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Investing in student well-being: how cyclic meditation can reduce stress and foster mindfulness in academic institutions: a case from India

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Abstract: In the relentless pursuit of modern life's rewards, moderate stress can be a catalyst for growth (eustress), yet the unyielding grip of ceaseless stress, devoid of rest, can lead to burnout–an existential reminder of our pressing quest for equilibrium. Aiming for this equilibrium, we explore the potential of cyclic meditation–an innovative protocol seamlessly weaving physical movements, balanced breathing, and calming meditation techniques, offering a promising path to harmonise these contrasting dynamics. We conducted a month-long randomised controlled trial with schoolchildren, employing rigorous t-tests. The empirical tapestry that unfolded confirmed the efficacy of cyclic meditation, with the intervention group demonstrating significant enhancements in mindfulness alongside concurrent reductions in psychological distress. These findings hold practical implications for academic institutions and healthcare systems, highlighting cyclic meditation as a cost-effective, non-pharmacological intervention seamlessly integrated into curricula, effectively nurturing well-being. Furthermore, we propel theoretical advancement by drawing upon the foundations of Stress and Coping Theory.

Keywords: cyclic mediation; mindfulness; psychological distress; randomised controlled trial; self-determination theory.

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1 Introduction

> "Happiness is not a matter of intensity but of balance, order, rhythm, and harmony." – Thomas Merton

The extant body of research robustly underscores the significance of a judiciously balanced dosage of stress, often denoted as 'eustress', in engendering positive outcomes (Bienertova-Vasku et al., 2020). However, an uninterrupted state of stress, bereft of appropriate intervals for recuperation, inexorably propels individuals towards the precarious precipice known colloquially as 'burnout'. This state is typified by the deleterious consequences ensuing from prolonged psychological stress and the adoption of maladaptive coping mechanisms (Maslach and Leiter, 2006). Notwithstanding the pervasive acknowledgement of the physical and psychological toll exacted by this scenario, a considerable cohort grapples with the exigent task of orchestrating a harmonious equilibrium between repose and stress (Bienertova-Vasku et al., 2020). This quandary transcends specific demographics and reverberates globally across various life domains, encompassing occupational stress, familial obligations, and scholastic pressures (Luby et al., 2014; Parodi et al., 2022). Even upon exiting the precincts of their educational institutions, school-aged children encounter persistent cognitive and emotional reverberations of the multifaceted challenges they confront (Luby et al., 2014; Parodi et al., 2022; Pechtel and Pizzagalli, 2011). The intricate web of detailed curricula, cutthroat competition, and peer expectations frequently leaves students grappling with a spectrum of adversities, ranging from confrontational behaviour to manifest signs of depression, along with the adoption of unfavourable coping strategies. Consequently, they become ensnared in a relentless cycle of psychological stress, endeavouring to

navigate the delicate balance between eustress and repose (Bienertova-Vasku et al., 2020). This ubiquitous struggle underscores the exigency of our research, which aspires to elucidate innovative avenues for augmenting the well-being of school-aged children.

Formal scholarship has posited that the repercussions of unaddressed stress transcend the individual child or family unit (Compas and Wagner, 2017; O'Connor et al., 2020). In the gravest instances, these repercussions can permeate entire educational institutions or societies at large, as exemplified by tragic events such as school-related violence (Borum et al., 2010). Given the urgency of this issue, particularly when considering the vulnerable age group involved, the imperative of devising strategies to alleviate psychological stress becomes self-evident. Notably, both private and public institutions have recognised the importance of addressing this issue and have made substantial investments in developing such interventions (Hofmann and Gómez, 2017; Kraag et al., 2006; Zenner et al., 2014). However, it's worth noting that only a few scholars have ventured into creating specialised interventions tailored specifically for children. Most of the past mindfulness-based interventions in this domain have predominantly focused on activities such as identifying stressors or practising relaxation techniques that are more passive-like-sitting with closed eyes for long periods (Davis and Hayes, 2011; Kabat-Zinn, 2003; Yu and Zellmer-Bruhn, 2018). These approaches, although valuable, often present challenges when individuals attempt to integrate them back into their predominantly active and high-pressure daily lives. Furthermore, many of these interventions have been primarily tailored to mature populations, which might include practices reported as challenging even for older individuals (Creswell, 2017).

So, it is essential to acknowledge that our understanding of the utility of mindfulness interventions for stress relief may have been skewed by the specific processes, contexts, and phenomena traditionally considered. Managing psychological stress and practicing mindfulness techniques can be considerably more challenging for young children. Moreover, given their inherently active nature, children may find sitting for extended periods during mindfulness practice difficult and unpleasant. As a result, they might struggle with effectively integrating these practices into their lives. In such a context, while potentially beneficial, existing interventions may fail to have a lasting impact.

Consequently, a more dynamic approach is needed. This leads us to investigate the application of cyclic meditation within this context (Parajuli et al., 2022; Subramanya and Telles, 2009). Cyclic meditation stands out as a distinctive meditative protocol, seamlessly blending dynamic movement with relaxation intervals through meditation practices. Specifically, this innovative intervention strikes a balance between dynamism and relaxing meditation (Parajuli et al., 2022; Nagendra, 2013). It not only aims to reduce psychological stress but also focuses on cultivating mindfulness, a trait that has shown promising correlations with positive academic outcomes. To advance this field, we advocate for rigorous empirical analysis of this new intervention, targeting its effectiveness in enhancing the well-being of young children within the complex context of their lives (Subramanya and Telles, 2009; Pradhan and Nagendra, 2010). Prior research has established the robust effects of cyclic meditation on various physiological indicators (Kabir and Yang, 2023; Kumari and Ghosh, 2015). Relatively few studies have explored its utility in introducing young individuals to the concept of mindfulness and positioning it as a promising intervention for stress management (Subramanya and Telles, 2009; Pradhan and Nagendra, 2010). This makes the school-age population an ideal context to examine the relevance and adaptability of this intervention. Given its

promising potential, our study endeavours to address two fundamental questions: Firstly, does cyclic meditation have an impact on reducing psychological stress among school children, and secondly, can it enhance mindfulness in this demographic?

In the pursuit to answer these questions of understanding the transformative potential of cyclic meditation on mindfulness and psychological distress among school children aged 12–14, we employed a rigorous research methodology designed to yield scientifically sound and reliable results. This study embraced the randomised controlled trial (RCT) framework, a gold standard in intervention research, chosen for its ability to establish causal links between interventions and outcomes while minimising potential confounding variables (Scriven, 2008; Hróbjartsson, 2011). Within this methodological framework, the intervention group, comprising school children within the specified age range, actively engaged in a meticulously structured cyclic meditation program. This program consisted of immersive 30-minute sessions conducted five times a week, over a span of one month (Pradhan and Nagendra, 2010). In stark contrast, the control group remained unexposed to any intervention or influence, providing a clear baseline for comparative analysis. The pivotal assessment of critical outcomes, including mindfulness and psychological distress, was systematically conducted using well-established tools with good reliability and validity. This comprehensive methodology was thoughtfully chosen to ensure the validity and credibility of our research findings, allowing for transparent evaluation and replication. Furthermore, it seamlessly aligns with the trajectory of our study, guiding the reader from the initial theoretical framework and rationale to the practical execution of the investigation, forging a coherent narrative within our paper.

