



Mini Review

Copyright © All rights are reserved by Samantha S Dardaman

A Mini Review of Kinesiophobia in Sport and Fitness Populations Following Anterior Cruciate Ligament Injuries

Samantha S Dardaman^{1*}, and Scott B Martin¹¹Department of Kinesiology, Health Promotion, and Recreation, University of North Texas, United States***Corresponding author:** Samantha S Dardaman, Department of Kinesiology, Health Promotion, and Recreation, University of North Texas, United States**Received Date:** June 01, 2026**Published Date:** June 08, 2026

Abstract

This review explores kinesiophobia, or the debilitating fear of movement or injury, of individuals recovering from an anterior cruciate ligament (ACL) injury. Kinesiophobia is a major psychological barrier in physical injury rehabilitation that frequently causes individuals, especially those with ACL injuries, to avoid certain activities and movements which may prolong pain and expected healing or recovery time. As ACL injuries are most common in sport, kinesiophobia is prominent amongst post-ACL recovering fitness enthusiasts and athletic populations. Various methodologies (i.e., quantitative, qualitative, or mixed methods approaches) and measures used to assess kinesiophobia in sport and fitness populations are discussed. This review may serve as a resource for clinical and sports practitioners, athletes and fitness enthusiasts, coaches and physical fitness trainers, and academic and corporate researchers to expand their understanding of injury-related fears and the potential influences on rehabilitation and recovery following ACL injury.

Keywords: Reinjury anxiety; exercise fears; psychological readiness; athletic rehabilitation

Introduction

Musculoskeletal injuries, such as a rupture or tear of the anterior cruciate ligament (ACL), are particularly common in sport and exercise settings. Previous literature indicates that severe injuries, especially those that limit or terminate physical activity or athletic involvement, can lead to emotional and psychological difficulties [1]. Post-ACL recovery entails a comprehensive healing process after an ACL tear or rupture, that often involves a reconstruction surgery and structured physical therapy. Similar to the progression of physical therapy that is used to reduce swelling, restore knee range of motion, rebuild muscular strength, and safely return the patient to normal unrestricted activities, Quinn and Fallon (1999) suggest that the psychological recovery from injury must also progress in a stage-like fashion [2-4]. Thus, a concentration of research literature regarding injury recovery has highlighted the

emotional responses and mental aspects of rehabilitation. Since ACL injuries are considered a major injury that requires long-term rehabilitation and reconditioning, psychological therapy and mental skills are commonly incorporated in the recovery process. Previously studied ACL rehabilitation interventions and treatments included the use of imagery [5], cognitive-behavioral based therapy [6], goal setting [7], visual modeling [8] or Video-Insight [9], and educational app-based support [10]. These approaches have been used with ACL-injured populations to aid in psychological readiness or the psychological preparedness to return to physical activity and sport following injury. Key components of psychological readiness are those such as confidence, motivation, coping skills, and lack of hesitation, but the most concerning for individuals recovering from ACL injury is kinesiophobia [2,11-14].

Review Methods

For the review of literature pertaining to kinesiophobia, database searches of MedLine (PubMed) and SPORTDiscus with Full Text (EBSCOhost) included publications from inception through March 1, 2024. The search criteria included a combination of keywords and subject headings representing “anterior cruciate ligament injury”, “ACL injury”, “kinesiophobia”, “injury fear”, and “reinjury anxiety”. Database filters were utilized to remove publication types such as systematic reviews, conference abstracts, editorials, or magazine articles. From the database search on March 1, 2024, a resulting 16,769 articles were imported into a web-based application called Rayyan where articles were first screened. To be included in this review, articles were delimited to those written in English, published in a peer-reviewed journal, accessible for full-text review, and reported original data collected from human participants. Only publications that utilized the Tampa Scale of Kinesiophobia, the most commonly used measure of kinesiophobia, and particularly those that involved participants of an anterior cruciate ligament injury were considered. Screening of articles was conducted first by reviewing the article titles and abstracts. After the initial abstract review, 258 articles were deemed relevant with ACL psychological recovery, kinesiophobia, and injury-related fears. Full-text reviews, including a manual search for eligible relevant references, were conducted to exclude 187 articles for various reasons. Of the total screened 258 articles, a resulting 71 studies were selected to be included for this review.

