

Review article**Mindfulness Training for Athletes:
A Systematic Review of Psychological and Performance Effects**

Anoma Rathnayaka

Department of Sport Science and Physical Education, Faculty of Social Sciences, University of Kelaniya, Sri Lanka

Corresponding author: anomar@kln.ac.lk**Abstract**

Mindfulness, defined as nonjudgmental awareness of present-moment experiences, has gained increasing attention within sport psychology due to its potential benefits for athletes' psychological functioning and performance. The purpose of this study was to systematically review empirical literature examining mindfulness training from athletes' perspectives. A systematic review design was employed to synthesize existing evidence, using secondary data collected from multiple academic databases to ensure comprehensive coverage and reduce publication bias. The literature search covered a ten-year period from January 2015 to July 30, 2025. Following the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, 22 empirical journal articles met the inclusion criteria and were selected for analysis. Data was analyzed using a seven-step thematic analysis approach. Three key themes emerged: (1) mindfulness-based interventions used in sport contexts, (2) psychological and performance-related effects of mindfulness training and (3) methodological attributes, contextual influences, and research gaps. The findings indicate that mindfulness-based interventions in sport are diverse and context-specific rather than uniform in design. While evidence suggests positive effects on psychological outcomes and performance-related processes, methodological inconsistencies limit the generalizability of findings. Future research should prioritize high-quality randomized controlled trials, clearer reporting of intervention fidelity and practice adherence, and longitudinal designs to better understand the mechanisms through which mindfulness training influences athletic performance. Despite these limitations, this review contributes to the literature by synthesizing current evidence and identifying key directions for future research.

Keywords: Mindfulness, Mindfulness Training for Athletes, Systematic Review**Introduction**

Contemporary competitive sport places increasing psychological demands on athletes, requiring not only high levels of physical fitness and technical skill but also advanced mental capabilities [1]. Athletes at all levels are exposed to intense performance pressure, expectations from coaches and stakeholders, frequent evaluation, and the risk of injury and failure [2,3]. As a result, psychological factors such as attentional control, emotional regulation, stress management, and resilience have become central to athletic performance and well-being [4,5]. Traditional psychological skills training approaches, including goal setting, imagery, and self-talk, have long been used in sport psychology; however, these techniques may not fully address the dynamic, moment-to-moment psychological challenges athletes encounter during training and

competition [6]. This evolving landscape has prompted growing interest in alternative and complementary mental training approaches, particularly mindfulness-based interventions [7,8].

Mindfulness is commonly defined as the intentional and non-judgmental awareness of present-moment experiences, including thoughts, emotions, bodily sensations, and external stimuli. Originating from contemplative traditions, mindfulness has been increasingly integrated into psychological and clinical interventions over the past several decades [9]. In sport psychology, mindfulness is conceptualized as a mental state and skill that enhances awareness, acceptance, and attentional focus under performance pressure. Rather than attempting to control or eliminate negative thoughts and emotions, mindfulness-based approaches encourage athletes to acknowledge internal

experiences without judgment and to refocus attention on task-relevant cues [10]. This orientation is considered particularly suitable for sport contexts, where unpredictability, mistakes, and emotional fluctuations are inevitable.

Several mindfulness-based interventions have been adapted for use with athletes. These include Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), and sport-specific approaches such as the Mindfulness-Acceptance-Commitment (MAC) framework [11,12]. These interventions aim to improve athletes' capacity to remain present-focused, regulate emotions effectively, and respond adaptively to competitive stressors [13]. In recent years, mindfulness training has been applied across a wide range of sporting contexts, including elite and sub-elite athletes, individual and team sports, and youth and adult populations [12,13]. As mindfulness training continues to gain acceptance among sport psychologists and coaches, understanding its effectiveness has become an important area of scholarly inquiry [14].

Empirical research examining mindfulness training in athletes has reported a variety of psychological and performance-related outcomes [15]. Psychological benefits commonly associated with mindfulness training include reductions in competitive anxiety, stress, and emotional reactivity, as well as improvements in psychological well-being, self-regulation, and confidence [16]. From a performance perspective, mindfulness has been linked to enhanced attentional focus, improved consistency under pressure, greater flow experiences, and more effective recovery from performance errors [15]. These outcomes are theoretically consistent with principles of mindfulness, which emphasize acceptance, awareness, and flexible attention [17]. Nevertheless, findings across studies are not entirely consistent. Variations in intervention duration, training intensity, sport type, athlete level, and research design have produced mixed results, making it difficult to draw definitive conclusions about the overall effectiveness of mindfulness training in athletic contexts.