1.1 The stress and coping theory

In the intellectual tapestry of our study, the Stress and Coping Theory, a foundational framework in psychology, offers valuable insights. This theory, developed by Lazarus and Folkman (1984), elucidates how individuals respond to stressors by employing various coping mechanisms. In the context of our research on cyclic meditation, this theory serves as a theoretical underpinning by highlighting the importance of effective coping strategies in managing stress. Cyclic meditation is an intervention that equips individuals, especially school children, with coping tools to address the challenges of stressors. By integrating physical movements, controlled breathing, and meditation, cyclic meditation provides a holistic approach to stress management, potentially enhancing individuals' perceived ability to cope with stressors. Our study aims to empirically examine how cyclic meditation influences stress perception and the utilisation of coping strategies, contributing to an enriched understanding of stress and coping theories. Through this research, we seek to extend the framework by demonstrating the effectiveness of cyclic meditation as a practical tool for stress management and well-being enhancement, particularly in the context of younger populations. These theoretical foundations not only underscore the intellectual depth of our study but also provide a conceptual framework for our research questions, which we will explore in subsequent sections of this paper.

The ramifications of our study are profound, particularly within the purview of academic institutions committed to nurturing the holistic well-being of their student body. The integration of cyclic meditation presents a meticulously structured avenue for the

augmentation of mindfulness and the amelioration of psychological distress. This bespoke intervention can seamlessly assimilate into academic curricula, physical education regimens, or dedicated well-being pedagogies, potentially heralding enhancements in academic performance, reductions in absenteeism, and heightened levels of student engagement. Furthermore, healthcare professionals are encouraged to contemplate the incorporation of cyclic meditation as a judicious, cost-effective adjunct to conventional therapeutic modalities, with particular applicability in the realm of paediatric mental healthcare. Its non-pharmacological nature, coupled with economic viability, renders it an enticing prospect, aligning harmoniously with the prevailing trends toward holistic and integrative healthcare paradigms. The societal reverberations of our study are equally profound, signifying the potential for evidence-based interventions that extend well beyond the academic precincts. Our findings portend a promising avenue toward bolstering mental health and well-being, especially among marginalised segments of our population. Thus, our research underscores the critical import of early, empirically substantiated interventions as a potent salve for the potential adversities arising from the throes of psychological distress experienced by school-aged children, thereby seamlessly bridging the theoretical constructs with the practical facets for their ultimate betterment. As we embark on this scholarly journey, we aim to navigate the intricate interplay between theory and practice, ultimately contributing to the academic discourse and the well-being of young minds.

2 Literature review

2.1 Stress in children

The prevalence of stress in children has raised concerns regarding its far-reaching implications on their well-being and development (Luby et al., 2014; Kapur, 2022). Within the school environment, multiple stressors converge, leading to a complex web of challenges (Tang et al., 2020). The academic sphere, characterised by performance expectations, tight deadlines, and exam pressure, imposes a substantial burden on students (Rodríguez-Arce et al., 2020). This competitive education system, fixated on grades, frequently instils anxiety and a fear of failure among students (Poots and Cassidy, 2020). Consequently, many students grapple with overwhelming workloads and struggle to meet soaring expectations (Poots and Cassidy, 2020). Social interactions within the school environment are another significant source of stress for children. Peer pressure, the quest for social acceptance, and the spectre of exclusion or bullying create a daunting social landscape (Jenkins et al., 2020; Hartas, 2021). Navigating these complex social dynamics while forging their identities within the school community can lead to anxiety and self-doubt (Perry et al., 2019; Parodi et al., 2022). Children may also encounter stressors beyond the school gate, stemming from family dynamics, such as parental expectations, conflicts, or unstable home environments (Buehler, 2020). Financial hardships, health issues, or significant life changes within the family further contribute to stress (Prime et al., 2020; Vrontis et al., 2019a). Additionally, the pressure to excel in extracurricular activities, hobbies, or sports can elevate stress levels as children grapple with multiple responsibilities and commitments. Recognising that children employ diverse coping mechanisms and exhibit varying resilience levels when facing stress is paramount (Mesman et al., 2021). Factors such as temperament, personality traits, and

past experiences significantly influence a child's capacity to cope with stressors. Effectively addressing stress in children necessitates a comprehensive approach. Schools play a pivotal role in cultivating a supportive and nurturing environment (Ernst et al., 2019). Strategies like promoting mental health awareness, offering access to counselling services, and integrating mindfulness and relaxation techniques into the curriculum are invaluable tools (Wang et al., 2020). Moreover, educators can foster positive student-teacher relationships, encourage open communication, and establish a secure space where children feel supported.

In summary, stress in children substantially challenges their overall well-being. Existing literature has demonstrated the adverse consequences of stress on their satisfaction and well-being (Mughal et al., 2010; Vrontis et al., 2019b; García-Carrión et al., 2019). Effectively addressing this issue necessitates a holistic approach involving schools, parents, and policymakers collaborating to create supportive environments, offer resources, and prioritise mental health. By acknowledging the unique stressors faced by children and implementing effective strategies, we can empower them to develop resilience, manage stress, and thrive in various aspects of their lives.

2.2 Mindfulness intervention

Mindfulness interventions have emerged as a promising approach to addressing stress in various contexts (Saunders and Kober, 2020). At its core, mindfulness involves intentionally and nonjudgementally paying attention to the present moment. It encourages individuals to observe their thoughts, feelings, and bodily sensations without getting caught up in them or reacting impulsively (Amundsen et al., 2020). By cultivating mindfulness, students develop a heightened awareness of their internal experiences and the external world. In a school setting, mindfulness interventions may take different forms (Suárez-García et al., 2020). They can be integrated into regular classroom activities, offered as standalone programs, or delivered through specialised mindfulness curricula (Janz et al., 2019). These interventions often include guided mindfulness exercises that encourage students to focus on their breath, body sensations, or specific objects of attention. Students are encouraged to observe their thoughts and emotions as they arise, acknowledging them without judgement and then gently redirecting their attention to the present moment (Emerson et al., 2020).

There is a growing body of literature on the topic, and we provide further exploration for a deeper understanding of the specific interventions and their effects. Mindfulness-based stress reduction (MBSR): MBSR is an eight-week program developed by Jon Kabat-Zinn (1990) that integrates mindfulness meditation, body awareness, and yoga. It has been widely researched and applied in various settings, including schools. MBSR has positively affected stress reduction, attention, emotional well-being, and academic performance. Mindfulness-based cognitive therapy (MBCT): MBCT combines mindfulness practices with elements of cognitive therapy to help individuals manage and prevent relapse from depression and anxiety (Segal et al., 2013). MBCT has been found effective in reducing symptoms and enhancing well-being in both clinical and non-clinical populations. Mindfulness-based interventions in education (MBI-Ed): MBI-Ed refers to adaptations of mindfulness programs specifically designed for educational settings. These interventions typically involve mindfulness practices tailored for students and educators and aim to promote well-being, social-emotional skills, and academic performance (Roeser et al., 2013). Research has shown positive outcomes,

including improved attention, self-regulation, and overall well-being in students and teachers. Mindfulness-Based Interventions for Children and Adolescents: Various mindfulness programs have been developed specifically for children and adolescents, such as mindfulness-based stress reduction for teens (MBSR-T) and mindfulness-based cognitive therapy for children (MBCT-C). These interventions have shown promising results in reducing stress, enhancing self-regulation, and improving emotional well-being in young populations (Biegel et al., 2009). Overall, school mindfulness interventions can offer a holistic approach to education by promoting students' mental well-being, emotional resilience, and academic success. By teaching students to cultivate mindfulness, schools aim to equip them with lifelong skills for self-awareness, emotional regulation, and navigating the challenges of daily life.

