

COMMENTARY

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Strong mind, strong body: The promise of mind–body interventions to address growing mental health needs among youth

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Abstract

As the prevalence of childhood and adolescent anxiety, depression, and other mental health concerns continues to rise, there has been an unprecedented increase in support of mind–body practices like yoga, dance, meditation, mindfulness, aerobic exercise, and more—in part driven by the mental health burden imposed by the COVID-19 pandemic. While a growing body of evidence supports the safety and effectiveness of mind–body approaches, gaps in funding for and empirical research on mechanistic underpinnings, methodology development to assess multicomponent therapeutic practices, dissemination and implementation, and diversity in researchers, practitioners, and recipients remain. As a consequence, the neurobiological impacts of mind–body techniques are not well understood nor broadly accepted as standard forms of care by clinicians and insurers—often being considered as “alternative” rather than “complementary” or “integrative.” In this commentary, we summarize work from our labs and others highlighting the promise of mind–body approaches for improving mental health in youth, in line with the National Institute of Mental Health's strategic plan to address health disparities. We offer a potential framework for implementation and research—the Expressive Therapies Continuum. We also propose solutions to key research and policy gaps, that by could have positive public health impacts for those who are struggling and to prevent emergence of psychiatric illness, especially in developing youth.

KEYWORDS

alternative therapies, child development, integrative health, mindfulness, neurobiology

1 | INTRODUCTION

Mind–body interventions hold promise as scalable approaches to address mental and physical health across the continuum from wellness to illness. Yet significant gaps remain in terms of clinician and recipient perceptions (Anand, 2021), who is able to access and is utilizing these methods (i.e., disparities in implementation) (Voiss et al., 2019), and integration with standard clinical care

(Anand, 2021). These factors preclude widespread implementation and dissemination of mind–body practices through school systems, communities, and healthcare facilities, as well as insurance coverage. Clearly there is still more work to be done, requiring a framework for effectively guiding research in this area, action from funding agencies, more rigorous randomized controlled trials in diverse communities, peer review and publication in high-impact journals to increase visibility, and legislative efforts to implement such practices in

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communities and other settings with insurance coverage (NIH, 2023). Prior reviews in children and adolescents (Mendelson & Tandon, 2016; Section on Integrative Medicine, 2016) have predominantly focused on specific conditions or modalities (e.g., mindfulness and meditation (Lin et al., 2019; Simkin & Black, 2014; Stritter et al., 2021), yoga (Stritter et al., 2021), and physical activity (Alves & Alves, 2019). In this commentary, we take a comprehensive approach to examine at mind-body modalities as a whole and highlight the motivation for and potential benefits of mind-body therapies. We draw on experiences in our own labs and community settings backed by research from our groups and others to provide a tangible model for research and implementation of neuroscience-informed mind-body interventions. Given that there is less evidence from youth compared to adults, we leverage research from adult populations in some cases to provide a foundation for discussing the potential for mind-body interventions in youth, from health to those with psychiatric illness. We uniquely lay out the critical next steps for intervention research in this space, lend our support for relevant legislation, and call for improvements in the dissemination and visibility of this line of work.

2 | MIND-BODY INTERVENTIONS: THE “WHAT,” “HOW,” AND “WHY”

The COVID-19 pandemic has unmasked the pervasiveness of stress, anxiety, depression, and other mental health concerns. Research by our group and others shows an increase since prepandemic in clinically relevant symptoms of depression, anxiety, posttraumatic stress, and sleep disturbances in youth (Bhagal et al., 2021; Panchal et al., 2021; Power et al., 2020; Samji et al., 2022). Youth from historically disadvantaged groups—including ethnic and racial minorities and persons of lower socioeconomic status (SES)—are disproportionately impacted by the pandemic and mental health consequences, furthered by structural barriers to accessing mental healthcare (Banks, 2022). In fact, the National Institute of Mental Health (NIMH) recently released a strategic framework to guide research to address the growing mental health disparities, particularly among underserved and underrepresented youth (Health, 2022). This includes a call for funding of interventions targeting youth mental health disparities (Health, 2022). Therefore, although all youth may benefit from interventions, underserved and under resourced groups are at greatest risk for mental disorders and may, therefore, benefit the most. However, existing psychotherapeutic and pharmacotherapeutic methods may not fully address these problems and growing health disparities and may (a) be inappropriate in the prodromal phase of illness (e.g., additional risks of introducing pharmacotherapy at a young age) (McGorry et al., 2001), (b) not be covered by health insurance in the prodromal phase or at levels of severity below clinical thresholds (Williams, 2020), and (c) not widely or easily accessible (Radez et al., 2021; Rowan et al., 2013). Here, we advocate for diversifying the “treatment toolkit” to include mind-body interventions as relatively low cost, low risk, and potentially more