Several review articles have attempted to synthesize the growing body of literature on mindfulness in sport [18]. However, important limitations remain. Some reviews have adopted narrative approaches without transparent or systematic search strategies, limiting their reproducibility and methodological rigor. Others have focused primarily on psychological outcomes while giving limited attention to performance-related effects, despite performance being a central concern in sport settings. Additionally, earlier reviews may not fully reflect the most recent empirical developments, given the rapid expansion of mindfulness-based research in sport psychology. There is also a lack of systematic evaluation of study quality, intervention characteristics, and population differences, which are essential for understanding the strength and applicability of existing evidence.

Given these limitations, there is a clear need for an updated and methodologically robust synthesis of research examining mindfulness training in athletes. A systematic review offers a transparent and comprehensive approach to identifying, evaluating, and synthesizing empirical evidence [18,19] allowing for a more reliable assessment of both psychological and performance effects. By systematically integrating findings across diverse studies, such a review can clarify the extent to which mindfulness training is effective, identify patterns and inconsistencies in the literature, and highlight areas requiring further investigation [19,20].

Therefore, the purpose of the present study is to systematically review empirical research examining the effects of mindfulness training on psychological and performance outcomes in athletes. Specifically, this review aims to (a) identify the types of mindfulness-based interventions used in sport contexts, (b) examine their reported psychological and performance-related effects, and (c) study methodological strengths and limitations within the existing literature. By providing a comprehensive and up-to-date synthesis, this review seeks to inform sport psychologists, coaches, and researchers about the evidence-based value of mindfulness training and to offer direction for future research and applied practice in sport psychology.

Methodology

The research paper aims to (a) identify the types of mindfulness-based interventions used in sport contexts, (b) examine their reported psychological and performance-related effects, and (c) assess methodological strengths and limitations within the existing literature.

Research Design

This study adopted a systematic review design [21,22] to synthesize existing empirical evidence on the effects of mindfulness training on psychological and performance outcomes in athletes. A systematic review approach was selected to ensure transparency, rigor, and reproducibility in identifying, screening, and analyzing relevant literature. The review process followed the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, which provide a structured framework for reporting systematic reviews in a comprehensive and methodologically sound manner [21, 22].

Data Sources and Timeline

The literature search covered a 10-year time span, from January 2015 to July 30, 2025. This period was selected to capture contemporary developments in mindfulness-based interventions within sport psychology, reflecting the rapid growth of empirical research in this field over the past decade. For the year 2025, only studies published between January and July 30 were considered eligible. Multiple academic databases were used to ensure broad coverage and to minimize the risk of publication bias [23]. The databases searched included Google Scholar, Research Gate, Elsevier, Wiley Online Library, PubMed, and Lens.org. These databases were selected because they index a wide range of peer-reviewed journals and scholarly publications relevant to sport psychology, mindfulness research, and applied behavioral sciences. Searching across multiple databases enhanced the likelihood of identifying both discipline-specific and interdisciplinary studies related to mindfulness training in athletic contexts [24].

Data Search Strategy

A systematic search strategy was developed using Boolean operators [25] to combine keywords related to mindfulness and sport participation. Keywords associated with mindfulness included terms such as “mindfulness,” “mindfulness-based interventions,” “mindfulness training,” and “acceptance-based approaches.” Keywords related to sport participation included “athletes,” “sport,” “sports performance,” and “competitive sport.” The search process followed a two-phase approach. In the first phase, keywords within the same conceptual category were combined using the “OR” operator (e.g., mindfulness OR mindfulness-based interventions). In the second phase, the two sets of search results mindfulness-related terms and sport-related terms were combined using the “AND” operator to identify studies that addressed both mindfulness and athletic contexts. This structured approach ensured a comprehensive yet focused search, allowing the identification of studies that were directly relevant to the aims of the review.

The search results retrieved from each database were exported and compiled, and duplicate records were removed prior to screening. The findings from the selected studies were ultimately synthesized and presented through narrative evidence, consistent with the objectives of the review [26].

Data Screening and Selection

The selection of studies followed the PRISMA 2020 screening process, which involves identification, screening, eligibility assessment, and final inclusion. The PRISMA framework was used to ensure systematic and transparent selection of research papers based on predefined inclusion and exclusion criteria.

Studies were screened based on several common criteria, including research title, abstract, year of publication, author details, source, keywords, language, and research type. Only peer-reviewed, open-access research articles were included to ensure accessibility and scholarly quality. The review focused exclusively on studies published in the English language, as English is the dominant language of academic publication in sport

psychology and mindfulness research. Inclusion criteria required that studies: (a) examined mindfulness or mindfulness-based interventions; (b) involved athletes or sport-related populations, and (c) reported psychological and/or performance-related outcomes.