2.3 Cyclic meditation

In this context, CM offers a unique perspective on promoting mental well-being and managing stress, especially among school children (Parajuli et al., 2022). While incorporating the core benefits of mindfulness interventions to emphasise awareness and emotional regulation, CM combines physical movements and relaxation techniques, providing an alternative that is more appealing to children and helps answer the question of the dichotomy between stress and relaxation, making it best suited for this context. The integration of CM into school routines not only complements mindfulness imputes but also enriches the array of strategies available to educators and policymakers in their efforts to create supportive environments that foster children's holistic development. In the following sections, we will delve into the specific benefits and considerations surrounding the incorporation of CM into educational settings. Cyclic Meditation (CM) emerges as a practice uniquely poised to enhance school children's mental well-being and stress management, setting itself apart from existing mindfulness practices. CM ingeniously combines yoga postures and relaxation techniques, presenting a holistic approach to nurturing young individuals' comprehensive health and development (Parajuli et al., 2022). In contrast to conventional mindfulness, CM encourages school children to intertwine physical movements and mental relaxation, strengthening their mental and physical fortitude, flexibility, and bodily awareness through age-appropriate yoga postures (Ningthoujam et al., 2021). Furthermore, CM incorporates specific relaxation techniques, enabling children to alleviate tension and cultivate a profound inner tranquility (Kabir and Yang, 2023).

Furthermore, CM holds a unique position within the Indian context due to its profound alignment with India's rich heritage of yoga and mindfulness practices (Subramanya and Telles, 2009). India is the birthplace of yoga, and the practice of mindfulness has deep roots in its cultural and spiritual traditions (Kabat-Zinn, 2013). CM, with its fusion of yoga postures, relaxation techniques, and mindfulness principles, encapsulates the essence of these ancient traditions (Subramanya and Telles, 2009). Moreover, it caters to the specific needs and sensibilities of the Indian population, where holistic well-being is highly valued. Its accessibility, as well as its integration of physical movements and emotional regulation, makes it culturally resonant and practical for individuals of all ages in India (Pradhan and Nagendra, 2010). Furthermore, the practice's adaptability to various settings, from schools to households, makes it particularly relevant in addressing the stress and well-being challenges faced by individuals in the Indian context (Burke and Hassett, 2020). In a country where stress is a

growing concern, cyclic meditation offers a homegrown solution rooted in centuries-old wisdom and aligns harmoniously with the ethos of holistic health and self-awareness deeply embedded in Indian culture (Nagendra, 2013).

It is important to note that implementing CM in schools requires trained instructors or educators who can guide children through the practice, ensuring proper technique, safety, and age-appropriate adaptations (Burke and Hassett, 2020). Creating a supportive and nurturing environment for CM practice within the school community fosters a positive mindset. It encourages children to embrace the practice as a valuable tool for their well-being (McClendon and Scott, 2018). Further research is needed to explore the specific effects of CM on school children, including its impact on academic performance, social-emotional development, and overall mental health. Continued studies in this area will contribute to a better understanding of CM's potential benefits and aid in developing evidence-based guidelines for integrating CM practices into educational settings.

2.4 Underlying bio-mechanisms

Several factors have been studied when it comes to understanding the mechanisms of action underlying mindfulness interventions and cyclic meditation in reducing stress and enhancing well-being. Here are some potential mechanisms:

Neuroplasticity: Mindfulness practices have been associated with changes in the brain's structure and function. Regular practice can lead to neuroplasticity changes, which refer to the brain's ability to reorganise and form new neural connections. These changes have been observed in areas related to attention, emotion regulation, and self-awareness, such as the prefrontal cortex, hippocampus, and insula. These structural and functional changes may contribute to improved cognitive and emotional processing, leading to reduced stress and enhanced well-being. Brain Activity Changes: Mindfulness interventions have been shown to modulate brain activity. Functional magnetic resonance imaging (MRI) studies have demonstrated altered brain activation patterns during mindfulness practice (Hölzel et al., 2011). In particular, increased activation in regions associated with attentional control and decreased activation in mind-wandering and self-referential thinking areas have been observed. These changes in brain activity may support improvements in attentional focus, emotional regulation, and decreased rumination, all of which contribute to stress reduction and well-being enhancement. Autonomic Nervous System Regulation: Mindfulness practices have been linked to changes in autonomic nervous system activity. Specifically, they can activate the parasympathetic nervous system, responsible for the 'rest and digest' response (Tang et al., 2007). This activation reduces physiological arousal, including decreased heart rate, blood pressure, and cortisol levels. By promoting relaxation and reducing stress-related physiological responses, mindfulness interventions contribute to overall well-being. Cognitive Reappraisal and Emotional Regulation: Mindfulness cultivates a non-judgemental and accepting awareness of one's present-moment experiences. It encourages individuals to observe their thoughts, emotions, and bodily sensations without reacting or getting caught up in them (Creswell, 2017). This process enhances cognitive reappraisal and emotional regulation, allowing individuals to respond to stressors with greater clarity, resilience, and flexibility. By reframing and managing their relationship to stressors, individuals experience reduced stress levels and improved well-being.

2.5 Key research gaps

The review has revealed critical gaps in the existing literature that our study seeks to address:

Age-appropriate stress interventions: Existing interventions often focus on older populations, overlooking the critical issue of stress initiation at a young age. Our study will explore how Cyclic Meditation, tailored for younger individuals, can effectively address stress and mindfulness needs among school children. Active vs. Passive Mindfulness Practices: While conventional mindfulness interventions often involve passive practices like detached observation or sitting meditation, our study recognises children's challenges in engaging with such practices. Cyclic Meditation offers an active, movement-based approach that may be more accessible and engaging for children. Gender Bias in Research: Past research in Cyclic Meditation has primarily involved male participants, potentially biasing the outcomes. Our study aims to provide a more balanced perspective by including a diverse participant pool, thus ensuring more equitable and representative findings. Duration of Intervention: Many previous interventions were conducted for short durations, limiting our understanding of the long-term effects of Cyclic Meditation. Our study intends to explore the sustained impact of Cyclic Meditation on stress reduction and mindfulness over an extended period.

