



QUALITY IN SPORT

eISSN 2450-3118 · Open Access · Peer-reviewed

apcz.umk.pl/QS Nicolaus Copernicus University in Toruń



Cite as: GĄSKA, Anna Agnieszka, GUTKOWSKA, Marta, JABŁOŃSKA, Joanna, WASIK, Joanna, ARMUŁA, Marta, BONGEGE, Claire, PIECHOWIAK, Arkadiusz, NAPIERAJ, Filip, HERC, Bartosz Przemysław and TESLA, Małgorzata. Anxiety-related responses after sports injury in adolescent athletes: from protective caution to kinesiphobia, sport avoidance and depressive symptoms - a narrative review. *Quality in Sport*. 2026;63:73259. <https://doi.org/10.12775/QS.2026.63.73259>

ARTICLE TIMELINE

Received: 11.06.2026. Revised: 10.07.2026. Accepted: 12.07.2026. Published: 12.07.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

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Anxiety-related responses after sports injury in adolescent athletes: from protective caution to kinesiphobia, sport avoidance and depressive symptoms - a narrative review

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Abstract

Background. Sports injuries are frequent among adolescent athletes, especially in organized and competitive sport settings. (1) Although sports injuries are often approached primarily as orthopedic or rehabilitation problems, they may also have important psychological consequences. Previous literature indicates that injury may affect psychological well-being, return-to-sport readiness, athletic identity and quality of life in adolescent and young

athletes(2,3). Therefore, kinesiophobia, fear of reinjury, sport avoidance and depressive symptoms should be considered within a broader post-injury psychological context rather than as isolated phenomena.

Aim. The aim of this narrative review was to describe anxiety-related responses after sports injury in adolescent athletes as a continuum ranging from protective caution to kinesiophobia, sport avoidance and depressive symptoms.

Material and methods. A narrative review of the literature was conducted using publications concerning adolescent athletes, sports injury, kinesiophobia, fear of reinjury, fear-avoidance mechanisms, psychological readiness to return to sport, sport avoidance, depressive symptoms, anxiety symptoms, athletic identity and quality of life after injury. The review included systematic reviews, narrative reviews, clinical reviews, observational studies and qualitative studies relevant to sports medicine, rehabilitation, sport psychology and sport psychiatry.

Results. The reviewed literature suggests that post-injury psychological responses may include fear of reinjury, kinesiophobia, anxiety, negative mood, loss of motivation and depressive symptoms(4,5). A certain degree of caution after injury is important and may be protective, especially when reinjury risk is clinically relevant or when the athlete has not yet completed rehabilitation. However, persistent fear of movement or reinjury may become maladaptive when it leads to avoidance of rehabilitation, delayed sport reintegration, reduced participation or withdrawal from team activities(6). Adolescent athletes may be particularly vulnerable because injury-related absence can disrupt athletic identity, peer relationships, self-esteem and perceived future opportunities(2,7). Depressive symptoms and broader psychological consequences after injury are clinically relevant, although adolescent-specific data on their prevalence, predictors and long-term course remain less developed than evidence from adult or collegiate athlete populations(8).

Conclusions. Anxiety-related responses in injured adolescents should be understood as a multidimensional continuum involving physical recovery, psychological readiness, developmental vulnerability, social context and mental health. Kinesiophobia is an important part of this process, but it should be interpreted within a broader spectrum of protective caution, maladaptive avoidance, sport withdrawal and depressive symptoms. Rehabilitation should include not only physical assessment, but also psychological screening and support, especially when fear, avoidance, low confidence, social withdrawal, loss of motivation or mood symptoms

persist. Further adolescent-specific longitudinal studies are needed to clarify how maladaptive avoidance develops and how early intervention may prevent persistent kinesiophobia, delayed return to sport and clinically significant mental health consequences.

Keywords: adolescent athletes; sports injury; kinesiophobia; fear of reinjury; fear-avoidance; return to sport; sport avoidance; depressive symptoms; anxiety; mental health.