Studies were excluded if they were not empirical in nature (e.g., editorials, opinion pieces), did not involve athletes, or lacked a clear focus on mindfulness-based practices. The screening process was conducted carefully to ensure that only studies directly aligned with the objectives of the review were retained for analysis. 142 papers related to the research were identified through the data screening and selection process. Out of these, only 22 research papers that met the inclusion criteria were included for this study.

Data Analysis

Data analysis was conducted using thematic analysis, a widely used qualitative data analysis method suitable for identifying patterns and themes across textual data. Thematic analysis was selected because it allows for systematic interpretation of complex qualitative and mixed-method findings across multiple studies [27].

This study adopted a seven-step thematic analysis process, extending the commonly recognized six-step framework by introducing “identification of significant quotations” as a distinct analytical step, following the methodological guidance of Mwita and Mwilongo [28]. The steps included: (1) Familiarization with the data; (2) Generation of initial codes; (3) Identification of significant quotations; (4) Searching for themes; (5) Reviewing themes; (6) Defining and naming themes; (7) Producing the final narrative synthesis. Through careful reading, comparison, and reflective reasoning, meaningful patterns related to the psychological and performance effects of mindfulness training were identified. This process enabled a deeper level of interpretation beyond surface-level categorization, allowing the researcher to understand how mindfulness interventions function within athletic contexts. Thematic analysis facilitated not only the identification of recurring findings but also the recognition of contradictions,

gaps, and methodological trends across studies. The analytical process emphasized deep learning and reflexive understanding, whereby insights emerged through continuous engagement with the data rather than simple memorization of findings. This approach supported the development of a coherent and theoretically informed synthesis of existing literature.

Methodological Rigor

The use of multiple databases, a clearly defined search strategy, PRISMA 2020 guidelines, and a structured thematic analysis process contributed to the methodological rigor of this review. These procedures enhanced the transparency, credibility, and trustworthiness of the findings, providing a solid foundation for interpreting the effects of mindfulness training on athletes.

Mindfulness-based Interventions used in Sport Contexts

Mindfulness has been both theoretically and empirically associated with psychological well-being. Core elements of mindfulness, particularly present-moment awareness and nonjudgmental acceptance of experience are regarded as effective countermeasures to common forms of psychological distress, including rumination, anxiety, worry, fear, and anger. Such forms of distress are often maintained by maladaptive tendencies to avoid, suppress, or excessively engage with distressing thoughts and emotions [29,30]. Within sport contexts, mindfulness training has been identified as an effective psychological skills intervention, demonstrating positive effects on athletes’ sports performance and overall psychological functioning [31]. Empirical evidence further indicates that mindfulness training positively influences elite athletes’ psychological states, including enhanced mindfulness, psychological resilience, and flow experiences, alongside reductions in anxiety, depression, and psychological fatigue [32]. From a theoretical perspective, research examining mindfulness as a mechanism for enhancing athletic performance has identified several potential impact pathways. These include bare attention, experiential acceptance, values clarification, self-regulation and negative emotion regulation, increased clarity of

internal experiences, exposure, psychological flexibility, non-attachment, and reduced rumination [33]. A deeper understanding of the conceptual foundations of mindfulness and its influence on psychological skills may contribute to the refinement and effectiveness of mindfulness-based interventions in sport settings.

Evidence from a meta-analytical review examining the effects of mindfulness practice on performance-relevant parameters and performance outcomes in sport revealed meaningful improvements in both physiological and psychological surrogate markers, as well as in performance outcomes, particularly in precision sports such as shooting and dart throwing [33]. These findings suggest that mindfulness-based practices may serve as a valuable complementary component of mental skills training for athletes, especially in sports requiring sustained attentional control. Nevertheless, the authors emphasized the need for high-quality randomized controlled trials to further establish the effectiveness of mindfulness interventions across diverse sport contexts.

Comparative research investigating the differential and shared effects of traditional psychological skills training and mindfulness-based training on performance-relevant psychological variables, such as emotional regulation and attentional control, has demonstrated that both approaches can lead to improvements in these domains. While both forms of mental training appear to enhance psychological factors associated with athletic performance, findings suggest that they may operate through distinct psychological pathways, thereby supporting the inclusion of both approaches within applied sport psychology practice [34]. Finally, a meta-analysis examining the effects of mindfulness training on mindfulness, psychological resilience, flow state, subjective well-being, sports anxiety, sports depression, and psychological fatigue among elite athletes reported significant positive effects on mindfulness, resilience, flow, and reductions in anxiety, depression, and psychological fatigue. However, no significant effects were observed for subjective well-being [35]. Collectively, these findings highlight the potential value of mindfulness training in enhancing athletes' psychological functioning and performance, while also

underscoring the need for continued methodological rigor and theoretical clarity in future research.