Upon analysis of the research design, psychometric measures, participants, sports, and results, the 71 included studies were sourced from peer-reviewed journals. All included studies were published from 1983 to 2024 and involved populations of ACL patients, with 90% of studies including athletic populations. Of the 71 total studies, the majority of research utilized quantitative approaches such as cross-sectional, prospective, retrospective, random controlled, and case study/series designs. Two studies were of qualitative research designs [15,16], and only one used a mixed methods approach [11]. Only studies that incorporate the Tampa Scale of Kinesiophobia (TSK), as opposed to other kinesiophobia or pain catastrophizing scales, were considered in this review. However, studies utilized various versions of the TSK that included 17 items (TSK-17), 13 items (TSK-13), or 11 items (TSK-11). The most frequently used kinesiophobia measures were the TSK-17 and TSK-11 with 35 studies utilizing each respectively; only one study used the TSK-13 [6]. Several of the included studies in this review tested the translation of the TSK into different languages such as Japanese [17], Dutch [18], Swedish [19], Italian [20], Brazilian-Portuguese [21], and Spanish [22]. The TSK has also been used as a validation measure for the development of other kinesiophobia scales such as the ACL Return-to-Sport After Injury Scale (ACL-RSI) [23] or the ACL Reasons Survey [24], also utilized in various languages such as Turkish [25], Brazilian-Portuguese [26] and Swedish [27].

Of the 71 included studies, there were a total of 5,520 participants ranging from 14 to 60 years of age ($M = 24.7$). Most studies ($n = 44$)

included more male participants (61.9%) than female participants (38.1%), with some studies exclusively sampling males [3,7,28,29] while only two studies sampled females only [30,31]. Eighteen studies involved samples of non-athletic populations [32-34], while other studies sampled from various levels such as “physically active adults” [35,36], recreational athletes [37,38], and semi-professional athletes [3,39]. Some of the athletic-based studies included samples from specific sports such as soccer [22,26,39], handball [7], football [40], running [41], karate [42], gymnastics [47], and various others.

Findings Related to Kinesiophobia

The terms “kinesiophobia”, “fear of reinjury”, and “reinjury anxiety” have been used synonymously in previous literature; however, a careful examination reveals important differences between the three [43]. The American Psychiatric Association (2013) defines anxiety as a state of worry in anticipation of a potential threat [44]. General anxiety, then, given the complexity of ACL injuries (i.e., surgical versus non-surgical recovery strategies, surgical graft types, concomitant injuries, etc.), may be considered a normal response as many patients await the uncertainties of the rehabilitation process [45]. Continually, given the prevalence of secondary ACL injuries, reinjury anxiety related to the anticipation or uncertainty of a potential reinjury to either the same ACL or contralateral knee ligaments, may also be deemed as a rational response [45,46]. Fear, although similar to anxiety, is an emotional reaction in response to a threat [44,47]. Little et al. (2023) explained that fears throughout the ACL recovery process are multifaceted and are driven by underpinning psychological (i.e., self-identity, loneliness, rumination, anxiety, trauma) and socio-economical (i.e., impact of financial situations, time away from work/sport) factors [16]. However, as the anxieties and fears that accompany an ACL injury do not typically resolve with time, reinjury anxieties and fears may be determined as an irrational emotional response [12,29,48,49]. A pilot research study by Van Wyngaarden et al. (2021) even found that some post-ACL patients reported to still experience fears of reinjury up to ten years after their injury [49].

It is this persistent and lingering fear of reinjury that distinguishes the term kinesiophobia, described as the excessive and debilitating fear of movement or physical activity or injury [45,50,51]. Kinesiophobia was originally introduced in the context of those who suffer from chronic pain [52]; however, in the case of post-ACL patients, actual pain levels may not be the key concern [45,51,53]. The term “pain catastrophizing” has been commonly associated with kinesiophobia, which refers to the exaggerated negative reactions that one has to a painful experience [53,54]. Although the perceptions of pain differ from person to person, pain catastrophizing may intensify one’s feelings of helplessness and negative thoughts during the injury recovery process [54,55]. Gulrandhe et al. (2021) references the fear-avoidance model to explain that those recovering from ACL injury may experience the negative emotions associated with pain due to their exaggerated fears [56].

Post-injury pain levels and pain catastrophizing, however, are inconsistent and greatly fluctuate throughout the months of ACL

recovery [53]. Since 70-80% of ACL injuries occur from accidental or non-contact movements, kinesiophobia for ACL recovery patients typically encompasses the fear of movement [51,57]. Particularly within athletics and fitness, many post-ACL athletes develop hesitation or fear of sports-related activities that mimic the cause of their original knee injury [58]. Meierbachtol et al. (2020) reported that post-ACL recovery patients showed increased kinesiophobia levels during rehabilitation with fear-evoking situations or movements such as jumping, cutting, pivoting, or changing directions; kinesiophobia also increased as the intensity and complexity of movements advanced, typical in the progressive nature of the rehabilitation process [3,4,33,59]. Thus, according to the fear-avoidance model, athletes' kinesiophobia or injury-related fears, if not addressed, may develop into movement or activity avoidance [32,45,51,60]. Padaki et al. (2018) reported that more than 87% of athletes who endure an ACL injury often experience symptoms of avoidance and post-traumatic stress disorder, along with kinesiophobia [61]. Thus, post-ACL kinesiophobia may affect athletes' mental health and wellbeing, which in turn, can significantly hinder their injury recovery and physical rehabilitation.