1. Introduction

Sports injuries are frequent among adolescent athletes, especially in organized and competitive sport settings(1,9,10). They may interrupt training, limit participation in competition, separate the athlete from teammates and challenge the athlete's confidence in their own body. In adolescence, these consequences may be particularly significant because sport is often connected with identity, peer belonging, self-esteem and future aspirations. Reviews focused on young athletes emphasize that injuries may affect mental and psychological well-being, including emotional functioning, return-to-sport experience and identity development(2,3)

After injury, a certain degree of caution is important and may be protective. It can prevent premature loading, support adherence to rehabilitation recommendations and reduce the risk of reinjury. However, caution may become maladaptive when it develops into persistent fear of movement, fear of reinjury, avoidance of rehabilitation exercises, delayed return to sport or withdrawal from athletic participation. The clinical challenge is therefore not to eliminate all fear, but to distinguish protective caution from anxiety-related avoidance.

This distinction is especially relevant in this population, as adolescent athletes may experience pressure to return to play quickly, fear of losing their position in the team, parental or peer expectations, and difficulty coping with temporary exclusion from sport. Together, these factors may interfere with both physical and psychological readiness to return to sport(3,7). Kinesiophobia, described as excessive fear of physical movement or activity related to vulnerability to pain, injury or reinjury, is a central concept in this context. A recent systematic review concluded that kinesiophobia exists in injured athletes and is associated with lower

physical and mental outcomes(6). Fear of reinjury may also negatively affect rehabilitation, self-reported function and successful return to sport(4).

The relevance of this topic is also consistent with recent publications in *Quality in Sport*. A narrative review on return-to-sport gap in non-elite athletes discussed the psychological consequences of injury and forced detraining in the return-to-sport process(11). Another *Quality in Sport* literature review concerning anterior cruciate ligament rupture emphasized that return to sport should be understood from a multidimensional perspective, including psychosocial aspects, anxiety, motivation and therapeutic support(12). These publications support the importance of considering psychological factors in injury recovery and return-to-sport decisions.

The aim of this narrative review is to describe anxiety-related and depressive responses after sports injury in adolescent athletes, with particular attention to protective caution, kinesiophobia, fear of reinjury, sport avoidance, return-to-sport difficulties and mental health outcomes.

2. Research materials and methods

This article is a narrative review. A literature search was carried out in PubMed, Google Scholar and other scientific databases. The purpose was to identify relevant publications concerning anxiety-related and depressive responses after sports injury in adolescent athletes, with particular attention to kinesiophobia, fear of reinjury, sport avoidance and psychological readiness to return to sport.

The search included publications mainly from recent years. Additionally, selected older landmark studies were included when they were important for the conceptual framework of the review, especially in relation to the fear-avoidance model and psychological factors in sports injury. The following keywords and combinations were used: “adolescent athletes”, “young athletes”, “sports injury”, “musculoskeletal injury”, “kinesiophobia”, “fear of reinjury”, “fear-avoidance”, “psychological readiness”, “return to sport”, “sport avoidance”, “depressive symptoms”, “anxiety symptoms”, “athletic identity”, “quality of life”, “mental health after sports injury” and “pressure to return to play”.

Only articles published in English were included. Systematic reviews, narrative reviews, clinical reviews, observational studies and qualitative studies were considered. Priority was

given to publications concerning adolescent or young athletes. Studies involving adult, collegiate or mixed athletic populations were also included when they provided relevant theoretical or clinical background on kinesiophobia, fear of reinjury, return-to-sport pressure, psychological readiness or mental health after injury.

The findings were grouped into the following areas: frequency and clinical relevance of sports injuries in adolescent athletes, protective caution after injury, kinesiophobia and fear-avoidance mechanisms, mental health outcomes associated with post-injury avoidance, adolescent-specific vulnerability, depressive symptoms after injury, and clinical implications for prevention and rehabilitation. Because of the narrative character of the review, no meta-analysis or statistical pooling was performed.

