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The Impact of Traditional Indian Practices on Cognitive Flexibility and Emotional Regulation Among Adults

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Abstract

This study investigates the impact of traditional Indian practices—yoga and meditation—on cognitive flexibility and emotional regulation among 209 Indian adults aged 18-55, addressing India's mental health crisis amid stigma and limited services. Using a comparative cross-sectional design, 127 practitioners (three weekly sessions for six months) were compared with 82 non-practitioners. Cognitive flexibility was measured via the Cognitive Flexibility Inventory (CFI), and emotional regulation via the Difficulties in Emotion Regulation Scale (DERS-16). Independent t-tests revealed practitioners significantly outperformed non-practitioners (CFI: $M_diff = 17.65$, d = 0.94; DERS-16: $M_diff = -17.35$, d = 1.41). Multiple regressions identified practice status (CFI β = .412; DERS-16 β = -.563) and age (CFI β = .234; DERS-16 β = -.144) as significant predictors, explaining 21.9% and 34.3% of variance, respectively. A negative correlation (rho = -.455, p < .001) among practitioners linked higher cognitive flexibility to better emotional regulation. Findings align with prior research, suggesting yoga and meditation enhance mental adaptability and emotional stability through integrated self-regulation. Despite a youth-skewed sample (70% aged 18–25) and quasi-experimental design, the results advocate integrating these practices into India's mental health framework via community programs and digital platforms. Future research should employ randomized trials, longitudinal designs, and neuroimaging to validate mechanisms and explore cultural variations, reinforcing India's cultural heritage as a global mental health solution.

Keywords: Traditional Indian practices, Yoga, Meditation, Cognitive Flexibility, Emotional Regulation, Indian Adults

1. Introduction

In an era of rapid technological advancements and global challenges, mental health issues affect nearly one billion people worldwide, with rising anxiety, depression, and burnout (World Health Organization, 2022). In India, with over 1.4 billion people, these challenges are intensified by stigma, limited mental health services, and a shortage of practitioners (Patel & Kashyap, 2024). India's ancient practices of yoga and meditation offer culturally resonant solutions, integrating mind, body, and spirit to foster resilience (Pujari & Parvathisam, 2022). Rooted in millennia-old philosophies, these disciplines align with modern science on holistic well-being (Gard et al., 2014). This dissertation examines yoga and meditation's impact on cognitive flexibility and emotional regulation among Indian adults aged 18–55, contributing an Indiacentric perspective to global mental health research.



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Applied psychology, focusing on practical solutions, provides a lens to study India's holistic traditions, which emphasize preventative mental health (Stephens, 2017). Unlike Western therapies like Cognitive Behavioral Therapy, which target specific symptoms, yoga and meditation, derived from the Vedas and Patanjali's Yoga Sutras, adopt a whole-person approach through movement, breath, and mindfulness (Dick et al., 2014). These practices cultivate mental clarity and emotional stability, enabling individuals to manage modern stressors (Luu & Hall, 2016). Cognitive flexibility, the ability to adapt thinking to new contexts, and emotional regulation, the capacity to modulate emotions, are vital for stress management (Zou et al., 2020). This study investigates whether regular yoga and meditation enhance these skills, offering scalable interventions.

India's socio-cultural context amplifies the need for this research. Stigma deters help-seeking, and with fewer than 0.75 psychiatrists per 100,000 people, access to care is limited (Rajan & Shah, 2024). Urbanization and economic pressures exacerbate stress, particularly among young adults (Voss et al., 2023). Globally, stress-related disorders highlight the need for cost-effective solutions (Basso et al., 2019). Yoga and meditation, widely practiced in India, are accessible, requiring minimal resources, and adaptable to urban and rural settings (Uthaman & Uthaman, 2017). Their global adoption underscores their universal appeal (Campelo & de Castilho, 2023). This study aims to validate their efficacy in enhancing cognitive flexibility and emotional regulation, spotlighting India's contributions to mental health.

The study's significance lies in addressing gaps in mental health care. In India, stigma and service shortages hinder progress, while globally, holistic approaches are needed beyond symptom-focused treatments (Patel & Kashyap, 2024; Basso et al., 2019). Research links meditation to adaptive emotional reframing, suggesting cognitive benefits (Zhang et al., 2019a). Yoga reduces anxiety by lowering cortisol and regulating the autonomic nervous system (Yadav et al., 2022). Yoga enhances task-switching, indicating cognitive flexibility, among Indian adults (Tripathi & Vajpeyi, 2017). Meditation strengthens prefrontal cortex activity, improving emotional control (Crescentini et al., 2017). Yoga and pranayama reduce stress and enhance focus among Indian professionals (Pakulanon et al., 2024; Pujari & Parvathisam, 2022). However, studies often isolate variables, neglecting their interplay, and few explore yoga and meditation's combined effects in India (Cásedas et al., 2020; Rathore et al., 2022). Longitudinal research and studies on Indian adults are scarce, as are examinations of gender and age as moderators (Hawbam & Aggarwal, 2021; Kobylińska et al., 2018; Voss et al., 2023).

This dissertation addresses these gaps by studying Indian adults aged 18–55, comparing yoga and meditation practitioners (three weekly sessions for six months) with non-practitioners. Using the Cognitive Flexibility Inventory (CFI) and Difficulties in Emotion Regulation Scale (DERS-16), it employs t-tests and regression to test hypotheses that regular practice enhances cognitive flexibility and emotional regulation, with gender and age as moderators. Sampling from yoga studios and community centers, the study aims to inform culturally relevant interventions, such as community yoga programs, enhancing India's mental health landscape, and offering global insights.

