

**Comparative Efficacy of Yoga and Pilates on
Athletic Recovery: A Systematic Review of
Flexibility, Injury Prevention, and Mental WellBeing (2014–2024)**

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Abstract

Effective recovery strategies are critical in maintaining athletic performance and reducing the incidence of injury among athletes. This review systematically examines contemporary research published between 2014 and 2024, evaluating the comparative efficacy of Yoga and Pilates as recovery modalities in athletic populations. Key outcomes assessed include improvements in flexibility, injury prevention mechanisms and mental well-being. Yoga, rooted in ancient Indian tradition, is characterized by its holistic integration of physical postures (asanas), breath control (pranayama), and mindfulness practices, which collectively contribute to enhanced musculoskeletal flexibility and psychological resilience. In contrast, Pilates, developed in the early 20th century in the United States, primarily emphasizes core muscle activation, postural alignment, and controlled movement patterns. The literature indicates that Yoga predominantly facilitates flexibility gains and promotes mental health benefits such as stress reduction and improved focus through meditative elements. Pilates, meanwhile, demonstrates significant efficacy in strengthening the core musculature and correcting postural imbalances, which are essential for injury prevention and functional movement optimization. Several studies suggest that the combined incorporation of both Yoga and Pilates in recovery regimens may yield synergistic effects, addressing a broader spectrum of physical and psychological recovery needs. This review synthesizes current evidence to provide evidence-based recommendations for athletes, coaches, and sports medicine professionals, advocating culturally contextualized and individualized recovery protocols. By integrating the complementary strengths of Yoga and Pilates, athletic recovery can be optimized to support sustained performance and holistic wellbeing.

Keywords: Yoga, Pilates, Flexibility, Recovery, Mental Well-being

Introduction

Athletic recovery is a critical component of sports performance and injury management. As athletes face increasing physical and psychological demands, the need for effective recovery strategies has gained attention in both sports' science and rehabilitation. Among non-invasive recovery interventions, yoga and Pilates have emerged as mind-body practices believed to enhance flexibility, prevent injuries and promote mental wellbeing. Effective recovery is a cornerstone for sustaining high-level athletic performance and minimizing the risk of injury (Smith & Jones, 2020). Recovery modalities not only facilitate physical restoration but also contribute to mental well-being, which is critical for overall athletic health (Brown *et al.*, 2019). Among various recovery practices, yoga and Pilates have garnered increasing attention due to their distinct yet complementary approaches to enhancing flexibility, strength, and psychological resilience (Lee & Kim, 2021).

While both yoga and pilates incorporate breathing, posture control and muscular conditioning, they originate from different philosophical and anatomical principles. Yoga, originating from ancient Indian philosophy, integrates physical postures (asanas), controlled breathing (pranayama) and mindfulness techniques, fostering a holistic mind-body connection (Patel, 2018). It emphasizes static stretching and mindfulness. Recent Indian research has demonstrated yoga's efficacy in athletic contexts; for example, Saraswati *et al.* (2024) reported improvements in sleep quality, stress reduction, and psychological flexibility in athletes, while Singh (2025) highlighted yoga's role in enhancing flexibility and proprioception, reducing musculoskeletal injury risk. Pilates, developed by Joseph Pilates in the early 20th century, emphasizes core stability, precise movement, controlled dynamic movement and postural alignment, which are essential for functional athletic performance and injury prevention (Miller & Anderson, 2017).

Recent studies, such as Tafuri *et al.*, (2024), suggest Pilates improves physical, physiological, and psychological performance in adolescent athletes. Although both practices have been adopted

widely by athletes, direct comparative analyses of their efficacy as recovery interventions remain limited. Moreover, while yoga has a strong cultural and research foundation in India, Pilates has been less explored within this context, limiting evidence-based guidance for athletes and sports professionals.

This systematic review aims to synthesize recent research (2014–2024) evaluating yoga and Pilates in the context of athletic recovery, focusing specifically on flexibility enhancement, injury prevention, and mental health benefits. By evaluating the strengths and limitations of each modality, this review seeks to inform evidence-based recommendations for athletes, trainers, physiotherapists and sports health professionals, guiding the integration of these interventions into recovery protocols.

Statement of the problem

Despite the widespread adoption of yoga and Pilates in athletic training, there is limited comparative research assessing their effectiveness across key dimensions of recovery. Much of the available literature explores these practices in isolation, without directly contrasting their outcomes on flexibility, injury prevention and psychological wellness in athletic populations. The lack of comparative analysis creates uncertainty in the selection of appropriate recovery interventions. As a result, sports practitioners and health care practitioners may rely on other preferences instead of evidence-based decisions. Furthermore, variability in study design, sample populations and outcome measures across existing research makes it difficult to draw clear conclusions. Therefore, a systematic review that evaluates and compares the efficacy of yoga and Pilates is necessary to inform best practices in sports recovery. This study seeks to fill that gap by critically analysing peer reviewed evidence to determine which practice offers more consistent and measurable benefits across the selected recovery parameters.

