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Original Article

Biopsychosocial Sports Physiotherapy Interventions After Injury in Athletes: A Narrative Review

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ABSTRACT

Background: Sports injury rehabilitation has traditionally focused on biological impairments such as pain, swelling, restricted range of motion, weakness, impaired biomechanics, and delayed tissue healing. Although these factors remain central to sports physiotherapy, athlete recovery and return to sport are also influenced by psychological and social factors, including fear of reinjury, anxiety, confidence, motivation, athletic identity, coach pressure, team expectations, social support, and communication quality. Objective: This narrative review aimed to synthesize recent literature on biopsychosocial sports physiotherapy interventions after injury in athletes and to explain why rehabilitation should move beyond impairment-only models toward whole-athlete recovery. Methods: A targeted narrative literature search was conducted using key concepts related to biopsychosocial sports injury rehabilitation, sports physiotherapy, return to sport, psychological readiness, fear of reinjury, social support, graded exposure, shared decision-making, and multidisciplinary care. Recent reviews, clinical commentaries, return-to-sport studies, and relevant athlete rehabilitation literature were prioritized. Evidence was synthesized conceptually across biological, psychological, and social domains. No meta-analysis, formal risk-of-bias assessment, or certainty grading was performed because the review was designed as a narrative synthesis. Results: The reviewed literature indicates that biological rehabilitation remains foundational, but physical recovery alone may be insufficient for safe and sustainable return to sport. Psychological readiness, fear-of-reinjury management, athlete confidence, education, goal setting, graded exposure, social support, and shared decision-making are clinically relevant components of rehabilitation. Biopsychosocial physiotherapy may improve rehabilitation adherence, confidence, communication, individualized decision-making, and return-to-sport planning. Conclusion: Biopsychosocial sports physiotherapy provides a broader and more clinically responsive framework than impairment-only rehabilitation. Future research should evaluate structured biopsychosocial protocols across specific sports, injury types, and competitive levels. Keywords: biopsychosocial model; sports physiotherapy; athletic injuries; return to sport; psychological readiness; fear of reinjury; rehabilitation; athlete-centered care.

INTRODUCTION

Sports injury rehabilitation has traditionally emphasized biological impairments such as pain, swelling, restricted range of motion, muscle weakness, altered neuromuscular control, impaired biomechanics,

and delayed tissue healing. These physical impairments remain central to sports physiotherapy because athletes must restore tissue capacity, movement quality, strength, endurance, and sport-specific performance before returning safely to training or competition. However, recovery after injury is not determined by biological healing alone. Athletes may regain measurable physical capacity yet continue to experience fear of reinjury, anxiety, reduced confidence, poor motivation, disrupted athletic identity, sleep disturbance, stress, or hesitation during sport-specific tasks. These psychological and contextual barriers can limit rehabilitation adherence, delay return to sport, reduce performance quality, and potentially increase reinjury risk (1).

The biopsychosocial model provides a broader clinical framework for understanding injury recovery in athletes. Within this framework, the biological domain includes tissue healing, pain modulation, inflammation, strength, mobility, endurance, biomechanics, and functional performance. The psychological domain includes fear avoidance, anxiety, mood, confidence, coping style, motivation, perceived readiness, and athletic identity. The social domain includes coach expectations, team pressure, family support, financial concerns, competition schedules, access to care, communication quality, and the athlete's broader sporting environment. Contemporary return-to-sport literature increasingly recognizes that these domains interact throughout rehabilitation rather than functioning as isolated contributors to recovery (2).

This broader perspective is especially important during return-to-sport decision-making. Physical tests such as strength symmetry, hop performance, range of motion, and sport-specific drills provide essential information, but they may not fully capture whether an athlete is psychologically prepared or socially supported for return to competition. An athlete may meet physical criteria but remain fearful of cutting, landing, sprinting, tackling, or competing under pressure. Conversely, an athlete may feel motivated to return prematurely because of team selection, competitive demands, scholarship concerns, or coaching expectations. Therefore, rehabilitation decisions based only on impairment resolution may overlook important barriers to safe and sustainable return to sport (3).