accessible than pharmacologic or psychotherapy, and as a useful adjunct to these evidence-based practices (Penrod & Moore, 2019). Adding mind-body interventions may be especially important for underserved or under resourced groups to foster resiliency, build stress coping skills, protect against adverse experiences, and ultimately reduce youth mental health disparities.

2.1 | What are mind-body interventions?

Mind-body interventions are those that leverage techniques to facilitate the mind's capacity to dynamically interact with bodily functions and symptoms (Guendelman et al., 2017; Wahbeh et al., 2008). Such interventions focus on reciprocal interfacing among the brain, psychological state, periphery, and behavior with the goal of using psychological functioning to affect physical functioning and vice versa (Guendelman et al., 2017; Razeghi & Ouyang, 2020). A variety of techniques may be applied to achieve these goals, and these techniques can be conceptualized across a continuum from those that offer rhythmic and tactile sensation to those that integrate complex processing and problem-solving (Kagin & Lusebrink, 1978). Mind-body interventions may include, but are not limited to, yoga, dance/movement therapy, art therapy, tai chi, various forms of moderate aerobic exercise, various meditation techniques such as mindfulness-based practices (Marlatt & Kristeller, 1999; Simkin & Black, 2014; Thompson & Waltz, 2007), music therapy, creative writing and narrative medicine, and deep-breathing exercises. Such interventions engage individuals across somatic, cognitive, emotional, cultural, esthetic, and social domains (Pandey et al., 2018) to promote nonverbal emotional expression (Vaisvaser, 2021).

In Figure 1, we adapt the Expressive Therapies Continuum to describe mind-body interventions across a spectrum from kinesthetic/sensory to cognitive/symbolic (Kagin & Lusebrink, 1978). The Expressive Therapies Continuum was originally developed to guide the therapeutic process of art therapists by providing a schema for how individuals interact with therapeutic mediums (here, art materials, but also movement, music, and other therapeutic components) to process information (e.g., memories, emotions, cognitions, etc.) (Hinz, 2019; Kagin & Lusebrink, 1978). This continuum also provides a useful framework for guiding research on the neurobiological basis of mind-body interventions. Indeed, similar to the NIMH's Research Domain Criteria (RDoC) initiative (Cuthbert & Kozak, 2013), the Expressive Therapies Continuum considers cross-cutting features that are present across various techniques (e.g., movement, social connection) and may have overlapping mechanistic underpinnings. Techniques leaning toward the kinesthetic/sensory end of the continuum may be more strongly rooted in moving the body in aerobic and rhythmic ways to quell systemic inflammation (Cooper et al., 2004; Grasser, 2022; Izadpanah et al., 2012), stimulate endocannabinoid signaling (Desai et al., 2022), regulate the balance between sympathetic and parasympathetic nervous system activity, and use movement as a form of nonverbal emotional expression. Interventions that engage perceptual/affective experiences may