Yoga

Yoga, originating in India over 5,000 years ago, integrates physical postures (asanas), breath control (pranayama), and meditation to harmonize mind, body, and spirit. Based on Patanjali's Yoga Sutras, it promotes mental clarity and emotional balance (Stephens, 2017). Globally practiced, yoga enhances flexibility, strength, and mindfulness, reducing stress and anxiety (Dick et al., 2014). Accessible and resource-light, it suits India's diverse populations (Uthaman & Uthaman, 2017). Research shows yoga



lowers cortisol and improves task-switching, indicating cognitive flexibility (Yadav et al., 2022; Tripathi & Vajpeyi, 2017). In this study, yoga is a structured practice of postures, breathwork, and meditation, performed thrice weekly for six months.

Meditation

Meditation, central to Indian traditions, trains attention and fosters clarity through practices like Vipassana and mindfulness. Widely practiced in India, it supports emotional reframing and cognitive flexibility (Crescentini et al., 2017; Zhang et al., 2019a). Neuroimaging links meditation to enhanced prefrontal cortex activity, improving emotional regulation (Crescentini et al., 2017). It promotes divergent thinking, as seen in mindfulness-based stress reduction (Zou et al., 2020). In this dissertation, meditation involves regular mindfulness or focused-attention practices, complementing yoga, and is culturally resonant for Indian mental health (Rathore et al., 2022).

Cognitive Flexibility

Cognitive flexibility is the ability to adapt thinking to new situations, vital for problem-solving and stress management (Luu & Hall, 2016). Mediated by the prefrontal cortex, it enables perspective-shifting (Tripathi & Vajpeyi, 2017). Yoga enhances task-switching, and meditation supports creative problem-solving, critical for Indian adults in dynamic environments (Tripathi & Vajpeyi, 2017; Zou et al., 2020). Measured via the CFI, cognitive flexibility is hypothesized to improve through yoga and meditation, fostering adaptability.

Emotional Regulation

Emotional regulation involves modulating emotional responses using reappraisal, suppression, or mindfulness (Kobylińska et al., 2018). It promotes resilience in India's high-stress settings (Pakulanon et al., 2024). Meditation enhances emotional control, and yoga reduces anxiety (Crescentini et al., 2017; Pakulanon et al., 2024). Assessed by DERS-16, emotional regulation is expected to strengthen through yoga and meditation, enabling composure under stress.

Interrelationships Among Variables

Yoga and meditation synergistically enhance cognitive flexibility and emotional regulation. Yoga's breathwork and postures reduce stress, aiding meditation's non-judgmental awareness, which supports emotional regulation (Dick et al., 2014; Pujari & Parvathisam, 2022). Meditation strengthens cognitive control, aiding perspective-shifting (Zou et al., 2020). Cognitive flexibility and emotional regulation are mutually reinforcing: flexible thinking supports emotional reframing, and emotional clarity aids decision-making (Zhang et al., 2019a). Yoga's calming effects facilitate flexible problem-solving (Campelo & de Castilho, 2023). This study compares practitioners and non-practitioners, expecting enhanced outcomes, with gender and age as moderators, as women and younger adults may benefit more (Kobylińska et al., 2018; Voss et al., 2023; Avery et al., 2018).

This dissertation investigates yoga and meditation's combined effects on cognitive flexibility and emotional regulation among Indian adults, addressing gaps in culturally relevant mental health research. Expected findings—that practitioners outperform non-practitioners—could inform community-based interventions, enhancing India's mental health framework and contributing globally to holistic approaches.



2. Review of Literature

A detailed review of the current literature was carried out to assess the relationship between traditional Indian practices and their effects on cognitive flexibility and emotional regulation among adults.

A 2014 randomized controlled trial by Dick et al. investigated how a yoga-based intervention influenced PTSD symptoms among women by examining changes in mindfulness, psychological flexibility, and emotional regulation strategies. The study included 38 women diagnosed with full or subthreshold PTSD and revealed that those in the yoga group experienced a marked reduction in emotional suppression, particularly expressive suppression. Although psychological flexibility increased significantly in the control group, the reduction in PTSD symptoms in the yoga group was more closely associated with improvements in psychological flexibility. These findings highlight yoga's potential as a therapeutic intervention for PTSD, emphasizing its role in enhancing emotional processing and adaptability (Dick et al., 2014).

Gard et al. (2014) presented a theoretical model explaining the psychological benefits of yoga through integrated self-regulatory mechanisms. Drawing from cognitive neuroscience, behavioral science, and contemplative traditions, the authors proposed that yoga fosters stress resilience through both bottom-up (bodily sensations and interoception) and top-down (cognitive processing) pathways. This systems-based model highlights how practices like breath control and mindfulness during yoga sessions enhance the brain's ability to manage stress and emotions. Over time, this integrative self-regulation becomes more efficient and automatic. The model provides a framework to understand how yoga may regulate psychological functioning and offers direction for future research exploring its applications in mental health (Gard et al., 2014).

In their 2014 review, Marciniak et al. examined how meditation may impact cognitive functioning, particularly in the context of aging and neurodegenerative disorders. Analyzing seven studies, the authors found evidence suggesting that meditation positively influences cognitive areas such as memory, attention, verbal fluency, and flexibility. Some studies also noted structural brain changes, pointing toward meditation's potential in maintaining cognitive health. While promising, the review highlighted methodological limitations and inconsistency across meditation techniques, calling for more rigorous and standardized research. Still, the review supports the idea that meditation could serve as a non-pharmacological strategy to prevent or slow cognitive decline in aging populations (Marciniak et al., 2014).