Recent sports medicine literature has increasingly called for interdisciplinary and athlete-centered rehabilitation models that combine physical conditioning with education, psychological readiness assessment, graded exposure, communication, shared decision-making, and contextual support. In professional and competitive sport, collaboration among physiotherapists, physicians, strength and conditioning staff, coaches, psychologists, nutritionists, athletes, and family members may improve decision quality and reduce fragmented care. This approach does not replace impairment-based rehabilitation; rather, it extends it by ensuring that tissue recovery, confidence, coping capacity, and social readiness are addressed together (4).

Despite growing recognition of biopsychosocial rehabilitation, clinical implementation remains inconsistent. Much of the available literature focuses on specific injury types, such as anterior cruciate ligament injury, concussion, chronic musculoskeletal pain, or professional soccer injuries, rather than presenting an integrated sports physiotherapy framework applicable across athletic injuries. In addition, psychological and social factors are often discussed separately from progressive loading and functional rehabilitation, which may limit their practical translation into physiotherapy planning. A narrative synthesis is therefore useful to organize current evidence, clarify clinically relevant domains, and identify how physiotherapists can incorporate biopsychosocial principles into everyday athlete rehabilitation.

This narrative review aims to synthesize recent literature on biopsychosocial sports physiotherapy interventions after injury in athletes. Specifically, it examines how biological, psychological, and social factors influence rehabilitation and return-to-sport outcomes, compares biopsychosocial rehabilitation with impairment-only approaches, and identifies practical strategies that physiotherapists can integrate into athlete-centered rehabilitation planning.

MATERIAL AND METHODS

This article was designed as a narrative review because the objective was to provide an integrated clinical synthesis of biopsychosocial sports physiotherapy interventions rather than to estimate pooled treatment effects or formally map all available evidence. The narrative approach was considered appropriate because the topic spans multiple injury types, athlete populations, rehabilitation settings, and intervention domains, including physical rehabilitation, psychological readiness, fear-of-reinjury management, education, graded exposure, social support, and multidisciplinary return-to-sport planning.

A targeted literature search was conducted to identify recent peer-reviewed literature relevant to biopsychosocial rehabilitation after sports injury. The search focused on publications from 2020 onward, with priority given to systematic reviews, narrative reviews, clinical commentaries, consensus-informed articles, return-to-sport studies, and research addressing psychological or social factors in injured athletes. Search concepts included “biopsychosocial sports injury,” “sports physiotherapy rehabilitation,” “return to sport,” “psychological readiness,” “fear of reinjury,” “athlete injury rehabilitation,” “social support,” “mindfulness after sports injury,” “graded exposure,” “shared decision-making,” and “psychological interventions in injured athletes.”

Articles were considered relevant when they addressed injured athletes, physically active populations, musculoskeletal sports injuries, concussion rehabilitation, return-to-sport decision-making, psychological readiness, fear avoidance, adherence, social support, or multidisciplinary rehabilitation. Evidence was prioritized when it had direct clinical relevance to sports physiotherapy or athlete rehabilitation. Studies and reviews focused exclusively on non-athletic general musculoskeletal populations were considered only when they provided transferable biopsychosocial concepts relevant to athlete care. Literature was excluded when it did not address rehabilitation, return to sport, biopsychosocial factors, or physiotherapy-relevant clinical decision-making.

The synthesis was organized conceptually into biological, psychological, and social domains. Biological interventions included progressive loading, mobility restoration, strengthening, neuromuscular retraining, movement correction, conditioning, and sport-specific drills. Psychological interventions included education, goal setting, psychological readiness assessment, graded exposure, confidence building, imagery, relaxation, mindfulness, and fear-of-reinjury management. Social interventions included communication with coaches and family members, team reintegration, shared decision-making, and multidisciplinary planning. Because this was a narrative review, no statistical pooling, meta-analysis, risk-of-bias scoring, or formal certainty grading was performed. This design introduces potential selection bias; therefore, conclusions are presented as a clinically oriented synthesis rather than as definitive estimates of intervention effectiveness.