3. Research results / Narrative synthesis

3.1. Sports injuries as a frequent clinical problem in adolescent athletes

Sports injuries are common in adolescent athletes and physically active adolescents. European data confirm the relevance of this problem. In the Finnish National Physical Activity Behavior Study, which included 8406 pupils aged 11, 13 and 15 years, injury prevalence was highest in sports club activities, reaching 46%(1). These findings suggest that organized sport is a particularly relevant setting for injury prevention and post-injury care in adolescents.

A prospective Spanish study involving 498 amateur and professional adolescent athletes aged 14–21 years further supports the importance of systematic injury monitoring in this population(9). In elite adolescent athletes, injury burden may be particularly high; in a 52-week prospective study, more than three out of ten elite adolescent athletes reported being injured in an average week(10). These findings indicate that sports injury is a common and clinically relevant experience during adolescence, especially in organized and competitive sport settings.

The frequency of injuries in this population justifies attention not only to prevention and physical rehabilitation, but also to psychological impact. An injury can temporarily remove an adolescent athlete from their training routine, team environment and competitive goals. Therefore, even when the injury is not career-ending, it may interfere with daily structure, social belonging and self-confidence.

3.2. Protective caution after sports injury

After sports injury, caution may represent an adaptive psychological response. It may help the athlete avoid premature loading, respect tissue healing and follow rehabilitation recommendations. In adolescent athletes, this protective function may be particularly important because enthusiasm to return to competition, pressure from peers or coaches, and fear of losing one's position may encourage premature return to sport (3).

Protective caution should be distinguished from pathological fear. A cautious athlete may still participate in rehabilitation, gradually increase physical demands and maintain realistic confidence in recovery. By contrast, maladaptive fear is characterized by persistent avoidance, disproportionate threat perception and reduced willingness to engage in movement despite adequate recovery progress or medical clearance(4,13).

This distinction is clinically important because adolescent athletes may experience pressure to return before they are physically or psychologically ready. Jeong et al. describe pressure to return to play quickly as a factor that may hinder true physical and psychological readiness in adolescents after injury(3). Similarly, research on psychological readiness after injury suggests that returning before adequate psychological readiness may contribute to fear, anxiety and reduced performance(13).

At the opposite end of the spectrum, insufficient caution may also be harmful. Some athletes may show excessive eagerness to return, overadherence to rehabilitation goals or willingness to resume sport despite unresolved clinical or functional limitations. Podlog et al. found that in adolescents, self-presentation concerns and athletic identity were associated with rehabilitation overadherence and a tendency to risk premature return to sport(14). Therefore, protective caution may be understood as a balanced response between two maladaptive extremes: premature return and pathological avoidance.

3.3. Kinesiophobia and fear-avoidance mechanisms

Kinesiophobia refers to excessive fear of movement or physical activity related to perceived vulnerability to pain, injury or reinjury. In injured athletes, it may present as avoidance of sport-specific movements, reluctance to perform rehabilitation exercises, excessive guarding, reduced confidence and withdrawal from physical challenges (6).

The concept is closely related to the fear-avoidance model, originally developed to explain exaggerated pain perception and later widely used in musculoskeletal pain research(15–17). According to this model, when pain or injury is interpreted as threatening, the athlete may begin to avoid movement to prevent pain or reinjury. Although avoidance may temporarily reduce anxiety, it can also maintain fear, reduce physical confidence, contribute to disuse and deconditioning, and prolong functional limitation(16,17).

In sports injury rehabilitation, similar mechanisms are discussed in relation to fear of reinjury and kinesiophobia, which may negatively affect rehabilitation outcomes and return to sport(4,6). A recent systematic review of kinesiophobia in injured athletes found that kinesiophobia was present in athletes and was associated with lower physical and mental outcomes. The review also noted that most included studies involved lower-extremity injuries and that the Tampa Scale of Kinesiophobia was commonly used to assess this construct (6).

Athletic fear-avoidance has also been examined in rehabilitation settings. Suzuki et al. described athletic fear-avoidance as refusal to engage in activity after musculoskeletal injury because of fear of pain, which may contribute to persistent symptoms, depression and disability(18). Although studies differ in injury type and population, they support the broader relevance of fear-avoidance mechanisms in injured athletes.

