Traditional, complementary, and integrative medicine (TCIM) encompasses a broad range of healthcare practices beyond conventional Western medicine. Despite its use globally and increased research, many TCIM research challenges persist impeding its progress and integration into clinical practice. Key challenges involve financial constraints, insufficient research training and educational support, and the methodological barriers which arise from a lack of standardization. Financial limitations hinder investment into crucial research limiting both the quantity and quality of TCIM research. Inadequate training in research and educational support limit the development of TCIM research, hindering growth and recognition of TCIM in academic and clinical settings. The inherent dynamic nature of TCIM therapies poses additional challenges for applying standardized biomedical research models. These challenges not only impede the advancement of TCIM research but also perpetuate negative attitudes and biases within the healthcare and research communities. To overcome these challenges, a comprehensive strategy is necessary to increase funding, improve literacy, and the promotion of open science practices in TCIM. Addressing these confounding factors will enable well-informed TCIM research literacy and the development of TCIM skills and facilitate the integration of evidence based TCIM therapies into a more inclusive healthcare domain, ultimately reducing negative attitudes and biases towards TCIM.

Keywords: complementary medicine, integrative medicine, traditional medicine

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Nutritional approaches involve special diets, dietary supplements, herbs, and probiotics [3]. Psychological practices are based on the incorporation of techniques such as mindfulness [3]. Physical therapies encompass treatments like massage and spinal manipulation [3]. Combinations of TCIM approaches integrate either psychological and physical elements (including yoga, tai chi, acupuncture, dance, art therapies) or psychological and nutritional components (such as mindful eating) [3].

Globally, the use of TCIM therapies have experienced notable growth in recent years [7]. The WHO estimates that approximately 100 million people in Europe utilize TCIM therapies [8,9]. Findings from the 2022 National Health Interview Survey in the United States show a significant increase in TCIM use among adults, with over 37% incorporating TCIM into their health practices [10]. Other high-income countries including Australia [11], South Korea [12], Singapore [13], and Japan [14] have also shown high rates of TCIM use. Notably, many migrant populations residing within Europe and the United States commonly uphold their traditional health practices including the use of TCIM therapies, contributing to its progressive increase [15-18]. The use of TCIM therapies are also present in numerous lower and middle-income countries, where they may even be regarded as common practice due to cultural factors and notable deficiencies in the local healthcare systems [19,20]. According to the WHO, in lower and middle-income countries, the proportion of the population depending on TCIM therapies as their primary healthcare varies widely, ranging from 40% in Colombia [21], up to 90% in Ethiopia [22]. TCIM therapies are widely used by patients with a variety of illnesses and ailments; among cancer patients globally, multiple studies have reported TCIM use up to 90% in some form [23-25]. Patients use TCIM for a variety of reasons including symptom relief, improved quality of life, augmentation of traditional therapy, reinforcing health philosophies, and gaining control over their healthcare [26,27]. TCIM consumers value the holistic healthcare approach, addressing functional, mental, emotional, spiritual, economic, and social aspects [3].

Consequently, the growing interest in TCIM, within the context of research, is evident based on the surge of scholarly output on this topic. A commentary published in 2014 [28], identified 175,482 articles using PubMed and the medical subject heading “complementary therapies”. A recent inquiry into the same database with identical parameters, was undertaken more recently in December 2023, and revealed a noteworthy increase in published articles whereby 248,265 results were retrieved (Table 1). This rise in research output underscores the growing attention and exploration of TCIM within the scientific community. Since the 1940s, there has been an upward trajectory in the number of publications on this topic [29]. However, despite this growing interest and expanding research output, numerous challenges and obstacles persist in conducting rigorous TCIM research and integrating its findings into clinical practice. This article delves into the challenges associated with TCIM research, specifically addressing impediments to conducting research in this field. These challenges include insufficient financial support, a lack of training in research and educational resources for TCIM students, and the absence of standardization resulting in methodological barriers. Additionally, this article also discusses how inherent negative attitudes and a lack of interest or understanding of TCIM by conventional healthcare practitioners and other biomedical researchers hinders its implementation into clinical practice.