Results / Synthesis

The literature supports the view that sports injury rehabilitation should not be limited to impairment correction alone. Across the reviewed sources, physical recovery remained essential, but return-to-sport success was also influenced by psychological readiness, confidence, fear of reinjury, athlete motivation, coping capacity, quality of communication, and social support. These findings support a rehabilitation model in which biological loading and performance restoration are integrated with psychological and contextual management.

Table 1. Summary of Key Evidence Informing Biopsychosocial Sports Physiotherapy After Injury

Author / Year	Article Type or Focus	Population / Context	Key Biopsychosocial Emphasis	Clinical Implication
Cederström et al., 2022 (1)	Clinical commentary on psychological factors in sports injury rehabilitation	Sports injury rehabilitation and physical therapy practice	Psychological factors such as fear, confidence, and readiness should be addressed by physiotherapists	Physiotherapists should screen psychological barriers and integrate basic psychologically informed strategies into rehabilitation

Author / Year	Article Type or Focus	Population / Context	Key Biopsychosocial Emphasis	Clinical Implication
de Queiroz et al., 2023 (2)	Systematic review of clinical practice guidelines for return to sport after ACL injury	Athletes and physically active individuals after ACL injury	Biopsychosocial domains are variably represented in return-to-sport guidelines	Return-to-sport planning should include psychological and contextual domains, not only physical criteria
Müller et al., 2023 (3)	Clinical call for interdisciplinary return-to-sport framework	Snow sports athletes	Return to sport requires biopsychosocial and interdisciplinary decision-making	Physiotherapists should collaborate with sport-specific professionals and consider athlete context
Rollo et al., 2021 (4)	Interdisciplinary review of return to play from musculoskeletal injuries	Professional soccer players	Sports psychology and nutrition complement physical rehabilitation	Elite athlete care should integrate psychological, nutritional, and physical rehabilitation support
Pomarensky et al., 2022 (5)	Biopsychosocial management of musculoskeletal pain	Chronic musculoskeletal pain and athletic training context	Pain and recovery are influenced by biological, psychological, and social factors	Physiotherapists should avoid purely biomedical explanations of persistent pain and disability
Register-Mihalik et al., 2020 (6)	Biopsychosocial model in concussion treatment	Athletes with concussion and post-traumatic headache	Symptoms may be shaped by psychological and social contributors as well as biological injury	Concussion rehabilitation should include symptom education, contextual management, and multidisciplinary care
Gennarelli et al., 2020 (7)	Systematic review of psychosocial interventions after musculoskeletal sports injury	Athletes with musculoskeletal sports injuries	Psychosocial interventions may support recovery, coping, and rehabilitation participation	Psychological support strategies can be useful adjuncts to physical rehabilitation
Aldanyowi and AlOraini, 2024 (8)	Cross-sectional investigation of musculoskeletal injuries and quality of life	Athletes with musculoskeletal injuries	Injury affects quality of life beyond physical impairment	Rehabilitation outcomes should include athlete well-being and function, not only physical recovery
Zhao and Zhang, 2024 (9)	Longitudinal analysis of rehabilitation outcomes after acute sports injuries	Basketball players after acute sports injury	Psychological, physiological, and rehabilitation outcomes interact over time	Monitoring should include both physical and psychological recovery indicators
Takáč, 2025 (10)	Narrative review of emerging technologies and biopsychosocial approaches	Sports injury rehabilitation	Emerging rehabilitation models combine technology, physical care, and biopsychosocial considerations	Modern rehabilitation should integrate innovation with athlete-centered biopsychosocial assessment
Kaur et al., 2025 (11)	Multidisciplinary perspective on rehabilitation strategies	Sports injury rehabilitation	Multidisciplinary rehabilitation supports broader recovery needs	Rehabilitation planning should involve coordinated input when athlete needs exceed physical impairment management

