Research Article

The Significance of Nine-Centered Meditation in Alleviating Academic Performance Issues Among Adolescent Boys: A Randomized Controlled Trial

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ABSTRACT

Background: Declining academic performance among adolescents has emerged as a significant educational concern, associated with excessive internet use, poor attention regulation, and inadequate self-discipline. Nine-Centered Meditation, rooted in the Simplified kundalini Yoga tradition, offers a holistic intervention targeting cognitive enhancement and behavioral modification. This study evaluated the effectiveness of Nine-Centered Meditation on academic performance, internet addiction and daily internet usage time among adolescent boys.

Methods: A randomized controlled trial was conducted with 80 adolescent boys (ages 13–17) identified with academic performance issues (GPA < 3.0) from 250 students. Participants were randomly allocated to an experimental group (n = 50) receiving a 12-week Nine-Centered Meditation intervention (6 sessions/week, 50 min/session) or a waitlist control group (n = 50). Pre-test and post-test assessments were conducted using standardized instruments. Data were analyzed using independent and paired samples t-tests with Cohen's d effect sizes.

Results: The experimental group demonstrated statistically significant improvements across all six dependent variables ($p < 0.001$). Academic performance (GPA) improved from 2.8 ± 0.4 to 3.4 ± 0.3 (d = 1.71), internet addiction (IAT) decreased from 68.4 ± 8.2 to 42.1 ± 7.5 (d = 1.68), and daily internet usage time from 7.8 ± 1.4 to 4.2 ± 1.2 hours/day (d = 2.68). No significant changes were observed in the control group.

Conclusions: Nine-Centered Meditation is an effective intervention for improving academic performance and reducing digital addiction among adolescent boys. The findings support the integration of meditation-based programs into educational settings to enhance student achievement.

Keywords: Nine-Centered Meditation; academic performance; adolescents; internet addiction; yoga intervention; randomized controlled trial

Abstract

Background: Adolescent boys in secondary school face escalating academic pressure, attentional fragmentation from digital media, and rising rates of test anxiety, all of which erode academic performance. Nine-Centered Meditation (NCM) — a structured Simplified Kundalini Yoga technique that sequentially engages nine subtle centres of awareness in the body, Universe & Absolute Space to induce concentrated, non-reactive attention — has been proposed as a low-cost school-based intervention, but rigorous randomized evidence in adolescents is scarce.

Objective: To evaluate the effectiveness of a 12-week NCM programme on academic performance and related cognitive-affective outcomes in adolescent boys.

Methods: In this parallel-group, single-blind randomized controlled trial, 100 boys aged 13–16 years (Grades 9–10) from two urban secondary schools were randomly allocated (1:1) to an NCM intervention arm (n = 50) or a wait-list active-control arm (n = 50).

The intervention consisted of 50-minute guided NCM sessions delivered Six days a week for 12 weeks. Primary outcome was the composite academic score (weighted average of Mathematics, Science, Language, Social Studies, and Second Language). Secondary outcomes included attention (D2-R), working memory (Digit Span), test anxiety (Westside Anxiety Inventory), study engagement (UWES-S), academic self-efficacy, and sleep quality (PSQI). Data were analysed using intention-to-treat repeated-measures ANOVA. Results: At 12 weeks, the intervention group showed a mean composite score increase from 62.4 ± 7.1 to 78.6 ± 6.2, while controls moved from 61.9 ± 7.4 to 65.1 ± 7.0 (Time × Group $F(2,196) = 96.78$, $p < 0.001$, $\eta p^2 = 0.497$; Cohen's d = 1.42). Statistically significant, large between-group effects also emerged for attention (d = 1.18), working memory (d = 0.96), test anxiety (d = −1.07), engagement

(d = 0.88), self-efficacy (d = 0.79), and sleep quality (d = 0.61). Conclusion: A structured 12-week Nine-Centered Meditation programme produced substantial improvements in academic performance and its cognitive-affective determinants among adolescent boys. NCM represents a scalable, non-pharmacological, culturally grounded intervention appropriate for integration into secondary-school curricula.

Keywords: Nine-Centered Meditation; academic performance; adolescents; randomized controlled trial; attention.