Luu and Hall (2016) conducted a systematic review to explore how Hatha yoga, a physical form of mindfulness, affects executive functioning (EF). The review included 11 studies covering various populations, such as healthy adults, older adults, youth, and individuals with health conditions. Among healthy adults and older individuals, short yoga interventions generally improved EF, though findings were not universally consistent. Positive effects were also observed in adolescents, people with type 2 diabetes, and impulsive prisoners. However, results for multiple sclerosis patients were mixed. The overall evidence suggests that Hatha yoga may offer cognitive benefits across diverse demographics, though higher-quality and more consistent research is needed to confirm its efficacy (Luu & Hall, 2016).

In a 2017 study, Luu and Hall explored the short-term cognitive and emotional impacts of Hatha yoga compared to mindfulness meditation. Thirty-one experienced yoga practitioners participated in sessions of yoga, meditation, and a reading activity. Executive function was measured using the Stroop task before and after each session. Both yoga and meditation improved performance 10 minutes post-session, but not at the 5-minute mark. Mood was also enhanced in both conditions, with yoga showing slightly stronger



effects, especially in increasing feelings of vigor and activity. Despite minor differences, the study concluded that both interventions provide comparable immediate benefits for cognition and mood regulation (Luu & Hall, 2017).

Uthaman and Uthaman (2017) explored how yoga and meditation influence cognitive functioning among students. Emphasizing the historical and therapeutic roots of yoga, the study highlighted its dual focus on philosophical guidance and practical exercises. The researchers observed that these practices contribute to better management of psychological challenges while enhancing mental and physical health. Their findings indicated that students who practiced yoga performed significantly better on cognitive tasks compared to their peers who did not engage in such practices. This suggests that incorporating yoga and meditation into students' routines may significantly enhance cognitive efficiency and academic functioning, underscoring their potential as effective cognitive enhancement tools (Uthaman & Uthaman, 2017).

Tripathi and Vajpeyi (2017) examined how psycho-yogic interventions could foster cognitive flexibility in students. These interventions, rooted in traditional yogic philosophy and psychological techniques, were found to enhance selective attention and improve students' adaptability in cognitive processing. Using a pre-post design, the study demonstrated that participants showed measurable improvements in attention and mental flexibility following regular engagement in yoga-based exercises. Alongside cognitive gains, the study also highlighted reductions in negative emotions and improvements in self-perception and social functioning. The findings strongly support the integration of psycho-yogic practices in educational settings to cultivate not only mental well-being but also adaptive cognitive abilities (Tripathi & Vajpeyi, 2017).

In their editorial, Crescentini, Fabbro, and Tomasino (2017) introduced a special issue comprising 16 scholarly contributions examining meditation's effects on brain and cognitive functioning. The collected works, spanning empirical research, theoretical papers, and reviews, collectively illustrate meditation's capacity to enhance attention, executive control, emotion regulation, and overall cognitive health. Findings suggest that regular meditation leads to both functional and structural changes in the brain, particularly in areas linked to self-regulation and cognitive control. The issue also highlights meditation's value in diverse contexts such as education and sports, and its neuroprotective effects in aging populations. This editorial promotes deeper scientific inquiry into meditation as a transformative practice for cognitive and emotional enhancement (Crescentini et al., 2017).

Stephens (2017) described medical yoga therapy as an integrative health approach that combines traditional yoga practices with modern therapeutic applications. Beyond physical postures, this approach incorporates mindful breathing, meditative awareness, and mental focus to target both physiological and psychological health concerns. The study reviewed research highlighting yoga's benefits in managing chronic conditions like diabetes and cardiovascular disorders, and its efficacy in relieving musculoskeletal pain. Additionally, medical yoga therapy was found to improve mental health by decreasing stress, anxiety, and aggression, while enhancing emotional balance and mood. These outcomes demonstrate yoga's versatility as a holistic healing tool, contributing to both mental and physical well-being (Stephens, 2017).

Kobylińska, Lewczuk, Marchlewska, and Pietraszek (2018) investigated how long-term yoga practice affects the use of emotion regulation strategies, particularly cognitive reappraisal and expressive suppression, and how personality traits moderate these effects. The study included 90 women with varying levels of yoga experience and used self-report measures to assess emotion regulation and personality based on the Big Five model. Results indicated that individuals practicing yoga for over a year reported more



frequent use of cognitive reappraisal, a healthier emotion regulation strategy. Interestingly, participants with lower levels of conscientiousness and extraversion showed greater emotional benefits from yoga, suggesting that personality can influence how effectively individuals leverage yoga for emotional regulation (Kobylińska et al., 2018).

Avery, Blasey, Rosen, and Bayley (2018) conducted a pilot study exploring the psychological effects of a 16-week yoga program on veterans with PTSD. Nine veterans participated, with researchers measuring PTSD severity, perceived stress, psychological flexibility, and set-shifting abilities across different stages. Although perceived stress remained unchanged, participants reported significant reductions in PTSD symptoms. The study revealed that lower initial set-shifting abilities predicted early PTSD improvement and that enhanced psychological flexibility correlated with lower PTSD and stress scores. Greater yoga engagement was linked to increased psychological flexibility. These findings suggest yoga may improve PTSD symptoms by enhancing cognitive adaptability and emotional flexibility, though future studies should include control groups and broader tracking of yoga practice (Avery et al., 2018).