Findings Related to Return to Sport or Physical Activity

Recognizing the likelihood of ligament retears or contralateral injuries amongst ACL-recovering individuals, the coupled focus of physical rehabilitation and psychological preparedness is crucial for recovery success [13]. Previous research indicates that kinesiophobia may relate to several physiological outcomes [62], such as poor knee function [39,63-67], poor joint biomechanics (i.e., knee flexion, hip flexion, knee abduction angle) [30,39,68], gait and plyometric asymmetry [28,36,39,69-70], poor quadriceps and hamstring muscle activation [35-37,69,71], and patella-femoral pain [72]. For example, Baez et al. (2023) found that post-ACL patients with high kinesiophobia levels reported to have experienced more persistent knee-related symptoms following their ACL reconstruction [68]. The physiological results of an ACL injury continue to affect not only the individual's physical recovery but also is associated with a poor knee-related quality of life [40,73,74]. Consequently, post-ACL athletes with high kinesiophobia tend to have lower physical activity levels following their injury [48,75]. These consequences of kinesiophobia influence the rehabilitation progress and the individual's physical preparedness to resume exercise or sport activities.

Nonetheless, the choice to return to sport and physical activity after an ACL injury is multifaceted and relates to the athlete's perceived satisfaction of their rehabilitation. Ardern et al. (2016) illustrated an adapted biopsychosocial model that includes the various physical, psychological, and social/contextual factors that are incorporated into the decision to return to sport such as functional performance, perceived pain levels, motivation to return, and recovery expectations [83]. Those with high confidence in their knee and physical reconditioning, high sport satisfaction or "love of the game" [76] and high psychological readiness tend to return to their sport after injury [38,76-79]. Although many

athletes and fitness enthusiasts report that kinesiophobia was the primary reason for not returning to sport or certain physical activities [43,80], approximately 45-49% of athletes still choose to resume their sport involvement [81,82]. Of those who returned to sport, their levels of kinesiophobia tend to be lower than those who chose to refrain from sport, indicating that kinesiophobia and psychological readiness may be negatively correlated [84-86]. However, this relationship is not consistent across the research literature and is not predictive of athletic success following activity return. McPherson et al. (2019) and Zarzycki et al. (2024) found that post-ACL athletes who reported to have high psychological readiness and low kinesiophobia levels were at a high risk for a second ACL injury, and although kinesiophobia generally diminishes as ACL rehabilitation progresses [12,31,34,87-92], this does not mitigate the fact that 37% of athletes suffer from a second ACL injury within two years of returning to sport [13]. Continually, Webster et al. (2008) reported that post-ACL recovery patients who had returned to sport within 12 months experienced more negative emotions, lower confidence levels, and more frequent thoughts of reinjury fears [23]. Thus, as many athletes would like to return to sports and fitness activities as quickly as possible, this may not be the best option in regard to their recovery and long-term physical and psychological health.

Conclusion

In conclusion, this review provides a comprehensive overview of the existing literature on kinesiophobia in the context of ACL injury recovery, particularly among athletes and fitness enthusiasts. As primarily quantitative methodologies have been used in the past to examine kinesiophobia, there is a gap in research regarding the use of qualitative and mixed methodologies to understand this complex psychological construct. Qualitative information from athletes' accounts of severe injuries may provide details of the thoughts, feelings, and attitudes experienced throughout the recovery process. Particularly, as the majority of participants in the included studies were males, inquiry of female athletes' perspective may provide further insight of their particular fear-related challenges of post-ACL recovery.

Anterior cruciate ligament injuries typically involve extensive periods of physical rehabilitation and psychological recovery; thus, a multifaceted approach is required. Particularly, as many post-ACL recovering individuals aim to return to physical activity and sport participation following injury, previous research highlights the importance of psychological therapy and mental skills training to address the challenges faced during rehabilitation. It has been widely reported that kinesiophobia, or the excessive fear of movement or reinjury, is the most common concern among post-ACL injury patients. Often associated with pain catastrophizing, avoidance behaviors, and lack of confidence, it can significantly hinder recovery, as well as facilitate long-term psychological consequences. For example, individuals experiencing kinesiophobia may lack confidence in their ability to perform physical tasks, or physical self-efficacy. Thus, understanding the intersection of kinesiophobia and its potential effects on injury recovery can lead

to earlier identification and intervention to prevent or minimize its impact. Raising awareness among athletes, coaches, and healthcare professionals about the psychological factors of injury recovery may provide a more supportive environment, promote psychological well-being, and facilitate successful rehabilitation.

