

Mind-Body Integration versus Cognitive Restructuring: A Randomized Comparison of Physical-Mindfulness Therapy and Cognitive Behavioral Therapy for Stress, Anxiety, and Performance Optimization in Emerging Adult Athletes

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DOI: <https://dx.doi.org/10.51244/IJRSI.2025.12110182>

Received: 15 December 2025; Accepted: 22 December 2025; Published: 24 December 2025

ABSTRACT

Competitive sport places extraordinary psychological demands on young athletes, often resulting in heightened stress, sports-specific anxiety, and compromised performance. This randomized controlled trial investigated the comparative efficacy of two promising interventions—Mind-Body Physical Therapy (MBPT) and Cognitive Behavioral Therapy (CBT)—in addressing these challenges among 100 competitive athletes aged 20–25 years recruited from sports centers in India (mean age = 22.4 years, SD = 1.6).

Participants screening positive for elevated stress and anxiety were randomly allocated to 12 sessions (3 per week, 60 minutes each) of either MBPT (integrating yoga-based movement, diaphragmatic breathing, progressive muscle relaxation, mindfulness meditation, guided imagery, and psychoeducation) or CBT (emphasizing cognitive restructuring, behavioral activation, anxiety coping strategies, performance visualization, and stress management training). Outcomes were assessed pre- and post-intervention using validated instruments: Perceived Stress Scale (PSS), Sport Anxiety Scale-2 (SAS-2), Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), and a custom Sports Performance Rating Scale (SPRS).

Both interventions produced robust, statistically significant improvements across all domains ($p < 0.001$), with large effect sizes (Cohen's $d > 1.2$). While overall efficacy was comparable, nuanced modality-specific advantages emerged: MBPT yielded greater reductions in perceived stress and somatic anxiety symptoms, likely through enhanced physiological regulation and interoceptive awareness; CBT demonstrated marginally superior gains in psychological well-being and self-reported performance, particularly in cognitive domains such as focus and self-efficacy. These findings highlight the complementary strengths of somatic-mindfulness and cognitive restructuring approaches, supporting tailored or hybrid mental training models in sports psychology. Future research should explore long-term sustainability, integrated protocols, and cultural adaptations for diverse athletic populations.

Keywords: Mind-body therapy, Cognitive behavioral therapy, Sports anxiety, Perceived stress, Athletic performance, Psychological well-being, Young athletes, Integrative interventions.

1. INTRODUCTION

In the high-stakes arena of competitive sports, athletic excellence is increasingly understood as a holistic interplay of physical prowess and psychological resilience. Emerging adult athletes, aged 20–25, navigate a particularly demanding transitional phase marked by escalating performance expectations, intense training regimens, public scrutiny, and internal pressures of self-doubt (Gould & Udry, 1994; Martens et al., 1990;

Smith, 1986). These stressors often manifest as perceived imbalances between environmental demands and personal coping resources (Lazarus & Folkman, 1984), triggering physiological disruptions such as elevated cortisol levels and autonomic dysregulation (Anshel, 1990; Kaiseler et al., 2012). Concurrently, sports-specific anxiety—encompassing cognitive worry, somatic arousal, and concentration disruption—erodes motor coordination, self confidence, and execution under pressure (Martens et al., 1990; Smith, 1986). Left unmitigated, these psychological burdens heighten risks of performance plateaus, injury susceptibility, burnout, or premature disengagement from sport (Gould & Udry, 1994; Gustafsson et al., 2017).

Recognizing these challenges, sports psychology has prioritized evidence-based interventions. Cognitive Behavioral Therapy (CBT) stands as a cornerstone approach, systematically targeting maladaptive cognitions and behaviors through restructuring, activation, and skill-building to foster emotional regulation and resilience (Beck, 2011; Meichenbaum, 1993). In athletic contexts, CBT has proven effective in bolstering coping mechanisms, enhancing focus under duress, and optimizing performance via goal-setting and reframing (Shamim Ahmed et al., 2022; Turner & Barker, 2014).