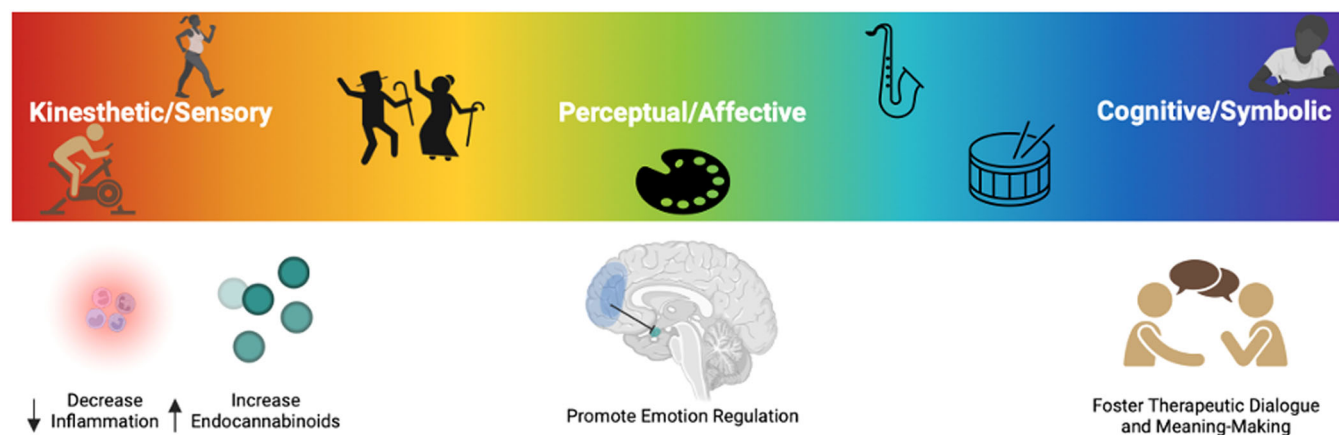


FIGURE 1 Mind-body therapies and their benefits may be defined along the Expressive Therapies Continuum (Kagin & Lusebrink, 1978). The top panel represents the continuum and the modalities that fall across this continuum; the bottom panel are the potential mechanisms underlying these interventions. Notably, these interventions have the capacity to span different ends of the spectrum. Mind-body therapies may lean into kinesthetic/sensory, perceptual/affective, or cognitive/symbolic experiences more strongly to promote various psychological and physiological responses. Alternatively, mind-body therapies may dynamically engage across the Expressive Therapies Continuum, starting at the kinesthetic/sensory end and culminating in the cognitive/symbolic as individuals progress through the therapeutic process. By integrating experientials that probe creativity, flexibility, and adaptability, better cognitive flexibility can be developed (Minton & Faber, 2016). Figure created in BioRender.

foster the use of creative media for personal expression and help strengthen emotion regulation. Art therapy and music therapy may lie within this space. Finally, creative writing and narrative medicine are examples from the cognitive/symbolic end of the Expressive Therapies Continuum and may help individuals to make meaning out of their experiences and find concrete manifestations of the abstract thoughts, feelings, and memories. Also at the cognitive/symbolic end, mindfulness promotes acceptance of difficult thoughts and feelings, reduces rumination, and improves psychological function, cognitive flexibility, and coping processes (Gillespie et al., 2012). Mindfulness also fosters self-regulation, resilience and well-being through increased awareness, healthy behaviors, and stress management (Smith et al., 2011).

As a whole, mind-body therapies provide an opportunity for accessible, affordable services (Lerner et al., 2005) to reduce risk of mental disorders and may help to mitigate disparities. These interventions have the opportunity to be “scaled up” through implementation at the school and community level (Jacquart et al., 2014), overcoming notable shortages in mental health professionals (Satiani et al., 2018). This may be especially relevant in rural communities, where access to healthcare providers can be limited (Beck et al., 2018). Mind-body therapies also offer the opportunity to foster facets of resiliency—including providing a sense of community and social support when implemented in group settings as well as an opportunity for mastery of skill through arts and movement practices (Feder et al., 2019). Where traditional therapeutic paradigms, research funding, and health insurance protocols widely center around reactive, rather than proactive, care, mind-body interventions offer an opportunity to bridge the gap and build out proactive community-based care structures. Mind-body therapies may not only be used for treatment, but also for prevention, where more

traditional approaches (i.e., psychotherapy, pharmacotherapy) may be less appropriate.

2.2 | Why might mind-body interventions be suited to address mental health?

A growing body of research has focused on identifying the neurobiological and physiological mechanisms underlying the therapeutic effects of mind-body practices, and suggests a wide variety of effects. For example, neuroimaging studies in youth suggest that mindfulness meditation is associated with structural and functional changes in neural networks involved in self- and emotion-regulation, attentional control, and self-awareness (Bauer et al., 2019; Dumontheil et al., 2023; Marusak et al., 2018; Weare, 2012). In addition, mind-body practices may affect autonomic regulation and immune reactivity, and modulate activity of several neuromodulatory systems, including serotonin, norepinephrine, dopamine, and endocannabinoids (Desai et al., 2022).