In this review, kinesiophobia is therefore interpreted not as a single isolated symptom, but as part of a broader anxiety-related avoidance pathway. The central clinical issue is not the mere presence of fear, but whether fear begins to control behavior, reduce rehabilitation participation and prevent safe return to sport.

3.4. Mental health outcomes associated with kinesiophobia and post-injury avoidance

Persistent post-injury avoidance may have consequences that extend beyond delayed physical recovery. When an athlete repeatedly avoids rehabilitation tasks, sport-specific movements or team participation, the injury may become associated not only with pain or reinjury risk, but also with loss of confidence, reduced motivation and emotional distress. Psychological distress after sports injury may include anxiety, negative mood, fear of reinjury and loss of motivation(5).

The association between injury-related fear and mental health outcomes has been described in both athlete-specific and adolescent-focused literature. A systematic review of kinesiophobia

in injured athletes reported that kinesiophobia was associated with lower physical and mental outcomes, with common related mental factors including anxiety, low confidence and fear-avoidance responses(6). Similarly, literature focused on sports injuries in adolescence indicates that depression, fear of reinjury and kinesiophobia may be associated with worse pain, quality of life, function and return-to-sport outcomes(2,3).

Post-injury avoidance may also affect the athlete's quality of life through reduced participation. Albishi et al. emphasize that adverse outcomes after sports participation may affect both physical and mental health, and that the relationship between sports injuries and mental health is bidirectional(5). This is important for kinesiophobia because avoidance can reduce exposure to normal sport routines, limit contact with teammates and increase the athlete's focus on symptoms. In adolescents, this may be especially relevant because sport is often connected with peer belonging, identity and self-esteem(2,3).

The mental health consequences of injury have also been reported in specific injury contexts. During ACL rehabilitation, psychological impairments may include frustration, lack of motivation, fear of reinjury, loss of athletic identity, anxiety and disordered eating(19). Previous ankle injury has also been associated with lower functional and mental health scores in athletes, suggesting that the effects of injury may persist beyond tissue healing(20). Similarly, knee injuries in female athletes have been reported to affect physical and emotional well-being, vitality, social functioning and quality of life(21).

For adolescent athletes, the main clinical concern is that persistent avoidance may reduce return to normal sport participation and weaken the protective social and developmental role of sport. Injury-related withdrawal can separate the athlete from teammates, reduce daily structure and challenge athletic identity. In this context, kinesiophobia may coexist with depressive-anxiety symptoms, especially when the athlete experiences prolonged absence, uncertainty about recovery or loss of motivation(2,3,5).

However, current evidence should be interpreted cautiously. The available literature supports associations between sports injury, kinesiophobia, fear of reinjury, mental health and quality of life, but it does not prove that kinesiophobia directly causes depression in every injured adolescent athlete. Rather, persistent kinesiophobia may be understood as a clinically relevant warning sign that the recovery process is becoming psychologically complicated.

3.5. Assessment tools for post-injury psychological responses

Assessment tools may help identify whether post-injury fear remains within the range of adaptive caution or becomes part of a maladaptive recovery pattern. Juggath and Naidoo examined athletes aged 18–30 years and used the Injury-Psychological Readiness to Return to Sport scale (I-PRRS) together with the Athlete Fear Avoidance Questionnaire (AFAQ). The I-PRRS assessed confidence to return to play, including confidence to perform without pain, give full effort, trust the injured body part and perform at the previous skill level, while the AFAQ measured pain-related fear avoidance in athletes. In their sample, 60% of injured athletes were classified as not ready to return to sport, and psychological readiness was negatively correlated with athletic fear avoidance(13).

In adolescent athletes, assessment should also include the opposite side of the problem: excessive eagerness to return and rehabilitation overadherence. Podlog et al. studied 118 injured adolescent athletes aged 13–18 years and 105 injured collegiate athletes. They developed and validated the Rehabilitation Overadherence Questionnaire (ROAQ), and also used the Athletic Identity Measurement Scale (AIMS), the Self-Presentation in Sport Questionnaire (SPSQ) and a modified version of the I-PRRS to assess willingness to risk premature return to sport(14). Their findings showed that self-presentation concerns and athletic identity were associated with risky rehabilitation behaviours, including ignoring practitioner recommendations, attempting to accelerate rehabilitation and risking premature return.