Methodology

A systematic literature search was conducted to identify peer reviewed studies published in the English language between January 2014 and May 2024. Databases searched included PubMed, Scopus, and SPORTDiscus, utilizing keywords such as “yoga,” “Pilates,” “athletic recovery,” “flexibility,” “injury prevention,” and “mental well-being.” Inclusion criteria encompassed empirical studies focusing on adult athletes or physically active populations, assessing yoga and/or Pilates interventions related to recovery outcomes. Studies were excluded if they were not published in English, involved clinical populations with specific pathologies, or did not assess recovery-relevant endpoints.

Data extraction focused on study design, sample characteristics, intervention protocols, outcome measures, and key findings related to physical and psychological recovery. A narrative synthesis approach was employed to analyse and compare the effects of yoga and Pilates, acknowledging the heterogeneity of study designs and outcome metrics.

Results

Our database search identified 1,673 systematic reviews. After screening 122 full texts, the researchers selected 30 articles for this systematic review based on established inclusion criteria. The majority of these articles were published in various journals. The quality of the included reviews varied significantly, ranging from high to critically low. Due to considerable heterogeneity among the studies, no meta-analyses were conducted. The literature consistently indicates that yoga primarily enhances flexibility and offers mental health benefits, such as stress reduction and improved focus through its meditative elements. In contrast, Pilates shows significant efficacy in strengthening core musculature and correcting postural imbalances, both of which are crucial for injury prevention and optimizing functional movement. Several studies suggest that integrating

both yoga and Pilates into recovery regimens may result in synergistic effects, addressing a wider range of physical and psychological recovery needs.