Addressing these identified gaps in the literature is crucial for several reasons, and it will significantly contribute to the existing body of knowledge: Early Intervention for Stress: Stress is not limited to adults; it affects children from a very young age, potentially impacting their well-being and development. Focusing on Cyclic Meditation as an intervention for children, our study acknowledges the importance of early stress management and mindfulness cultivation. This approach aligns with a preventive and proactive stance, potentially equipping children with valuable coping skills from an early age. Active Mindfulness for Children: Most mindfulness interventions involve passive practices that may not be well-suited for children, who often struggle with sustained attention. Cyclic Meditation's active nature, combining movement and attention engagement, offers an innovative alternative. Exploring the feasibility and effectiveness of this approach can expand the toolkit of interventions available for children, making mindfulness more accessible and engaging. Gender and Cultural Inclusivity: By addressing the gender bias in previous research and striving for a diverse participant pool, our study aims to provide a more inclusive perspective on the benefits of Cyclic Meditation. This inclusivity is essential for ensuring that findings can be applied to a broader population, accounting for potential gender and cultural variations in the effectiveness of the intervention. Long-Term Impact: Understanding the sustained effects of Cyclic Meditation over an extended duration is vital for evaluating its practicality and long-term benefits in academic settings. This knowledge can guide educators, policymakers, and practitioners in implementing evidence-based programs that promote children's well-being and resilience throughout their academic journey.

3 Hypotheses development

3.1 Impact of cyclic mediation on psychological stress among children

Psychological stress refers to the emotional and physiological response that occurs when an individual perceives a disparity between the demands placed upon them and their ability to cope with those demands. This response can manifest as tension, anxiety, frustration, or even physical symptoms, and it arises from various life circumstances, such as academic pressure, social interactions, family conflicts, or other stressors (Lazarus and Folkman, 1984).

There are three strong reasons backed by past literature to establish a relationship between cyclic mediation and psychological stress. These reasons provide a strong foundation for the proposed hypotheses and model:

Cyclic meditation and its components have been shown to enhance various bioindicators of well-being in diverse populations. These indicators include heart rate, blood pressure, breathing volume, and patterns (Nagendra, 2013; Subramanya and Telles, 2009). These physiological markers are closely related to stress reduction. When individuals experience improved bioindicators of well-being, they are better equipped to handle psychological stress. For instance, a lower heart rate and blood pressure indicate a more relaxed physiological state, which is associated with reduced stress. Cyclic meditation's ability to positively impact these bioindicators suggests that it can better prepare participants to manage psychological stress effectively. This reason is grounded in the notion that improved physiological functioning can lead to better stress resilience.

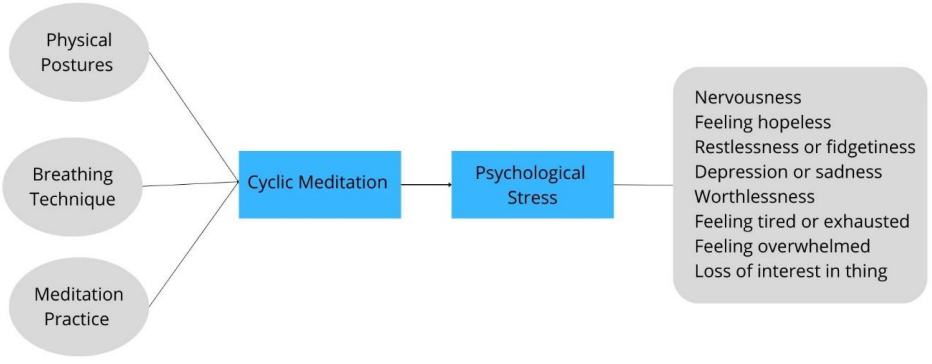
Previous studies have demonstrated that practices such as mindful breathing, body awareness, and specific relaxation techniques effectively reduce psychological stress in diverse populations, including children (Burke and Hassett, 2020; Subramanya and Telles, 2009). These interventions encourage individuals to focus on the present moment, observe their thoughts and sensations without judgement, and employ relaxation techniques to manage stress. As cyclic meditation incorporates relaxation techniques similar to those found in mindfulness-based interventions, it is reasonable to assume that cyclic meditation can positively impact reducing psychological stress in children. The foundation of this reason lies in the established effectiveness of mindfulness-based approaches in stress reduction.

Cyclic meditation differs from traditional sitting mindfulness practices involving physical movements. This distinction makes it more accessible and appealing, particularly to children (Burke and Hassett, 2020; Pradhan and Nagendra, 2010). Children are naturally inclined to engage in physical activities, and cyclic meditation aligns with their active nature. The practice's appeal may lead to better engagement and adherence among children. This higher engagement and adherence are likely to positively impact the effectiveness of cyclic meditation in reducing psychological stress. In essence, the idea is that a practice that is accessible and enjoyable for children is more likely to yield positive outcomes in stress reduction. This reason is based on the assumption that a practice that resonates with children's preferences and activities is more likely to reduce psychological stress among them effectively. In summary, these three literature-backed reasons provide a solid foundation for our first hypothesis and corresponding model.

H1a: Cyclic meditation has no effect on psychological stress among children.

H1b: Cyclic meditation has a negative effect on psychological stress among children.

Proposed model 1 (see online version for colours)



3.2 Impact of cyclic mediation on mindfulness among children

Mindfulness is characterised by non-judgemental awareness of the present moment. It involves deliberately paying attention to one's thoughts, emotions, bodily sensations, and environment without trying to change or evaluate them. Mindfulness practices often include meditation techniques that cultivate this awareness, promoting self-acceptance, emotional regulation, and a heightened sense of clarity and presence (Kabat-Zinn, 2003).

There are three strong reasons backed by past literature to establish a relationship between cyclic mediation and mindfulness. These reasons provide a strong foundation for the proposed hypotheses and model:

Cyclic meditation can increase body awareness, and this has a positive impact on mindfulness. The physical movements and breathing exercises involved in cyclic meditation encourage individuals to become more attuned to their sensations and emotions (Kabat-Zinn, 2013; Subramanya and Telles, 2009). As individuals practise cyclic meditation, they develop a heightened awareness of their bodily experiences. This heightened body awareness is fundamental to mindfulness, where individuals learn to observe their sensations without judgement. Therefore, the increased body awareness resulting from cyclic meditation is expected to lead to better levels of mindfulness.

Cyclic meditation is known to improve emotional well-being by increasing awareness and regulation of emotions. This aspect of emotional regulation is closely intertwined with mindfulness. The practice of cyclic meditation involves becoming aware of emotions, acknowledging them, and learning to regulate them effectively (Nagendra, 2013). Emotion regulation is integral to mindfulness cultivation, where individuals are encouraged to observe their emotions without reacting impulsively. Therefore, the improved emotional regulation resulting from cyclic meditation will contribute to better mindfulness levels.