Meta-analyses support the effectiveness of mind-body approaches for improving mental and physical health in the general population (Feruglio et al., 2022; Perrier et al., 2020; Section on Integrative Medicine, 2016). For example, data from 209 mindfulness-based therapy trials indicated moderate effectiveness compared to no intervention and other active treatments, including psychological treatments, for anxiety, depression, and stress, with efficacy comparable to that observed for cognitive behavioral therapy and antidepressants (Khouri et al., 2013). Similarly, data from 21 dance/movement therapy trials described decreases in depression and anxiety, as well as increased quality of life, interpersonal skills, and cognitive skills across a variety of cohorts

including severely impaired clinical patients (Koch et al., 2019). However, the robustness of the evidence base does differ across modalities—for example, research on mindfulness and mindfulness-based interventions in adults is much more pervasive (Goldberg et al., 2022), while studies examining developmental cohorts, clinical populations (Burnett-Zeigler et al., 2016), and preventative curricula (Montero-Marín et al., 2022; Tudor et al., 2022) are fewer.

Early life experiences impact development and have lasting effects on health and behavior (Gazendam et al., 2020). Development is marked by important timeframes during which sensations, perceptions, and actions can have more profound influences on the maturation of organ systems, including the nervous and endocrine systems, which in turn contribute to variation in behavior (Zeanah et al., 2011). While systems are adaptable and dynamic throughout the lifespan (Zeanah et al., 2011), there are developmental windows of greater plasticity “when the effects of experience are particularly strong” (Knudsen, 2004) or those in which “experience shapes a trait to a larger extent than the same experience does in other time periods” (Frankenhuis & Walasek, 2020). Therefore, intervening early during brain development may be crucial to mitigating later-life psychopathology. Here, we present examples from our own research in this field.

Work from the Stress, Trauma, and Anxiety Research Clinic (STARC Lab; www.starclab.org) at Wayne State University (WSU) has shown that dance/movement and art therapy are feasible and effective ways to reduce stress and trauma-related symptoms in youth who resettle as refugees (Feen-Calligan et al., 2020; Grasser et al., 2019). These 8–12 week group programs follow a similar structural format to that of group cognitive behavioral therapy and offer a variety of experientials (therapeutic activities) from week to week that build on one another. Experientials focus on developing stress-regulation techniques (i.e., breathing, tension/release, meditation exercises), provide space for nonverbal emotional expression through art and movement, and allow for dialogue to both observe and be seen in the group.

Complementary work in the WSU Trauma History Investigation of Neurodevelopment in Kids (THINK) lab (www.wsuthinklab.com) shows the promise of meditation and martial arts-based approaches for targeting mental disorders. Our research shows that martial arts-based programs can reduce pain and emotional distress in children with cancer, sickle cell, other chronic health conditions, and their siblings (Marusak et al., 2020). We have also demonstrated that a martial arts-based school program was associated with reduced stress and COVID-19-related anxieties in predominantly Black, lower SES elementary school students (Marusak et al., 2022). Using neuroimaging, we found that greater trait mindfulness was associated with lower anxiety and increased markers of neural flexibility in children (Marusak et al., 2018). We also found that active meditation, such as focused attention to the breath, was associated with lower activity in the brain's default mode network, which is implicated in distress and rumination, in children with cancer (Hehr et al., 2022).

2.3 | How can mind–body interventions be implemented and scaled up?

Based on our own work, we offer examples and recommendations for how mind–body interventions can be effectively implemented and scaled up. The STARC Lab has shown that dance/movement and art therapy programs can be scaled up for implementation through virtual learning platforms, to reach a wider group of school-age children across virtual and in-person settings (Grasser & Javanbakht, 2021), and through community groups to facilitate neighborhood-level interventions. Indeed, the initial success of and evidence from these programs has led to partnership with and funding from the State of Michigan's Office of Global Michigan to bring creative arts and movement therapies to all five major resettlement sites across the state to serve New Americans from Syria, Afghanistan, Burma, the Democratic Republic of the Congo, Ukraine, and other nations (Feen-Calligan et al., 2020; Grasser, 2022; Grasser et al., 2019; Grasser & Javanbakht, 2021). To date, over 600 New Americans and metro Detroiters have engaged in these programs (Grasser, 2022).