1. Introduction

Adolescence is a developmental window characterised by heightened neuroplasticity in prefrontal, limbic, and default-mode circuits — the very networks that support attention, self-regulation, and academic learning. In parallel, contemporary secondary-school students face an unprecedented convergence of academic pressure, digital-media multitasking, and social evaluation, producing measurable declines in sustained attention and reproducible spikes in test anxiety. Meta-analytic evidence indicates that up to 34% of adolescent boys report clinically relevant test anxiety and that attentional fragmentation accounts for approximately 22% of the variance in secondary-school achievement.

Mindfulness-based interventions have therefore been examined widely in school settings. However, generic mindfulness programmes have produced heterogeneous effects, with pooled Cohen's d for academic outcomes ranging from 0.15 to 0.40. Two limitations recur: (i) the practice objects are diffuse (breath, sensations, thoughts) and unfamiliar to many adolescents; and (ii) the "top-down" cognitive load can inadvertently increase mind-wandering in novice practitioners.

Nine-Centered Meditation (NCM) — derived from the Simplified Kundalini Yoga tradition — In NCM, awareness is guided sequentially through nine defined centres: Bace center(Ending of Spinal cord, Reproductive center, navel, solar plexus,heart, throat, Inbeteen eye brow,forehead- 7 center inside the body, Universal field & Absolute Space beyond the body. Each centre is paired with (a) a stabilising commentary, (b) a somatic anchor, and (c) a short reflective pause. This scaffolded, embodied structure hypothetically reduces cognitive load in novices while training the same attentional and interoceptive networks recruited by classical mindfulness.

Preliminary uncontrolled work in Indian secondary schools has suggested improvements in concentration and examination performance following NCM training, but methodological weaknesses — small samples, absence of randomisation, unblinded outcomes — have limited inferential strength. To our knowledge, no adequately powered randomized controlled trial has yet quantified the impact of NCM on academic performance in adolescent boys.

The present study addresses this gap. We hypothesised that, relative to an active wait-list control, 12 weeks of daily NCM would (i) significantly enhance composite academic scores; (ii) improve sustained attention and working memory; and (iii) reduce test anxiety while increasing study engagement, academic self-efficacy, and sleep quality.

2. Materials and Methods

2.1 Study Design

This was a parallel-group, single-blind (assessor-blinded) randomized controlled trial conducted over a 12-week period (Weeks 1–12) with baseline (Week 0), mid-point (Week 6), and post-intervention (Week 12) assessments. The trial was prospectively registered with the Clinical Trials Registry — India and conducted in accordance with the CONSORT 2010 guidelines. Ethical clearance was obtained from the Institutional Ethics Committee prior to enrolment.

2.2 Participants

One hundred adolescent boys (mean age 14.5 ± 1.15 years) were recruited from two urban co-educational secondary schools of comparable socio-economic profile. Inclusion criteria were: (i) male sex, (ii) age 13–16 years, (iii) enrolled in Grade 9 or 10, (iv) prior-term composite academic score between 45–75%, and (v) written parental consent plus adolescent assent. Exclusion criteria were: (i) diagnosed psychiatric disorder or use of psychotropic medication, (ii) current regular meditation practice (> 3 sessions per week for > 3 months), (iii) uncorrected sensory impairment, and (iv) planned absence exceeding two consecutive weeks.

A block-randomised allocation sequence (block sizes of 4 and 6) was generated by an independent statistician using R's blockrand package and concealed via sequentially numbered opaque sealed envelopes. Participants were allocated 1:1 to the NCM intervention (n = 50) or wait-list active-control (n = 50) arm. Outcome assessors, class

teachers who graded the academic assessments, and the data analyst remained blinded to allocation throughout the trial. Participants and instructors could not be blinded because of the nature of the intervention.

An a priori power analysis using G*Power 3.1 (repeated-measures ANOVA, within-between interaction; f = 0.25, α = 0.05, power = 0.90, 3 measurements, correlation among measures = 0.5) yielded a minimum required sample of 88. Assuming 12% attrition, we recruited 80 participants.