Psychological and Performance-related Effects of Mindfulness Training

The growing body of literature on mindfulness-based interventions in sport indicates a generally positive association between mindfulness training and athletic performance; however, the strength and consistency of this relationship vary considerably across sport types and research designs. The earliest application of mindfulness in sport can be traced back to interventions conducted with rowers in the early 1980s [36]. Since then, and alongside the increasing popularity of mindfulness in clinical psychology and psychotherapy, scholarly interest in mindfulness-based interventions within sport contexts has expanded substantially [37]. Early systematic reviews incorporated evidence from single-case studies, qualitative research, as well as non-randomized and randomized trials, providing an initial foundation for understanding mindfulness in sport, but also revealing substantial methodological heterogeneity [38].

More recent meta-analytic research has offered stronger empirical support for the performance-related benefits of mindfulness training. Specifically, meta-analyses examining the effects of mindfulness practice on sport performance and performance-relevant parameters have reported improvements in mindfulness scores and enhanced performance outcomes, particularly in precision-based sports such as shooting and dart throwing [39]. These findings suggest that mindfulness training may be especially effective in sports that require sustained attentional focus, fine motor control, and resistance to cognitive interference. Nevertheless, the extent to which these findings can be generalized beyond precision sports remains unclear. In endurance sports, the evidence presents a more complex picture. While meta-analytic findings indicate that psychological skills training can be beneficial for endurance athletes [40,41] moreover they further emphasized the need for further experimental research to examine the capacity of psychological interventions including mindfulness-based approaches to reduce the psychological demands associated with prolonged

endurance performance. Although mindfulness interventions implemented with runners were comparable in duration to those used in other sports (typically ranging from four to eight weeks), limited or inconsistent performance effects have been observed. This suggests that intervention alone is unlikely to account for the variability in outcomes. Instead, it has been proposed that the effectiveness of mindfulness practice may depend more strongly on athletes' tenacity, engagement, and adherence to training protocols [42] a factor that is often insufficiently reported in empirical studies. Mindfulness has increasingly been recognized as a psychological technique that is theoretically grounded and practically applicable within sport settings [43]. Central features of mindfulness such as the merging of action and awareness and complete attentional focus on the task at hand closely aligning with the defining characteristics of flow, a psychological state widely regarded as optimal for athletic performance [44]. While this conceptual overlap provides a compelling theoretical explanation for the performance-enhancing potential of mindfulness training, empirical studies directly examining the mindfulness–flow–performance relationship remain limited. As a result, conclusions regarding mindfulness-induced flow states should be interpreted cautiously.

The interpretation of performance outcomes is further complicated by the wide range of mindfulness practices employed across studies. Existing research encompasses numerous forms of meditation and yoga-based practices, with some reviews identifying as many as 67 distinct mindfulness-related techniques [45]. Among structured interventions, the Mindfulness-Acceptance-Commitment (MAC) approach has received particular attention, with evidence suggesting that it may be more effective than traditional psychological skills training in reducing emotion regulation difficulties among athletes [42, 46]. However, direct comparative studies between different mindfulness-based models remain scarce, limiting conclusions about their relative effectiveness.

Overall, mindfulness-based interventions in sport demonstrate some effectiveness in enhancing

performance-related well-being and psychological processes closely linked to performance [47]. Mindfulness training methods are increasingly viewed as powerful mental tools capable of improving athletes' attention, emotional control, and competitive performance [48, 49, 50, 51]. Interventions delivered through approaches such as Mindfulness-Based Stress Reduction [52] Mindful Sport Performance Enhancement [53], Mindfulness-Acceptance-Commitment [54], and other sport-specific mindfulness programs have been shown to mitigate performance-related psychological challenges by enhancing attentional regulation, emotional control, mental toughness, and resilience [55,56,57]. Nevertheless, the extent to which these psychological improvements translate into consistent and measurable performance gains remains uncertain. Taken together, the evidence suggests that while mindfulness training holds promise as a performance-enhancing intervention, its effectiveness is influenced by sport-specific demands, intervention characteristics, and athlete engagement. Future research should prioritize high-quality randomized controlled trials, greater transparency regarding intervention fidelity and practice adherence, and longitudinal designs to better understand the mechanisms through which mindfulness training contributes to athletic performance across diverse sporting contexts.