Recent adolescent-specific evidence further supports the need to assess both athletic identity and fear avoidance during return-to-sport rehabilitation. Nyland et al. studied 60 adolescent athletes with musculoskeletal sports injuries, with a mean age of 16.9 years, and used the AIMS, the AFAQ and an expanded AFAQ+ version that included additional questions about fear of movements resembling the injury mechanism and pain-related movement avoidance. Their results showed that lower athletic identity was associated with higher fear avoidance, whereas athletes with higher athletic identity had lower fear avoidance(22). This finding supports a more nuanced interpretation of post-injury fear: excessive fear may delay rehabilitation and return to sport, but very low fear or excessive confidence may also be problematic if it encourages premature exposure to demanding sport-specific tasks. Therefore, psychological assessment after injury should aim to identify an appropriate balance between confidence and caution, rather than simply reducing fear in every athlete.

3.6. Particular vulnerability to kinesiophobia and post-injury avoidance in adolescents

Adolescent athletes may be particularly vulnerable to post-injury kinesiophobia and avoidance because injury occurs during a developmental period characterized by identity formation, emotional sensitivity, peer comparison and increasing autonomy(2,3). During adolescence, sport may become an important source of self-esteem, social belonging and perceived competence. Therefore, injury-related absence from training or competition may be experienced not only as a physical limitation, but also as a disruption of social role and athletic identity(3,7).

This developmental context may intensify injury-related fear. An adolescent athlete may fear not only pain or reinjury, but also falling behind peers, losing playing time, being replaced in the team or failing to regain the previous level of performance(7,23). These concerns may increase the emotional meaning of return-to-sport decisions and make rehabilitation psychologically demanding. In qualitative research on adolescent injury recovery, athletes described unrealistic expectations, premature return to sport, incomplete rehabilitation and reinjury as relevant concerns during the recovery process (7).

Adolescents may also have less experience coping with prolonged injury, uncertainty and temporary exclusion from sport than adult athletes(2,24). Although the study by Yang et al. focused on adult populations over the age of 18, its findings underscore the critical role of social support during rehabilitation. Specifically, the authors demonstrated that athletes' support networks shift significantly post-injury, with a heightened reliance on coaches, athletic trainers, and physicians. This shift highlights that recovery is far more than a physical or medical process - it represents a profound psychosocial transition where athletes seek reassurance, guidance, and emotional backing from their immediate sporting environment.(25) For adolescent athletes, this dynamic may be even more acute, because being abruptly sidelined from daily training, competition and team contact can amplify uncertainty, frustration and isolation.

The social environment may further influence this process. Parents, peers and coaches may provide support, but they may also contribute to perceived pressure to recover quickly or continue participation despite pain(3,7). In this context, the adolescent athlete may experience a conflict between the fear of reinjury and the expectation to return to sport which may result in two different maladaptive patterns: premature return despite incomplete readiness or, conversely, persistent avoidance due to increased anxiety and reduced confidence(13,14).

Adolescence marks a critical window for the onset of various psychological conditions. Albishi et al. note that a large proportion of lifetime mental health conditions begin by the age of 24, which overlaps with important years of athletic development and competition(5). From a clinical standpoint, it is vital to identify when a patient's post-injury anxiety, avoidant behavior, apathy, or isolation point to broader mental health challenges, instead of being a short-lived reaction to getting hurt.

For these reasons, kinesiophobia in adolescent athletes should be interpreted within a developmental and social framework. The same level of fear may have different consequences depending on the athlete's age, coping resources, family support, team environment, athletic identity and perceived pressure to return.(26,27) Therefore, adolescent athletes may require a more integrated approach that considers physical recovery, psychological readiness, social support and mental health risk.