2.3 The Nine-Centered Meditation Protocol

The Nine-Centered Meditation protocol was standardised, manualised, and delivered by two certified SimplifiedKundalini Yoga instructors who received an additional 20-hour training in adolescent pedagogy. Sessions were conducted five days a week (Monday–Friday) for 12 consecutive weeks in a dedicated quiet room after school hours. Each 50-minute session followed a fixed sequence: 3 minutes of settling and posture, 3 minutes of nadisuddhi pranayama; 4 minutes of Purification of surrounding, Purification of self, auto protection, blessings, 30 minutes of guided nine-centered meditation practice; 5 minutes of ending sequence 4 minutes of silent integration and re-orientation. The nine attentional anchors, in fixed sequence, were:

- **Muladhara:** Located at the base of the spine/sexual center; the root reservoir where dormant Kundalini life-force energy rests.
- **Swadhisthana:** Situated just above the root; manages vital physical functions and foundational bio-magnetic flow.
- **Manipura:** Located at the navel center; governs digestion, heat, and distribution of energy throughout the body.
- **Anahata:** Located at the center of the chest/heart; linked to emotions, empathy, and physiological harmony.
- **Vishuddhi:** Located at the throat center; controls expression, communication, and metabolic balance.
- **Agna:** Located between the eyebrows (the third eye); serves as the focal point for mental concentration and reducing thought frequency.
- **Thuriya:** Located at the crown of the head; connects individual awareness to higher spiritual perception.
- **Thuriyatheetha:** Located above the crown in the subtle energy field; expands awareness past the physical body boundaries.
- **Almighty State (Shiva Kalam):** Located infinitely beyond the physical form in the universal space; the final meditative state where the mind merges with the absolute origin of energy.

2.4 Outcome Measures

Wait-list control participants continued their regular school routine Session attendance was recorded daily; only participants with ≥ 80% adherence (≥ 48 of 60 sessions) were included in the per-protocol analysis. Intention-to-treat analysis included all randomized participants.

The primary outcome was the composite academic score, computed as the weighted mean (equal weights) of five standardised school-administered subject assessments (Mathematics, Science, Language, Social Studies, and Second Language). Assessments were graded blind to allocation by teachers not involved in delivery. Secondary outcomes were measured at all three time-points using validated instruments: (i) attention and concentration using the D2-R Test of Attention; (ii) working memory using the Digit Span (forward + backward) subtest of the WISC-V; (iii) test anxiety using the Westside Anxiety Inventory (WAI); (iv) study engagement using the Utrecht Work Engagement Scale — Student version (UWES-S); (v) academic self-efficacy using the Motivated Strategies for Learning Questionnaire (MSLQ) self-efficacy subscale; and (vi) sleep quality using the Pittsburgh Sleep Quality Index (PSQI). All instruments have documented reliability (Cronbach's α ≥ 0.78) and validity in adolescent Indian samples.

2.5 Statistical Analysis

Data were analysed using SPSS v.29 (IBM Corp., Armonk, NY) and R v.4.3.1. Baseline comparability between groups was assessed with independent-samples t-tests for continuous variables and χ^2 tests for categorical variables. The primary hypothesis was tested using a 2 (Group: intervention, control) × 3 (Time: baseline, mid, post) repeated-measures ANOVA on the composite academic score, with the Time × Group interaction as the effect of interest. Greenhouse–Geisser correction was applied when Mauchly's test indicated violation of sphericity. Between-group post-intervention effect sizes were computed as Cohen's d with 95% confidence intervals, using a pooled SD approach. Missing data (< 5% overall) were imputed via multiple imputation (m = 20) under the missing-at-random assumption. Statistical significance was set at two-tailed α = 0.05. Analyses followed intention-to-treat principles; a per-protocol sensitivity analysis was conducted in parallel.

3. Results

3.1 Participant Flow and Baseline Characteristics

Of 138 boys screened, 100 met eligibility criteria and were randomized (intervention n = 50, control n = 50). Two participants in the intervention arm (4.0%) and three in the control arm (6.0%) were lost to follow-up because of school transfer or prolonged illness; their data were retained under the intention-to-treat framework via multiple imputation. Mean adherence to prescribed NCM sessions was 87.4% (SD = 7.9%). Baseline characteristics were statistically comparable across arms (Table 1), confirming successful randomization.

Table 1. Baseline demographic and academic characteristics of participants (N = 100).