Acknowledgement

None.

Conflicts of Interest

No conflicts of interest.

References

- Palisch AR, Merritt LS (2018) Depressive symptoms in the young athlete after injury: Recommendations for research. *J. Pediatr Health Care* 32(3): 245-249.
- Quinn AM, Fallon BJ (1999) The changes in psychological characteristics and reactions of elite athletes from injury onset until full recovery. *J Appl Sport Psychol* 11(2): 210-229.
- Kasmi S, Sariati D, Hammami R, Clark CCT, Chtara M, et al. (2023) The effects of different rehabilitation training modalities on isokinetic muscle function and male athletes' psychological status after anterior cruciate ligament reconstructions. *BMC Sports Sci Med Rehabil* 15(1): 43.
- Mahood C, Perry M, Gallagher P, Sole G (2020) Chaos and confusion with confidence: Managing fear of re-injury after anterior cruciate ligament reconstruction. *Phys Ther Sport* 45: 145-154.
- Rodriguez RM, Marroquin A, Cosby N (2019) Reducing fear of reinjury and pain perception in athletes with first-time anterior cruciate ligament reconstructions by implementing imagery training. *J Sport Rehabil* 28(4): 385-389.
- Coronado RA, Sterling EK, Fenster DE, Bird ML, Heritage AJ, et al. (2020) Cognitive-behavioral-based physical therapy to enhance return to sport after anterior cruciate ligament reconstruction: An open pilot study. *Phys Ther in Sport* 42: 82-90.
- Gholami F, Letafatkar A, Moghadas Tabrizi Y, Gokeler A, Rossetini G, et al. (2023) Comparing the effects of differential and visuo-motor training on functional performance, biomechanical, and psychological factors in athletes after ACL reconstruction: A randomized controlled trial. *J Clin Med* 12(8): 2845.
- Rhim HC, Lee SJ, Jeon JS, Kim G, Lee, et al. (2020) Effectiveness of modeling videos on psychological responses of patients following anterior cruciate ligament reconstruction: A pilot randomized trial. *Medicine* 99(45): e23158.
- Zaffagnini S, Russo RL, Marcheggiani Muccioli GM, Marcacci M (2013) The Videoinsight® method: Improving rehabilitation following anterior cruciate ligament reconstruction - a preliminary study. *Knee Surg Sports Traumatol Arthrosc* 21(4): 851-858.
- Ringberg M, Eldh AC, Ardern CL, Kvist J (2023) Athletes' experiences of using a self-directed psychological support, the BACK in the Game (BANG) smartphone application, during rehabilitation for return to sports following anterior cruciate ligament reconstruction. *BMC Sports Sci Med Rehabil* 15(1): 113.
- Burland JP, Toonstra J, Werner JL, Mattacola CG, Howell DM, et al. (2018) Decision to return to sport after anterior cruciate ligament reconstruction, Part I: A qualitative investigation of psychosocial factors. *J Athl Train* 53(5): 452-463.
- Filbay S, Kvist J (2022) Fear of reinjury following surgical and nonsurgical management of anterior cruciate ligament injury: An exploratory analysis of the NACOX multicenter longitudinal cohort study. *Phys Ther* 102(2): pzab273.
- Losciale JM, Zdeb RM, Ledbetter L, Reiman MP, Sell TC (2019) The association between passing return-to-sport criteria and second anterior cruciate ligament injury risk: A systematic review with meta-analysis. *J Orthop Sports Phys Ther* 49(2): 43-54.
- Ohji S, Aizawa J, Hirohata K, Mitomo S, Ohmi T, et al. (2021) Athletic identity and sport commitment in athletes after anterior cruciate ligament reconstruction who have returned to sports at their pre-injury level of competition. *BMC Sports Sci Med Rehabil* 13(1): 37.