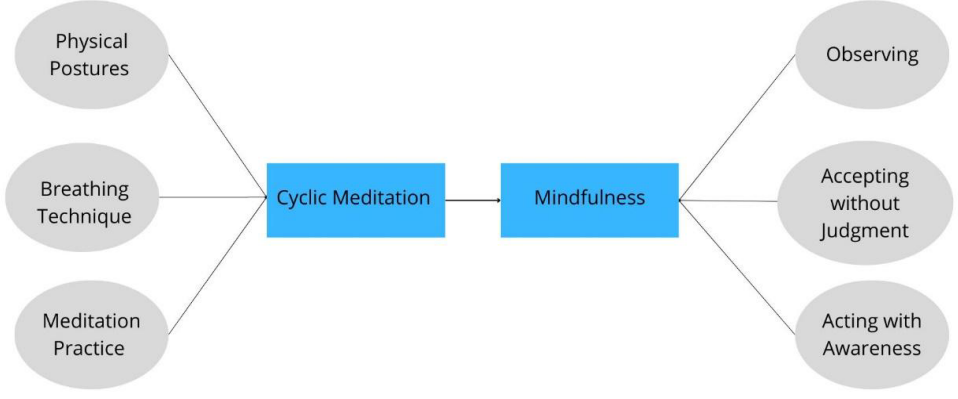
Cyclic meditation offers an integrated approach that combines various facets of practices independently shown to impact specific components of mindfulness. These facets include controlled breathing, body awareness, and meditation (Burke and Hassett, 2020; Pradhan and Nagendra, 2010). Each of these components contributes to different aspects of mindfulness. For example, controlled breathing helps individuals focus their attention on the present moment, body awareness encourages observing sensations without judgement, and meditation fosters a calm and non-reactive mind. By combining these practices into a single integrated approach, cyclic meditation is expected to have a

synergistic effect on mindfulness. This integrative approach is likely to enhance mindfulness levels among individuals who practice cyclic meditation. In summary, the three literature-backed reasons provide a strong rationale for our second hypothesis and corresponding model.

H2a: Cyclic meditation has no effect on state mindfulness among children.

H2b: Cyclic meditation positively affects state mindfulness among children.

Proposed model 2 (see online version for colours)



3.3 Theoretical framework

Our study's theoretical framework is grounded in the Stress and Coping Theory, established by Lazarus and Folkman in the late 20th century. This theory serves as the cornerstone for our hypotheses and corresponding models, offering a crucial lens through which to comprehend individuals' responses to stressors. According to this theory, individuals undergo a dual-stage cognitive appraisal process when confronted with stressors: primary appraisal, where they gauge the significance of the stressor, and secondary appraisal, where they evaluate their available coping resources and strategies.

Our first hypothesis, denoted as H1b, posits that "Cyclic meditation negatively impacts psychological stress among children." Aligned with the Stress and Coping Theory, this hypothesis is grounded in the primary appraisal aspect, suggesting that the unique combination of dynamic movements and relaxation techniques inherent in cyclic meditation may influence how children perceive and assess stressors. Engaging in cyclic meditation practices may empower children to develop enhanced coping resources, potentially leading to a reduction in their perceived psychological stress levels. Our second hypothesis, H2b, asserts that "Cyclic meditation positively affects state mindfulness among children." This hypothesis extends the Stress and Coping Theory's secondary appraisal component. It suggests that cyclic meditation, with its focus on mindful awareness of physical movements, breathing, and relaxation, may contribute to the cultivation of mindfulness skills in children. Through regular practice, children may bolster their capacity to observe and manage their thoughts, emotions, and bodily sensations, potentially resulting in increased state mindfulness.

Our study's theoretical underpinnings harmoniously meld the principles of the Stress and Coping Theory with the specific context of cyclic meditation as an intervention

tailored for children. We hypothesise that cyclic meditation operates as a coping mechanism, influencing how children appraise stressors and enhancing their state of mindfulness. These theoretical constructs provide a robust foundation for our study's hypotheses and steer the development of our statistical models, enabling us to empirically investigate the impact of cyclic meditation on psychological stress and state mindfulness among children.

4 Research methodology

4.1 Design

The experimental method is a fundamental approach used in scientific research to investigate and understand various phenomena, test hypotheses, and establish cause-and-effect relationships. This method involves systematically manipulating one or more independent variables while carefully measuring their impact on dependent variables under controlled conditions. The current study adopts a randomised controlled design comprising two distinct groups: an intervention group receiving cyclic meditation training and a control group devoid of any intervention. To evaluate the impact of cyclic meditation, pre- and post-intervention assessments of mindfulness and psychological distress were employed, drawing from the works of Greco et al. (2011) and Kessler et al. (2003). The randomisation process for group allocation employed a stratified randomisation technique, as elucidated by Kernan et al. (1999). This method involved categorising participants into strata based on pertinent variables and subsequently conducting randomisation within each stratum, following the insights of Suresh (2011). This meticulous approach was chosen to heighten the study's internal validity, ensuring equitable distribution of potential confounding variables, including age, gender, and baseline levels of mindfulness and psychological distress, between the intervention and control groups. Consequently, bias was minimised, and any observed disparities in outcomes between the groups could be more confidently attributed to the intervention itself rather than pre-existing variations in participant characteristics, aligning with the rationale presented by Kernan et al. (1999) and Suresh (2011). The inclusion of a control group in this study serves a pivotal role by mitigating potential confounding effects stemming from external interventions or life events, a strategy elucidated by Campbell et al. (1963). The control group functions as a baseline reference point, facilitating the assessment of the specific influence of cyclic meditation. Random assignment further ensures the comparability of the experimental and control groups, effectively controlling for pre-existing differences, as emphasised by Shadish and Cook (2009). The employment of pre- and post-intervention measures enables the evaluation of individual changes over time, effectively accounting for external factors, individual idiosyncrasies, or age-related effects by contrasting each participant's baseline measurements with their post-intervention data, as recommended by Huck and McLean (1975). In this controlled group design, data analysis relies upon the established statistical tool of the t-test, with a specific application of paired-samples t-tests for the comparison of means between pre- and post-intervention measures within each group (experimental and control). This analytical approach, in accordance with the guidance of Cohen and Miller (2009), facilitates the identification of statistically significant alterations in psychological stress and mindfulness over the course of the study for both groups.

4.2 Participants

Participants for this study were meticulously selected from two local educational institutions, with informed assent obtained from both guardians and participants. The cohort consisted of 60 school children, aged 12–14, who met specific inclusion criteria (Table 1), namely enrolment in one of the two participating schools, proficiency in English, and the ability to attend cyclic meditation sessions. Exclusion criteria encompassed the presence of medical or psychological disorders that might impede the intervention or measurement processes. These rigorous recruitment and selection criteria align with established precedents in research on mindfulness interventions in school-aged children. The study cohort comprised 60 participants, evenly distributed into an intervention group ($n = 30$) and a control group ($n = 30$). The average age of the candidates was 13.2 years, with a standard deviation of 0.8, and female participants constituted 54% of the sample. Importantly, the intervention and control groups exhibited comparability across key dimensions, including age, gender distribution, and baseline scores on measures of mindfulness and psychological distress.

Our choice to focus on school children aged 12–14 is underpinned by several important considerations. Firstly, adolescence, spanning ages 12–14, represents a critical phase marked by significant physical, emotional, and cognitive changes. This period is characterised by complex emotions, self-identity formation, and increased academic pressures. Research indicates that stress and mental health issues often emerge or intensify during this phase, making it an ideal time to introduce interventions that may alleviate these challenges. Secondly, children in the 12–14 age range are typically in middle school or junior high, where academic expectations and demands escalate. This transition can lead to significant stress among students, potentially affecting their academic performance and overall well-being. Therefore, investigating the effectiveness of cyclic meditation within this age group directly relates to their educational context.