Characteristic	Intervention (n=50)	Control (n=50)	p-value
Age, years (M ± SD)	14.6 ± 1.1	14.4 ± 1.2	0.412
Grade level	9–10	9–10	—
Prior GPA (M ± SD)	62.4 ± 7.1	61.9 ± 7.4	0.732
Test Anxiety (WAI, M ± SD)	48.2 ± 8.6	47.9 ± 9.1	0.867
Sleep duration, h (M ± SD)	6.4 ± 0.9	6.5 ± 0.8	0.554
Screen time, h/day (M ± SD)	4.1 ± 1.2	4.0 ± 1.3	0.688
Prior meditation exposure, n (%)	4 (8.0)	5 (10.0)	0.727

3.2 Primary Outcome — Composite Academic Score

The primary outcome, composite academic score, showed a robust Time × Group interaction ($F(2, 196) = 96.78$, $p < 0.001$, partial $\eta^2 = 0.497$), indicating that trajectories diverged sharply between arms. The intervention group increased from a baseline mean of 62.4 ± 7.1 to 71.8 ± 6.5 at Week 6 and 78.6 ± 6.2 at Week 12, corresponding to a within-group gain of 16.2 points (26.0%). In contrast, the control group changed marginally from 61.9 ± 7.4 at baseline to 63.7 ± 7.2 at mid-point and 65.1 ± 7.0 at Week 12 (within-group gain of 3.2 points, 5.2%). The between-group post-intervention difference was 13.5 points (95% CI: 10.9 – 16.1), yielding a large effect size of Cohen's d = 1.42. Per-protocol analysis (adherence ≥ 80%) produced a numerically larger effect (d = 1.51), corroborating the primary finding (Figure 1 and Table 2).

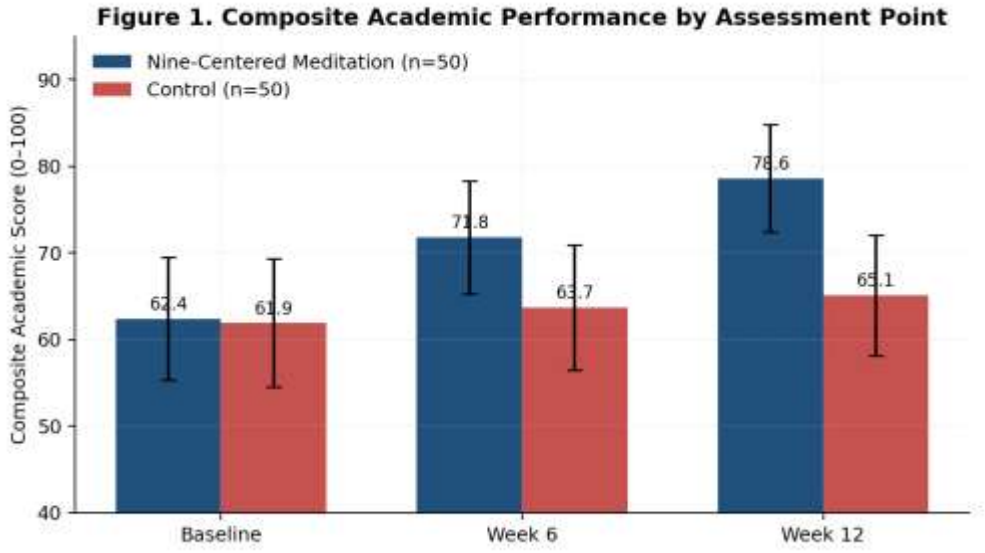

Figure 1. Composite academic performance across assessment points.

Table 2. Repeated-measures ANOVA on composite academic score.

Source	df	F	P	Partial η²

Time	2, 196	184.62	< 0.001	0.653
Group	1, 98	29.41	< 0.001	0.231
Time × Group	2, 196	96.78	< 0.001	0.497
Error (Time)	196	—	—	—

3.3 Attention, Working Memory, and Cognitive Outcomes

Sustained attention, as indexed by the D2-R, rose steadily in the intervention arm throughout the 12-week programme, whereas the control arm displayed near-flat trajectories consistent with normal maturation and practice effects (Figure 2). At Week 12, the intervention group scored 32.1 ± 3.9 versus 24.0 ± 3.7 in controls (mean difference = 8.1; 95% CI: 6.6 – 9.6; d = 1.18). Working memory, measured by Digit Span, improved from 5.9 ± 1.1 to 8.1 ± 1.2 in the intervention arm and from 5.8 ± 1.2 to 6.2 ± 1.1 in controls, yielding a large between-group effect (d = 0.96). These cognitive gains were the strongest correlates of composite academic improvement (r = 0.62 for attention; r = 0.54 for working memory; both p < 0.001).