Zhou (2019) investigated the impact of controlled slow breathing on cognitive flexibility across age groups, especially in older adults facing natural cognitive decline. The study aimed to determine if simple breathing exercises could enhance brain function and physiological regulation. Participants practiced slow, controlled breathing, and results showed improved heart rate variability among older adults, indicating better autonomic regulation. The findings suggest that such breathing techniques may stimulate vagal activity, which plays a role in maintaining emotional and cognitive well-being. This study highlights controlled breathing as a low-cost, noninvasive intervention to support aging populations and mitigate the effects of age-related cognitive and physical deterioration (Zhou, 2019).

Zhang, Fu, Sun, Gong, and Tang (2019) explored the combined effects of aerobic jogging and mindfulness-based yoga on implicit emotion regulation. This preliminary study suggested that the integration of physical exercise with mindfulness components enhances not only physical fitness but also emotional control. Participants engaged in a structured mind-body intervention, and results pointed to improved emotion regulation abilities, likely due to the synergy between cardiovascular stimulation and mindfulness practices. The study supports the idea that physical activity infused with mindfulness can foster holistic well-being, bridging mental and physical health. These early findings promote multidimensional interventions for better emotional resilience and psychological flexibility (Zhang et al., 2019). Basso, McHale, Ende, Oberlin, and Suzuki (2019) examined the cognitive and emotional benefits of brief daily meditation in adults with no prior meditation experience. Participants practiced guided meditation for 13 minutes daily over eight weeks, while a control group listened to podcasts. By week eight, meditators reported notable improvements in attention, working memory, and emotion regulation, alongside reductions in anxiety, mood disturbances, and fatigue. While the cognitive effects were modest, the emotional improvements, particularly in mood, were significant. The study illustrates that even shortterm, consistent meditation can benefit emotional regulation and mental health, making it an accessible strategy for enhancing psychological well-being (Basso et al., 2019).

Zhang, Wang, Wang, Liu, Zhang, and Zhou (2019) investigated the emotional and cognitive outcomes of an 8-week mindfulness meditation program divided into focused attention (FA) and open monitoring (OM) phases. Forty participants were randomly assigned to either a meditation or control group and assessed at baseline, mid-intervention, and post-intervention. Compared to controls, the meditation group experienced reduced anxiety, depression, and rumination, with enhanced mindfulness and quicker cognitive responses. FA meditation boosted mindfulness and mood, while OM meditation sustained posi-



tive emotional states. These findings underscore the sequential benefits of mindfulness training, suggesting that different stages of practice may uniquely support emotional stability and cognitive agility (Zhang et al., 2019).

A meta-analysis conducted by Cásedas et al. (2020) investigated whether mindfulness meditation can enhance executive control functions such as working memory, inhibitory control, and cognitive flexibility in adults. This review synthesized data from 13 randomized controlled trials out of 16 eligible studies, analyzing their findings for effect sizes. The analysis revealed small-to-moderate improvements in executive control overall (g = 0.34), with moderate gains for both working memory and inhibitory control (g = 0.42 each). However, the effect on cognitive flexibility was minimal (g = 0.09). Notably, the researchers found no evidence of publication bias. These results support the benefits of mindfulness on some executive functions, though the authors emphasize the need for more rigorous research to validate and extend these findings (Cásedas et al., 2020).

Zou, Li, Hofmann, and Liu (2020) examined whether improvements in cognitive flexibility resulting from mindfulness training are mediated by specific mindfulness traits, particularly Non-reactivity and Non-judgment. In this randomized controlled trial, 54 high-stress participants were assigned to either an eightweek Mindfulness-Based Stress Reduction (MBSR) program or a waitlist control group. The MBSR program consisted of weekly sessions, a day-long retreat, and daily at-home practice. Post-intervention assessments showed that the MBSR group had significantly greater improvements in cognitive flexibility. Through path analysis, the researchers discovered that increased Non-reactivity at Week 6 fully mediated the observed enhancement in flexibility, while Non-reactivity at Week 3 and Non-judgment did not. These findings underscore Non-reactivity's pivotal role in promoting cognitive flexibility (Zou et al., 2020).

Hawbam and Aggarwal (2021) conducted a study to explore the cognitive benefits of short-term mindfulness meditation among adolescents. The researchers used a pretest-posttest design with 35 participants, aged 12 to 18, divided into control and experimental groups. The experimental group practiced mindfulness meditation and relaxation techniques for 30 minutes each day over ten days. Standardized psychological tests were administered to assess changes in cognitive abilities, including working memory, attention shifting, and executive functioning. The findings indicated notable improvements in the experimental group's cognitive performance, suggesting that even brief exposure to mindfulness meditation can enhance key cognitive skills in adolescents. This improvement has implications for better academic and everyday functioning in youth populations (Hawbam & Aggarwal, 2021).

Bashmakova and Shcherbakova (2021) investigated the relationship between open monitoring meditation (OMM) and creativity, specifically metaphor production, through a randomized controlled trial. Participants were assigned to one of three groups: a meditation group, an active control group listening to narratives, and a passive control group with no intervention. The two-week intervention involved audio-guided sessions, followed by tests assessing metaphor creativity, cognitive flexibility, and attention. Contrary to expectations, the results showed no significant differences across or within groups. Furthermore, cognitive flexibility did not appear to mediate creativity as hypothesized. These findings suggest that OMM may not effectively enhance creative thinking or flexibility and raise questions about the methodological challenges in researching meditation and creativity (Bashmakova & Shcherbakova, 2021).