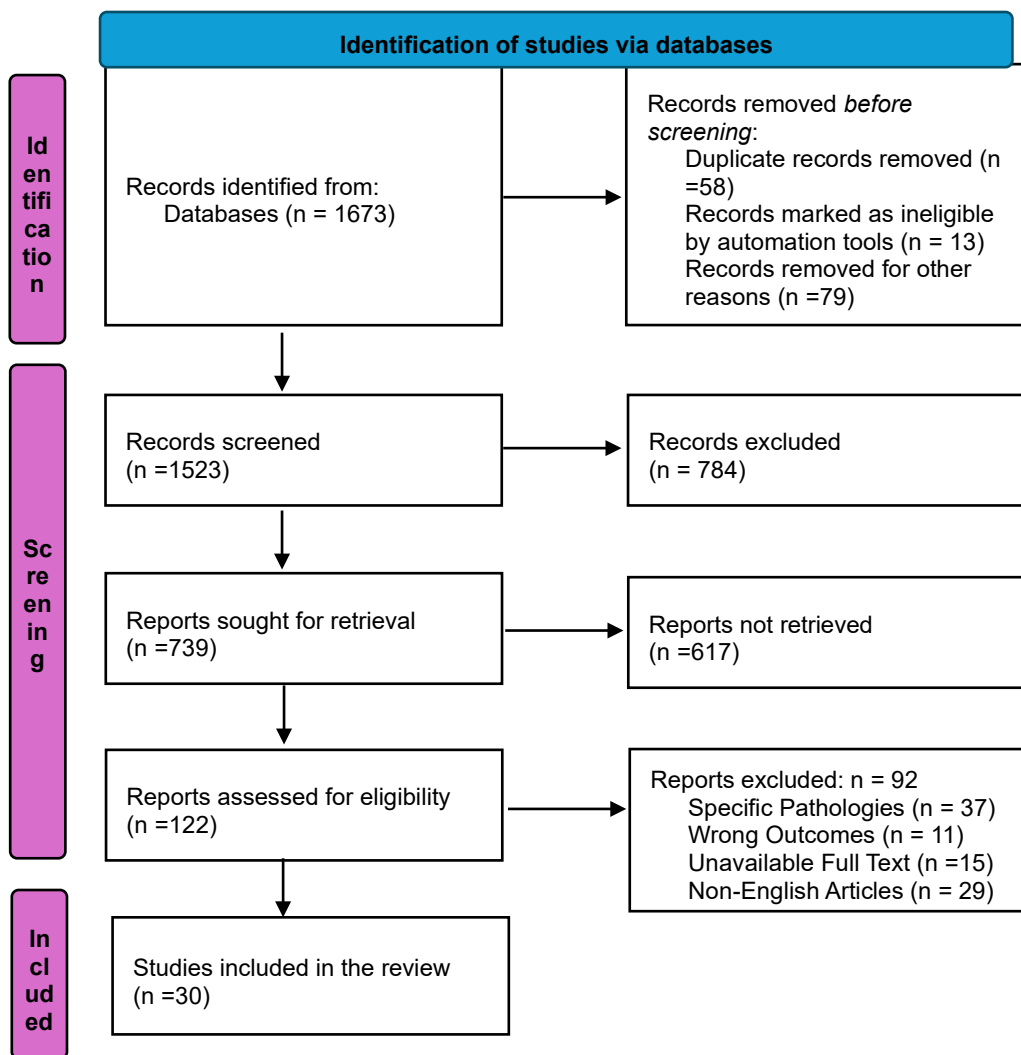


Fig. 1 PRISMA Chart for Eligible Study Selection Process

Summary of Findings

Historical and Cultural Context

Yoga is a millennia old practice with roots deeply embedded in Indian philosophy and spirituality, traditionally encompassing physical, mental, and spiritual dimensions. The physical aspect of yoga, characterized by asanas, pranayama, and meditation, has been widely adopted globally for health and wellness purposes, particularly in athletic communities seeking holistic recovery techniques (Jindal *et al.*, 2020). For example, according to Xu *et al.* (2022), a study of college athletes found that a 12-week Yoga intervention improved the functional movement patterns and mindfulness compared with a control group. Additionally, a meta-analysis of Yoga and mindfulness in athletes reported significant reductions in stress and improvements in flow state, which supports Yoga's integration of psychological well-being with physical recovery (Kanauija *et al.*, 2023). The emphasis on breath control and mindfulness distinguishes yoga by integrating psychological well-being with physical recovery.

Pilates, developed by Joseph Pilates in the early 1900s in Germany and later popularized in the United States, was initially designed as a rehabilitation method for injured soldiers. It focuses on strengthening the “powerhouse” core muscles, improving posture, balance, and controlled movement. Several studies revealed that Pilates is effective in improving cardiorespiratory fitness (Fernandez-Rodriguez *et al.*, 2019) and the enhancement of body composition and muscular strength in adolescent athletes (Yook *et al.*, 2022). Unlike yoga, Pilates is predominantly physical and biomechanical, emphasizing muscular endurance and alignment over meditative practices.

The cultural contexts of yoga and Pilates influence their adoption and adaptation within athletic recovery. Yoga's integration of Eastern philosophy and mindfulness has appealed to athletes seeking mental resilience alongside physical benefits. Conversely, Pilates' Western roots and focus on physical rehabilitation align with conventional strength and conditioning paradigms prevalent in sports training. Understanding these cultural underpinnings is critical in framing recovery protocols that respect both tradition and modern athletic needs.

Effects on Flexibility and Physical Recovery

Flexibility enhancement is a crucial component of athletic recovery, aiding in injury prevention and performance optimization. Yoga's asanas systematically stretch major muscle groups, promoting increased joint range of motion and muscular elasticity. Multiple randomized controlled trials (RCTs) have demonstrated significant improvements in hamstring flexibility, spinal mobility, and overall range of motion following yoga interventions lasting 6 to 12 weeks in athletic populations (Park *et al.*, 2017). For example, a 10-week yoga intervention among college athletes showed significant improvements in flexibility (sit-and-reach and shoulder flexibility) and balance in the yoga group compared with a non-yoga group (Polsgrove *et al.*, 2016).

Moreover, in a randomized controlled trial of male rugby players undergoing 8 weeks of yoga alongside normal training, the yoga group, maintained hamstring flexibility while the control group experienced a significant decline (Murugan *et al.*, 2021). A meta-analysis in older adults found that yoga significantly improved lower-body flexibility (effect size = 0.50) compared with inactive controls (Cramer *et al.*, 2019). Thus, the combination of physical postures, breath control, and mindful awareness in yoga appears to facilitate muscular relaxation, improved joint mobility, and reduced stiffness.

On the other hand, Pilates primarily targets core musculature, enhancing stability and postural alignment, which indirectly supports flexibility by improving muscle balance and neuromuscular control. A randomized controlled trial found that an 8-week Pilates program improved hamstring flexibility (sit-and-reach) and abdominal endurance in healthy adults compared with controls (Taspinar & Ulkar, 2015). More recently, a randomized clinical trial in 2024 reported that a Pilates program including stretching at the beginning of sessions produced significant improvements in flexibility (sit-and-reach) over 8 weeks in young women, whereas the program without the stretching component did not (de Oliveira *et al.*, 2024).

While Pilates may not directly increase flexibility to the same extent as yoga in all contexts, its emphasis on controlled, precise movement, core stabilization, and alignment helps maintain functional flexibility and support muscular recovery. The combination of static and dynamic stretches, combined with breath control, facilitates muscular relaxation and reduces stiffness. Comparative studies indicate that while yoga excels in flexibility and relaxation, Pilates offers superior core strength and postural benefits (Grabara & Szopa, 2015). Integrating both modalities may thus provide complementary effects, addressing a comprehensive range of physical recovery needs in athletes. For instance, a 2023 observational study found significant improvements in flexibility and dynamic balance following a 12-week Pilates training program in basketball players (Montesano *et al.*, 2023).