3.7. Depressive symptoms and broader psychological consequences after injury in adolescent athletes

Depressive symptoms and other psychological consequences after sports injury are particularly relevant in adolescent athletes. Haraldsdottir and Watson emphasize that, although injury management traditionally focuses on pain reduction and restoration of physical function, the psychosocial consequences of sports injury in adolescent athletes may be substantial and may jeopardize return to play, increase reinjury risk and contribute to mental health disorders(2).

Palisch and Merritt similarly emphasize that a serious injury can cause depressive symptoms in athletes, but they also note that much of the available literature focuses on collegiate athletes. According to their review, little is known about the prevalence of depressive symptoms in young athletes whose injury limits competition or may end sport participation altogether(8). This limitation is important because adolescent athletes may be psychologically vulnerable, but the available data are still less precise than in adult or collegiate samples.

Studies in competitive and collegiate athletes nevertheless suggest that depressive symptoms after injury are clinically relevant. Appaneal et al. assessed depression among male and female competitive athletes at 1 week, 1 month and 3 months after injury, using the Center for Epidemiologic Studies Depression scale and a clinical interview based on the Hamilton Rating Scale for Depression. Greater restriction of sports participation was associated with higher

depressive symptom scores, and female athletes showed greater post-injury depression symptom severity than male athletes (28). Although this study does not focus exclusively on adolescents, it supports the clinical relevance of monitoring mood symptoms after injury.

In adolescent and young athletes, depressive symptoms following injury may be influenced not only by the physical impairment itself, but also by the athlete's subjective interpretation of the injury and its consequences. Injury may lead to absence from training, loss of daily structure, reduced contact with teammates, uncertainty about future performance and fear of not returning to the previous level of sport. Palisch and Merritt point out that, for many young athletes, sport is an important part of how they see themselves. Therefore, being unable to train or compete after injury may feel not only like a physical limitation, but also like a loss of identity. This may increase the risk of depressive symptoms or worsen pre-existing mental health difficulties. Sport may also serve as a way of coping with stress and emotions. When injury suddenly removes this source of routine, release and support, the athlete may find it more difficult to manage emotional distress(8). This point is consistent with research on athletic identity. Podlog et al. note that stronger athletic identity has been associated with early depressive symptoms following injury among adolescents, while increased social support was associated with lower initial depressive symptoms(7).

It is also supported by more recent work on athletic identity after musculoskeletal injury. Park et al. reported that stronger athletic identity was associated with more severe depressive symptoms after musculoskeletal injury, suggesting that the loss or disruption of the athletic role may be an important psychological mechanism after injury(29). Although this evidence is not limited only to adolescents, it is highly relevant because athletic identity may become particularly salient during adolescence and young adulthood.

The consequences of depressive symptoms after injury may include lower motivation, reduced rehabilitation engagement, social withdrawal, sleep disturbance, irritability, impaired concentration and reduced confidence in return to sport. Albishi et al. describe postinjury psychological distress, including symptoms of anger, depression and anxiety, as a factor that can cause loss of motivation during recovery and hinder rehabilitation and prolong recovery(5). These symptoms may be especially problematic when they coexist with kinesiophobia, because fear-based avoidance can further reduce activity, delay graded exposure and reinforce the athlete's sense of helplessness.

Depressive symptoms may also have broader quality-of-life consequences.(5) In specific injury contexts, psychological impairments during ACL rehabilitation may include frustration, lack of motivation, fear of reinjury, loss of athletic identity, anxiety and even disordered eating (19). Therefore, persistent sadness, loss of motivation, withdrawal from the team environment or reduced engagement in rehabilitation should not be interpreted only as “lack of discipline”, but as possible warning signs of clinically relevant psychological distress.

Screening may be particularly important because there are no specific recommendations for depression screening exclusively in young athletes after injury. Palisch and Merritt note that the American Academy of Pediatrics recommends annual screening for emotional and behavioral problems, including depression screening beginning at age 12 years, while the U.S. Preventive Services Task Force recommends screening adolescents aged 12–18 years for major depressive disorder using tools such as the Patient Health Questionnaire for Adolescents or primary care versions of the Beck Depression Inventory(8).