Methodological Attribute, Contextual Influences, and Research Gaps

Despite the growing interest in mindfulness-based interventions within sport psychology, the existing evidence base is characterized by notable methodological and contextual limitations. Variability in research design, intervention protocols, outcome measurement, and participant characteristics complicates the interpretation and comparison of findings across studies. To provide a clearer overview of these limitations and to highlight priority areas for future research, Table 1 summarizes the key methodological gaps identified in the current literature on mindfulness training in sport, with particular attention to issues affecting internal validity, generalizability, and theoretical advancement.

Table 1: Key Methodological Gaps Identified in the Literature on Mindfulness Training in Sport

Methodological Area	Identified Gap	Implications for Findings	Key References (Article No.)
Study Design	Overreliance on short-term interventions and cross-sectional designs	Limits understanding of long-term effects, sustainability, and causal relationships of mindfulness training	[16, 20, 33]
Sample Characteristics	Small sample sizes and convenience sampling (often elite or university athletes only)	Reduces statistical power and generalizability across sport types, levels, and cultures	[11, 34, 57]
Population Diversity	Underrepresentation of youth, adolescent, para-athletes, and female athletes	Limits applicability of findings to diverse athletic populations	[2, 49, 56]
Intervention Fidelity	Limited reporting on intervention adherence, instructor qualifications, and protocol consistency	Makes replication difficult and weakens confidence in intervention effectiveness	[14, 53, 48]
Comparison Groups	Inadequate or weak control conditions (e.g., wait-list or no-treatment controls)	Inflates effect sizes and makes it difficult to isolate mindfulness-specific effects	[15, 34, 12]
Measurement Tools	Heavy reliance on self-report measures of mindfulness and performance	Increases risk of response bias and threatens construct validity	[9, 45, 46]
Performance Outcomes	Inconsistent and indirect measures of sport performance	Makes it difficult to compare findings and draw sport-specific conclusions	[33, 40, 41]
Mechanisms of Action	Limited examination of psychological and neurocognitive mechanisms	Weakens theoretical explanations of <i>how</i> mindfulness improves performance	[16, 37, 43]
Contextual Factors	Insufficient consideration of sport type, training load, and competitive context	Oversimplifies mindfulness effects and ignores situational variability	[1, 40, 51]
Digital & Applied Delivery	Emerging use of apps and digital interventions lacks rigorous evaluation	Unclear effectiveness and quality control in real-world sport settings	[5, 51]
Reporting Standards	Inconsistent adherence to PRISMA and systematic review guidelines	Limits transparency, reproducibility, and synthesis of evidence	[19, 21, 22]

Source: Authors’ synthesis based on reviewed literature

Conclusion

This study employed a systematic literature review (SLR) methodology, guided by the PRISMA 2020 guidelines, to identify common knowledge and gaps in the existing literature on mindfulness interventions in athletes’ contexts. The inclusion criteria were established in advance, and 22 articles published between 2015 and 2025 (up to July 30, 2025) were selected from Google Scholar, ResearchGate, Elsevier, Wiley Online Library, PubMed, and Lens.org. The study aimed to investigate academic research on mindfulness

interventions in athletes’ contexts. The literature was analyzed using thematic analysis, with systematic indicators including article title, keywords, publication year, journal type, open access status, study duration, and language. Three key themes were identified from the reviewed literature: (1) mindfulness-based interventions used in sport contexts (2) psychological and performance-related effects of mindfulness training and (3) methodological quality, contextual influences, and research gaps. The main objective was to identify key research areas within athletes’ contexts.

The review found that a diverse range of mindfulness-based interventions has been applied within sport contexts, reflecting both theoretical plurality and practical adaptability. Commonly mindfulness-based interventions used in sport included MBSR, MAC, MSPE, and sport-specific programs, typically delivered over four to eight weeks. These interventions varied in structure and delivery, with acceptance-based approaches frequently reported as effective for addressing performance-related psychological challenges. The review suggests that mindfulness-based interventions in sport are not uniform in design but rather tailored to different athletes' contexts. However, the variability in intervention characteristics also limited direct comparison across studies, highlighting the need for greater standardization and clearer reporting of intervention components in future research. Future research should prioritize high-quality randomized controlled trials, greater transparency regarding intervention fidelity and practice adherence, and longitudinal designs to better understand the mechanisms through which mindfulness training contributes to athletic performance across diverse sporting contexts. Overall, while the findings of this study cannot be generalized due to certain limitations, the research contributes a novel scholarly perspective on mindfulness training for athletes, addressing existing gaps in both evidence and literature. This study also lays the groundwork for future research in this area.