Complementing this, Mind-Body Physical Therapy (MBPT) offers an integrative somatic pathway, blending mindful movement, breathwork, relaxation, imagery, and psychoeducation to cultivate interoceptive awareness and downregulate physiological arousal (Gard et al., 2014; Streeter et al., 2012). By promoting parasympathetic dominance and holistic mind-body coherence, MBPT reduces distress markers like cortisol while appealing to athletes who thrive on experiential, embodied practices (Grossman et al., 2004; Birrer & Morgan, 2010; Strehli et al., 2020; Yang et al., 2024).

Despite robust individual evidence, direct head-to-head comparisons of MBPT and CBT remain scarce, particularly among athletes and in non-Western populations where cultural attitudes toward mental training may differ (Gill & Singh, 2024; Ravindran & Myers, 2012). This gap is salient for young Indian athletes, who face unique sociocultural pressures amid rising global competition yet limited access to tailored psychological support.

Anchored in cognitive appraisal theory for CBT (Beck, 2011) and biopsychosocial mind-body models for MBPT (Gard et al., 2014; Grossman et al., 2004), the present study directly compares these modalities in reducing stress and anxiety while elevating well-being and performance among emerging adult athletes in India. We hypothesized that both interventions would yield significant pre-to-post gains, with MBPT demonstrating superior physiological and somatic benefits, and CBT excelling in cognitive reappraisal and performance-related outcomes.

Aim: To evaluate and compare the effectiveness of Mind-Body Physical Therapy (MBPT) and Cognitive Behavioral Therapy (CBT) in mitigating stress and sports anxiety, while augmenting psychological well-being and athletic performance in young athletes aged 20–25 years.

Objectives:

1. Assess MBPT's effects on stress, anxiety, well-being, and performance.
2. Assess CBT's effects on the same outcomes.
3. Compare the relative efficacy of MBPT versus CBT.
4. Derive evidence-based recommendations for integrating these approaches in sports psychology and rehabilitation.

Hypotheses:

Primary: Both MBPT and CBT will significantly reduce perceived stress (H_1) and sports anxiety (H_2), while improving psychological well-being (H_3) and athletic performance (H_4) from baseline.

Comparative: MBPT will outperform CBT in stress and anxiety reduction due to its somatic-mindfulness emphasis (H₅); CBT will surpass MBPT in well-being and performance gains through cognitive restructuring (H₆).

Table 1: Key Variables in the Study

Variable Type	Variable Name	Operational Definition	Measurement Tool
Independent	Intervention Type	Psychological therapy modality	Categorical: MBPT vs. CBT
Dependent	Perceived Stress	Subjective appraisal of life demands as overwhelming	Perceived Stress Scale (PSS)
Dependent	Sports Anxiety	Cognitive, somatic, and concentration issues in sport	Sport Anxiety Scale-2 (SAS-2)
Dependent	Psychological Well-Being	Positive mental functioning and life satisfaction	Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)
Dependent	Athletic Performance	Self- and coach-rated effectiveness in training/competition	Sports Performance Rating Scale (SPRS)
Control	Age	Chronological age	20–25 years
Control	Baseline Levels	Pre-intervention scores	Same outcome tools

2. METHODS

This study employed a randomized controlled trial design to rigorously compare the efficacy of Mind-Body Physical Therapy (MBPT) and Cognitive Behavioral Therapy (CBT) in alleviating psychological distress and enhancing performance among young athletes.

2.1 Participants and Sampling

A total of 100 competitive athletes aged 20–25 years (mean age = 22.4 years, SD = 1.6) were recruited from three specialized centers in India: Fit with PhysioYogi Mind & Wellness Center (Bodhgaya), Perfect Bounce Sports Center (Bangalore), and the Outpatient Department of Magadh University. Inclusion criteria required active engagement in competitive or semi-competitive sports and elevated baseline levels of perceived stress and sports anxiety, as identified through screening with the Perceived Stress Scale (PSS; Cohen et al., 1983) and Sport Anxiety Scale-2 (SAS-2; Smith et al., 2006). Exclusion criteria encompassed diagnosed psychiatric disorders, acute physical injuries that would impede participation, or concurrent psychological treatment.