Table 2. Biopsychosocial Domains in Athlete Rehabilitation

Domain	Key Factors	Physiotherapy Interventions	Expected Clinical Outcome
Biological	Pain, swelling, strength loss, reduced range of motion, impaired tissue capacity, altered biomechanics, poor neuromuscular control	Progressive loading, mobility work, strengthening, proprioception, balance training, movement retraining, conditioning, sport-specific drills	Improved tissue tolerance, strength, movement quality, physical function, and sport-specific performance
Psychological	Fear of reinjury, anxiety, low confidence, poor motivation, reduced athletic identity, low psychological readiness	Education, goal setting, graded exposure, readiness screening, confidence-building drills, imagery, relaxation, mindfulness, referral when needed	Improved confidence, coping, adherence, emotional regulation, and readiness to return to sport
Social	Coach pressure, team isolation, family expectations, financial stress, communication gaps, competition demands	Shared decision-making, coach education, family involvement, team reintegration, multidisciplinary meetings, coordinated return-to-sport planning	Improved support, reduced external pressure, clearer communication, and safer return-to-sport decisions

Table 3. Comparison of Impairment-Only and Biopsychosocial Rehabilitation

Feature	Impairment-Only Rehabilitation	Biopsychosocial Rehabilitation
Main focus	Tissue healing and correction of physical deficits	Whole-athlete recovery across physical, psychological, and contextual domains
Assessment	Pain, swelling, range of motion, strength, biomechanics, functional tests	Physical impairments plus psychological readiness, fear, confidence, stress, adherence, and social support
Return-to-sport decision	Based mainly on physical recovery and performance testing	Based on physical performance, psychological readiness, athlete confidence, communication, and sporting context
Athlete role	Often a passive recipient of prescribed treatment	Active participant in goal setting and shared decision-making
Common limitation	May miss fear, stress, low confidence, poor communication, and external pressure	Requires more time, communication, clinical reasoning, and multidisciplinary coordination
Clinical value	Useful for restoring physical capacity	More complete for safe, sustainable, athlete-centered return to sport

Table 4. Practical Biopsychosocial Interventions for Sports Physiotherapy

Intervention	Primary Target	Evidence-Informed Rationale	Practical Application
Progressive loading	Biological recovery	Restores tissue capacity, strength, tendon tolerance, joint control, and sport-specific physical readiness	Progress from protected movement to strength training, plyometrics, running, agility, and sport-specific drills

Intervention	Primary Target	Evidence-Informed Rationale	Practical Application
Psychological readiness assessment	Return-to-sport confidence	Psychological readiness is associated with return-to-sport behavior and may identify athletes who are physically capable but hesitant	Use validated readiness scales where available and discuss confidence before full competition
Fear-of-reinjury management	Avoidance and protective movement	Fear can persist after physical recovery and may limit performance quality or increase guarded movement	Use graded exposure to feared movements such as sprinting, cutting, landing, tackling, or jumping
Education	Understanding and self-management	Clear explanation improves expectations, adherence, and athlete engagement	Explain injury mechanism, healing timelines, load management, flare-up interpretation, and return criteria
Goal setting	Motivation and adherence	Structured goals improve participation and give athletes visible markers of progress	Use short-term and sport-specific goals linked to measurable functional milestones
Mindfulness and relaxation	Stress and emotional regulation	Stress, frustration, and anxiety may affect rehabilitation participation and perceived readiness	Use breathing, relaxation, mindfulness, or referral when emotional distress is prominent
Social support	Team reintegration and coping	Support from coaches, family, teammates, and clinicians may improve confidence and adherence	Include key support figures in rehabilitation discussions when appropriate
Shared decision-making	Safe return to sport	Athlete-centered decisions may reduce premature return and improve commitment to rehabilitation	Combine test results, athlete goals, confidence, clinical judgment, and sport demands before clearance

Overall, the synthesis indicates that biopsychosocial sports physiotherapy provides a broader and more clinically responsive framework than impairment-only rehabilitation. Biological interventions remain the foundation of recovery, but psychological and social interventions help address barriers that may persist after physical impairments improve. The most clinically relevant outcomes supported by the literature include improved rehabilitation adherence, better psychological readiness, reduced fear of reinjury, improved communication, safer progression, and more individualized return-to-sport planning.