- Lisee CM, DiSanti JS, Chan M, Ling J, Erickson K, et al. (2020) Gender differences in psychological responses to recovery after anterior cruciate ligament reconstruction before return to sport. *J Athl Train* 55(10): 1098-1105.
- Little C, Lavender AP, Starcevic C, Mesagno C, Mitchell T, et al. (2023) Understanding fear after an anterior cruciate ligament injury: A qualitative thematic analysis using the common-sense model. *Int J Environ Res Public Health* 20(4): 2920.
- Hirohata K, Aizawa J, Furuya H, Mitomo S, Ohmi T, et al. (2020) The Japanese version of the Anterior Cruciate Ligament-Return to Sport After Injury (ACL-RSI) Scale has acceptable validity and reliability. *Knee Surg Sports Traumatol Arthrosc* 28(8): 2519-2525.
- Slagers AJ, Reininga IHF, van den Akker-Scheek I (2017) The Dutch language Anterior Cruciate Ligament Return to Sport After Injury Scale (ACL-RSI)-validity and reliability. *J Sports Sci* 35(4): 393-401.
- Larsson C, Hansson EE, Sundquist K, Jakobsson U (2014). Psychometric properties of the Tampa Scale of Kinesiophobia (TSK-11) among older people with chronic pain. *Physiother Theory Prac* 30(6): 421-428.
- Tortoli E, Francini L, Giovannico G, Ramponi C (2022) Translation, cross-cultural adaptation and validation of the Italian version of the Anterior Cruciate Ligament-Return to Sport After Injury (ACL-RSI) Scale. *Knee Surg Sports Traumatol Arthrosc* 30(4): 1180-1186.
- Silva LO, Mendes LMR, Lima PO de P, Almeida GPL (2018) Translation, cross-adaptation and measurement properties of the Brazilian version of the ACL-RSI Scale and ACL-QoL Questionnaire in patients with anterior cruciate ligament reconstruction. *Braz J Phys Ther* 22(2): 127-134.
- Sala-Barat E, Av Ivarez-Díaz P, Alentorn-Geli E, Webster KE, Cugat R, et al. (2020) Translation, cross-cultural adaptation, validation, and measurement properties of the Spanish version of the Anterior Cruciate Ligament-Return to Sport After Injury (ACL-RSI-Sp) Scale. *Knee Surg Sports Traumatol Arthrosc* 28(3): 833-839.
- Webster KE, Feller JA, Lambros C (2008) Development and preliminary validation of a scale to measure the psychological impact of returning to sport following anterior cruciate ligament reconstruction surgery. *Phys Ther Sport* 9(1): 9-15.
- Kuenze C, Lisee C, Triplett A, Collins K, Walaszek M, et al. (2023) Validation of a survey to characterize barriers to physical activity after anterior cruciate ligament reconstruction. *J Athl Train* 58(10): 841-848.
- Harput G, Tok D, Ulusoy B, Eraslan L, Yildiz TI, et al. (2017) Translation and cross-cultural adaptation of the Anterior Cruciate Ligament-Return to Sport After Injury (ACL-RSI) Scale into Turkish. *Knee Surg Sports Traumatol Arthrosc* 25(1): 159-164.
- Albano TR, Lima PODP, Rodrigues CAS, Melo AKP, Tavares MLA, et al. (2022) Measurement properties of the Brazilian Portuguese Anterior Cruciate Ligament - Return to Sport after Injury (ACL-RSI) scale short version after anterior cruciate ligament reconstruction. *Braz J Phys Ther* 26(4): 100421.
- Kvist J, Oy sterberg A, Gauffin H, Tagesson S, Webster K, et al. (2013) Translation and measurement properties of the Swedish version of ACL-Return to Sports After Injury Questionnaire. *Scand. J Med Sci in Sport* 23(5): 568-575.
- Tajdini H, Letafatkar A, Brewer BW, Hosseinzadeh M (2021) Association between kinesiophobia and gait asymmetry after ACL reconstruction: Implications for prevention of reinjury. *Int J Environ Res Public Health* 18(6): 3264.