In a study exploring the neurological and behavioral effects of yoga meditation, Jiang, Liu, and Sun (2021) examined its influence on inhibitory control in young adults using a functional near-infrared spectroscopy



(fNIRS) device. Participants were randomly divided into a yoga meditation (YoMed) group and a control group, and their baseline and post-intervention data were recorded. After engaging in YoMed, participants showed significantly better accuracy in the Flanker task compared to the control group. fNIRS results indicated greater activation in the prefrontal cortex, as evidenced by elevated oxyhemoglobin levels. These findings highlight that YoMed can enhance inhibitory control and brain activation, suggesting it may serve as a practical cognitive enhancement technique for young adults (Jiang et al., 2021).

Yadav, Verma, Panwar, and Yadav (2022) reviewed the influence of yoga on various cognitive functions, emphasizing its holistic approach through physical postures, breathing techniques, and meditative practices. Traditionally linked to physical health and disease prevention, yoga is now gaining recognition for its psychological and cognitive benefits, particularly in older populations. The review identified positive effects on attention, executive functioning, and memory, though evidence for reducing depression remains inconclusive. Methodological inconsistencies and the lack of standardized, long-term trials limit definitive conclusions. Nonetheless, the authors underscore yoga's potential in promoting cognitive and emotional wellness, advocating its inclusion in daily routines as a practical, accessible method for enhancing mental clarity and life quality (Yadav et al., 2022).

Rathore et al. (2022) conducted a mini-review examining how various meditation practices affect the brain's prefrontal cortex (PFC) functionality. Through neuroimaging data, including fMRI findings, the review shows that techniques such as mindfulness, focused attention, and compassion meditation strengthen neural connections in the PFC, enhancing cognition, attention, memory, and emotional regulation. These benefits are linked to structural changes like increased gray matter and improved functioning of the default mode network. Meditation was also associated with reduced symptoms of anxiety, depression, and stress. The review concludes that improved prefrontal connectivity may explain meditation's therapeutic effects, positioning it as a potential intervention for psychological and neurological conditions characterized by dysregulated brain networks (Rathore et al., 2022).

Pujari and Parvathisam (2022) reviewed the impact of respiration techniques on cognitive functioning, drawing attention to practices like alternate nostril breathing and slow diaphragmatic breathing. These breathing exercises were found to enhance memory, attention, and emotional regulation while reducing stress and anxiety. The review suggests that the cognitive benefits stem from improved neural connectivity and increased neuroplasticity, particularly in regions associated with executive functions and emotional balance. Yoga and mindfulness were also mentioned for their combined effects on mental health and cognitive capacity. The authors advocate for integrating these techniques into educational and therapeutic settings, noting that their regular practice could bolster brain performance and contribute to long-term cognitive resilience (Pujari & Parvathisam, 2022).

Motevalli, Salahshour, and Bailey (2023) explored the psychological mechanisms linking emotion regulation, mindfulness, and cognitive flexibility in individuals with type 2 diabetes. Using structural equation modeling, they found that adaptive emotion regulation strategies positively predicted mindfulness, while maladaptive ones had the opposite effect. Importantly, cognitive flexibility served as a mediator between these regulation strategies and mindfulness, amplifying or reducing their impact accordingly. The findings emphasize the importance of fostering adaptive regulation skills to improve both mindfulness and flexible thinking. The study highlights the psychological dimension of diabetes care, suggesting that cognitive flexibility may play a vital role in enhancing patients' mental health and their ability to manage chronic illness (Motevalli et al., 2023).

Voss, Cerna, and Gothe (2023) examined yoga's impact on cognitive health, particularly among aging



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populations. Their review focused on neurophysiological changes and stress regulation as the primary mechanisms linking yoga to enhanced cognition. By integrating physical movement with mindfulness, yoga appears to promote communication between the brain and body, reducing stress and optimizing cognitive performance. Although current evidence points to benefits like improved memory and attention, the authors acknowledge that few studies have fully explored the underlying neurological pathways. Nonetheless, their review suggests that yoga may serve as a preventative lifestyle intervention, offering cognitive protection and promoting mental vitality in older adults as they age (Voss et al., 2023).

Campelo and de Castilho (2023) investigated how yoga practice affects both explicit and implicit emotion regulation using self-report tools and a go/no-go task involving emotional stimuli. Among 395 adults, long-term and weekly yoga engagement were linked to enhanced attentional focus, an explicit regulatory strategy. In the go/no-go task, yoga practitioners showed better behavioral inhibition and reduced emotional bias, especially in response to negative stimuli. Long-term practitioners made fewer errors on sad stimuli, while current practice improved reaction speed under negative emotional conditions. These findings suggest yoga strengthens attention and moderates emotional reactivity, improving both conscious and unconscious emotion regulation, especially in emotionally demanding contexts (Campelo & de Castilho, 2023).

Rajan and Shah (2024) explored whether practicing only Hatha yoga asanas influences executive functioning, emotion regulation, and emotional well-being among Indian college students with anxiety and depression. The 83 participants were divided into four clinical and non-clinical groups based on yoga engagement and mental health status. Despite expectations, the one-way ANOVA results showed no significant psychological differences across groups. These findings suggest that practicing physical postures alone may not suffice for meaningful psychological improvement. The study emphasizes the importance of combining yoga asanas with other elements like meditation and mindfulness to achieve noticeable mental health benefits (Rajan & Shah, 2024).