Furthermore, existing research underscores the long-term benefits of addressing mental health and stress-related concerns early in life. By targeting school children aged 12–14, this study aims to determine if cyclic meditation can serve as an early intervention strategy, equipping them with valuable stress management and mindfulness skills that can positively impact their well-being throughout adolescence and into adulthood. Finally, educational institutions provide structured and accessible environments for implementing such interventions. Students in this age bracket are often readily available through schools, making it practical to execute and examine the effects of cyclic meditation within this setting. In summary, our rigorous participant selection, including the detailed inclusion and exclusion criteria, ensures the reliability of our findings, while our focus on school children aged 12–14 aligns with their developmental needs, educational context, and the potential for long-term positive outcomes.

Ethical Justification Related to the Sample: Informed Consent: Prior to participating in the study, all participants and their parents or legal guardians were provided with detailed information about the purpose, procedures, potential risks and benefits, and their rights as participants. Informed consent was obtained from both the participants and their parents or legal guardians, ensuring their voluntary participation and understanding of the study. Confidentiality and Anonymity: Measures were taken to ensure the confidentiality and anonymity of the participants. Any identifying information was kept strictly confidential, and data were anonymised during analysis and reporting. This protects the privacy and confidentiality of the participants and prevents any potential harm or

negative consequences. Voluntary Participation and Withdrawal Rights: Participation in the study was entirely voluntary, and participants had the right to withdraw from the study at any time without facing any negative consequences. They were informed of their right to withdraw and were assured that their decision would not affect their academic standing or any other aspects of their relationship with the academic institution. By following ethical principles and guidelines, the study ensured the protection, rights, and well-being of the participants (World Medical Association, 2013).

Table 1 Table 1 represents the criteria of inclusion/exclusion adopted in the study

Inclusion criteria	*Exclusion criteria*
Aged 12–14 years old	Physical disorders that may impact intervention participation or completion
Enrolled in one of the two participating schools	Psychiatric problems that may impact intervention participation or completion
Able to understand and speak English	Not willing to participate or consent for parents not available
Able to attend the cyclic meditation training sessions	Already going through other interventions

4.3 Intervention

The intervention group engaged in a rigorous regimen of cyclic meditation, participating in sessions five times a week for a duration of one month. The sessions were conducted by a highly qualified instructor boasting over five years of experience in imparting meditation techniques, thereby ensuring the provision of expert guidance. These sessions took place in the serene environment of the school's dedicated silent room, each spanning a duration of 30 min, a configuration consistent with the established practice of Subramanya and Telles (2009). Participants were thoughtfully advised to don comfortable attire and to remove their shoes during these sessions, fostering an optimal atmosphere for engagement. The rationale behind opting for a one-month mindfulness intervention is rooted in the potential efficacy of such a timeframe in effecting meaningful transformations in psychological well-being, stress mitigation, and mindfulness. Indeed, while the precise duration of mindfulness interventions can be contingent upon distinct objectives and contextual considerations, extant research underscores the capacity of even relatively brief mindfulness interventions to yield positive outcomes. This judicious selection of a non-intervention control group assumes paramount importance as it serves as the linchpin for isolating the exclusive effects of cyclic meditation and facilitating a precise evaluation of its impact on both mindfulness and psychological distress. By assiduously ensuring that the control group remained unaffected by extraneous activities or interventions, we could unequivocally attribute any observed distinctions in outcomes between the intervention and control cohorts to the singular influence of the cyclic meditation program. This methodological approach, underpinned by its ability to heighten the study's internal validity, elucidates with precision the specific benefits derived from cyclic meditation. Empirical evidence gleaned from numerous studies underscores that mindfulness interventions, even of relatively concise durations, can engender substantial reductions in stress levels. Notably, a meta-analysis conducted by Khoury et al. (2015) elucidated that mindfulness-based

interventions, encompassing durations ranging from 4 to 12 weeks, yielded demonstrable reductions in stress and ameliorated symptoms of anxiety. This body of research underscores the potential effectiveness of mindfulness interventions conducted over brief periods, reinforcing the rationale behind the study's chosen one-month timeframe for cyclic meditation.

4.4 Measures

Psychological distress was assessed using a modified version of the Kessler Psychological Distress Scale (K10) (Kessler et al., 2002), which gauges the frequency and severity of distress symptoms over the last four weeks across ten items. This adapted version, designed for children (De Stefano et al., 2022), employed a 5-point Likert scale, with higher scores indicating greater distress. It demonstrated good consistency and validity (De Stefano et al., 2022), with an internal consistency (Cronbach's alpha) of 0.86 and strong convergent validity. Thus, it proved to be a reliable instrument for measuring psychological distress in children. Mindfulness was assessed using the Child and Adolescent Mindfulness Measure (CAMM) (Greco et al., 2011), a ten-item questionnaire adapted for adolescents and children. Participants rated items on a scale ranging from 0 (never true) to 4 (always true), which was further adjusted to a range of 1–5 in this study. The CAMM demonstrated strong internal consistency and reliability (Greco et al., 2011), consistent with prior research (Mohsenabadi et al., 2020), which found an internal consistency (α) of 0.80 and a retest reliability (r) of 0.46. These findings support the reliability and validity of the CAMM for assessing mindfulness in our study.

To ensure the integrity of our results, we addressed potential sources of bias. Social desirability bias was mitigated by assuring participant confidentiality and emphasising the importance of honest responses. Furthermore, selection bias was minimised through randomised group assignment, ensuring that potential biases were evenly distributed between the intervention and control groups. These measures were implemented to enhance the credibility and reliability of our findings, providing a more accurate assessment of the impact of cyclic meditation on mindfulness and psychological distress in school children aged 12–14 years.

5 Results

This research is designed to examine the effect of cyclic meditation on mindfulness and psychological distress in school children aged 12–14 years old. A randomised controlled trial design was employed, with the intervention group receiving cyclic meditation training five times a week for one month; on the other hand, the control group did not obtain any intervention. The result of the study proves that the intervention group outperformed in enhancing mindfulness and lowering psychological distress. For the psychological distress measure, a similar paired t-test was conducted. The intervention group displayed a significant rise in psychological distress scores from pre- to post-intervention (mean difference = 0.234, SD = 0.798, SEM = 0.146, $t(29) = 12.0416$, $p < 0.0001$). The control group did not explain a significant alteration in psychological distress scores, pre- to post-intervention (mean difference = 0.020, SD = 0.897, SEM = 0.164, $t(29) = 0.7566$, $p = 0.4554$). For mindfulness, a paired t-test was managed to evaluate pre- and post-intervention records within groups. The scores disclosed that the

intervention group had a significant hike in mindfulness scores from pre- to post-intervention (mean difference = 0.170, SD = 0.813, SEM = 0.148, $t(29) = 9.4257$, $p < 0.0001$). On the other hand, the control group did not show a substantial contrast in mindfulness scores from pre- to post-intervention (mean difference = 0.033, SD = 0.791, SEM = 0.144, $t(29) = 1.3548$, $p = 0.1859$).

In conclusion, the outcomes of this study provide robust support for our hypotheses regarding the impact of cyclic meditation on school-aged children. Hypothesis 1b, which suggested that cyclic meditation has a negative effect on psychological stress among children, found validation in the significant reduction of psychological distress scores within the intervention group. This reduction in stress levels aligns with our hypothesis and highlights the potential of cyclic meditation as a valuable intervention for mitigating psychological distress in school-aged children.