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### Challenges to Conducting TCIM Research

#### 1. Lack of financial support

The challenges associated with conducting TCIM research are deeply rooted in the lack of financial support and funding, posing impediments to the progress and advancement of this field. This skepticism permeates through various channels, including media coverage, which tends to present TCIM in a more negative manner compared with conventional medicine [30]. Bias has also been reported in medical students who developed a more negative perspective towards TCIM after exposure to and completion of conventional medicine curriculum, despite possessing a positive interest before commencing their education [31,32]. This shift in attitude in medical students observed over the course of their medical degree not only reflects a potential bias in medical education but may also influence research priorities in the future, contributing to the existing publication bias against articles and studies on TCIM therapies [33,34].

Despite a noticeable increase in TCIM research in recent decades, [23-35-37], the decisions regarding the allocation of research funding remains imbalanced reflecting differing funding priorities. For instance, in 2022, only 0.17%
Food and Drug Administration has not approved any dietary supplement or food for cancer prevention or treatment [44]. The resultant lack of patent protection places manufacturers under competitive pricing pressures, making it difficult to generate the necessary profits for extensive Phase III clinical trials [44]. Another challenge to patenting TCIM products emerges when considering the concept of biopiracy, which refers to the unethical appropriation or economic exploitation of Indigenous knowledge and/or biological resources from Indigenous communities without the proper compensation or acknowledgement [45]. In the context of TCIM, many therapies are derived from Indigenous practices and natural products that have been passed down through generations within specific cultural groups. However, when these practices or natural products are commercialized and patented without the consent or involvement of the Indigenous communities, it can lead to various ethical and legal concerns.

2. Lack of training in research and educational support

The challenges associated with conducting TCIM research are exacerbated by a notable lack of training in research and educational support within the TCIM community [8,46,47]. This deficiency stems from varying factors that hinder the fundamental development of research skills, knowledge, and competency among TCIM professionals. Specifically, a considerable proportion of TCIM practitioners, particularly those specializing in disciplines such as naturopathy, homeopathy, and herbal medicine, pursue their education and training within private colleges [28,48]. This preference is primarily driven by considerations of cost and wider accessibility to private colleges in comparison with universities [28]. Additionally, some Western countries such as Canada, do not offer TCIM programs at public universities, resulting in TCIM practitioners obtaining an education from institutes outside of the university educational system [49]. Ultimately, this educational trajectory often results in a lower number of practitioners obtaining a bachelor’s degree which may present barriers to their involvement in research endeavours in the future. For instance, a little over half of TCIM professionals in New Zealand (56.6%) and a little under half of TCIM professionals in Australia (49.1%) attained a high school certificate or advanced diploma as their highest level of education [50]. In Canada, 8.1% of TCIM professionals do not have a bachelor’s degree [50].

When seeking education and training in research skills, the typical route for a researcher to gain recognition involves the completion of a postgraduate degree with a research focus. As such, applying to study for an advanced degree presents a challenge for the TCIM practitioner who attended a private college and lacks a bachelor's degree. In addition, the need to complete a bachelor's degree as a
prerequisite for admission to postgraduate programs would place time constraints on the professional practice of TCIM by practitioners who decide to return to school.

Additionally, unlike students in other professional health programs such as the Doctor of Medicine program, students may apply for research opportunities offered within or outside of their universities, but typically TCIM students are not offered these research opportunities [48]. This absence of exposure to research does not enable development of research skills for TCIM practitioners or facilitate integration of research into their career paths. Notably, for those practitioners who aspire to engage in research later in their careers, navigating this path is particularly challenging. The lack of prior research experience, combined with the absence of formal connections within the research community, and limited exposure during their education/ training period, creates a challenge for TCIM practitioners aspiring to pursue research projects [8]. Navigating this unfamiliar path may require extra effort and support for those seeking to establish themselves and become involved in research opportunities.

The clinical-centric focus of TCIM institutions that does not expose students to research opportunities, combined with the historically marginalized nature of TCIM, makes it challenging to engage practitioners in research endeavors [51]. Some TCIM practitioners may become distrustful towards research, particularly those with nonscientific worldviews [52]. These worldviews often diverge from the principles of scientific inquiry and encompass perspectives that prioritize subjective experiences, intuitions, spiritual beliefs, or holistic approaches. Interestingly, challenges persist in actively involving TCIM practitioners, even when they express support for research. A survey of US American naturopaths revealed that while a substantial portion (40.7%) would recommend patient participation in research projects, only a fraction (25.5%) would support recruiting them from their own clinics [53]. This reluctance may be rooted in the perception that research is more relevant to the public and broader health system’s views on TCIM than to the practitioners’ day-to-day clinical practice as instilled within their educational training [51]. Findings from a cross-sectional study conducted by Wayne et al on acupuncture and Oriental medicine students in the United States revealed that the initially high interest in research among 1st year students diminished in the subsequent years [54]. Overall, these findings reinforce the need for a re-evaluation of TCIM education, integration of training on research into TCIM courses, and support to bridge the gaps in order to cultivate a more research-informed practitioner community.