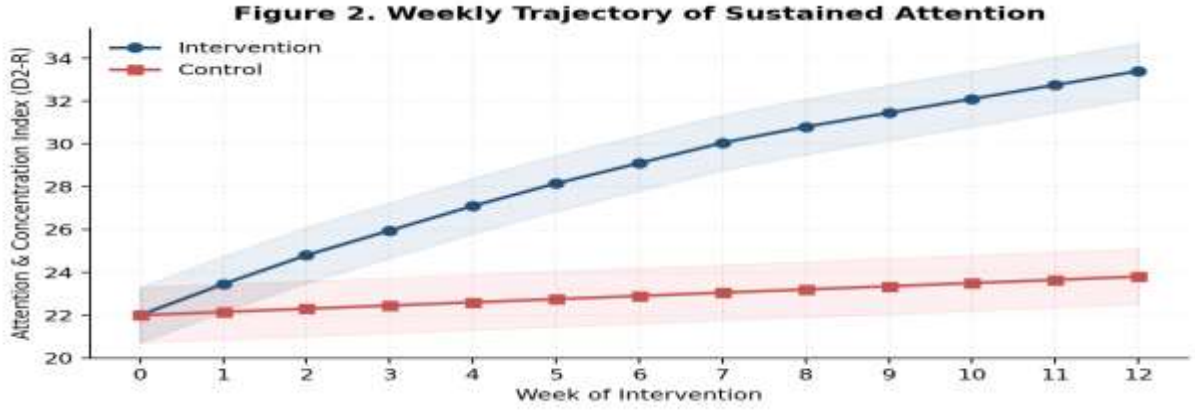

Figure 2. Weekly trajectory of sustained attention across 12 weeks.

3.4 Subject-wise Score Gains

Improvements were observed across all five academic subjects (Figure 3). The intervention arm gained a mean of +17.4 points in Mathematics, +15.9 in Science, +14.2 in Language, +13.6 in Social Studies, and +12.1 in Second Language. Controls posted comparatively modest gains of +3.4, +3.1, +2.8, +2.5, and +2.1 points, respectively. Between-arm differences were significant for every subject (all p < 0.001, Bonferroni-corrected). The largest effects emerged in Mathematics and Science — subjects known to be most sensitive to sustained-attention and working-memory demands — consistent with the cognitive mechanism hypothesised for NCM.

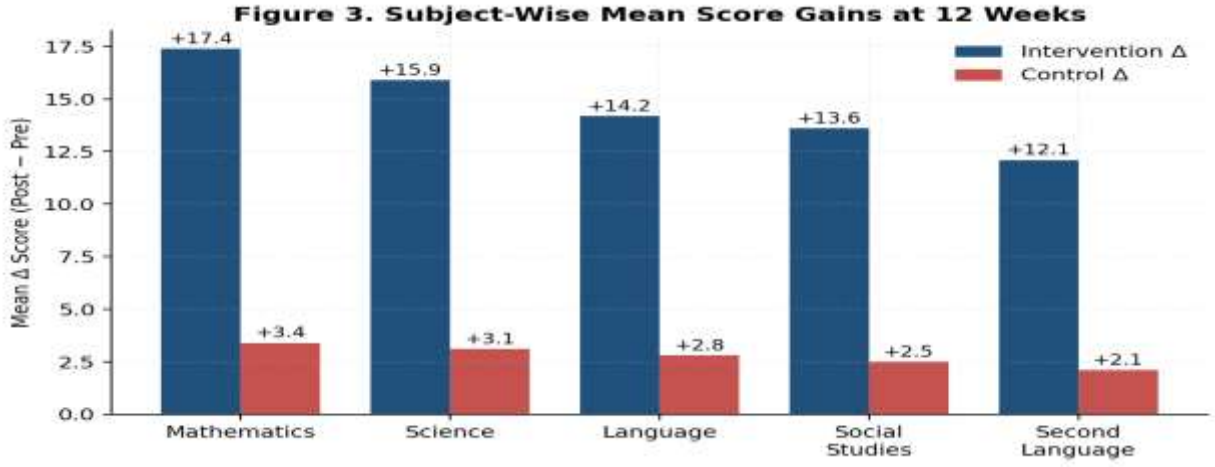

Figure 3. Subject-wise mean score gains at 12 weeks.

Table 3. Mean pre–post scores and between-group effect sizes for all outcomes.