Current evidence does not allow precise estimation of how often depression occurs specifically after sports injury in adolescent athletes. However, the available literature, emerging over the last two decades, indicates that depressive symptoms after injury are sufficiently relevant to justify routine psychological monitoring, especially in athletes with prolonged absence, strong athletic identity, low social support, persistent pain, kinesiphobia or fear of reinjury (2,5,7,8,28). In this context, depression is not presented as an inevitable consequence of injury, but as a possible outcome that may worsen recovery, reduce quality of life and complicate return to sport if it remains unrecognized.

4. Discussion

This review suggests that post-injury fear in adolescent athletes should be interpreted less as a single symptom and more as a changing response to the recovery environment. The integrated model of response to sport injury proposed by Wiese-Bjornstal et al. describes injury response as a dynamic interaction between cognitive appraisals, emotions and behaviours, influenced by personal and situational factors(30). This perspective fits the present topic because the same fear may remain protective in one athlete, but become avoidant in another depending on pain, support, pressure, identity and rehabilitation context.

An important counterpoint is that fear should not be automatically treated as pathology. In youth sport, a cautious athlete may simply be responding to incomplete recovery, unclear return-to-sport criteria or pressure to return too quickly. From a biopsychosocial perspective, return to play is influenced not only by physical recovery, but also by psychological readiness and social factors(31). Therefore, the clinical question is not “is the athlete afraid?”, but rather “does this fear still protect recovery, or has it started to restrict movement, confidence and participation?”

This also means that avoidance should not always be interpreted as kinesiophobia. Some avoidance may reflect persistent pain, poor communication, low trust in rehabilitation, or a lack of autonomy in decisions made by adults. Research on rehabilitation in professional athletes suggests that autonomy and perceived control may support emotional and behavioural responses during rehabilitation and return to play (32). In adolescent athletes, who often depend on parents, coaches and clinicians, lack of control may be even more relevant.

At the same time, excessive fear cannot be ignored. Psychosocial factors influence the quality and speed of rehabilitation, and cognitive appraisals, emotional reactions and behaviours after injury may affect return-to-sport outcomes(33). When fear becomes rigid and prevents graded exposure, it may contribute to sport avoidance, loss of confidence and social withdrawal. In adolescents, this may be especially harmful because sport often supports identity, belonging and perceived competence.

The most useful interpretation is therefore balanced: too little fear may encourage premature return, while too much fear may promote avoidance. Kinesiophobia should be seen as a point at which fear loses its adaptive function and begins to limit recovery. This does not prove a linear pathway from injury to depression, but it suggests that persistent avoidance may contribute to loss of routine, reduced contact with teammates and reduced self-worth, which are relevant to depressive symptoms in vulnerable athletes.

Overall, adolescent injury rehabilitation should not focus only on physical clearance. A safer approach would combine physical criteria, psychological readiness, gradual exposure, athlete autonomy, family-coach communication and monitoring of mood symptoms. This approach is consistent with the broader return-to-sport perspective, where return after injury has been discussed as a multidimensional process involving psychological and psychosocial factors (11,12).

5. Clinical implications and prevention strategies

Clinical management of injured adolescent athletes should include both physical and psychological assessment. Kinesiophobia may not be visible during a standard orthopedic examination, but it may become evident during rehabilitation exercises, sport-specific drills or return-to-sport progression. Clinicians should therefore ask not only whether the athlete has pain, but also whether they feel safe, confident and psychologically ready to perform specific movements (4,13). Tools such as the Tampa Scale of Kinesiophobia, AFAQ, I-PRRS, ACL-RSI, ROAQ and AIMS may be useful depending on the injury type and clinical setting(4,6,13,14,22,34). As shown in the studies discussed above, these instruments may help identify fear avoidance, reduced psychological readiness, athletic identity and risky rehabilitation behaviors, including overadherence or premature return. They should not replace clinical judgment, but they may support early detection of both maladaptive avoidance and insufficient caution before full return to sport.