29. Uysen A, Tolu S (2021) Factors affecting the femoral cartilage thickness after anterior cruciate ligament reconstruction. *India. J Orthop* 55(2): 352-359.
30. Trigsted SM, Cook DB, Pickett KA, Cadmus-Bertram L, Dunn WR, et al. (2018) Greater fear of reinjury is related to stiffened jump-landing biomechanics and muscle activation in women after ACL reconstruction. *Knee Surg Sports Traumatol Arthrosc* 26(12): 3682-3689.
31. Zarzycki R, Cummer K, Arhos E, Failla M, Capin JJ, et al. (2024) Female athletes with better psychological readiness are at higher risk for second ACL injury after primary ACL reconstruction. *Sports Health* 16(1): 149-154.
32. Burland JP, Howard JS, Lepley AS, DiStefano LJ, Frechette L, et al. (2020) What are our patients really telling us? Psychological constructs associated with patient-reported outcomes after anterior cruciate ligament reconstruction. *J Athl Train* 55(7): 707-716.
33. Chmielewski TL, George SZ, Tillman SM, Moser MW, Lentz TA, et al. (2016) Low- versus high-intensity plyometric exercise during rehabilitation after anterior cruciate ligament reconstruction. *Am. J. Sports Med* 44(3): 609-617.
34. Hoch JM, Sinnott CW, Robinson KP, Perkins WO, Hartman JW (2018) The examination of patient-reported outcomes and postural control measures in patients with and without a history of ACL reconstruction: A case control study. *J Sport Rehabil* 27(2): 170-176.
35. Markström JL, Grinberg A, Häger CK (2022) Fear of reinjury following anterior cruciate ligament reconstruction is manifested in muscle activation patterns of single-leg side-hop landings. *Phys Ther* 102(2): pzab218.
36. Norte GE, Solaas H, Saliba SA, Goetschius J, Slater LV, et al. (2019) The relationships between kinesiophobia and clinical outcomes after ACL reconstruction differ by self-reported physical activity engagement. *Phys Ther Sport* 40: 1-9.
37. Lentz TA, Zeppieri G, George SZ, Tillman SM, Moser MW, et al. (2015) Comparison of physical impairment, functional, and psychosocial measures based on fear of reinjury/lack of confidence and return-to-sport status after ACL reconstruction. *Am J Sports Med* 43(2): 345-353.
38. Tripp DA, Stanish W, Ebel-Lam A, Brewer BW, Birchard J (2007) Fear of reinjury, negative affect, and catastrophizing predicting return to sport in recreational athletes with anterior cruciate ligament injuries at 1year postsurgery. *Rehabil Psychol* 52(1): 74-81.
39. Bortone I, Moretti L, Bizzoca D, Caringella N, Delmedico M, et al. (2021) The importance of biomechanical assessment after return to play in athletes with ACL-reconstruction. *Gait Posture* 88: 240-246.
40. Ardern CL, Oy sterberg A, Tagesson S, Gauffin H, Webster KE, et al. (2014) The impact of psychological readiness to return to sport and recreational activities after anterior cruciate ligament reconstruction. *Brit J Sports Med* 48(22): 1613-1619.
41. Wittig AF, Hournard JA, Costill DL (1989) Psychological effects during reduced training in distance runners. *Int J Sports Med* 10(2): 97-100.
42. Gholami M, Kamali F, Mirzeai M, Motealleh A, Shamsi M (2020) Effects of kinesio tape on kinesiophobia, balance and functional performance of athletes with post anterior cruciate ligament reconstruction: A pilot clinical trial. *BMC Sports Sci Med Rehabil* 12: 57.
43. Ross CA, Clifford A, Louw QA (2017) Factors informing fear of reinjury after anterior cruciate ligament reconstruction. *Physiother Theory Prac* 33(2): 103-114.
44. American Psychiatric Association (2013) *Diagnostic and Statistical Manual of DSM-5* (5th edition). American Psychiatric Association Publishing.
45. Hsu CJ, Meierbachtol A, George SZ, Chmielewski TL (2017) Fear of reinjury in athletes: Implications for rehabilitation. *Sports Health* 9(2): 162-167.