3. Lack of standardization and methodological barriers

Conducting TCIM research poses challenges due to the diverse nature of TCIM therapies, characterized by their dynamic nature [55]. These factors give rise to methodological barriers resulting from the tension between the demand for standardization in scientific research and the personalized nature of TCIM therapies. Whilst efforts have been made to establish a operational definition for TCIM therapies through systematic evidence-based approaches [55], a lack of international consensus persists among experts in the field [56]. This lack of consensus becomes particularly apparent when attempting to categorize certain TCIM therapies due to cultural nuances [5]. For instance, therapies rooted in Buddhist practices may be considered common care practices in some Eastern cultures but are categorized as TCIM in Western contexts [19,20]. While this cultural variation underscores the complexities of TCIM research, it also raises practical questions about the impact of different categorizations on funding prioritizes and research agendas. Additionally, it also presents challenges concerning competence and cultural respect in research practice. Researchers must navigate cultural differences in understanding health and illness as well as navigating the deeply ingrained beliefs and practices associated with various TCIM therapies. Adapting research methodologies to accommodate cultural differences and preferences is necessary and thereby further highlighting the challenges posed by standardization in research.

Notably, TCIM practitioners prioritize a comprehensive, individualized, and holistic approach to patient care which is opposed to the reductionist approach commonly associated with conventional biomedical research. Conventional biomedical research refers to the mainstream scientific investigation that typically focuses on isolating specific biological mechanisms or components to understand disease processes or treatment effects [46,57]. Therefore, conventional biomedical research often involves a more focused and mechanistic exploration which often does not neatly align with TCIM. For instance, when investigating naturopathic systems that consider entire plants with multiple constituents rather than isolating single components, many methodological processes become limiting [46]. The holistic nature of TCIM practices pose methodological barriers that challenge the application of conventional research models such as use of a randomized controlled trial [51,58]. Many TCIM therapies target syndromes rather than isolated diseases, focusing on functional relationships between systems in individuals. This departure from the disease-centered model often used by Western biomedicine complicates the development of effective controls for TCIM therapies, especially when the key factors are not well understood or easily assessed, as is the case with certain mind-body therapies (such as qi gong, yoga, tai chi, and meditation) or energetic therapies (such as reiki, therapeutic touch, magnet therapy, and polarity therapy) [58-60]. While the WHO
has made guidelines for methodologies on research and evaluation of traditional medicine [22], and guidelines for clinical research on acupuncture [61], standardizing criteria across TCIM modalities requires careful consideration of cultural, contextual, and philosophical differences. These WHO guidelines, while valuable, highlight the complexity involved in standardizing TCIM research due to their diverse cultural backgrounds and unique approaches to healthcare. The diverse nature of herbal medicines, for example, presents unique challenges in standardization efforts. Herbal medicine practices encompass a vast array of botanical remedies and traditional healing methods, each deeply rooted in cultural beliefs and traditions. Furthermore, the variability in herbal preparations, dosages, and administration methods adds layers of complexity to research standardization, making it essential to address these nuances to ensure robust and meaningful outcomes in TCIM research. Thus, while guidelines serve as a foundation for research standardization, adapting them to accommodate the intricacies of TCIM practices remains an ongoing and essential task.

