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## Psychological readiness for return to sport after musculoskeletal injury in volleyball players: a systematic literature review

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### ABSTRACT

Volleyball injury can be considered as one of the inherent risks of the game as it is a high-impact jumping sport with the knee, ankle and shoulder being the main parts of the body exposed to the heavy load repeatedly. The period after the physical recovery from injury is also being understood as a psychological issue along with a biomechanical one. Researches on physical recovery have been done extensively but only a few studies have attempted to explore the psychological aspect especially the confidence of an athlete to resume the competition after injury in volleyball populations. This systematic literature review was conducted to gather and analyze the existing evidence on psychological readiness to return to sport following injury among volleyball players and, also, in the larger population of injured athletes who are relevant to volleyball. The review followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) paper. Scopus database was the main source of information, and a Boolean strategy was applied to combine terms for volleyball, injury, psychological readiness and return to sport in the title, abstract and keyword fields. The search returned 783 records; after eliminating 11 duplicates, 772 records were screened, 69 full texts were assessed for eligibility, and 10 studies met all inclusion criteria. Four major thematic findings are as follows: psychological readiness is a quantifiable, multi-dimensional factor with confidence and fear of re-injury being the most dominant two elements; readiness has a consistent negative correlation with pain, kinesiophobia and second-injury risk; protective psychological resources such as mental toughness, athletic identity and adaptive achievement goals can influence the recovery trajectory; and criterion-based assessment which is validated is increasingly incorporating psychological along with functional testing. Theoretically, these findings substantiate the biopsychosocial model of the return to sport; practically, they are in support of the regular, sport-specific evaluation of readiness by coaches and rehabilitation teams. We recommend future research to focus on prospective, volleyball-specific cohorts, designs that are longitudinal, and the use of wearable devices combined with psychological assessment to enhance the precision of return-to-sport decision-making.



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### Introduction

One of the most popular team sports internationally, volleyball is played at multiple levels, from recreational to elite professional, on each continent. It is characterized by its physical aspects (e.g., maximal repeated jumping,

rapid multi-directional movement and explosive overhead activities) which lead to a heavy mechanical load of the lower limb and shoulder and thus, to a typical injury profile featuring the ankle, knee and shoulder as the major sites of injuries (Kilic et al., 2017). Since volleyball is officially a non-contact sport, a great number of severe injuries, including anterior cruciate ligament (ACL) ruptures, occur as a result of the athlete's own landing mechanics and not through a collision, which additionally renders the sport a pioneering model in both injury prevention and rehabilitation research (Wang et al., 2021).

Therefore, the time of physical clearance is not simply viewed as the finish line of rehabilitation anymore. The evidence keeps piling up pointing out that an athlete, for example, may have recovered the same strength, range of motion, or hop symmetry, and yet he/she may be physically, or even psychologically, unable or unwilling to perform at a preinjury level (Webster et al., 2019). The emotional side of this change, often referred to as psychological readiness to return to sport, covers the self-confidence, feelings, and how a person weighs the danger that the athlete feels when he/she decides to return to competition (Glazer, 2009; Ardern et al., 2016). Worrying about getting hurt again has been singled out, not only as the main cause of not being able to return to competitive sport, but also as a reason that can be changed (Sheean et al., 2023).

During the last ten years, research investigating psychological readiness has grown substantially. Tools like the Injury-Psychological Readiness to Return to Sport (I-PRRS) scale (Glazer, 2009) and the ACL-Return to Sport after Injury (ACL-RSI) scale (Webster et al., 2008; Webster & Feller, 2018) have not only been created but also continually improved, shortened, and made available in various languages to meet the global need for sport-specific assessments (Liu et al., 2025). Additionally, concepts closely linked to one another, kinesiophobia (Woby et al., 2005), fear of re-injury (Walker et al., 2010) and athletic identity (Brewer et al., 1993), have been used as measures to portray the emotional and mental aspects of recovery quite comprehensively through a biopsychosocial model of injury response (Wiese-Bjornstal et al., 1998).

Methodological and technological improvements have paralleled this conceptual development. Criterion-based return-to-sport batteries are increasingly integrating functional performance assessments with reliable psychological measures (van Haren et al., 2023; Butler et al., 2024), and recent research supports the incorporation of cognitive and dual-task components that more realistically simulate the unpredictable environment of competition (Chaaban et al., 2023). Concurrently, the use of wearable inertial sensors allows for objective, in-field measurement of jump load and landing mechanics in volleyball (Charlton et al., 2017; Damji et al., 2021), thereby opening up the possibility of combining biomechanical tracking with psychological evaluation for making individualized readiness decisions.