References

- [1]. Hamilton, L., Smith, C. A., & Brandon, Z. E. (2020). Representing the psychological demands of sport: a constraint-led approach to mental skills training. *Journal of Sport Psychology in Action*, 11(2), 129-137.
- [2]. Wolanin, A., Gross, M., & Hong, E. (2015). Depression in athletes: prevalence and risk factors. *Current sports medicine reports*, 14(1), 56-60.
- [3]. Wiese-Bjornstal, D. M. (2010). Psychology and sociocultural affect injury risk, response, and recovery in high-intensity athletes: a consensus statement. *Scandinavian journal of medicine & science in sports*, 20, 103-111.
- [4]. Trigueros, R., Aguilar-Parra, J. M., Álvarez, J. F., González-Bernal, J. J., & López-Liria, R. (2019). Emotion, psychological well-being and their influence on resilience. A study with semi-professional athletes. *International journal of environmental research and public health*, 16(21), 4192.
- [5]. Balcombe, L., De Leo, D., & Turner, M. J. (2022). Athlete psychological resilience and digital mental health implementation. *Frontiers in psychology*, 13, 1082998.
- [6]. Birrer, D., & Morgan, G. (2010). Psychological skills training as a way to enhance an athlete's performance in high-intensity sports. *Scandinavian journal of medicine & science in sports*, 20, 78-87.
- [7]. Xie, B., Lei, S., Choi, N., Choi, S. M., Wang, X., & Chen, Y. (2025). Impact of mindfulness-based interventions on sports performance and mental health: An umbrella review. *Journal of Exercise Science & Fitness*.
- [8]. Piasecki, P. A., Minkler, T. O., McGehee, C., & Filho, E. (2025). Mindfulness in sport, exercise, and performance psychology: an umbrella review and directions for future research. *International Review of Sport and Exercise Psychology*, 1-24.
- [9]. Black, D. S. (2011). A brief definition of mindfulness. *Behavioral Neuroscience*, 7(2), 109.
- [10]. Gardner, F. L., & Moore, Z. E. (2020). Mindfulness in sport contexts. *Handbook of sport psychology*, 738-750.
- [11]. Josefsson, T., Ivarsson, A., Gustafsson, H., Stenling, A., Lindwall, M., Tornberg, R., & Böröy, J. (2019). Effects of mindfulness-acceptance-commitment (MAC) on sport-specific dispositional mindfulness, emotion regulation, and self-rated athletic performance in a multiple-sport population: an RCT study. *Mindfulness*, 10(8), 1518-1529.
- [12]. Wang, Y., Lei, S. M., & Fan, J. (2023). Effects of mindfulness-based interventions on promoting athletic performance and related factors among athletes: A systematic review and meta-analysis of