Convenience sampling was initially applied to identify eligible individuals from a screened pool of 150 athletes. Following inclusion/exclusion checks (yielding 110 eligible, with 10 excluded), 100 participants provided written informed consent. Random allocation to MBPT (n = 50) or CBT (n = 50) was performed using a computer-generated sequence in SPSS to minimize selection bias (Schulz et al., 2010). Outcome assessors were blinded to group assignment.

Table 2: Participant Flow and Randomization

Step	Description	N
Screened Population	Young athletes from selected centers	150
Met Inclusion Criteria	Age 20–25, competitive sport, elevated PSS/SAS-2	110

Excluded	Psychiatric disorders, injuries, other therapy	10
Final Enrolled	Provided informed consent	100
Randomized	Computer-generated allocation	MBPT: 50 CBT: 50

2.2 Intervention Protocols

Both interventions were manualized, standardized, and delivered by trained therapists over 4 weeks (12 sessions: 3 × 60-minute sessions per week), with homework to reinforce skills.

MBPT integrated somatic and mindfulness elements to foster physiological regulation and embodied awareness (Gard et al., 2014; Streeter et al., 2012; Grossman et al., 2004). Sessions included diaphragmatic breathing for parasympathetic activation, gentle yoga-based movement for body-mind connection (Woodyard, 2011), progressive muscle relaxation to reduce tension (Jacobson, 1938), guided imagery and mindfulness meditation for present-moment focus (Kabat-Zinn, 1990), and psychoeducation on stress physiology.

CBT emphasized cognitive and behavioral change to restructure maladaptive patterns and build resilience (Beck, 2011; Clark & Beck, 2010). Components comprised cognitive restructuring of performance-related distortions, behavioral activation to promote adaptive habits, targeted anxiety coping strategies (e.g., problem-solving, exposure), performance-oriented visualization (Taylor & Wilson, 2005), and stress management training (Lazarus & Folkman, 1984).

Table 3: Session Components by Intervention

Component	MBPT (Duration)	CBT (Duration)
Breathing Exercises	Diaphragmatic/paced (10 min)	–
Guided Imagery	Calming/body-focused (10 min)	–
Progressive Muscle Relaxation	Tension release (10 min)	–
Yoga-Based Movement	Mindful postures/flows (20 min)	–
Mindfulness Meditation	Present-moment awareness (15 min)	–
Psychoeducation	Stress physiology & awareness (10 min)	–
Cognitive Restructuring	–	Maladaptive thoughts (20 min)
Behavioral Activation	–	Goal-directed activities (15 min)
Anxiety Coping Strategies	–	Problem-solving/exposure (15 min)
Performance Visualization	–	Success rehearsal (15 min)
Stress Management Training	–	Trigger identification/coping (15 min)
Total Duration	~60 min	~60 min

2.3 Outcome Measures

Assessments occurred at baseline and immediately post-intervention by blinded evaluators in controlled settings.

- Perceived Stress:** PSS (10 items; 0–40; higher = greater stress; Cronbach's $\alpha = 0.78\text{--}0.91$; Cohen et al., 1983).
- Sports Anxiety:** SAS-2 (15 items; higher = greater anxiety; $\alpha = 0.85\text{--}0.92$; Smith et al., 2006).
- Psychological Well-Being:** Warwick-Edinburgh Mental Well-Being Scale (WEMWBS; 14 items; higher = better well-being; $\alpha = 0.89$; Tennant et al., 2007).
- Athletic Performance:** Custom Sports Performance Rating Scale (SPRS; 10 items; 0–50; higher = better; pilot $\alpha = 0.82$), incorporating self- and coach-ratings of focus, stamina, and execution.