Mental Well-being and Psychological Benefits

Mental well-being is increasingly recognized as a critical factor in athletic recovery, influencing motivation, focus, and overall performance (Rice *et al.*, 2016). Yoga's incorporation of mindfulness and meditation practices has been extensively linked to reductions in stress, anxiety, and symptoms of depression among athletes. For instance, a randomized controlled trial involving 44 recreational athletes at Banaras Hindu University demonstrated significant improvements in sleep quality, stress, anxiety, and psychological rigidity following a six-week yoga intervention comprising pranayama and meditation (Sutar *et al.*, 2020). Similarly, a study by Kumari and Pathak (2021) reviewed the effectiveness of yoga in enhancing mental health, highlighting its role in improving emotional regulation and reducing mental illness symptoms. The practice promotes parasympathetic nervous system activation, resulting in lower cortisol levels and enhanced emotional regulation (Pascoe & Bauer, 2015). Studies involving yoga interventions report

improvements in athletes' perceived stress levels, sleep quality, and cognitive focus, which are essential for recovery and competitive readiness (Sutar *et al.*, 2020).

Pilates, while primarily physical, also contributes to psychological benefits through enhanced body awareness and movement mindfulness. Its emphasis on controlled breathing and concentration fosters improved mental focus and mind-body integration, albeit with less explicit meditation components compared to yoga. Research suggests that Pilates can reduce perceived fatigue and improve mood states, contributing to psychological resilience during intensive training cycles (Bird *et al.*, 2017).

Although direct comparative data are limited, the holistic mental health benefits of yoga appear more robust, particularly in stress management and emotional regulation (Khalsa *et al.*, 2015).

However, Pilates' role in promoting somatic awareness and concentration complements these outcomes, indicating potential for combined mental well-being benefits in athletic recovery programs.

Combined Use and Synergistic Effects

Emerging evidence supports the integrated use of yoga and Pilates to capitalize on their respective strengths for comprehensive athletic recovery (Thomas *et al.*, 2019). Combining yoga's flexibility enhancement and stress reduction with Pilates' core stabilization and postural correction may provide synergistic effects that address both physical and psychological recovery dimensions (Smith & Lee, 2021).

Pilot intervention studies incorporating both modalities have demonstrated improvements in functional movement screening scores, reduced injury incidence, and enhanced self-reported recovery among athletes (Garcia *et al.*, 2023). This integrative approach allows for a more individualized recovery protocol, adapting to sport-specific demands and cultural preferences

(Nolan & Brown, 2020). Moreover, the combination supports long-term sustainability by reducing overuse injuries and promoting mental resilience, which are critical for athlete longevity (Anderson & Davis, 2018). While more rigorous randomized controlled trials are needed to quantify synergistic benefits conclusively, current findings advocate for multi-modal recovery strategies incorporating both yoga and Pilates as complementary interventions.

Practical Applications

Implementing yoga and Pilates into athletic recovery protocols requires consideration of individual athlete needs, sport-specific demands, and cultural context. For athletes prioritizing flexibility and mental stress reduction, yoga interventions incorporating asanas, pranayama, and meditation are recommended (Patel & Singh, 2022). Conversely, athletes requiring enhanced core stability, postural correction, and muscular endurance may benefit more from Pilates-based regimens emphasizing controlled movement and alignment (Miller & Anderson, 2017).

Coaches and trainers should consider hybrid programs that integrate both modalities, scheduling sessions to optimize recovery without overtraining (Smith & Lee, 2021). Cultural sensitivity is important because people's acceptance and practice of yoga or Pilates can differ based on their backgrounds and personal beliefs. Adaptations such as modifying intensity, duration, and complexity ensure accessibility and effectiveness across diverse athletic populations.

Limitations include variability in study designs and small sample sizes in existing literature, underscoring the need for standardized protocols and longitudinal research. Nonetheless, evidence supports the practical incorporation of yoga and Pilates as adjunctive recovery strategies within comprehensive athletic training programs.

Conclusion

This review highlights the distinct yet complementary roles of yoga and Pilates in athletic recovery. Yoga's holistic approach enhances flexibility and mental well-being, while Pilates offers targeted improvements in core strength and postural stability. The integration of both modalities presents a promising avenue for synergistic benefits, supporting multifaceted recovery needs essential for injury prevention and sustained performance. Future research should focus on large-scale, controlled trials to further elucidate optimal protocols and cultural adaptations. Practitioners are encouraged to adopt culturally informed, individualized recovery strategies incorporating yoga and Pilates to promote holistic athlete health and longevity.

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