46. Walker N, Thatcher J, Lavallee D (2010) A preliminary development of the Re-Injury Anxiety Inventory (RIAI). *Phys Ther Sport* 11(1): 23-29.
47. Martin SB, Polster CM, Jackson AW, Greenleaf CA, Jones GM (2008) Worries and fears associated with competitive gymnastics. *J Clin Sport Psychol* 2(4): 299-316.
48. Baez S, Hoch M, Hoch J (2020) Psychological factors are associated with return to pre-injury levels of sport and physical activity after ACL reconstruction. *Knee Surg Sports Traumatol Arthrosc* 28(2): 495-501.
49. Van Wyngaarden JJ, Jacobs C, Thompson K, Eads M, Johnson D, et al. (2021) Quadriceps strength and kinesiophobia predict long-term function after ACL reconstruction: A cross-sectional pilot study. *Sports Health* 13(3): 251-257.
50. Huang H, Nagao M, Arita H, Shiozawa J, Nishio H, et al. (2019) Reproducibility, responsiveness and validation of the Tampa Scale for Kinesiophobia in patients with ACL injuries. *Health Quality Life Outcomes* 17(1): 150.
51. Kvist J, Silbernagel KG (2022) Fear of movement and reinjury in sports medicine: Relevance for rehabilitation and return to sport. *Phys Ther* 102(2): pzab272.
52. Tkachuk GA, Harris CA (2012) Psychometric properties of the Tampa Scale for Kinesiophobia-11 (TSK-11). *J Pain* 13(10): 970-977.
53. Jochimsen KN, Pelton MR, Mattacola CG, Huston LJ, Reinke EK, et al. (2020) Relationship between pain catastrophizing and 6-month outcomes following anterior cruciate ligament reconstruction. *J Sport Rehabil* 29(6): 808-812.
54. Tichonova A, Rimdeikienė I, Petruševičienė D, Lendraitienė E (2016) The relationship between pain catastrophizing, kinesiophobia and subjective knee function during rehabilitation following anterior cruciate ligament reconstruction and meniscectomy: A pilot study. *Medicina* 52(4): 229-237.
55. Gulrandhe P, Warutkar V, Chitale N, Arora SP, Phansopkar P (2021) Fear avoidance model of kinesiophobia and rehabilitation. *J. Med. Pharm. Allied Sci* 10(5): 3529-3533.
56. Lethem J, Slade PD, G Troupe JD, Bentley G (1983) Outline of a fear-avoidance model of exaggerated pain perception. *Behav Res Ther* 21(4): 401-408.
57. Voskanian N (2013) ACL Injury prevention in female athletes: Review of the literature and practical considerations in implementing an ACL prevention program. *Curr Rev in Musculoskel Med* 6(2): 158-163.
58. McVeigh F, Pack SM (2015) An exploration of sports rehabilitators' and athletic rehabilitation therapists' views on fear of reinjury after anterior cruciate ligament reconstruction. *J Sport Rehabil* 24(2): 140-150.
59. Meierbachtol A, Obermeier M, Yungtum W, Bottoms J, Paur E, et al. (2020) Injury-related fears during the return-to-sport phase of ACL reconstruction rehabilitation. *Orthop J Sport Med* 8(3): 2325967120909385.
60. Oysterberg A, Kvist J, Dahlgren MA (2013) Ways of experiencing participation and factors affecting the activity level after nonreconstructed anterior cruciate ligament injury: A qualitative study. *J Orthop Sport Phys Ther* 43(3): 172-183.
61. Padaki AS, Noticewala MS, Levine WN, Ahmad CS, Popkin MK, et al. (2018) Prevalence of posttraumatic stress disorder symptoms among young athletes after anterior cruciate ligament rupture. *Orthop J of Sport Med* 6(7): 2325967118787159.
62. Chmielewski TL, George SZ (2019) Fear avoidance and self-efficacy at 4 weeks after ACL reconstruction are associated with early impairment resolution and readiness for advanced rehabilitation. *Knee Surg Sports Traumatol Arthrosc* 27(2): 397-404.
63. Alswat M, Khojah O, Dabroom A, Alghamdi A, Alshibely A, et al. (2021) Factors associated with fear of re-injury in physically active individuals