Furthermore, the emphasis TCIM practitioners place on personalized care not only highlights the importance of tailoring therapies to meet each patient's unique needs and preferences but, also introduces additional challenges for standardizing research practice. Some TCIM practitioners may be hesitant to adopt standardized treatments as it may compromise their capacity to address the diverse needs of patients effectively. Despite these challenges, effort has been made to establish benchmarks and guidelines for the practice of TCIM. The WHO has published benchmarks for various TCIM modalities, including acupuncture [62], Unani medicine [63], and Ayurveda [64], serving as useful resources providing in-depth information on levels of practice, requirements, and safety considerations. Moreover, countries including South Korea and China have taken steps towards promoting standardization of practice by publishing clinical practice guidelines for TCIM therapies. While such guidelines are useful for promoting practice standardization, incorporating them into TCIM requires striking a balance between ensuring consistency and preserving the holistic, patient-centered approach that TCIM practitioners utilize. Although similar issues of research and practice standardization are present in assessments of non-TCIM therapies (such as psychological counselling, exercise, and nutrition), these challenges have not led to dismissing the effectiveness or importance of such therapies. However, within the context of TCIM, negative attitudes and bias have emerged. Overall, the dynamic nature of TCIM, combined with the difficulties of incorporating standardized methods highlight the intricacies involved in conducting rigorous research within this field.

**Challenges of Implementing TCIM Research into Clinical Practice**

1. **Inherent and systemic negative attitudes towards TCIM research**

The incorporation of TCIM research findings into clinical practice faces various challenges due to inherent and systemic negative attitudes within the health professional and health researcher community. This pervasive bias not only obstructs the integration of evidence informed TCIM into conventional healthcare but, also fosters negative attitudes towards TCIM practitioners wherein some have reported their research unjustly being labelled as “unscientific” [8,65]. TCIM research is also perceived as less credible when compared with biomedical research, irrespective of scientific validity [46]. For instance, despite evidence supporting the efficacy of TCIM research, such as in the case of herbal medicines, practitioners report experiencing challenges reflecting bias. While safety concerns and potential interactions should always be a priority, it is essential to treat these concerns with equal importance for both TCIM and conventional treatments. However, current reports from TCIM practitioners indicate a disproportionate emphasis on safety concerns and potential interactions, with minimal consideration given to the potential benefits [46]. These negative attitudes and biases highlight the challenges of incorporating TCIM research in clinical practice, emphasizing the need to implement strategies to reduce the biases held by conventional healthcare practitioners.

Language biases pose an additional substantial obstacle to TCIM research integration. The literature on TCIM therapies is disseminated across various languages, with English and Chinese being predominant contributors [66]. Studies published in English-language journals tend to report more negative results associated with TCIM therapies compared with non-English language journals. It was found that when compared with English-language journals, TCIM studies that were published in Chinese, Japanese, Taiwanese, and Russian-language journals report a higher frequency of positive results [67]. Additionally, TCIM research conducted in countries such as China, Japan, Hong Kong, Taiwan, and India conclude greater positive results [67,68]. While the likelihood of publication bias may contribute to an increase in positive results, it is crucial to recognize that the specifics of TCIM research in languages other than English remain largely unexplored; the differences in findings based on language underscore the challenges faced by TCIM research globally [69,70]. These language-related challenges contribute to the reinforcing of negative inherent systemic attitudes towards TCIM research, especially among health professionals who predominantly search for and read literature in the English language. Addressing these
complex challenges requires a strategic approach that involves improving research methods and reporting across all languages to ensure study results are consistent across different language journals to recognize the validity and significance of TCIM research on a global scale.

2. Insufficient interest and understanding of TCIM research

Despite the high rates of TCIM use among patients with varying conditions and illnesses, many patients are reluctant to disclose their use of TCIM therapies to their healthcare professionals (HCPs) [71-73]. It has been found that in order to promote well-informed decision-making, HCPs are advised to inquire about patients’ engagement and interest regarding TCIM [74]. Although HCPs could serve as trusted sources of information about TCIM research, their knowledge in this domain often falls short [75,76]. For physicians, this knowledge gap can be attributed to insufficient education or training in TCIM during medical school or residency, coupled with a lack of awareness regarding available evidence-based TCIM resources [77]. Bridging this knowledge gap through education in TCIM is crucial. In spite of efforts made to educate HCPs about TCIM, the most common approach used in the US is voluntary through elective courses as opposed to compulsory courses integrated as part of the curriculum [7778]. This lack of standardized TCIM healthcare education further exacerbates the challenge of fostering interest and understanding among conventional healthcare providers, hindering the effective incorporation of TCIM research into clinical practice. In addition to the lack of interest and understanding of TCIM research expressed by conventional HCPs, some TCIM practitioners may also exhibit insufficient interest and understanding of TCIM research and may possess distrustful and dismissive attitudes, and perceive TCIM research as inadequate at capturing the subtleties of their TCIM practice [52]. This may stem from the belief that the standardized methodologies used in research fail to sufficiently represent the holistic and individualized nature of TCIM therapies [51,58]. This lack of interest and understanding among TCIM practitioners not only impedes their engagement with research but may also reinforce the perception by other health researchers and HCPs that TCIM studies are less credible, hindering TCIM integration into clinical practice.