Such programming and research has been possible by cultivating working relationships with community organizations within frameworks inspired by participatory action research (PAR) (Baum et al., 2006) and community-based participatory research (Holkup et al., 2004). Given the existence of mind–body therapies, their incorporation of evidence-based neuroscience concepts (Vaisvaser, 2021), and their accessibility, we chose to leverage such existing programs and resources to meet the needs of the communities described above. Before programming commencing, listening sessions were established with beneficiary communities, and potential offerings were detailed. Beneficiary communities then shared their wants, needs, and desired outcomes for therapeutic programming. In partnership with local community organizations (nonprofits, resettlement agencies, schools, neighborhood groups), preferred programs were then implemented within the community space. Research conducted in tandem with these programs was then given back to community organizations and beneficiaries for their use—including to advocate for continued funding for sustainable programming and local policy efforts to support community mental health. This is just one example framework among others that may foster increased acceptance of and engagement in mind–body intervention programs at the community level. Of note, while research has highlighted initial safety and effectiveness of many mind–body modalities mentioned above for some psychiatric disorders (Bojic & Becerra, 2017), there is always possibility of adverse effects of any approach (Britton et al., 2021) and while structured programs are generally safe, unguided meditation, for instance, can worsen psychotic symptoms in some individuals (Dyga & Stupak, 2015). Therefore, testing safety and acceptability in diverse populations—for example, across ages, psychopathologies, ethnoracial backgrounds, settings—continues to be necessary. Conducting research that actively integrates stakeholders throughout the process can positively contribute to such efforts.

3 | RECOMMENDATIONS FOR FUTURE RESEARCH

The paucity of empirical research on mind–body techniques precludes these techniques from being broadly accepted as standard of care by clinicians and insurers, in medical settings, and in communities—often referred to as “alternative.” Mind–body interventions could have a significant clinical and public health benefit; yet, there are several outstanding questions that require more research and legislative support.

One challenge is in identifying the specific aspects of mind–body programs that drive therapeutic effects. Large-scale so-called “dismantling” trials are required to disentangle the therapeutic components, for example, social interaction/support, physical activity, breathing exercises, or mindfulness, and a clear framework, such as the Expressive Therapies Continuum, may be useful for guiding this research. As there may be multiple mechanisms of change underlying efficacious treatments for mental health conditions of various etiologies, identifying the effects of various treatment components could help to refine, optimize, and individualize mind–body interventions to maximize affordability, time, and accessibility. It is also unclear *how* these techniques work at the neurobiological level. Studies that integrate neuroimaging, biological, or physiological measures are needed to identify the psychobiological mechanisms through which mind–body interventions improve mental health. Such foundational understanding is critical for developing more targeted, effective interventions.

Additional work is needed to identify which populations benefit most from certain types of interventions, and which intervention types are most effective for different populations. When asking how these techniques work at the neurobiological level, researchers must also ask *how much* is required to achieve the desired outcome—that is, what is the optimum “dosage” (frequency, duration, and/or intensity) and modality (e.g., yoga, seated meditation), and whether these interventions result in clinically significant (not just statistically significant) changes. Research on the biological side of this question is lacking, yet this is an important consideration especially when considering the accessibility and affordability of mind–body interventions. The use of objective biomarkers—for example, brain structure/function, psychophysiology, and neurochemical/hormone levels (Grasser & Jovanovic, 2021)—may also prove feasible in identifying those who may benefit most from specific interventions in line with precision medicine and identifying mechanisms of treatment. Findings from a meta-analysis of exercise interventions, for example, suggest that moderate- (vs. light-) intensity exercise results in greater augmentation of endocannabinoid concentrations (Desai et al., 2022)—one suggested biomarker of anxiolytic and antidepressant effects of exercise. Beyond empirical study, there is a need to standardize these methods to allow for broader distribution and replication.

Although helpful for assessing feasibility and initial effect sizes, research on mind–body interventions should apply the gold-standard randomized controlled trial approach. Yet this approach can face

practical and ethical challenges when working within communities, such as lack of clear blinding and a control group. Stepped wedge cluster randomized trials offer an opportunity to ensure ethical delivery of interventions on a community-wide scale, where they may have their most robust impact (Hussey & Hughes, 2007). Here, clusters of individuals—classrooms or schools, community entities, and so on—are randomly assigned to groups or conditions, rather than random assignment of individuals. In the stepped wedge approach, each cluster starts the intervention at a different timepoint. First, no intervention is implemented to allow for baseline measurement. Then, each cluster is randomly assigned to start the intervention at a different time—similar to waitlist controls. This ensures the opportunity for a “no-treatment” control group while ensuring that every group will ultimately receive the intervention. For the research team, this also alleviates logistical burdens in that the intervention(s) does not need to be ran simultaneously across all sites.