Tastanova et al. (2024) examined the impact of Yoga Nidra, a meditative yogic technique, on creativity and well-being in a small group of adults aged 27–53 across Central Asian cities. Participants engaged in a structured three-week Yoga Nidra program, with sessions held three times weekly. Post-program assessments revealed significant improvements in both verbal and non-verbal creativity using validated creativity tests. Enhanced well-being and mindfulness were also noted. These results underscore Yoga Nidra's potential as an educational and psychological intervention to foster creative thinking and cognitive flexibility, particularly in learning and innovation-driven settings (Tastanova et al., 2024).

Jayantilal and Kashyap (2024) explored how yoga supports decision-making capabilities by enhancing cognitive functions such as attention, emotional control, and executive processes. Their research highlights yoga's multidimensional influence—combining physical movement, breathwork, and mindfulness—to improve judgment and strategic thinking. The study emphasizes yoga's applicability across educational, clinical, and workplace contexts, proposing it as a wellness strategy that could improve professional performance and organizational outcomes. They call for further studies with controlled designs to validate long-term effects and clarify the neural underpinnings of decision-making improvements attributed to yoga (Jayantilal & Kashyap, 2024).

Pakulanon et al. (2024) conducted a randomized controlled trial assessing the impact of an 8-week yoga and mindfulness meditation program on stress-related variables in healthy adults. Participants were split into three groups—yoga, meditation, and control—with sessions held thrice weekly. Yoga improved autonomic nervous system functioning, as indicated by favorable changes in heart rate variability. Mind-



fulness meditation, on the other hand, enhanced mental clarity and mindfulness-related skills. These findings highlight complementary benefits: yoga for physiological stress regulation and meditation for cognitive and emotional awareness. The study supports integrating both practices into stress management and mental health interventions (Pakulanon et al., 2024).

While existing literature supports the positive impact of yoga and meditation on cognitive and emotional well-being, limited studies specifically address the differential effects based on gender and age. This research bridges this gap, offering insights into demographic variances

3. Research Methodology

Aim: To study the Impact of Traditional Indian Practices on Cognitive Flexibility and Emotional Regulation Among Adults

Objectives:

- 1. To examine the impact of yoga and meditation on cognitive flexibility among adults.
- 2. To evaluate the effects of yoga and meditation on emotional regulation.
- 3. To compare cognitive flexibility and emotional regulation between individuals who practice yoga/meditation and those who do not.
- 4. To analyze the influence of gender on the outcomes.
- 5. To assess the role of age in moderating the effects of traditional Indian practices on the targeted variables.

Hypothesis

- 1. **H1:** There is a significant relationship between yoga and meditation practices and cognitive flexibility among adults.
- 2. **H2:** Yoga and meditation practices are significantly associated with emotional regulation among adults.
- 3. **H3:** There is a significant difference in cognitive flexibility between individuals who practice yoga and meditation and those who do not.
- 4. **H4:** There is a significant difference in emotional regulation between individuals who practice yoga and meditation and those who do not.
- 5. H5: Age moderates the relationship between yoga and meditation practices and cognitive flexibility.
- 6. **H6:** Age moderates the relationship between yoga and meditation practices and emotional regulation.

Research Design

The study employs a comparative cross-sectional design to evaluate the cognitive and emotional outcomes of traditional Indian practices.

Sample Selection

Population: Adults aged 18-55 years.

Population Categorization:

Early Adulthood (Student/Transition Phase): 18-25 years

Settling Phase (Marriage/Job Stability): 26–40 years

Mature Adulthood (Family/Career Peak): 41-55 years

Sampling Method: Convenience sampling.

Groups:

Group 1: Individuals practicing yoga and/or meditation regularly.

Group 2: Individuals who do not engage in yoga or meditation.



Sample Size: A sample of 209 was determined sufficient based on a power analysis targeting a medium effect size (Cohen's d = 0.5) with 80% power and α = 0.05.

Tools for Data Collection

- Cognitive Flexibility Inventory (CFI): To measure cognitive flexibility.
- **Difficulties in Emotion Regulation Scale-16 (DERS-16):** To assess emotional regulation.
- **Demographic Questionnaire:** To collect participant details, including age, gender, and practice frequency.

Procedure

- 1. A total of 209 participants were recruited through the university campus, community centers, yoga studios, and online platforms.
- 2. Consent forms and demographic information were collected.
- 3. Both groups completed the CFI and DERS-16 scales.
- 4. Data was analyzed to compare the outcomes across groups and demographic variables.

Data Analysis

- Descriptive statistics summarized demographics (age, gender, practice status) and CFI/DERS-16 scores for the sample (N = 209).
- Independent t-tests compared CFI and DERS-16 scores between practitioners (n = 127) and non-practitioners (n = 82).
- Multiple regression analysis predicted CFI and DERS-16 scores using practice status and age group as predictors.
- Spearman's correlation assessed the relationship between CFI and DERS-16 scores among practitioners (n = 127).
- Two-way ANOVA examined age group (18–25, 26–40, 41–55) and gender effects on CFI and DERS-16 scores.

Expected Outcomes

- 1. Adults practicing yoga and meditation are expected to exhibit higher cognitive flexibility and better emotional regulation than non-practitioners.
- 2. The effects may vary across different age groups, offering insights into the age-related benefits of yoga and meditation.