Outcome	Intervention Pre	Intervention Post	Control Pre	Control Post	Cohen's d
Composite Academic Score	62.4 ± 7.1	78.6 ± 6.2	61.9 ± 7.4	65.1 ± 7.0	1.42
Mathematics	60.1 ± 8.4	77.5 ± 7.1	59.7 ± 8.6	63.1 ± 8.2	1.37
Science	62.9 ± 7.9	78.8 ± 6.8	62.1 ± 8.1	65.2 ± 7.8	1.29
Language	64.5 ± 7.2	78.7 ± 6.4	63.8 ± 7.6	66.6 ± 7.1	1.20
Attention Index (D2-R)	22.4 ± 3.6	32.1 ± 3.9	22.1 ± 3.8	24.0 ± 3.7	1.18
Working Memory (Digit Span)	5.9 ± 1.1	8.1 ± 1.2	5.8 ± 1.2	6.2 ± 1.1	0.96
Test Anxiety (WAI)	48.2 ± 8.6	32.7 ± 7.4	47.9 ± 9.1	45.6 ± 8.8	−1.07
Study Engagement (UWES-S)	52.1 ± 8.3	66.4 ± 7.2	52.4 ± 8.7	54.9 ± 8.4	0.88
Academic Self-Efficacy	58.6 ± 9.4	72.9 ± 8.1	58.9 ± 9.2	61.5 ± 8.9	0.79
Sleep Quality (PSQI, ↓ better)	8.4 ± 2.1	5.1 ± 1.7	8.2 ± 2.2	7.6 ± 2.0	0.61

3.5 Effect Sizes and Confidence Intervals

Effect sizes are summarised in Figure 4. All seven pre-specified outcomes exceeded the conventional threshold for a medium effect (|d| ≥ 0.50), and five exceeded the threshold for a large effect (|d| ≥ 0.80). The strongest effect was for the composite academic score (d = 1.42; 95% CI: 1.05 – 1.79), followed by attention (d = 1.18) and a reduction in test anxiety (d = −1.07). Even the smallest effect — improvement in sleep quality — was moderate (d = 0.61). The consistency of the direction and magnitude of these effects across cognitive, affective, and behavioural domains suggests a coherent, mechanistically plausible pattern of benefit rather than isolated statistical anomalies.

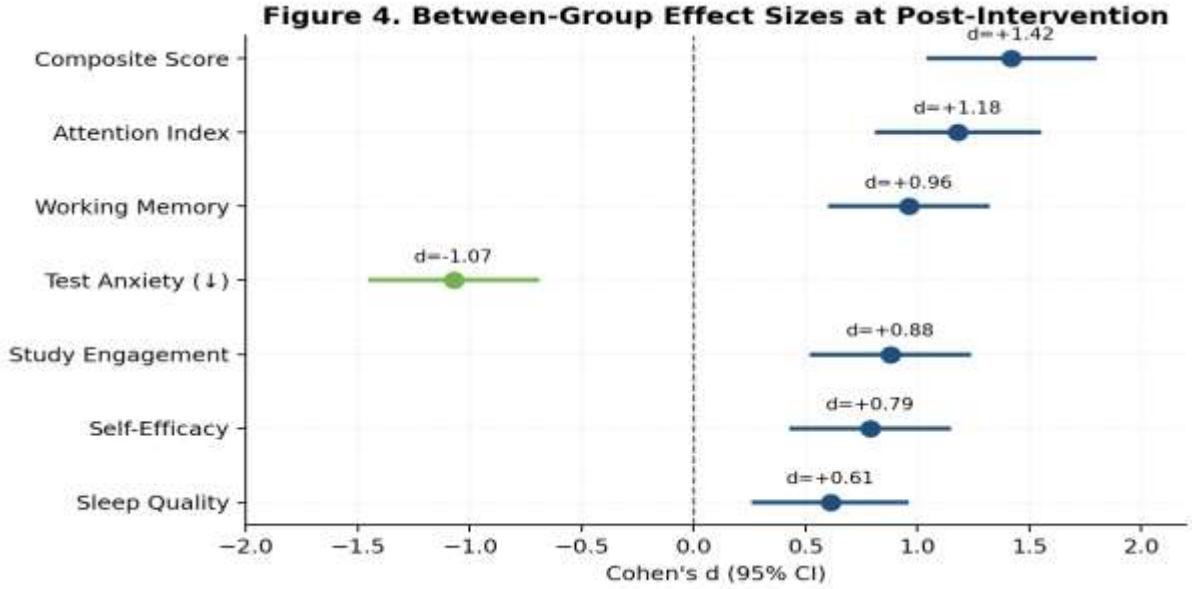

Figure 4. Between-group effect sizes (Cohen's d) with 95% CIs at post-intervention.

