

LETTER TO THE EDITOR

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**Bridging Science and Innovation in Mind-Body Exercises:
A Call for Integration, Personalization, and Technological
Advancement**¹Lourdu Mary A²Chandra Bathran³Akuma IfeanyichukwuReceived 10th August 2025, accepted 21st November 2025, published 09th December 2025

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DEAR EDITOR,

We are responding to your esteemed journal's recent review of the study "Mind-Body Exercises: What Do We Know So Far? An Update" [1]. As professionals from the Department of Geriatrics, the College of Physiotherapy, and the Centre for Ethics, we commend the comprehensive synthesis of current evidence. We also urge the scientific community to go further, especially in the context of functional disorders and physiotherapy-led care for ageing populations. While there is growing enthusiasm about mind-body exercises (MBE), including yoga, tai chi, qigong, and mindfulness-based movement, their full clinical potential remains underexplored and underutilised in mainstream rehabilitation and geriatric care. Our goal in this letter is to highlight the urgent need for scientific refinement, broadened clinical applications, and a more nuanced integration of innovation, particularly artificial intelligence (AI), into mind-body therapies.

The rationale for advancing MBE research and application is twofold. First, functional disorders, characterised by symptoms without clear structural causes, are common among the elderly and chronically ill. MBE offers promising strategies for modulating bodily functions through attentional training, breath work, and mindful movement. Second, physiotherapy is uniquely positioned to leverage these practices, given its holistic engagement with physical and psychosocial health outcomes. Despite robust empirical support, the neurophysiological

underpinnings of MBE require a deeper inquiry. Studies using functional magnetic resonance imaging fMRI and Electroencephalogram (EEG) have linked these practices to modulation in key brain areas, including the prefrontal cortex and basal ganglia, influencing emotion regulation, cognitive control, and sensorimotor integration [2,3]. These changes are particularly relevant in populations experiencing functional decline or neurological impairments. However, individual responses to MBE vary widely, highlighting the importance of personalised approaches.

Sex-specific responses, age-related neuroendocrine shifts, and even cultural factors can mediate the impact of MBE. For example, women may benefit more from emotional regulation and flexibility, while older men may gain in muscular coordination and proprioception. Additionally, neuroendocrine pathways involving cortisol and oxytocin in response to mind-body activities merit further investigation as potential biomarkers. Scientific progress also depends on methodological rigour. Most MBE trials suffer from small sample sizes, limited follow-up durations, and high heterogeneity. We advocate for large-scale, multicentre randomised controlled trials that embrace CONSORT extensions and improve reproducibility. Diverse demographic groups should be deliberately included to ensure findings are generalizable across sociocultural contexts.

Equally critical is the setting in which MBE is practised.



A community-based tai chi class led by an experienced instructor is not equivalent to an online video followed at home. These contextual variables, such as instructor training, delivery format, and practice environment, may confound research findings and impact real-world efficacy. Tailoring interventions for settings like geriatric clinics, rehabilitation centres, aged-care homes, and remote or resource-limited populations must be a priority. Physiotherapy, as a discipline, benefits significantly from deeper integration with MBE. Evidence suggests that modalities like yoga and tai chi not only improve musculoskeletal function but also reduce anxiety, depressive symptoms, and fall risk among older adults [4]. When used as adjunct therapies, MBE practices may enhance recovery in stroke rehabilitation, Parkinson's management, chronic pain, and even mild cognitive impairment. This potential calls for curricular reforms and upskilling among physiotherapists. Training programs should incorporate mind-body modules and encourage interdisciplinary collaboration among yoga therapists, psychologists, and integrative medicine specialists. Beyond technical competence, this also fosters a patient-centred, ethical approach to care.

The emergence of AI and digital health tools represents a transformative opportunity for mind-body medicine. Wearable sensors and motion capture systems can provide real-time feedback, enabling physiotherapists to monitor postural alignment, breathing patterns, and muscular activation with greater precision. Machine learning algorithms can adjust difficulty levels and recommend personalised progressions based on user data, fostering safer and more effective practice. Such innovations hold particular promise for tele-rehabilitation and remote geriatric care, especially post-pandemic. AI-powered platforms can address access barriers, offer multilingual interfaces, and provide tailored regimens that evolve with patient feedback. However, we must proceed cautiously, ensuring these technologies are ethically designed, validated, and inclusive of populations with varying degrees of digital literacy.

We conclude that mind-body practices have emerged as promising tools for addressing physiological and psychological health dimensions, especially in ageing populations. Their future lies not only in tradition or anecdotal effectiveness but in a rigorous, personalised, and technologically informed framework. As clinicians, educators, and researchers, we urge the physiotherapy and broader medical community to take up this challenge, integrating innovation with evidence, and ethics with accessibility. We hope this letter contributes meaningfully to the evolving discourse on mind-body integration.

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