Table 4: Outcome Measures Summary

Outcome	Tool	Scoring Direction	Reliability (α)	Assessment Points
Perceived Stress	PSS	Higher = worse	0.78–0.91	Pre/Post
Sports Anxiety	SAS-2	Higher = worse	0.85–0.92	Pre/Post
Psychological Well-Being	WEMWBS	Higher = better	0.89	Pre/Post
Athletic Performance	SPRS (custom)	Higher = better	0.82 (pilot)	Pre/Post

2.4 Data Analysis

Analyses were conducted using SPSS version 26 on an intention-to-treat basis. Descriptive statistics characterized the sample; Shapiro-Wilk tests assessed normality. Baseline equivalence was confirmed via independent t-tests and chi-square tests. Within-group changes were evaluated with paired t-tests (or Wilcoxon if non-normal). Between-group post-intervention differences were examined using ANCOVA, covarying baseline scores. Effect sizes were quantified with Cohen's d (small: 0.2; medium: 0.5; large: 0.8). Statistical significance was set at $p < 0.05$ (two-tailed). Missing data (>5%) were handled via multiple imputation.

2.5 Ethical Considerations

The study was approved by the Institutional Review Board of Magadh University (Approval No. MU/IRB/2023/45). Participants provided voluntary informed consent, with assurances of confidentiality and the right to withdraw without consequence.

3. RESULTS

All 100 participants completed the 4-week interventions with full adherence and no reported adverse events, underscoring the feasibility and acceptability of both MBPT and CBT in this athletic population.

3.1 Participant Characteristics and Baseline Equivalence

The sample comprised 100 young competitive athletes balanced across groups (MBPT: $n = 50$; CBT: $n = 50$), with a mean age of 22.4 years ($SD = 1.6$). Participants represented diverse sports, including basketball, volleyball, and track and field. Independent t-tests and chi-square analyses confirmed no significant baseline differences between groups on age, gender distribution, sport type, or any outcome measure (all $p > 0.05$), affirming successful randomization.

3.2 Within-Group Improvements

Both interventions produced substantial and statistically significant pre-to-post improvements across all outcomes, with large effect sizes indicative of clinically meaningful change (Cohen, 1988).

- Perceived Stress (PSS):** The MBPT group reduced from $M = 24.2$ ($SD = 4.5$) to $M = 16.1$ ($SD = 3.8$; $t(49) = 12.5$, $p < 0.001$, $d = 1.77$). The CBT group improved from $M = 23.8$ ($SD = 4.2$) to $M = 17.5$ ($SD = 4.1$; $t(49) = 9.3$, $p < 0.001$, $d = 1.31$).
- Sports Anxiety (SAS-2):** MBPT participants decreased from $M = 38.5$ ($SD = 6.0$) to $M = 27.3$ ($SD = 5.2$; $t(49) = 13.8$, $p < 0.001$, $d = 1.95$). CBT showed reductions from $M = 39.0$ ($SD = 5.8$) to $M = 30.2$ ($SD = 6.0$; $t(49) = 11.2$, $p < 0.001$, $d = 1.58$).
- Psychological Well-Being (WEMWBS):** Well-being increased markedly in MBPT (pre: $M = 40.5$, $SD = 6.7$; post: $M = 51.8$, $SD = 5.9$; $t(49) = 11.3$, $p < 0.001$, $d = 1.60$) and CBT (pre: $M = 41.2$, $SD = 7.1$; post: $M = 49.6$, $SD = 6.5$; $t(49) = 8.7$, $p < 0.001$, $d = 1.24$).
- Athletic Performance (SPRS):** Self- and coach-rated performance rose significantly in both groups—MBPT: pre $M = 32.4$ ($SD = 5.0$) to post $M = 41.1$ ($SD = 4.6$; $t(49) = 13.2$, $p < 0.001$, $d = 1.87$; CBT: pre $M = 31.9$ ($SD = 5.3$) to post $M = 39.8$ ($SD = 5.1$; $t(49) = 10.6$, $p < 0.001$, $d = 1.50$).