The evidence also suggests that biopsychosocial care should be applied pragmatically rather than as a separate treatment category. For example, a football player recovering from hamstring injury may require progressive sprint exposure, strength restoration, education about load tolerance, confidence-building drills, and communication with coaching staff about staged reintegration. Similarly, an athlete after knee injury may pass strength and hop testing but still require graded exposure to cutting, landing, and reactive decision-making before full competition. These examples illustrate that physical performance, psychological readiness, and sporting context should be interpreted together during rehabilitation.

Because the included literature covers diverse injury types, sports, and athlete populations, the current synthesis should not be interpreted as proof that every biopsychosocial intervention produces equivalent benefit across all athletes. Instead, the evidence supports a clinically reasoned model in which physiotherapists routinely screen for biological, psychological, and social barriers, match interventions to the athlete's needs, and collaborate with other professionals when barriers exceed the physiotherapist's scope of practice.

DISCUSSION

This narrative review synthesized recent literature on biopsychosocial sports physiotherapy interventions after injury in athletes, with emphasis on how biological, psychological, and social factors influence rehabilitation and return-to-sport planning. The principal finding is that athlete recovery cannot be adequately understood through impairment resolution alone. Physical rehabilitation remains the foundation of sports injury management, including progressive loading, strength restoration, mobility recovery, neuromuscular retraining, conditioning, and sport-specific performance preparation. However, the reviewed literature indicates that psychological readiness, fear of reinjury, confidence, motivation, adherence, social support, communication quality, and contextual pressure also influence whether an athlete returns safely and sustainably to sport (1–4).

These findings are consistent with contemporary sports rehabilitation literature, which increasingly emphasizes psychologically informed and interdisciplinary care. Cederström et al. highlighted that psychological factors are clinically relevant in sports injury rehabilitation and should not be considered outside the physiotherapist's concern (1). Similarly, de Queiroz et al. found that return-to-sport guidelines

after anterior cruciate ligament injury variably incorporate biopsychosocial domains, suggesting that psychological and contextual factors remain inconsistently embedded in formal rehabilitation guidance (2). This supports the central argument of the present review: physical criteria are necessary, but they do not fully represent athlete readiness.

The review also supports the view that return-to-sport decision-making should be interpreted as a multidimensional process rather than a single clearance event. Traditional impairment-based rehabilitation commonly emphasizes pain reduction, restored range of motion, strength symmetry, functional testing, and sport-specific drills. These indicators remain essential because athletes require adequate tissue capacity and performance tolerance before returning to high-load activity. Nevertheless, an athlete who demonstrates acceptable physical performance may still avoid sport-specific movements because of fear, hesitation, low confidence, or uncertainty about reinjury. This is particularly relevant after injuries involving cutting, landing, sprinting, contact, or high-speed directional change, where psychological hesitation may alter movement patterns and performance execution.

The interdisciplinary return-to-sport literature further reinforces the need to integrate psychological and social considerations into rehabilitation. Müller et al. called for biopsychosocial and interdisciplinary return-to-sport frameworks in snow sports athletes, emphasizing that sport-specific context and athlete environment must be considered alongside physical recovery (3). Rollo et al. similarly described the value of integrating sports psychology and sports nutrition with musculoskeletal rehabilitation in professional soccer, indicating that elite athlete care often requires coordinated input beyond physiotherapy alone (4). These findings suggest that biopsychosocial rehabilitation is not a replacement for physical rehabilitation but an expansion of clinical reasoning that allows physiotherapists to identify and manage barriers that impairment-only models may overlook.