In addition to supporting rigorous research in this area, increased emphasis on best practices for mind–body interventions should be included in training at all levels. The next generation of scientists should be thoroughly trained in behavioral clinical trials to tease apart these questions with well-designed controls. They should also be trained in community-based participatory research, and in sensitivity in working with the public and in diverse populations.

4 | CALL TO ACTION

Recent years have witnessed an increase in social and institutional support of mind–body mental health interventions (Purohit et al., 2013). Yet mind–body modalities receive significantly less research inquiry, funding, and representation in the scientific literature as compared to psychotherapy and pharmacotherapy. Indeed, an NIH Reporter search (February 23, 2023) with the term “mind–body” yielded 7194 active projects—after screening, we identified merely 27 that focused on mind–body interventions for youth and/or parents. These studies were limited to exercise/physical activity, mindfulness, yoga, and biofeedback interventions for pain, sleep, attention deficit hyperactivity disorder, stress, depression, Type I Diabetes, and overall positive affect/developmental health, signaling a need for more focused studies investigating mind–body interventions for specific mental health conditions and using modalities like art therapy, dance/movement therapy, martial arts, and so on. In 1991, Congress passed legislation to establish an office within NIH “to investigate and evaluate promising unconventional medical practices,” which resulted in the establishment of the National Center for Complementary and Integrative Health (NCCIH). Currently, the NCCIH receives the second-lowest funding allocation of the 27 NIH Institutes and Centers and supports only 462 active projects, 19 of which are related to mind–body interventions in youth. Further, US consumers spend approximately \$30 billion out of pocket on complementary and alternative medicine (Nahin et al., 2016). Therefore, this lag in federal funding confers a cost to the general public (NIH, 2021). This is despite rousing early findings, data

supporting self-selection of mind-body therapy use among adults with neuropsychiatric symptoms to circumvent the cost of conventional treatments (Purohit et al., 2013), and cost efficacy with potential to reduce healthcare utilization (Dossett et al., 2020). In addition to increasing funding for research in this field, prominent child development and mental health journals, including *Mental Health Science*, can welcome and encourage manuscript submissions on mind-body approaches. Currently, publication of these topics is funneled toward specialized journals and many top journals in psychiatry and psychology do not publish on mind-body interventions—sometimes due to scientific shortcomings described above; doing so when rigorously conducted studies are presented could promote more rigorous review and greater visibility for novel and/or less-studied approaches to neuropsychiatry.

Scientists have an opportunity to put their research into action and shape policy—broadly, doing so can make neuroscience more publicly accessible, drive prioritization of areas for funding, and dispel myths and mistrust that increasingly plague our political system (Rouzer et al., 2023). Increased research on the direct benefits, cost efficacy, and increased accessibility of mind-body therapies compared to traditional forms of care for mental health with dissemination from scientists as trusted professionals (Rouzer et al., 2023) can support legislative efforts to integrate such programming into schools and communities. Examples from the 117th US Congress include the Improving Mental Health in Schools Act (HR 6709), the Early Childhood Mental Health Support Act (HR 6509), and the Continuing Systems of Care for Children Act (HR 7248). Mind-body therapies are strong candidates for behavioral mental health promoting practices in schools and communities given the range of options, cost efficacy (Penrod & Moore, 2019), adaptability, and credentialed providers (e.g., art therapists, dance/movement therapists, trauma-informed yoga therapists, MBSR-certified instructors, somatic movement therapists, and so on. Notably, these certifications require extensive training, and in some cases are Master's level degrees that include licensure in psychology and/or social work). The latter is particularly relevant given the shortage in mental healthcare providers. Scientists can advocate for this and similar legislation by meeting with policymakers and writing policy memos integrating research findings, among other efforts (Rouzer et al., 2023).

5 | CONCLUSION

The proposed framework and exciting initial findings described herein provide support for the notion that mind-body therapies have benefits for mental health, and that these effects may be mediated by changes in key neurobiological pathways that mediate stress, pain, and psychopathology. As a result, we call for funders, journals, and legislators to support rigorous and reproducible mind-body research and offer a framework for conducting such research through integration of the Expressive Therapies Continuum and RDoC principles. The public health potential of such is enormous, to help those who are struggling and to prevent emergence of psychiatric illness, especially in developing youth.

The integration of mind-body practices across ecological systems could not only have acute, positive benefits—like addressing the current mental health pandemic—but also transformative long-term effects, improving overall health and reducing healthcare costs.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

This manuscript does not have any data associated, as it is a commentary.

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