- after an anterior cruciate ligament reconstruction. *J Musculoskel Surg Res* 5(1): 30-34.
64. Chmielewski TL, Zeppieri G, Lentz TA, Tillman SM, Moser MW, et al. (2011) Longitudinal changes in psychosocial factors and their association with knee pain and function after anterior cruciate ligament reconstruction. *Phys Ther* 91(9): 1355-1365.
65. Hartigan EH, Lynch AD, Logerstedt DS, Chmielewski TL, Snyder-Mackler L (2013) Kinesiophobia after anterior cruciate ligament rupture and reconstruction: Noncopers versus potential copers. *J Orthop Sport Phys Ther* 43(11): 821-832.
66. Tengman E, Brax Olofsson L, Nilsson KG, Tegner Y, Lundgren L, et al. (2014) Anterior cruciate ligament injury after more than 20 years: Physical activity level and knee function. *Scan J Med Sci Sport* 24(6): e491-e500.
67. Lentz TA, Tillman SM, Indelicato PA, Moser MW, George SZ, Chmielewski TL (2009) Factors associated with function after anterior cruciate ligament reconstruction. *Sports Health* 1(1): 47-53.
68. Baez S, Collins K, Harkey M, Birchmeier T, Triplett A, et al. (2023) Kinesiophobia is associated with peak knee abduction angle during jump landing after ACL reconstruction. *Med Sci Sport Exerc* 55(3): 462-468.
69. Paterno MV, Flynn K, Thomas S, Schmitt LC (2018) Self-reported fear predicts functional performance and second ACL injury after ACL reconstruction and return to sport: A pilot study. *Sports Health* 10(3): 228-233.
70. Roe C, Jacobs C, Kline P, Lucas K, Johnson D, et al. (2021) Correlations of single-leg performance tests to patient-reported outcomes after primary anterior cruciate ligament reconstruction. *Clin J Sport Med* 31(5): e265-e270.
71. Ohji S, Aizawa J, Hirohata K, Ohmi T, Mitomo S, et al. (2023) Association between landing biomechanics, knee pain, and kinesiophobia in athletes following anterior cruciate ligament reconstruction: A cross-sectional study. *P M R* 15(5): 552-562.
72. Culvenor AG, Collins NJ, Vicenzino B, Cook JL, Whitehead TS, et al. (2016) Predictors and effects of patellofemoral pain following hamstring-tendon ACL reconstruction. *J Sci Med Sport* 19(7): 518-523.
73. Kvist J, Ek A, Sporrstedt K, Good L (2005) Fear of re-injury: A hindrance for returning to sports after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc* 13(5): 393-397.
74. Tavares MLA, Lima PO de P, Albano TR, Rodrigues CAS, Almeida GPL (2023) The relationship of knee-related quality of life with function, psychological factors, strength, performance, and postural stability after ACL reconstruction: A cross-sectional study. *Sports Health* 15(2): 192-198.
75. Haraldsdottir K, Watson AM (2021) Psychosocial impacts of sports-related injuries in adolescent athletes. *Curr Sports Med Rep* 20(2): 104-108.
76. Kunnen M, Dionigi RA, Litchfield C, Moreland A (2019) 'My desire to play was stronger than my fear of re-injury': athlete perspectives of psychological readiness to return to soccer following anterior cruciate ligament reconstruction surgery. *Ann Leisure Res* 23(3): 1-15
77. Müller U, Krüger-Franke M, Schmidt M, Rosemeyer B (2015) Predictive parameters for return to pre-injury level of sport 6 months following anterior cruciate ligament reconstruction surgery. *Knee Surg Sports Traumatol Arthrosc* 23(12): 3623-3631.
78. Ueda Y, Matsushita T, Shibata Y, Takiguchi K, Ono K, et al. (2021) Satisfaction with playing pre-injury sports one year after anterior cruciate ligament reconstruction using a hamstring autograft. *Knee* 33: 282-289.
79. Ardern CL, Oy sterberg A, Sonesson S, Gauffin H, Webster KE, et al. (2016) Satisfaction with knee function after primary anterior cruciate ligament reconstruction is associated with self-efficacy, quality of life, and returning to the preinjury physical activity. *Arthroscopy* 32(8): 1631-1638.e3.
80. Filbay SR, Crossley KM, Ackerman IN (2016) Activity preferences, lifestyle modifications and re-injury fears influence longer-term quality of life in people with knee symptoms following anterior cruciate ligament reconstruction: A qualitative study. *J Physiother* 62(2): 103-110.
81. Ardern CL, Taylor NF, Feller JA, Webster KE (2012) Return-to-sport outcomes at 2 to 7 years after anterior cruciate ligament reconstruction surgery. *Am J Sports Med* 40(1): 41-48.
82. Ardern CL, Taylor NF, Feller JA, Whitehead TS, Webster KE (2015) Sports participation 2 years after anterior cruciate ligament reconstruction in athletes who had not returned to sport at 1 year: A prospective follow-up of physical function and psychological factors in 122 athletes. *Am J Sport Med* 43(4): 848-856.
83. Ardern CL, Kvist J, Webster KE (2016) Psychological aspects of anterior cruciate ligament injuries. *Oper Tech Sport Med* 24(1): 77-83.
84. Langford JL, Webster KE, Feller JA (2009) A prospective longitudinal study to assess psychological changes following anterior cruciate ligament reconstruction surgery. *Br J Sports Med* 43(5): 377-381.
85. Ohji S, Aizawa J, Hirohata K, Ohmi T, Mitomo S, et al. (2023) Kinesiophobia is negatively associated with psychological readiness to return to sport in patients awaiting anterior cruciate ligament reconstruction. *Arthroscopy* 39(9): 2048-2055.
86. Xiao M, van Niekerk M, Trivedi NN, Hwang CE, Sherman SL, et al. (2023) Patients who return to sport after primary anterior cruciate ligament reconstruction have significantly higher psychological readiness: A systematic review and meta-analysis of 3744 patients. *Am J Sport Med* 51(10): 2774-2783.
87. McPherson AL, Feller JA, Hewett TE, Webster KE (2019) Psychological readiness to return to sport is associated with second anterior cruciate ligament injuries. *Am J Sport Med* 47(4): 857-862.
88. Isaji Y, Nakamura M, Mori K, Aoyama N (2024) Trends and associations between kinesiophobia and knee function from preoperatively to three and six months postoperatively in patients post-ACL reconstruction surgery. *J Bodyw Mov Ther* 37: 290-295.
89. Kaur M, Hart JM (2021) How do fear-related patient reported outcomes changes following ACL reconstruction and rehabilitation? *Med Sci Sport Exerc* 53(8S): 392-393.
90. Ohji S, Aizawa J, Hirohata K, Ohmi T, Mitomo S, et al. (2022) Changes in subjective knee function and psychological status from preoperation to 6 months post anterior cruciate ligament reconstruction. *J Exp Orthop* 9(1): 114.
91. Theunissen WWES, van der Steen MC, Liu WY, Janssen RPA (2020) Timing of anterior cruciate ligament reconstruction and preoperative pain are important predictors for postoperative kinesiophobia. *Knee Surg Sports Traumatol Arthrosc* 28(8): 2502-2510.
92. Baez S, Harkey M, Birchmeier T, Triplett A, Collins K, et al. (2023) Psychological readiness, injury-related fear, and persistent knee symptoms after anterior cruciate ligament reconstruction. *J Athl Train* 58(11-12): 998-1003.