Likewise, Hypothesis 2b, which posited that cyclic meditation has a positive effect on mindfulness among children, was substantiated by a significant improvement in mindfulness scores within the intervention group. This result underscores the effectiveness of cyclic meditation in enhancing mindfulness skills in this age group. Overall, this study's findings are in concordance with our initial hypotheses, emphasising the impact of cyclic meditation on both mindfulness and psychological stress among children. These results shed light on the potential of cyclic meditation as a non-pharmacological and accessible approach to promote the mental well-being of school-aged children, with implications for educators and policymakers aiming to enhance children's mental health and academic performance.

6 Discussion and managerial implications

This study sought to evaluate the effectiveness of cyclic meditation, a novel practice encompassing physical movements, breathing exercises, and contemplation, in enhancing mindfulness and mitigating psychological distress among 12–14-year-old school children. This research was driven by the growing prevalence of psychological distress in this demographic and the pressing need for evidence-based interventions within educational settings. Employing a randomised controlled trial (RCT) design, the intervention group underwent cyclic meditation training five times a week for one month, while the control group received no intervention. Mindfulness and psychological distress were assessed using well-established self-report instruments: the 'Child and Adolescent Mindfulness Measure' and a modified version of the 'Kessler Psychological Distress Scale'. Following the intervention, the intervention group exhibited a notable increase in mindfulness, as reflected by a mean score of 2.597 post-intervention compared to 2.427 pre-intervention. Conversely, the control group showed no significant change in mindfulness. Furthermore, the intervention group demonstrated a significant reduction in psychological distress, with a mean score of 3.423 post-intervention compared to 3.657 pre-intervention, while the control group displayed no significant alterations in psychological distress. These findings provide robust support for the efficacy of cyclic meditation in enhancing mindfulness and alleviating psychological distress among school children. Notably, cyclic meditation not only effectively reduced psychological distress in school-aged children but also had a positive impact on mindfulness. This is of particular significance as mindfulness has been associated with improved academic performance, reduced behavioural issues, and increased overall well-being (Hofmann and Gómez,

2017; Kabat-Zinn, 2003). The utilisation of cyclic meditation as an intervention not only aids students in managing stress but also cultivates a valuable resource and skill, namely mindfulness, which has demonstrated positive effects on academic outcomes and various facets of well-being in existing literature (Subramanya and Telles, 2009). This suggests that cyclic meditation has the potential to yield a range of beneficial outcomes beyond the reduction of psychological distress. Consequently, this research contributes to the expanding body of evidence supporting the effectiveness of mindfulness-based interventions in producing favourable mental health outcomes in adolescents and children. The implications of these research findings are substantial, particularly in the context of developing interventions to mitigate psychological distress and promote positive outcomes in school-aged children.

The practical implication of this study lies in the application and implementation of cyclic meditation programs in academic institutions and the potential benefits it can offer to various stakeholders. Academic Institutions: The findings of this study have implications for academic institutions, highlighting the potential of cyclic meditation as a cost-effective and non-pharmacological intervention for promoting mental health among school children. Implementing cyclic meditation programs can contribute to creating a supportive and healthy learning environment, leading to improved student well-being, academic performance, and overall satisfaction. Healthcare Management Systems: The results of this study can inform healthcare management systems about the effectiveness of cyclic meditation in reducing psychological distress and fostering mindfulness among children. Integrating such evidence-based interventions into healthcare management strategies can lead to better mental health support for children, potentially reducing the burden on healthcare systems and promoting preventive approaches to mental well-being. Public Policies: The findings of this study can influence public policies related to education and mental health. Incorporating cyclic meditation programs into educational policies can provide a framework for promoting mental health and well-being among school children. The evidence supporting the effectiveness of such interventions can guide policymakers in allocating resources and implementing initiatives that prioritise mental health support for students.

Our study's theoretical contribution is evident through the application of the Stress and Coping Theory in the context of assessing cyclic meditation's effects on psychological stress and state mindfulness among children. The Stress and Coping Theory, which posits that individuals experience stress when they perceive a misalignment between the demands they face and their available coping resources, provides a comprehensive framework to understand how cyclic meditation influences children's psychological well-being. In our study, children confront a multitude of stressors, including academic pressures, peer interactions, and personal challenges. Cyclic meditation emerges as a valuable coping resource, offering children a structured approach to stress management. This structured approach incorporates dynamic movements, controlled breathing exercises, and mindfulness practices, equipping children with a repertoire of effective coping mechanisms. These newly acquired tools empower them to actively regulate their emotions and responses to stressors, aligning with the core principles of the Stress and Coping Theory, which emphasise purposeful coping efforts to alleviate stress. Furthermore, our findings contribute to the development of theoretical models of mental health and well-being by highlighting the pivotal role of mindfulness in promoting positive mental health outcomes in children and adolescents. Notably, our study suggests that interventions centred on mindfulness can significantly

enhance adaptive coping mechanisms among young individuals. This revelation holds substantial implications for theories related to resilience and coping, underscoring the potential of mindfulness-based interventions in promoting adaptive coping skills and augmenting resilience in this population. Lastly, our study emphasises the potential efficacy of cyclic meditation as a targeted intervention for improving mental health outcomes in school-aged children. This unique approach not only aligns seamlessly with the principles of Stress and Coping Theory but also contributes to the theoretical foundation of mindfulness interventions. By identifying a specific method that holds promise for enhancing mental health outcomes in this particular demographic, we extend the theoretical underpinnings of mindfulness-based interventions, offering a valuable contribution to the field.

The study's findings hold significant potential for broader social implications by addressing the pressing need for evidence-based interventions to foster mental health and well-being, particularly among vulnerable populations. Children from low-income families, those who have experienced trauma, and those with developmental disorders are often at higher risk of mental health disorders due to various socio-economic and environmental factors. By demonstrating the potential efficacy of cyclic meditation in promoting mental health among school-aged children, this research contributes to a growing body of knowledge on accessible and effective interventions. These findings can inform the development of tailored, evidence-based programs that can be applied in various social contexts, including schools, community centres, and clinical settings. Such interventions could provide support and resilience-building tools to children who are at risk of mental health challenges, ultimately working towards reducing health disparities and enhancing the overall well-being of vulnerable populations. This research thus has the potential to positively impact society by addressing critical mental health needs and promoting inclusivity in mental healthcare.

The generalisability of the study's findings to broader populations and contexts is a crucial consideration. While this study specifically focused on school children aged 12–14 years, the principles of cyclic meditation and its potential benefits can extend to various age groups and cultural backgrounds. However, it's essential to acknowledge that the effectiveness of cyclic meditation may vary depending on specific factors. For instance, younger children may require age-appropriate modifications to the meditation protocol, while older individuals may benefit from more advanced practices. Cultural differences in attitudes toward meditation and stress management techniques may also influence its acceptance and effectiveness. Therefore, future research should explore the adaptability of cyclic meditation across diverse populations and settings to ensure its broader applicability and effectiveness in promoting mental well-being.