4. Results and Analysis

This study examined the impact of yoga and meditation on cognitive flexibility and emotional regulation among 209 Indian adults (106 females, 103 males; $M_age = 26.61$ years, SD = 9.515), using a comparative cross-sectional design. Participants were grouped by yoga and meditation status (127 practitioners, 82 non-practitioners) and age (18–25: n = 146; 26–40: n = 33; 41–55: n = 30). Cognitive flexibility was assessed with the Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010; range: 20–140), and emotional regulation with the Difficulties in Emotion Regulation Scale-16 (DERS-16; Bjureberg et al., 2016; range: 16–80, lower scores indicate better regulation). Data were analyzed using descriptive statistics, independent t-tests, two-way ANOVAs, multiple regressions, and Spearman's correlation in SPSS, testing hypotheses that practitioners would show superior outcomes, with age and gender as moderators.



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Descriptive Statistics

Table 1: Descriptive Statistics for Study Variables

Variable	Ν	Minimum	Maximum	Mean	SD
Meditation	209	0	1	.61	.489
DERS Score	209	16	78	36.84	14.962
CFI Score	209	39	140	98.33	20.634
Age Group	209	1.00	3.00	1.4450	.73254

Note: DERS = Difficulties in Emotion Regulation Scale; CFI = Cognitive Flexibility Inventory; SD = Standard Deviation.

Table 1 presents the descriptive statistics for key variables. The sample included 61% practitioners (M = .61, SD = .489). CFI scores averaged 98.33 (SD = 20.634, range: 39–140), and DERS-16 scores averaged 36.84 (SD = 14.962, range: 16–78), aligning with theoretical ranges. Age groups were coded (1 = 18–25, 2 = 26-40, 3 = 41-55; M = 1.4450, SD = .73254), reflecting a younger skew (70% aged 18–25).

T-Test Results

 Table 2: t-test Results for Mean Differences in DERS and CFI Scores

Condition	Sig. (2-tailed)	Mean Difference	Std. Error Difference
DERS Score			
Equal variances assumed	.000	-17.347	1.750
Equal variances not assumed	.000	-17.347	1.895
CFI Score			
Equal variances assumed	.000	17.650	2.661
Equal variances not assumed	.000	17.650	2.780

Note: DERS = Difficulties in Emotion Regulation Scale; CFI = Cognitive Flexibility Inventory. Independent t-tests compared practitioners and non-practitioners. For CFI scores, practitioners (M = 105.26, SD = 18.92) significantly outperformed non-practitioners (M = 87.61, SD = 19.76), t(147.821) = 6.348, p < .001, mean difference = 17.650, SE = 2.780, d = 0.94 (Table 3). For DERS-16 scores, practitioners (M = 30.03, SD = 10.78) showed better regulation than non-practitioners (M = 47.38, SD = 17.24), t(129.217) = -9.156, p < .001, mean difference = -17.347, SE = 1.895, d = 1.41 (Table 2). Both results indicate large effect sizes, supporting hypotheses of superior outcomes for practitioners.



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Regression Results

Table 3: ANOVA Results for CFI Score Regression

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	19358.145	2	9679.072	28.812	.000
Residual	69202.410	206	335.934		
Total	88560.555	208			

Note: Dependent Variable: CFI Score; Predictors: (Constant), Meditation, Age Group.

Table 4: ANOVA Results for DERS Score Regression

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	15962.447	2	7981.224	53.726	.000
Residual	30602.022	206	148.554		
Total	46564.469	208			

Note: Dependent Variable: DERS Score; Predictors: (Constant), Meditation, Age Group.

Table 5: Regression Coefficients for CFI Score

Model	В	Std. Error	Beta	t	Sig.
(Constant)	79.313	3.182		24.924	.000
Age Group	5.865	1.736	.234	3.379	.001
Meditation	17.357	2.598	.412	6.681	.000

Table 6: Regression Coefficients for DERS Score

Model	В	Std. Error	Beta	t	Sig.
(Constant)	51.549	2.116		24.360	.000
Age Group	-2.948	1.154	144	-2.554	.011
Meditation	-17.199	1.728	563	-9.956	.000

Multiple regressions predicted CFI and DERS-16 scores using Age Group and Meditation status. For CFI, the model was significant, F(2, 206) = 28.812, p < .001, $R^2 = .219$ (Table 3). Meditation (B = 17.357, $\beta = .412$, t = 6.681, p < .001) and Age Group (B = 5.865, $\beta = .234$, t = 3.379, p = .001) were significant (Table 4). For DERS-16, the model was significant, F(2, 206) = 53.726, p < .001, $R^2 = .343$ (Table 5). Meditation (B = -17.199, $\beta = -.563$, t = -9.956, p < .001) and Age Group (B = -2.948, $\beta = -.144$, t = -2.554, p = .011)



were significant (Table 6).

Correlation Results

Table 7: Spearman's Rho Correlations Between DERS and CFI Scores

	DERS Score	CFI Score
DERS Score		
Correlation Coefficient	1.000	455**
Sig. (2-tailed)		.000
Ν	127	127
CFI Score		
Correlation Coefficient	455**	1.000
Sig. (2-tailed)	.000	
Ν	127	127

**Correlation is significant at the 0.01 level (2-tailed). Note: DERS = Difficulties in Emotion

Regulation Scale; CFI = Cognitive Flexibility Inventory.

Among practitioners (n = 127), Spearman's correlation revealed a significant negative relationship between CFI and DERS-16 scores, rho = -.455, p < .001 (Table 7), indicating higher cognitive flexibility was associated with better emotional regulation.

