustrated some researchers. 'The medicine works because of the whole package of things', one researcher explained. A tai chi researcher considering movement, breathing, visualisation, social interaction, teacher-student interaction, illness narrative, and 'imprint on the essence' as therapeutic, ruminated on the impossibility of controlling for such numerous and diverse factors. 'This just doesn't fit neatly into a conventional model', he concluded. A shamanism researcher further commented, 'Most of the alternative therapies

are so holistic or so synergistic that it is difficult to say that one herb or one drumbeat really makes a difference. You don't want to distill [shamanic healing] down to one little process'. These scientists felt individual elements of a therapy should not be disaggregated from the larger context within which therapeutic events unfolded.

The RCT's exclusion of other contextual or 'placebo' factors, such as expectation and belief, concerned CAM researchers as well. 'The problem is that in alternative medicine, connecting to the whole person, putting your heart into it, having them believe in you and believe in themselves is actually part of the treatment', one researcher remarked. Another expressed his desire to do away with the placebo control altogether. 'I think we need to do systems work where we put a black box around something and we don't care if it works more or less than a sham needle, we just want to know if it works'.

As demonstrated in the above examples, CAM researchers often acted strategically in order to compensate for ideological biases encountered during experimental design, research and peer review. Reflecting contemporary scientific trends in experimental design, they strictly adhered to principles of the RCT in an effort to gain credibility in a suspicious environment. This sometimes meant conceding certain methodological decisions in favour of the biomedical status quo. In such instances, researchers expressed a sense that something critical was being overlooked in the process of experimental design.

Discussion

Our main findings demonstrated CAM researchers': (1) personal engagement with CAM, (2) perceptions of antagonistic colleagues involved in mainstream scientific research, and (3) strategic methodological efforts to counteract perceived biases encountered during the research and peer review process.

Personal engagement with CAM

We found close personal ties to CAM to be a highly important motivating factor for entering the field of CAM research. Six researchers attributed either a lifelong interest in or personal therapeutic experience with CAM as their original impetus for beginning CAM research. At first glance, this personal connection may seem disconcerting. Such personal affiliations and/or agendas are generally frowned upon in the purportedly disinterested, objective world of contemporary biomedical research (Merton 1973, Ziman 2002). Indeed, personal motivations are frequently thought to contribute to many research biases (Kaptchuk 2003).

Some suggest however, that this finding is common to scientists of all disciplines. Methodologists have argued that something beyond a commitment to science is often needed to sustain motivation and morale during the adversary, daily mishaps, and tedious stretches of research. As such, all researchers may hold a latent objective, 'secret hopes of what (s)he will achieve', which may even prove a 'useful starting place for research' (Vandenbroucke, 1998). Latent objectives may include an intuitive sense that a hypothesis is correct, a drive for prestige, competitiveness, emotional investment in an outcome, or even the far-reaching question of how the 'world will be changed' after the research is published (Vandenbroucke 1998). This latter objective was articulated by the four CAM researchers expressing a desire for CAM to become more publically visible and commonly practised. In this regard, if underlying personal motivations are in fact routine within scientific practice, the only distinguishing characteristic of CAM researchers may be that their latent objectives tend to challenge normative science.

Through interviews we also explored how researchers conceptually navigated discrepant paradigms when accounting for therapeutic efficacy. Here we found five CAM researchers who included CAM-specific constructs such as ‘chakra’ or ‘chi’ in their responses, concepts lacking biomedical correlates. Rather than seeking some sort of biomedical approximation for these concepts, these researchers described them didactically and phenomenologically.

Other researchers hybridised concepts from multiple domains. One researcher, for instance, attributed the salubrious effects of yoga to ‘subconscious jumps’ in the mind. While many biomedical doctrines would attribute the effectiveness of yoga to exercise and relaxation, and most yogic texts would emphasise the role of chakras, this researcher employed neither doctrine directly. Her epistemology hinged instead upon a conception of tiered consciousness indebted to both psychoanalytic and Buddhist philosophical traditions. As with other CAM researchers, she crafted a conciliatorily framework paying credence to principles of CAM therapies while simultaneously mitigating potential opposition to biomedicine.