7 Conclusion

In conclusion, the study's results highlight the potential that cyclic meditation can enhance mindfulness and reduce psychological distress in children. Incorporating physical movements into cyclic meditation may enhance accessibility and appeal to younger populations. Overall, this study's outcomes indicate that cyclic meditation could be valuable for encouraging mental health in school-aged children. Further research is required to duplicate and enhance these detections and to inform policy decisions concerning mental health backing in educational settings. Promoting mental health in

children is crucial, and evidence-based interventions such as cyclic meditation can mitigate the development of mental health disorders in adulthood, leading to broader benefits for mental health and well-being. Limitations of the study involve the minor experiment size and the application of self-report calculations, which may be concerned with bias. Future research should duplicate these results in substantial samples and incorporate objective mindfulness and psychological distress measures.

Ultimately, our research addresses the pressing challenge of finding a delicate equilibrium between the stresses and relaxation experienced by school children. By offering a viable solution in the form of cyclic meditation, we aim to contribute to improving children's mental health during their crucial developmental years. As society grapples with the increasing complexities of modern life, the importance of equipping young minds with effective stress management tools cannot be overstated. Through our study, we endeavour to provide a pathway toward this equilibrium, promoting the flourishing of the next generation. In essence, this research invites future explorations and underscores the potential for cyclic meditation to be a transformative force in the lives of school children, ushering them toward a future marked by resilience, mindfulness, and enhanced psychological well-being. Based on the study, we provide future research directions on eight dimensions as follows. The identified themes for future research directions align closely with the limitations and gaps highlighted in the current study, thus serving as pertinent avenues for further investigation.

Theme	*Future research directions*	*Citation* (*to start with*)
Psychological stress	What underlying mechanisms cause the growth and preservation of psychological stress in children and adolescents? Longitudinal research investigates the biological, psychological, and ecological issues that impact the growth and preservation of psychological stress	Kraag et al. (2006), Pechtel and Pizzagalli (2011), Kessler et al. (2003) and Scheiner et al. (2023)
Mindfulness-based interventions	What is mindfulness-based intermediations' best dosage and duration for reducing psychological distress in adolescents and children? To identify optimal parameters for reducing psychological distress in school-aged children	Creswell (2017), Zoogman et al. (2014), Zenner et al. (2014) and Grabovac et al. (2011)
Psychological stress and academic performance	A cross-sectional study investigates the bond linking psychological stress and academic performance in school-aged children and values the success of mindfulness-based interventions in successful academic effects	Dahl (2004), Hofmann and Gómez (2017) and Scheiner et al. (2023)
Mindfulness-based interventions and resilience	An RCT follows participants over several years to assess the durable impacts of these involvements on resilience, adaptation, and well-being	Pechtel and Pizzagalli (2011), Scriven (2008) and Campbell et al. (1963)
Mindfulness-based interventions	A longitudinal study follows a cohort of school-aged children who received mindfulness-based interventions over several years	Hofmann and Gómez (2017), Kraag et al. (2006) and Kabat-Zinn (2003)

Theme	*Future research directions*	*Citation* (*to start with*)
Cyclic meditation	It is a randomised controlled trial that compares the effectiveness of cyclic meditation to other mindfulness-based interventions, like mindfulness-based stress depletion, regarding limiting psychological distress in school-aged children	Subramanya and Telles (2009), Kumari and Ghosh (2015) and Nagendra (2013)
Implementation of interventions	A qualitative study that explores the experiences of teachers, parents, and other stakeholders in executing mindfulness-based research in schools and additional community parameters to identify effective strategies for implementation	Scriven (2008) and Hróbjartsson (2011)
Cost-effectiveness of interventions	A cost-effectiveness analysis that compares the cost and outcomes of mindfulness-based interventions to traditional treatments such as pharmacological interventions	Zoogman et al. (2014), Zenner (2014) and World Health Organization (2018)

Finally, limitations may involve sample size, the specific study population, or intervention duration. Additionally, biases like selection or social desirability bias could influence outcomes. However, we have meticulously addressed these limitations and biases in our research design. We encourage future researchers to consider these factors, advancing knowledge in the field.

Author contributions

Author 1 led ideation, literature review, model development, and manuscript writing; Author 2 handled intervention administration and data collection/analysis; Author 3 provided guidance and ideational support throughout the study.

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Appendix

1 Table of constructs

Constructs	*Definition*
Psychological distress	Psychological stress refers to the emotional and physiological response that occurs when an individual perceives a disparity between the demands placed upon them and their ability to cope with those demands. This response can manifest as tension, anxiety, frustration, or even physical symptoms, and it arises from various life circumstances, such as academic pressure, social interactions, family conflicts, or other stressors (Lazarus and Folkman, 1984)
Mindfulness	*Mindfulness* is characterised by non-judgemental awareness of the present moment. It involves deliberately paying attention to one's thoughts, emotions, bodily sensations, and environment without trying to change or evaluate them. Mindfulness practices often include meditation techniques that cultivate this awareness, promoting self-acceptance, emotional regulation, and a heightened sense of clarity and presence (Kabat-Zinn, 2003)
Cyclic mediation	A practice that combines yoga postures, relaxation techniques, and mindfulness principles to enhance comprehensive well-being and stress management. It involves gentle physical movements, deep breathing, and meditation techniques (Subramanya and Telles, 2009; Pradhan and Nagendra, 2010)

2 Scale: "Children and Adolescents Psychological Distress Scale" (Stefano et al., 2022)

Items	**None Of The Time**	**A Little The Time**	**Some Of The Time**	**Most Of The Time**	**All Of The Time**
1. I have felt angry, stressed out or worried	1	2	3	4	5
2. I haven't managed to overcome my stress or to deal with it	1	2	3	4	5
3. I have been restless or had trouble sitting still	1	2	3	4	5
4. I haven't felt like doing things or enjoyed doing things	1	2	3	4	5
5. I have felt discouraged or sad or unhappy	1	2	3	4	5
6. I have felt sluggish or have felt a lack of energy	1	2	3	4	5
7. I have felt physical pain, have felt tired or have had trouble sleeping	1	2	3	4	5
8. I have disobeyed or have opposed my parents	1	2	3	4	5
9. I have felt irritable or unpleasant or have lost my temper	1	2	3	4	5
10. I have argued, have had a fight, have provoked other people	1	2	3	4	5

3 Scale: "Child and Adolescent Mindfulness Measure" (Greco et al., 2011)

Items	Never True	Rarely True	Some-Times	Often True	Always True
1.I get upset with myself for having feelings that don't make sense.	1	2	3	4	5
2. At school, I walk from class to class without noticing what I'm doing.	1	2	3	4	5
3.I keep myself busy so I don't notice my thoughts or feelings.	1	2	3	4	5
4.Itell myself that shouldn't feel the way I am feeling.	1	2	3	4	5
5.I push away thoughts that I don't like.	1	2	3	4	5
6. It is hard for me to pay attention to only one thing at a time.	1	2	3	4	5
7.I get upset with myself for having certain thoughts.	1	2	3	4	5
8. I think about things that have happened in the past instead of thinking about things that are happening right now.	1	2	3	4	5
9. I think that some of my feelings are bad and that I shouldn't have them.	1	2	3	4	5
10.1 stop myself from having feelings that I don't like.	1	2	3	4	5