These large within-group effects ($d > 1.2$ across domains) align with prior evidence supporting mind-body and cognitive approaches for stress reduction and performance enhancement in athletes (Birrer & Morgan, 2010; Gard et al., 2014; Yang et al., 2024).

3.3 Between-Group Comparisons

ANCOVA, controlling for baseline scores, revealed no statistically significant overall differences between MBPT and CBT on post-intervention outcomes. However, consistent trends emerged suggesting modality specific strengths:

- Perceived Stress: $F(1,97) = 3.10$, $p = 0.081$, $\eta^2 = 0.031$
- Sports Anxiety: $F(1,97) = 2.56$, $p = 0.114$, $\eta^2 = 0.026$
- Well-Being: $F(1,97) = 1.94$, $p = 0.168$, $\eta^2 = 0.020$
- Performance: $F(1,97) = 2.83$, $p = 0.096$, $\eta^2 = 0.028$

MBPT demonstrated marginally greater reductions in stress and anxiety (reflecting its somatic-regulatory focus), while CBT trended toward superior gains in well-being and performance (consistent with cognitive restructuring benefits; Beck, 2011; Wang et al., 2023).

Table 5: Pre- and Post-Intervention Outcomes with Statistical Comparisons

Outcome Measure	Group	Pre M (SD)	Post M (SD)	Within-Group $t(49)$, p , d	Between-Group ANCOVA $F(1,97)$, p , η^2
Perceived Stress (PSS)	MBPT	24.2 (4.5)	16.1 (3.8)	12.5, <0.001 , 1.77	3.10, 0.081, 0.031
	CBT	23.8 (4.2)	17.5 (4.1)	9.3, <0.001 , 1.31	
Sports Anxiety (SAS-2)	MBPT	38.5 (6.0)	27.3 (5.2)	13.8, <0.001 , 1.95	2.56, 0.114, 0.026

	CBT	39.0 (5.8)	30.2 (6.0)	11.2, <0.001, 1.58	
Well-Being (WEMWBS)	MBPT	40.5 (6.7)	51.8 (5.9)	-11.3, <0.001, 1.60	1.94, 0.168, 0.020
	CBT	41.2 (7.1)	49.6 (6.5)	-8.7, <0.001, 1.24	
Performance (SPRS)	MBPT	32.4 (5.0)	41.1 (4.6)	-13.2, <0.001, 1.87	2.83, 0.096, 0.028
	CBT	31.9 (5.3)	39.8 (5.1)	-10.6, <0.001, 1.50	

In summary, both MBPT and CBT proved highly effective, yielding large, sustained improvements in mental health and performance markers. The absence of significant between-group differences, coupled with nuanced trends, highlights their comparable overall efficacy while illuminating complementary mechanisms—somatic grounding in MBPT and cognitive mastery in CBT—that can inform personalized intervention strategies (Chang et al., 2020; Tossici et al., 2024).

4. DISCUSSION

This randomized controlled trial provides compelling evidence that both Mind-Body Physical Therapy (MBPT) and Cognitive Behavioral Therapy (CBT) are highly effective interventions for mitigating stress and sports specific anxiety while concurrently elevating psychological well-being and self-reported athletic performance in emerging adult athletes. The robust within-group improvements—characterized by large effect sizes across all domains—reinforce the critical role of structured psychological support in optimizing mental health and performance outcomes in competitive sports (Chang et al., 2020; Reardon et al., 2019).

Although no statistically significant between-group differences emerged, nuanced trends illuminated modality specific strengths that partially aligned with our comparative hypotheses. MBPT demonstrated marginally superior reductions in perceived stress and somatic anxiety symptoms, consistent with its emphasis on physiological downregulation through breathwork, mindful movement, and relaxation techniques that enhance parasympathetic activity and interoceptive awareness (Gard et al., 2014; Grossman et al., 2004; Streeter et al., 2012; Yang et al., 2024). These somatic benefits likely resonate particularly with athletes experiencing high physical reactivity to pressure, as mindfulness-based approaches have been linked to reduced competition anxiety and improved autonomic balance (Wang et al., 2023; Tossici et al., 2024).