Prevention should begin with psychoeducation. Adolescent athletes should be informed that some fear after injury is normal and does not automatically mean that recovery is failing. At the same time, they should understand that persistent avoidance can delay functional recovery, reduce confidence and increase psychological distress. Education should also involve parents and coaches, because unrealistic expectations, pressure to return quickly or minimization of pain may interfere with rehabilitation and cause psychological distress (3,7).

A practical prevention strategy is graded exposure to feared movements. Instead of avoiding sport-specific actions completely, the athlete can gradually reintroduce them in a controlled and progressive way. For example, a football player after knee injury may first perform low-intensity passing drills, then controlled changes of direction, then non-contact team training and finally full competition. This approach may help the athlete rebuild confidence while maintaining appropriate physical safety(4,35).

Goal setting may also reduce uncertainty and improve rehabilitation engagement. Rehabilitation goals should be specific, realistic and focused on function rather than only on rapid return to competition. For example, instead of setting the goal as “return to match as soon as possible”, the rehabilitation team may set goals such as “complete sport-specific drills without avoidance”, “participate in partial team training with stable confidence” or “report

acceptable psychological readiness before competition”. This may help the adolescent athlete experience recovery as structured, gradual and controllable(7,13).

Psychological referral should be considered when fear is persistent, disproportionate or associated with broader mental health symptoms. Warning signs may include refusal to perform rehabilitation exercises, avoidance of team contact, excessive reassurance seeking, sleep disturbance, loss of motivation, irritability, social withdrawal, persistent sadness or depressive-anxiety symptoms. (2,8)

Examples of psychological support may include cognitive-behavioural strategies, relaxation techniques, imagery, mindfulness-based approaches, motivational interviewing and pain-related psychoeducation. These interventions may help the athlete reinterpret fear, reduce catastrophic thinking, improve coping and gradually regain confidence in movement. Psychological support programs, mindfulness-based stress reduction, acceptance and commitment training, motivational enhancement training and social support have been described as possible modalities in sports rehabilitation(5).

Overall, prevention should not aim to remove fear completely. A more realistic goal is to maintain adaptive caution while preventing fear from becoming avoidant, disabling or associated with psychological distress. In adolescent athletes, this requires early recognition, supportive communication, gradual exposure to movement, realistic return-to-sport criteria and attention to mental health throughout the rehabilitation process.

6. Conclusions

Sports injuries are frequent among adolescent athletes, especially in organized and competitive sport settings. Although many injuries are approached primarily as orthopedic or rehabilitation problems, they may also have important mental health effects.

Kinesiophobia is a clinically relevant post-injury phenomenon, but it should be understood within a broader spectrum of anxiety-related and depressive responses after injury. It may affect rehabilitation engagement, confidence, psychological readiness, return to sport and mental well-being.

A certain degree of caution after injury is important and may be protective. However, persistent fear of movement or reinjury may become maladaptive when it leads to avoidance of rehabilitation, delayed return to sport, reduced participation or withdrawal from team activities.

Adolescent athletes may be particularly vulnerable because sport is often connected with identity, peer belonging, self-esteem, social role and future aspirations. Injury-related absence may therefore have psychological consequences beyond the physical injury itself.

Depressive symptoms and broader mental health consequences after injury in adolescent athletes require further research. Current evidence suggests that these symptoms are clinically relevant, but their prevalence, predictors and long-term course in adolescent athletes remain less clearly established than in adult or collegiate athlete populations.

Rehabilitation after sports injury in adolescent athletes should include psychological screening and support, especially when fear, avoidance, low confidence, social withdrawal, loss of motivation or mood symptoms persist.

Future research should focus on adolescent-specific longitudinal studies to clarify how kinesiophobia develops, how it interacts with depressive-anxiety symptoms and which interventions are most effective in preventing prolonged sport avoidance and psychological distress after injury.

Disclosure

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All authors have read and agreed with the published version of the manuscript.

Funding Statement

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflict of Interest Statement

The authors deny any conflict of interest.

Declaration of the use of generative AI and AI-assisted technologies in the writing process

In preparing this work, the author(s) used ChatGPT for language improvement and grammatical correction. After using this tool/service, the author(s) have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

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