Reflecting a similar hybridisation process, a shamanism researcher, rather than simply substituting shamanic concepts with biomedical terms (*e.g.* replacing ‘spirit loss’ with ‘trauma’ or ‘emotional distress’), endeavoured to refashion ‘spirit loss’ into a concept more amenable to biomedical research — a generalised ‘spiritual loss’. By approaching ‘spirit loss’ in these terms, shamanic concepts had been distilled down and ‘culturally decontextualised’ to what some have termed ‘neo-shamanism’ (Kelly 1992), or in anthropological terms made to reflect not an ‘emic’ (or culturally specific) perspective on the CAM therapy, but an ‘etic’ (or behavioural) one (Harris 1979). While still foreign to biomedical models of disease, ‘spiritual loss’ versus a ‘spirit’ that is ‘lost’ fits more readily with social science concepts of personhood and healing (McGuire 1983, Kirmayer 1993, Cassell 1991).

Responses to suspicious colleagues

Interviews secondly demonstrated CAM researchers’ concern that close ties to alternative therapies could threaten their professional credibility. Consequently, to protect their reputation, CAM researchers had to be continuously diligent about self-presentation. As is customary in controversial fields of research, social factors — such as reception of work and position in the field (Latour and Woolgar 1979) — had become highly visible markers of scientific legitimacy in CAM research.

Sociologists of science describe how researchers’ success is owed in large part to their reputation in their respective fields and how they are perceived by colleagues (Latour and Woolgar 1979). In fact, some argue for science to be conceived as a large-scale ‘competitive struggle’ over ‘scientific authority’ (Bourdieu 1975), with successful researchers accumulating the most intellectual influence within their field over time. While struggling for scientific authority, one’s professional image is a vital resource, critical to institutional and economic survival. After all, a research career depends on peer-reviewed grant and publication awards being maintained in a steady stream (Latour and Woolgar 1979).

CAM researchers in this cohort preempted the negative connotations associated with unorthodox work by carefully selecting and editing what was shared with colleagues. They sought to distance themselves from alternative medicine and reposition themselves nearer to the norms of biomedical research. In this respect, CAM researchers’ struggle for everyday scientific legitimacy could be considered a form of ‘boundary work’ — the redefinition of categorical borders by which one group, for the purpose of building a favourable social image, more or less arbitrarily distinguishes its practices, standards, or beliefs from another’s (Gieryn 1983). Although encountered throughout interviews, this was particularly evident in the researcher who outwardly distinguished her meditation research from ‘wacky’

aura research conducted in the 1970s. Although no sanctioned line separates aura research from meditation research, as respectively ‘wacky’ versus ‘non-wacky’, or ‘scientific’ versus ‘non-scientific’, her juxtaposition both articulated a specific categorical border and strategically positioned her closer to normative standards of science.

Boundary work was also employed when CAM researchers emphasised their professional identities, making frequent third-person references to themselves as ‘scientists’ and describing certain CAM therapies as ‘ancient science’. Sociologists have considered similar expressions of scientific ethos to be delivered intentionally, ‘for the benefit of the outside observer’ (Latour and Woolgar 1979: 189), a subtle reminder of what the speaker additionally wishes to communicate. Alongside instances of scientific self-identification, researchers also drew attention to their affiliation with prominent biomedical research institutions. One researcher mentioned that only after the NIH created the NCCAM did she feel comfortable pursuing CAM research as a career. In sociological terms we might consider how this research ‘borrowed’ the authority of the institution (Pinch 1990), using its prior established ‘approval’ to validate her own pursuits. In agreement with these findings, a study of biomedical and CAM practitioners working at integrative health centres reported similar professional dominance patterns, whereby CAM practitioners utilised biomedical terminology and affiliation to advance their professional standing (Hollenberg 2006).

Finally, a number of CAM researchers explicitly reframed their unconventionality as demonstrative of innovation, originality, and the chance for great discovery. Framed in these terms, beyond positioning themselves closer to mainstream science, CAM researchers situated themselves at the forefront. As such, CAM research embodied some of the core ideals of scientific inquiry — to challenge boundaries, break from tradition, foster new discoveries, and reform the consensus (Shills 1981).

Methodological strategy

The third main finding of this study conveyed CAM researchers’ use of methodological stringency to compensate for perceived peer reviewer biases. Prejudice of peer reviewers towards CAM research has been empirically demonstrated elsewhere. When 398 scientists unknowingly recruited into an experiment of reviewer biases were randomly sent one of two nearly identical versions of a ‘short report’ by a leading nutrition journal, either for a conventional drug or homeopathic treatment for obesity, reviewers showed significant favour towards the orthodox treatment (Resch and Ernst *et al.* 2000). The pattern of responses suggested biases relating to the seeming implausibility of the homeopathic treatment. This study confirms what CAM researchers spoke out against regarding CAM’s disadvantage in the peer review process. They understand, as many observers have suggested, that ‘extraordinary claims demand extraordinary results’ (Micozzi 2001)⁵.