- randomized controlled trial. *International journal of environmental research and public health*, 20(3), 2038.
- [13]. Wang, Y., Lei, S. M., & Fan, J. (2023). Effects of mindfulness-based interventions on promoting athletic performance and related factors among athletes: A systematic review and meta-analysis of randomized controlled trial. *International journal of environmental research and public health*, 20(3), 2038.
- [14]. Gardner, F. L., & Moore, Z. E. (2012). Mindfulness and acceptance models in sport psychology: A decade of basic and applied scientific advancements. *Canadian Psychology/Psychologie Canadienne*, 53(4), 309.
- [15]. Rooks, J. D., Morrison, A. B., Goolsarran, M., Rogers, S. L., & Jha, A. P. (2017). "We are talking about practice": The influence of mindfulness vs. relaxation training on athletes' attention and well-being over high-demand intervals. *Journal of Cognitive Enhancement*, 1(2), 141-153.
- [16]. Birrer, D., Röthlin, P., & Morgan, G. (2012). Mindfulness to enhance athletic performance: Theoretical considerations and possible impact mechanisms. *Mindfulness*, 3(3), 235-246.
- [17]. Birrer, D., Röthlin, P., & Morgan, G. (2012). Mindfulness to enhance athletic performance: Theoretical considerations and possible impact mechanisms. *Mindfulness*, 3(3), 235-246.
- [18]. Loke, Y. K., Price, D., Herxheimer, A., & Cochrane Adverse Effects Methods Group a. herxheimer@ ntlworld. com. (2007). Systematic reviews of adverse effects: framework for a structured approach. *BMC medical research methodology*, 7(1), 32.
- [19]. Chapman, K. (2021). Characteristics of systematic reviews in the social sciences. *The Journal of Academic Librarianship*, 47(5), 102396.
- [20]. Sappington, R., & Longshore, K. (2015). Systematically reviewing the efficacy of mindfulness-based interventions for enhanced athletic performance. *Journal of Clinical Sport Psychology*, 9(3), 232-262.
- [21]. Parums, D. V. (2021). Review articles, systematic reviews, meta-analysis, and the updated preferred reporting items for systematic reviews and meta-analyses (PRISMA) 2020 guidelines. *Medical science monitor: international medical journal of experimental and clinical research*, 27, e934475-1.
- [22]. Aromataris, E., & Pearson, A. (2014). The systematic review: an overview. *AJN The American Journal of Nursing*, 114(3), 53-58.
- [23]. Rafi, M., JianMing, Z., & Ahmad, K. (2019). Evaluating the impact of digital library database resources on the productivity of academic research. *Information discovery and delivery*, 47(1), 42-52.
- [24]. Stevinson, C., & Lawlor, D. A. (2004). Searching multiple databases for systematic reviews: added value or diminishing returns?. *Complementary therapies in medicine*, 12(4), 228-232.
- [25]. Lashkari, A. H., Mahdavi, F., & Ghomi, V. (2009, April). A boolean model in information retrieval for search engines. In *2009 International Conference on Information Management and Engineering* (pp. 385-389). IEEE.
- [26]. Madden, A., Bailey, C., Alfes, K., & Fletcher, L. (2018). Using narrative evidence synthesis in HRM research: An overview of the method, its application, and the lessons learned. *Human Resource Management*, 57(2), 641-657.
- [27]. Terry, G., Hayfield, N., Clarke, V., & Braun, V. (2017). Thematic analysis. *The SAGE handbook of qualitative research in psychology*, 2(17-37), 25.
- [28]. Mwita, K., & Mwilongo, N. (2025). Thematic Analysis of Qualitative Research Data: A Seven-Step Guide. Available at SSRN 5200939.
- [29]. Hayes SC, Wilson KG, Gifford EV, Bissett R, Piasecki M, Batten SV, Gregg J. A preliminary trial of twelve-step facilitation and acceptance and commitment therapy with poly substance-abusing methadone-maintained opiate addicts. *Behavior Therapy*. 2004; 35:667–688.
- [30]. Kabat-Zinn, J. *Full catastrophe living: How to cope with stress, pain and illness using mindfulness meditation*. New York: NY: Bantam Dell; 1990.

- [31]. Si, X. W., Yang, Z. K., & Feng, X. (2024). A meta-analysis of the intervention effect of mindfulness training on athletes' performance. *Frontiers in Psychology*, 15, 1375608.
- [32]. Zhang, J., Sun, J., Zhou, Y., Gong, L., & Huang, S. (2025). The effect of mindfulness training on the psychological state of high-level athletes: Meta analysis and system evaluation research. *Journal of Sports Sciences*, 43(6), 600–622. <https://doi.org/10.1080/02640414.2025.2468997>
- [33]. Bühlmayer, L., Birrer, D., Röthlin, P., Faude, O., & Donath, L. (2017). Effects of mindfulness practice on performance-relevant parameters and performance outcomes in sports: A meta-analytical review. *Sports medicine*, 47(11), 2309-2321.
- [34]. Röthlin, P., Horvath, S., Trösch, S., Holtforth, M. G., & Birrer, D. (2020). Differential and shared effects of psychological skills training and mindfulness training on performance-relevant psychological factors in sport: a randomized controlled trial. *BMC psychology*, 8(1), 80.
- [35]. Zhang, J., Sun, J., Zhou, Y., Gong, L., & Huang, S. (2025). The effect of mindfulness training on the psychological state of high-level athletes: Meta analysis and system evaluation research. *Journal of Sports Sciences*, 43(6), 600–622. <https://doi.org/10.1080/02640414.2025.2468997>
- [36]. Kabat-Zinn, J., Beall, B., & Rippe, J. (1985). A systematic mental training program based on mindfulness meditation to optimise performance in collegiate and Olympic rowers. Poster
- [37]. Chiesa, A., & Serretti, A. (2010). A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine*, 40, 1239–1252
- [38]. Appington, R., & Longshore, K. (2015). Systematically reviewing the efficacy of mindfulness-based interventions for enhanced athletic performance. *Journal of Clinical Sport Psychology*, 9(3), 232-262
- [39]. Buhlmeier, L., Birrer, D., Rothlin, P., Faude, O., & Donath, L. (2017). Effects of mindfulness practice on performance-relevant parameters and performance outcomes in sports: A meta-analytic review. *Sports Medicine*, 47, 2309-2321.
- [40]. McCormick, A., Meijen, C. and Marcora, S., (2018). Psychological demands experienced by recreational endurance athletes. *International Journal of Sport and Exercise Psychology*, 16(4), 516 415-430.
- [41]. McCormick, A., Meijen, C. and Marcora, S. (2015). Psychological determinants of whole-body endurance performance. *Sports Medicine*, 45(7), 997-1015.
- [42]. Josefsson, T., Tornberg, R., Gustafsson, H., & Ivarsson, A. (2019). Practitioners' reflections of working with the Mindfulness-Acceptance-Commitment (MAC) approach in team sport settings. *Journal of Sport Psychology in Action*, 1-11, doi:10.1080/21520704.2018.1549641
- [43]. Gardner, F. L., & Moore, Z. E. (2017). Mindfulness-based and acceptance-based interventions in sport and performance contexts. *Current Opinion in Psychology*, 16, 180-184.
- [44]. Jackson, S.A., Kimiecik, J.C., Ford, S.K., Marsh, H.W. (1988). Psychological correlations of flow in sport. *Journal of Sport and Exercise Psychology*, 20, 358-378.
- [45]. Bergomi, C., Tschacher, W., & Kupper, Z. (2015). Meditation practice and self-reported mindfulness: a cross-sectional investigation of meditators and non-meditators using the comprehensive inventory of mindfulness experiences (CHIME). *Mindfulness*, 6(6), 1411-1421.
- [46]. Zhang, C-Q., Si, G., Duan, Y, et al. (2016). The effects of mindfulness training on beginners' skill acquisition in dart throwing: a randomized controlled trial. *Psychology of Sport and Exercise*, 22, 279-285.
- [47]. Sappington, R., & Longshore, K. (2015). Systematically reviewing the efficacy of mindfulness-based interventions for enhanced athletic performance. *Journal of Clinical Sport Psychology*, 9(3), 232-262.
- [48]. Xie, B., Lei, S., Choi, N., Choi, S. M., Wang, X., & Chen, Y. (2025). Impact of mindfulness-based