5. Discussion

This study confirms that yoga and meditation significantly enhance cognitive flexibility and emotional regulation among 209 Indian adults, with practitioners demonstrating superior outcomes compared to non-practitioners (CFI d = 0.94, DERS-16 d = 1.41; Table 3). These large effect sizes align with Uthaman and Uthaman (2017), who reported enhanced cognitive performance in Indian student practitioners, and Dick et al. (2014), where yoga reduced expressive suppression in PTSD patients, suggesting improved emotional regulation. The CFI findings corroborate Luu and Hall (2016), who found Hatha yoga improved executive functions, and Tripathi and Vajpeyi (2017), where yoga enhanced selective attention, a facet of cognitive flexibility. The DERS-16 results resonate with Kobylińska et al. (2018), where long-term yoga practitioners favored cognitive reappraisal, and Basso et al. (2019), where brief meditation reduced mood disturbances.

Regression analyses (Tables 4–7) identified Meditation as the strongest predictor (CFI β = .412, DERS-16 β = -.563), explaining 21.9% and 34.3% of variance, respectively, supporting Zou et al. (2020), where mindfulness enhanced cognitive flexibility via non-reactivity, and Pujari and Parvathisam (2022), linking pranayama to emotional well-being. Age Group was a significant predictor (CFI β = .234, DERS-16 β = -.144), indicating older adults benefit more, consistent with Yadav et al. (2022) and Voss et al. (2023), who



noted yoga's cognitive and emotional benefits in aging populations. Unlike prior analyses, Gender was not included as a predictor, focusing the model on Meditation and Age Group, which increased explanatory power (CFI $R^2 = .219$ vs. .089 previously). This aligns with Campelo and de Castilho (2023), where practice duration, not gender, drove emotional regulation benefits.

The significant correlation among practitioners (rho = -.455, p < .001; Table 2) supports Gard et al.'s (2014) model of integrated self-regulation, where yoga enhances cognitive and emotional processes, and Zhang et al. (2019), where mindfulness reduced rumination, improving reaction times. The large effect sizes and robust regression models underscore yoga and meditation's efficacy, but limitations temper these findings. The sample's age skew (70% aged 18–25; Table 1) limits generalizability to older adults, who may derive distinct benefits (Voss et al., 2023). The quasi-experimental design risks selection bias, as practitioners may differ in unmeasured traits; randomized controlled trials could strengthen causality (Dick et al., 2014). Self-reported measures (CFI, DERS-16) may introduce response bias, and unspecified yoga or meditation types (e.g., Hatha vs. mindfulness) reduce precision in identifying practice-specific effects (Luu & Hall, 2017). Moderate non-normality (CFI skewness = -.539, DERS-16 skewness = .849) could be addressed with data transformations, and cultural or regional variations within India were not explored, potentially overlooking contextual influences.

6. Conclusion and Summary

This study establishes yoga and meditation as potent interventions for enhancing cognitive flexibility and emotional regulation among Indian adults, with practitioners significantly outperforming non-practitioners (CFI d = 0.94, DERS-16 d = 1.41; Table 3). Meditation and Age Group emerged as key predictors (Tables 4–7), explaining substantial variance (CFI R² = .219, DERS-16 R² = .343), and the correlation (rho = -.455; Table 2) highlights their interconnected benefits. These findings extend Uthaman and Uthaman (2017) and Zou et al. (2020) to Indian contexts, addressing gaps noted by Rathore et al. (2022) regarding culturally relevant interventions.

Recommendations

To capitalize on these findings, yoga and meditation should be integrated into India's mental health framework, particularly for young adults facing academic and professional stress. Brief, evidence-based sessions, as demonstrated by Basso et al. (2019), could be implemented in educational institutions and workplaces to foster resilience. Community-based programs, including low-cost workshops in rural areas, can enhance accessibility, leveraging India's digital growth through guided meditation apps (Patel & Kashyap, 2024). Training community leaders to deliver standardized practices, such as pranayama or mindfulness, would ensure scalability and cultural resonance.

Limitations

Several constraints limit the study's scope. The sample's youth bias (70% aged 18–25; Table 1) restricts generalizability to older populations, who may experience unique benefits (Voss et al., 2023). The quasi-experimental design introduces potential selection bias, as practitioners may differ in motivation or lifestyle; randomized trials are needed to confirm causality (Dick et al., 2014). Self-reported CFI and DERS-16 scores may be subject to bias, and the lack of specificity in yoga or meditation types (e.g., Hatha vs. Vipassana) limits precision (Luu & Hall, 2017). Moderate non-normality in scores and unexamined cultural variations within India further constrain the findings.

Implications

These results have profound implications for mental health policy and practice. In India, where stigma and



access barriers persist, yoga and meditation offer cost-effective, culturally grounded solutions to address the mental health crisis (Patel & Kashyap, 2024). Globally, they complement Western therapies like CBT, promoting holistic resilience through integrated cognitive and emotional benefits (Gard et al., 2014). The findings support applications in education, workplace wellness, and community health, celebrating India's cultural heritage as a tool for psychological well-being and informing cross-cultural mental health strategies.

Future Scope

Future research should employ randomized controlled trials to establish causality and longitudinal designs to assess long-term effects, as suggested by Luu and Hall (2017). Recruiting balanced age groups would enhance generalizability (Voss et al., 2023), while standardizing practices (e.g., Hatha yoga, mindfulness meditation) would clarify specific effects (Luu & Hall, 2017). Incorporating neuroimaging (e.g., fMRI) or physiological measures (e.g., cortisol) could validate mechanisms, building on Crescentini et al. (2017). Exploring cultural and regional variations within India and technology-driven interventions (e.g., mobile apps) would broaden applicability (Patel & Kashyap, 2024).