Next Steps

1. Strategies to overcome barriers

The intricate interrelationships among the challenges facing TCIM research (Figure 1), underscores the need for a comprehensive strategy spanning multiple domains to effectively address them. One crucial aspect is the need for increased funding to propel TCIM research forward. A correlation between funding increments and a rise of both the quantity and quality of published scientific research has been reported [79-81]. The effectiveness of increased funding has been demonstrated by the successes of research across various health fields such as autism [82], cancer [83], dyspnea, and nausea [84]. Increased research funding has led to advancements in the prognosis and treatments of many diseases including ovarian cancer, and has facilitated advancements in screening techniques, early diagnosis, and a broader range of effective treatment options [85]. Crucially, the establishment of diverse funding bodies within and beyond the TCIM community is essential, fostering innovative collaborations and entities that enhance awareness of TCIM.

While navigating barriers arising from funding TCIM research, it is also crucial to overcome the inadequacy in research capability within the TCIM community arising from insufficient training and educational support. To address the shortage of TCIM graduates prepared to perform research, it is essential to incorporate faculty development initiatives aimed to advance research literacy in TCIM education institutions. Effective faculty development programs can play a crucial role in empowering faculty to make impactful changes in the learning environments of students and their outcomes. As a result, the research skills of TCIM students depends heavily on the faculty’s ability to teach research methodology courses, offer research opportunities, and support students by effectively and comprehensively answering questions. Previously, the National Institute of Health/NCCIH initiated the “CAM Practitioner Research Education Project Grant Partnership,” granting it to nine TCIM institutions [86]. The primary objective of this initiative was to elevate the quality and quantity of research content within the curricula of TCIM institutions across the United States. The program aimed to explicitly increase TCIM practitioners’ understanding, exposure, and appreciation of evidence-based research, literature, and methods for advancing scientific knowledge [87]. A distinctive feature of the program was the requirement for TCIM institutions to collaborate with a research-intensive institution in developing and executing research education [87]. Initially, all nine TCIM institutions that had received the grant were provided with foundation training in research literacy [88]. This training assisted each institution’s faculty with the incorporation of research literacy into both their teaching and clinical responsibilities to their students. The institutions expressed enthusiasm for instructional approaches that embraced collaborative and small group learning strategies [88]. These methods were perceived as advantageous, offering each faculty member a relatively uncommon yet highly valued chance...
to engage with their colleagues and health educators from diverse disciplines, both within and between institutions. The institutions favored the “multi-hour seminar series” instructional format due to its positive outcomes [89]. These series provided faculty groups with dedicated time to participate in formal presentations and engage in small group guided conversations, reflecting on the integration of new information. TCIM institutions around the world could proactively work towards incorporating similar faculty development initiatives. By providing a faculty with the necessary training and educational support, TCIM education and training institutions can bridge the gap in research capabilities, ensuring that graduates are well-equipped with essential research skills. This strategic initiative aims to increase the number of TCIM graduates with adequate research literacy and skills, thereby empowering TCIM practitioners to critically evaluate biomedical literature, actively participate in research, and in some cases, inspire pursuit of advanced training in research and career development opportunities. Such a comprehensive and collaborative approach not only addresses the challenges posed by the current lack of research capability in TCIM graduating students but also contributes to the advancement and credibility of TCIM as a field of study and practice.