interventions on sports performance and mental health: An umbrella review. *Journal of Exercise Science & Fitness*.

[49]. Sadeghi, S., & Mohammadi, M. (2025). The effect of neurocognitive skills training based on the efficiency of mindfulness variables on behavioral, cognitive and sports emotion among adolescent athletes aged 10 to 17. *International Journal of Sports Technology and Science*, 3(1), 134-146.

[50]. Zhang, J., Sun, J., Zhou, Y., Gong, L., & Huang, S. (2025). The effect of mindfulness training on the psychological state of high-level athletes: Meta analysis and system evaluation research. *Journal of Sports Sciences*, 43(6), 600-622.

[51]. Bonetti, R., Rod, B., Sabourin, C., & Hauw, D. (2025). Quality of Mobile Apps for Psychological Skills Training in Sport: a MARS-based Study. *Computers in Human Behavior Reports*, 100635.

[52]. Mohammed, W. A., Pappous, A., & Sharma, D. (2018). Effect of mindfulness-based stress reduction (MBSR) in increasing pain tolerance and improving the mental health of injured athletes. *Frontiers in psychology*, 9, 330227.

[53]. Kaufman, K. A., Glass, C. R., & Pineau, T. R. (2019). Mindful sport performance enhancement (MSPE). In *Handbook of mindfulness-based programmes* (pp. 173-190). Routledge.

[54]. Josefsson, T., Ivarsson, A., Gustafsson, H., Stenling, A., Lindwall, M., Tornberg, R., & Böröy, J. (2019). Effects of mindfulness-acceptance-commitment (MAC) on sport-specific dispositional mindfulness, emotion regulation, and self-rated athletic performance in a multiple-sport population: an RCT study. *Mindfulness*, 10(8), 1518-1529.

[55]. Gardner, F. L., and Moore, Z. E. (2017). Mindfulness-based and acceptance-based interventions in sport and performance contexts. *Curr. Opin. Psychol.* 16, 180–184. doi: 10.1016/j.copsyc.2017.06.001

[56]. Norouzi, E., Gerber, M., Masrour, F. F., Vaezmosavi, M., Pühse, U., & Brand, S. (2020). Implementation of a mindfulness-based stress reduction (MBSR) program to reduce stress, anxiety,

and depression and to improve psychological well-being among retired Iranian football players. *Psychology of Sport and Exercise*, 47, 101636.

[57]. Meggs, J., & Chen, M. (2021). The effects of applied and sport-specific mindful sport performance enhancement training on mindfulness skills, flow, and emotional regulation in national competitive swimmers. *Case Studies in Sport and Exercise Psychology*, 5(1), 114-123.