Fear of reinjury emerged as a particularly important psychological barrier. It may persist even after pain, swelling, strength deficits, or range-of-motion restrictions have improved. If unaddressed, fear may contribute to avoidance, guarded movement, low training intensity, reduced confidence, and delayed return to competitive performance. Graded exposure offers a practical strategy for integrating psychological and physical rehabilitation because it allows athletes to progressively confront feared movements under controlled conditions. For example, an athlete recovering from hamstring injury may progress from controlled running to acceleration drills, reactive sprinting, sport-specific sprint exposures, and full team training. Similarly, an athlete recovering from knee injury may progress from basic strength and landing mechanics to planned cutting, unplanned agility, contact preparation, and competition-specific scenarios. In this way, graded exposure functions as both a physical progression and a confidence-building intervention.

Social and contextual factors also require greater clinical attention. Athletes may experience pressure from coaches, teammates, parents, sponsors, selection timelines, competition schedules, or financial demands. These pressures can lead to premature return, symptom concealment, poor adherence, or conflict between athlete goals and clinical recommendations. A biopsychosocial approach encourages communication among the athlete, physiotherapist, physician, coach, family, and other support personnel when appropriate. Shared decision-making is especially important because athletes are more likely to engage with rehabilitation when they understand return-to-sport criteria, participate in goal setting, and feel that their concerns are acknowledged.

The findings of this review also have implications for outcome measurement. Rehabilitation success should not be evaluated only through physical impairment measures. In addition to pain, range of motion, strength, neuromuscular control, and functional performance, physiotherapists should consider psychological readiness, fear of reinjury, athlete confidence, perceived function, adherence, sleep, stress, and quality of social support. This does not mean that every athlete requires extensive psychological intervention. Rather, routine screening can help identify those who may benefit from education, graded

exposure, confidence-building tasks, relaxation strategies, or referral to a sport psychologist or mental health professional.

A key contribution of this review is the integration of biopsychosocial principles into a practical sports physiotherapy framework. Existing literature often discusses physical rehabilitation, psychological readiness, and social support as separate themes. By organizing these domains together, this review emphasizes that athlete rehabilitation should be individualized, progressive, and context-sensitive. For clinicians, this means that rehabilitation planning should ask not only whether the injured tissue has recovered, but also whether the athlete feels ready, trusts the injured body region, understands the rehabilitation process, has adequate support, and can tolerate the demands of the intended sporting environment.

This review has several limitations. First, because it was designed as a narrative review, it did not use a fully systematic search protocol, dual independent screening, formal risk-of-bias assessment, certainty grading, or meta-analysis. Therefore, the findings should be interpreted as a clinically oriented synthesis rather than as definitive evidence of intervention effectiveness. Second, the reviewed literature included diverse injury types, sports, competitive levels, and rehabilitation contexts, which limits the ability to make injury-specific recommendations. Third, psychological and social interventions are difficult to standardize because athletes differ in personality, injury history, sport demands, social environment, and access to multidisciplinary care. Fourth, some recommendations are supported by indirect evidence or expert interpretation rather than high-quality randomized trials in athlete-specific populations.

Future research should develop and test structured biopsychosocial rehabilitation protocols for specific athlete groups and injury types. Randomized controlled trials and prospective cohort studies are needed to evaluate whether integrating psychological readiness assessment, graded exposure, education, goal setting, shared decision-making, and social support improves return-to-sport rates, reinjury risk, adherence, performance, confidence, and long-term well-being. Future studies should also examine which biopsychosocial screening tools are most practical for physiotherapy settings and how multidisciplinary teams can implement these approaches in resource-limited environments.

CONCLUSION

Biopsychosocial sports physiotherapy provides a more complete framework for athlete rehabilitation after injury than impairment-only rehabilitation. Physical recovery remains essential, but return to sport is also shaped by psychological readiness, fear of reinjury, confidence, motivation, social support, communication, and contextual pressure. Physiotherapists should therefore combine progressive physical rehabilitation with education, goal setting, psychological screening, graded exposure, shared decision-making, and coordinated support when appropriate. Future research should evaluate structured biopsychosocial rehabilitation models across specific sports, injury types, and competitive levels to determine their effects on return-to-sport success, reinjury rates, performance restoration, and long-term athlete well-being.

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