CAM researchers’ primary response to peer reviewer bias involved a more concentrated effort into rigorous methodological design. While careful methodology is a goal of all researchers, methodological stringency appeared to place CAM researchers in a difficult bind. On the one hand, strict adherence to RCT protocols could lend professional credibility to CAM researchers otherwise troubled by the ideological biases against their topic of research. Demonstrating the therapeutic efficacy of a CAM in a well-designed RCT could lead to publications in top-tiered journals, help secure further funding, and advance one’s career. On the other hand, by adhering to conventional biomedical research practices, CAM researchers feared they were making methodological concessions that could severely distort, even undermine, the therapeutic value of the therapy under investigation. These concessions worked against their notion that a flexible methodology accommodating unique facets of

alternative therapies might be a more appropriate way to study CAM (Micozzi 2001). Indeed, the appropriateness of the RCT for CAM research — in terms of standardisation, outcome measurements, qualitative versus quantitative methods, contextual factors, and placebo controls — has been widely discussed in the social science literature (Barnes 2005, Coulter 2004, Jiang 2005, Kerr 2002, Patel 1987, Verhoef *et al.* 2002, Walach 2001).

Conclusion

This article has depicted the challenges CAM researchers perceive and face as they negotiate their work at the boundary of biomedicine and CAM. The tension between CAM researchers' interest in CAM and the need to maintain their identity and the apparatuses of a biomedical scientist was palpable in our informants. Concerned about being viewed as unscientific — or 'wacky' — by the larger scientific community, CAM researchers struggled to appear and act more 'scientific' during professional interactions. They countered colleagues' ideological biases through strategic social manoeuvres in the workplace and by investing concentrated effort into rigorously structured experimental designs — even when this went against their better judgment.

In each instance, we find CAM researchers pushing against the boundaries of permissible scientific practice and discourse. Furthermore, as technicians capable of working at the contested interface of biomedicine and CAM, they are simultaneously attempting to redefine what counts as medically and scientifically permissible. While there are assuredly others working at this boundary — consumers searching for expanded healthcare options, corporations seeking to expand their markets, insurance companies creating regulations about coverage — this discussion has focused on the role of scientific research in the ongoing process of constructing and reconstructing the boundaries of science, as well as CAM.

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Notes

- 1 Although for simplicity medical domains will be referred to as singular entities in this article, 'CAM' refers to a heterogeneous range of distinctive medical practices and beliefs (Kaptchuk and Miller 2005), and 'biomedicine' is more accurately defined by multiple explanatory schema (Thagard 1999). Furthermore, alternate models of biomedical disease, including the 'biopsychosocial model' (Engel 1977) that values thoughts, emotions, behaviours and social context in addition to the biological sciences, tend to obscure some theoretical distinctions between biomedicine and CAM (Bausell and Berman 2002).

- 2 The authors recognise this study's small sample size as a potential limitation and encourage further investigation. Also, it seems that NCCAM has undertaken a concerted effort to attract top tier biomedical scientists to ensure that it is not criticised for second rate science (Briggs 2009).
- 3 Such observations reverberate with historical analyses indicating how the conflict between mainstream and unorthodox medicine may have generated innovations in methodological safeguarding against research bias, giving rise to the development of placebo controls and randomisation, for example (Kaptchuk 1998).
- 4 As standard biomedical practice, the efficacy of a given therapy is compared to an inert treatment mimicking delivery of the therapy in question (*i.e.* a drug versus sugar pill test). Contextual factors are thereby excised from the calculation of how well a therapy works. Instead of seeing the therapeutic value of these processes, biomedical researchers generally tend to treat context as 'clinical noise' that must be 'tuned out' in order to detect the 'signal' and find the 'real problem' and true physiologic effect of the treatment (Waldrum 2000, Moerman 2002).
- 5 It is important to keep in mind that such extra hurdles operate within mainstream medicine as well (*i.e.* as with helicobacter infection and gastric ulcers) (Kaptchuk 2003).

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