Furthermore, to effectively address preconceived biases and negative attitudes towards TCIM research, a strategic approach could involve integrating open science practices. Open science practices play a crucial role in enhancing transparency and reproducibility in research by making the dissemination of knowledge and the research process accessible to everyone. The adoption of these practices within TCIM research can be instrumental in mitigating negative biases associated with the field. A recent audit investigating the nature of open science practices across complementary, alternative, and integrative medicine (CAIM) journals by using the Transparency and Openness Promotion (TOP) Factor reported that CAIM journals provide minimal guidelines to encourage or require that authors adhere to open science practices, as reflected by the average TOP Factor of 2.95, within a range of 0 to 24 [90]. Comparisons of audits assessing open science
practices across various health domains including, health and medical science journals, pain journals, and sleep and chronobiology journals, reveal mean TOP Factors of 7.00, 3.50, and 3.00, respectively [91-93]. These findings underscore the lowest usage of open science practices in the field of TCIM when compared to journals belonging to these other health domains. In a recent study assessing barriers and the incorporation of open science practices among CAIM researchers, findings indicated that while most researchers were actively engaging in open access publishing, registering study protocols, and adhering to reporting guidelines, about 75% of respondents emphasized insufficient funding as the primary barrier hindering further integrating of open science practices into their work [94]. Among the CAIM researchers participating in the study, there was a notable lack of formal training in open science practices [94].

Moreover, to effectively overcome barriers in implementing TCIM research into clinical practice, an essential strategy involves incorporating principles of implementation science. Implementation science offers valuable methodologies for translating evidence-based TCIM interventions into real-world practice settings by utilizing a comprehensive approach that seeks to understand the complexities of the implementation by employing determinant frameworks. These frameworks categorize various determinant factors into barriers or facilitators, encompassing five interconnected domains: (i) the effectiveness of implementation strategies; (2) the characteristics of the implemented service, including its perceived complexity and compatibility with existing services; (3) the attributes of adopters, such as their attitudes, beliefs, and motivation toward the implemented service; (4) the characteristics of patients or recipients of the implemented practice, including their preferences and values; and (5) contextual influences, such as cultural and collective factors affecting adopters [95]. By focusing on understanding the factors influencing successful implementation, dissemination, and sustainability of TCIM interventions, implementation science provides a systematic approach to bridging the gap between TCIM research and practice. Embracing implementation science principles can enhance the integration of evidence-based TCIM interventions into healthcare systems.

Considering that TCIM training has predominantly been reported to occur in private colleges rather than universities, TCIM researchers may lack exposure to research practices in comparison with those in conventional biomedical fields [28,48]. This can lead to poorer research practices such as not incorporating international research reporting standards into their work [8]. Approximately 50% of the respondents expressed that practical support from their institutions, coupled with clearer communication highlighting the benefits and importance of open science, would serve as motivating factors to incorporate more open science practices into their research [94]. It is thus essential for TCIM institutions to actively support such practices. This can be achieved through the implementation of faculty development programs, as discussed above, that educate and train faculty members to integrate research literacy and open science practices into the curricula. By doing so, institutions can not only empower faculty to embrace open science but also foster an environment that supports students in adopting these practices. By incorporating open science practices into TCIM research, guidelines for transparency and reproducibility can be established, fostering a more robust and credible research environment. This is particularly noteworthy in addressing concerns about the efficacy and safety of TCIM practices, which are often subjected to skepticism. Transparent and reliable research, guided by open science principles, becomes a powerful tool to validate or refute concerns surrounding TCIM practices, thereby contributing to the reshaping of perceptions and dispelling negative biases associated with TCIM research.

In addition, overcoming preconceived biases and negative attitudes toward TCIM practices presents another layer of complexity that requires a strategic and collaborative approach within professional healthcare programs. It is crucial to recognize the variability of academic TCIM institutions and degrees, acknowledging that they may be limited or nonexistent in several regions [49]. An essential element in this process involves the integration of comprehensive TCIM content and research into conventional medical and professional healthcare curricula. Integrating TCIM research and education into these conventional settings not only fosters interdisciplinary collaboration but also expands the reach, impact, and interest in TCIM from various HCPs within their respective fields/areas of expertise. Furthermore, this incorporation will not only provide future HCPs with the essential knowledge to confidently integrate TCIM advancements and research findings into clinical practice but will also encourage them to act as a catalyst for fostering open communication with future patients about their use of TCIM [96,97]. Institutions must proactively support these changes, both financially and logistically, to ensure the effective implementation of TCIM integration [98]. This commitment involves not only the financial investment necessary for curriculum development but also the organizational support to ensure these changes are substantive and meaningful in healthcare education. For example, program evaluations could serve as an important measure in assessing the impact of integrating TCIM into educational curricula, ensuring it goes beyond a symbolic gesture and rather it becomes a substantive change [98]. These changes may lay the foundation for a healthcare education system that fosters more informed HCPs capable of reducing the negative attitudes and biases associated with TCIM in a knowledgeable and supportive manner. Current HCPs are strongly encouraged to regularly update
their TCIM knowledge through published literature, such as TCIM recommendations in clinical practice guidelines [99-104]. This reframing of biases, when combined with enhanced education, provides the foundation for addressing the challenges associated with integrating TCIM research into clinical practice.