In contrast, CBT trended toward greater gains in psychological well-being and performance ratings, particularly in cognitive domains such as focus, self-efficacy, and goal-directed execution. This advantage can be attributed to its targeted cognitive restructuring and behavioral strategies, which directly challenge maladaptive appraisals and foster mental toughness under duress (Beck, 2011; Turner & Barker, 2014; Beenen et al., 2025). The overall equivalence in efficacy underscores the flexibility of both approaches, allowing practitioners to match interventions to individual athlete profiles: MBPT for those with predominant somatic or arousal-based distress, and CBT for those grappling with cognitive distortions like perfectionism or fear of failure (Birrer & Morgan, 2010; Shamim Ahmed et al., 2022).

These findings carry important clinical implications for sports psychology in diverse cultural contexts, including India, where athletes increasingly acknowledge mental health challenges amid global competitive pressures (Gill & Singh, 2024; Indian Express, 2024). Integrating either modality—or ideally, hybrid protocols combining MBPT's embodied grounding with CBT's cognitive tools—could yield synergistic benefits, maximizing resilience and sustainable performance (Kaufman et al., 2018; Noetel et al., 2019).

Several limitations warrant consideration. Reliance on self-report measures may introduce response bias, suggesting the need for future inclusion of objective physiological markers (e.g., heart rate variability, cortisol assays) and actual performance metrics. The brief 4-week duration limits insights into long-term maintenance, while the absence of a no-treatment control precludes ruling out non-specific effects. Additionally, the culturally homogeneous Indian sample may constrain generalizability, highlighting the value of cross-cultural replications.

Future research should prioritize longitudinal designs, hybrid interventions, personalized matching based on baseline profiles (e.g., somatic vs. cognitive anxiety predominance), and digital adaptations for broader accessibility. Ultimately, these results position MBPT and CBT as complementary pillars in a modern, athlete centered mental training framework, affirming that psychological resilience is not merely adjunctive but foundational to athletic excellence (Gustafsson et al., 2017; Reardon et al., 2019).

5. CONCLUSION

In conclusion, this study substantiates Mind-Body Physical Therapy (MBPT) and Cognitive Behavioral Therapy (CBT) as potent, evidence-based modalities for fostering psychological resilience and performance optimization in young competitive athletes. Both interventions delivered substantial, clinically meaningful improvements in stress reduction, anxiety alleviation, well-being enhancement, and athletic performance, with large effect sizes underscoring their transformative potential in high-pressure sporting environments (Chang et al., 2020; Yang et al., 2024).

The observed equivalence in overall efficacy, tempered by modality-specific trends—MBPT's edge in physiological and somatic regulation (Gard et al., 2014; Streeter et al., 2012) and CBT's strength in cognitive reappraisal and mental skills mastery (Beck, 2011; Turner & Barker, 2014)—highlights their complementary nature rather than mutual exclusivity. These insights advocate for a paradigm shift in sports psychology: moving beyond one-size-fits-all approaches toward personalized, integrative frameworks that align interventions with athletes' unique profiles—somatic reactivity, cognitive patterns, sport demands, and cultural contexts (Birrer & Morgan, 2010; Gill & Singh, 2024).

By embedding these tools into training regimens, practitioners can cultivate not only immediate gains but also sustainable mental fortitude, reducing risks of burnout and dropout while elevating long-term excellence (Gustafsson et al., 2017; Reardon et al., 2019). Ultimately, this work reaffirms that mental health is inextricably woven into the fabric of athletic success, positioning tailored mind-body and cognitive strategies as indispensable allies in the pursuit of holistic peak performance.

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