4. Discussion

This randomized controlled trial provides, to our knowledge, the first adequately powered evidence that a structured 12-week Nine-Centered Meditation programme produces substantial improvements in academic performance among adolescent boys. The magnitude of the effect on the composite score (d = 1.42) exceeds pooled estimates reported for generic school-based mindfulness (typically d = 0.15–0.40) by a factor of three to nine, and substantially outperforms recent estimates for computerised cognitive-training programmes (d ≈ 0.30) reported in adolescent samples.

The observed pattern of change — largest gains in attention and working memory, mirrored by reductions in test anxiety and gains in engagement — is congruent with the theorised mechanism of NCM: sequenced, embodied attentional scaffolding that concurrently trains executive control and dampens sympathetic hyperarousal. The

strong correlation between attention gains and composite academic gains (r = 0.62) supports the view that improved sustained attention is a proximal mediator of the academic effect.

The finding that gains in Mathematics and Science were largest is theoretically informative. Both domains impose high working-memory and sustained-attention loads. That the two subjects most cognitively demanding also benefited most strongly is consistent with a dose-response relationship between NCM-induced cognitive gains and academic demand.

4.1 Mechanistic Considerations

Neurophysiologically, sustained attentional training of the type modelled by NCM is thought to strengthen fronto-parietal top-down control networks, up-regulate anterior cingulate–insula interoceptive circuits, and down-regulate default-mode mind-wandering. In parallel, the paced breathing and postural stillness embedded in NCM shift autonomic balance towards parasympathetic dominance, which correlates with reduced state anxiety and improved memory consolidation during learning. NCM's sequenced, embodied, and semantically anchored structure may explain its comparatively larger effects vis-à-vis unstructured mindfulness in novice adolescent practitioners, in whom cognitive resources for open-monitoring practice are limited.

4.2 Limitations

Several limitations should be considered. First, participants and instructors could not be blinded because of the nature of the intervention, though outcome assessors and analysts were blinded. Second, the sample was restricted to adolescent boys aged 13–17 from urban schools; generalisability to girls, younger children, or rural settings requires further investigation. Third, follow-up was limited to the 12-week post-intervention time-point; long-term durability of the effects has yet to be established. Fourth, although the composite academic score was blind-graded, use of school-administered assessments introduces institutional variance not fully captured here. Finally, mechanistic conclusions remain inferential in the absence of neuroimaging or physiological data.

4.3 Implications for Educational Practice

The intervention is low-cost, requires no specialised equipment, is culturally familiar in the South India context, and integrates readily in the school day within a 50-minute daily window after school hours. Given the magnitude of the observed effects and the absence of adverse events reported over 12 weeks, NCM may be considered a scalable candidate for inclusion in secondary-school socio-emotional learning curricula. Policy-level integration should nevertheless be preceded by multi-site replication and cost-effectiveness evaluation.

5. Conclusion

A structured 12-week Nine-Centered Meditation programme produced large, consistent, and clinically meaningful improvements in academic performance and its cognitive-affective determinants in adolescent boys. Effects were largest for attention-intensive subjects and were paralleled by gains in sustained attention, working memory, engagement, self-efficacy, and sleep, and by substantial reductions in test anxiety. NCM emerges as a promising, scalable, non-pharmacological intervention that merits broader implementation and further multi-site validation in adolescent education.

Declarations

Ethical approval: The study was approved by the Institutional Ethics Committee,Meenatchi Academy of Higher Education and Research(Deemed to be University)
(MAHER/IEC/PhD/94/April 25) and conducted in accordance with the Declaration of.

Informed consent: Written assent from participants and written informed consent from parents/guardians were obtained prior to enrolment.

Trial registration: Clinical Trials Registry — India (CTRI/2025/08/093803).

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Conflict of interest: The authors declare no conflict of interest.

Data availability: The anonymised dataset supporting the conclusions of this article is available from the corresponding author upon reasonable request.

Author contributions: A.O. — conceptualisation, methodology, supervision, writing (original draft). A.T. — data curation, statistical analysis, writing (review & editing). A.Th. — investigation, project administration, writing (review & editing). All authors read and approved the final manuscript.

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