**Conclusion**

The widespread global use of TCIM therapies and the growing body of research surrounding its diverse therapeutic modalities highlights the field’s increasing popularity. However, financial constraints, a deficiency in research training and educational support, and a lack of standardization and methodological barriers, pose hurdles for prospective TCIM researchers. Financial barriers inhibit the necessary investment for robust research initiatives, limiting the scope and depth of TCIM investigations. The lack of training in research and educational support impedes the development of TCIM researchers, hindering the growth and acceptance of TCIM within academic and healthcare settings. Additionally, a lack of standardization and methodological barriers caused by the dynamic nature of TCIM therapies pose challenges when applying biomedical research models to holistic TCIM practices. These challenges not only impede the progression of TCIM research but also reinforce negative biases. Language biases in TCIM research, evident in the disparities between the findings reported in English-language and non-English-language journals reinforce negative attitudes towards TCIM making the translation of research findings into clinical practice difficult. In navigating these challenges, a comprehensive approach is essential, encompassing increased funding, enhanced research literacy, strategic efforts to increase open science practices, and integrate TCIM content in professional healthcare programs to reduce negative biases and attitudes. Addressing these barriers collectively opens up a more inclusive, informed, and integrative healthcare domain that recognizes and incorporates the benefits of evidence-based TCIM therapies.

**Author Contributions**

Co-drafted the project outline and original draft of the manuscript with substantial contributions to all revisions: MR. Provided critical feedback, suggestions, and edits: HC, MSL, and LSW. Conceived the project, co-drafted the outline and original draft of the manuscript providing supervision, critical feedback, suggestions, and edits: JYN. All authors have read and approved the final version of this manuscript.

**Conflicts of Interest**

The authors have no conflicts of interest to declare.

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**Ethical Statement**

This review article did not require research ethics board approval.

**Data Availability**

All relevant data are included in this manuscript.

**References**


[29] Ng JY. Insight into the characteristics of research published in traditional, complementary, alternative, and integrative medicine journals: a bibliometric analysis. BMC Complement Med Ther 2021;21(1):385.


[53] Ng JY. Insight into the characteristics of research published in traditional, complementary, alternative, and integrative medicine journals: a bibliometric analysis. BMC Complement Med Ther 2021;21(1):385.


Pacific WHoro for the Western guidelines for clinical research on acupuncture [Internet]. WHO Regional Office for the Western Pacific; 1995 [cited 2024 Apr 6]. Available from: https://iriswho.int/handle/10663/20703.

WHO benchmarks for the practice of acupuncture [Internet]. [cited 2024 Apr 6]. Available from: https://www.who.int/publications-detail-redirect/978924-400638-0.

WHO benchmarks for the practice of Unani medicine [Internet]. [cited 2024 Apr 6]. Available from: https://www.who.int/publications-detail-redirect/9789240042698.


Cramer H, Lauche R, Langhorst J, Dobos G. Are Indian yoga trials more likely to be positive than those from other countries? A systematic review of randomized controlled trials. Contemp Clin Trials 2015;41:269-72.

Pham B, Klassen TP, Lawson ML, Moher D. Language of publication restrictions in systematic reviews gave different results depending on whether the intervention was conventional or complementary. J Clin Epidemiol 2005;58(9):769-76.e2.


Sanservere ME, White JD. Quality assessment of online complementary and alternative medicine information resources relevant to cancer. Integr Cancer Ther 2021;20:15347354211066081.


Baugh E. Ensuring Canada’s competitiveness through an investment in ovarian cancer research [Internet]. [cited 2024 Jan 10]. Available from: https://www.ourcommons.ca/Content/Committee/421/FINA/Brief/BR10005209/br-external/OvarianCancerCanada-e.pdf.