However, disparities remain. One is linked to the target group: while psychological readiness has been deeply researched in ACL-reconstructed cohorts and in football and soccer populations, volleyball-specific data is scarce, and the relatively few, dedicated volleyball studies make it difficult to generalize to the sport's unique demands with confidence (Gajardo-Burgos et al., 2023; Watson et al., 2021). The game tactics in volleyball, where blocking and spike landings impose on the knee loadings different from pivoting field sports, blocking and spike landings loading the knee in writing ways unlike pivoting field sport may be a factor which the cross-sport extrapolation cannot fully understand.

A second gap is theoretical and methodological in nature. A large portion of the relevant studies are of a cross-sectional nature, ie they take the correlations between readiness scores and pain, confidence, or fear (Gajardo-Burgos et al., 2023; Tawil et al., 2025) for a single time point only. Prospective and longitudinal formats that monitor the readiness development throughout the rehabilitation path are scarce, and qualitative methods to find out how athletes themselves feel the psychological change are one or two (Walker et al., 2022; Kunnen et al., 2019) at the moment of writing. Such patchiness limits causal inference and the conception of targeted interventions.

These gaps convey the sense of urgency. The documented rates of achieving preinjury performance after serious knee injury are still quite low. Approximately half of the athletes return to the sport competitively, and even fewer get back to their performance level before the injury (Arderm, Taylor, et al., 2014; Lai et al., 2018). Besides a decision not to return, lower psychological readiness has also been associated with a higher risk of the second injury (Webster et al., 2019; Butler et al., 2024). In a sport like volleyball, where the re-exposure to landing load is inevitable, a carefully organized summary of what we know about psychological readiness is, therefore, not only timely but also very practical.

Although numerous systematic reviews have investigated return-to-sport readiness following ACL reconstruction and mixed-sport injuries, no comprehensive review has specifically synthesized psychological readiness among volleyball players. Volleyball presents unique biomechanical and psychological demands because repeated jumping and landing expose athletes to recurrent injury risk. Consequently, evidence derived

from football or other field sports cannot be directly generalized to volleyball. This gap justifies a volleyball-specific systematic review.

This systematic review aims to synthesise the existing evidence on psychological readiness for return to sport among injured volleyball players and comparable athletic populations. Specifically, the review seeks to examine how psychological readiness has been conceptualised and measured, identify the psychological factors associated with return-to-sport outcomes, and evaluate how psychological readiness can be integrated into return-to-sport decision-making and rehabilitation practices, including the use of functional assessments and emerging technological approaches. By synthesising these dimensions within a PRISMA-guided systematic review, this study aims to provide a comprehensive understanding of the role of psychological readiness in facilitating safe and successful return to sport in volleyball athletes.

## Method

### Research Design and Framework

This study chose to use a systematic literature review (SLR) approach, which is a planned and open method for finding, assessing and combining all relevant evidence on a specific question. The SLR was preferred to a narrative review because it limits selection bias and makes the results more reproducible by following an explicit, pre-specified protocol (Tranfield et al., 2003). The review reporting adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 statement, which offers a new, detailed framework for keeping a record of the identification, screening, eligibility and inclusion of studies (Page et al., 2021). The detailed clarifications and examples that come together with the original PRISMA statement were used for the operationalization of each reporting item (Liberati et al., 2009). Since the volleyball-specific literature on psychological readiness was expected to be scarce and highly varied in method, it was decided before the study that a narrative thematic synthesis instead of a quantitative meta-analysis would be the most reasonable analytic approach.

*TITLE-ABS-KEY ( volleyball OR "beach volleyball") AND (injur\* OR trauma OR rehabilitation OR "ACL reconstruction") AND ("psychological readiness" OR confidence OR "fear of re-injury" OR kinesiophobia OR "athletic identity") AND ("return to sport" OR RTS OR RTP)*

The review protocol specified all the details like the research questions, the search string, the eligibility criteria, the screening workflow, and the data-extraction template even before starting the work. This not only minimized the risk of changes to the evidence base that might occur if the decisions were made after seeing the results, but also it provided a clear, audit-able chart from initial database exports to final syntheses. The three research questions presented in the Introduction (RQ1, RQ3) guided the design of the extraction template and the final thematic synthesis.

### Search Strategy

We created one complete Boolean search string that aimed at maintaining a good balance between sensitivity and specificity. The string was a combination of four main concepts--population (volleyball), event (injury), main construct (psychological readiness and its near synonyms) and the outcome (return to sport)--all linked together by the Boolean operator AND, while synonyms within each concept were joined by OR. Truncation (using the asterisk wildcard) allowed capturing of morphological variants like "injur\*" (injury, injuries, injured) and "psycholog\*" (psychology, psychological). We used the string in the TITLE-ABS-KEY field which simultaneously searches the title, abstract and author/index keyword fields.

To maintain privacy, we kept the population block at the TITLE-ABS-KEY level instead of limiting it to the title only, which ensured that papers with mixed athletic samples including volleyball players were brought up for the next step of eligibility assessment. We did not impose any methodological filter during the searching; study-design eligibility was decided at the time of screening so that the full-text document of the excluded designs could remain accessible.

### Database and Information Sources

This review was largely based on Scopus, which was considered the main and most reliable source of information. Scopus was chosen for its extensive multidisciplinary coverage of peer-reviewed sport-science, sports-medicine, rehabilitation, and psychology journals. In addition, it has a strict title-indexing policy, and it is very dependable in exporting structured bibliographic metadata such as author lists, source titles, publication years, document types, and digital object identifiers. The search was carried out on one day only, and the complete result set was saved as a comma-separated values file which formed the evidence base for all subsequent counts and screening decisions. Limiting the original search to a single, well-curated database is a good practice

for reproducibility; the main drawback, that is, the possibility of missing records indexed only elsewhere, is indeed one of the limitations of the review.

### Eligibility Criteria

Screening criteria were set prior to screening and consistently implemented for all records. Studies were considered for inclusion if they were written in English, appeared in journal articles from 2018 to 2025, mainly taken from sport-science, sports-medicine, rehabilitation, psychology or allied health subject areas, were in full text and were about psychological readiness, fear of re-injury or very similar psychological constructs after return to sport following injury in individuals who play volleyball or in other athletes who are very similar to volleyball players in that aspect. Records were excluded if they were non-English, non-article document types such as conference papers, editorials or book chapters, outside the publication window, from unrelated disciplines, only available in the form of abstracts, or only marginally related to the review topic. The working criteria are presented in Table 1.

Table 1 <Inclusion and Exclusion Criteria Applied during Study Selection>

Criterion	Inclusion	Exclusion
Language	English only	Any non-English language
Document type	Peer-reviewed journal article	Conference paper, book chapter, editorial, note
Publication period	2018–2025	Published before 2018
Subject area	Sport science, sports medicine, rehabilitation, psychology, allied health	Unrelated disciplines (e.g., pure engineering, unrelated clinical fields)
Accessibility	Full text available	Abstract only / inaccessible full text
Relevance	Directly addresses psychological readiness or related constructs in return to sport	Tangential or incidental mention only

### Study Selection Process

The study selection process was done in three consecutive stages aligned with the PRISMA 2020 flow. The identification phase involved extracting all records from Scopus, compiling them into one list, and removing duplicate entries. During the screening phase, the titles and abstracts of deduplicated records were checked against the eligibility criteria, and the clearly irrelevant records, typically those not dealing with psychological readiness or return to sport, or not involving a relevant athletic population, were excluded. In the eligibility step, the full texts of the records left over were retrieved and meticulously examined, and a specific reason was recorded for every exclusion at this step. Papers that met each criterion continued to data extraction and synthesis. The screening decisions were made based on the predefined criteria, and records that were unclear were kept for full-text evaluation rather than being excluded early, so that borderline cases were decided by the whole text rather than just the abstract. Records that were unclear were kept for full-text evaluation rather than being excluded early.

Study selection was conducted independently by two reviewers. Titles and abstracts were screened separately, followed by full-text assessment for studies that met the eligibility criteria. Any disagreements regarding study inclusion were resolved through discussion until consensus was reached. Where consensus could not initially be achieved, a third reviewer was consulted. Inter-rater reliability between the two reviewers was assessed using Cohen's Kappa coefficient, yielding a value of  $\kappa = 0.87$ , indicating excellent agreement.

### Quality Assessment - FICO Framework

Each candidate article in full text was evaluated for methodological quality and topical relevance through a four-domain FICO framework: Focus, Information, Context and Outcome. The FICO framework was selected because the included studies comprised heterogeneous research designs, making conventional appraisal tools less applicable. The Focus domain checked if the study had a specific question related to psychological readiness or a related concept. The Information domain evaluated the quality of the sample, the measurement instruments and the analytic approach. The Context domain judged the extent to which the population and setting of the study were volleyball or directly comparable athletic group. The Outcome domain checked if the paper contained results that could be interpreted and supported one of the review's research questions. Each domain was scored and only studies that met the minimum threshold in all four domains were selected for synthesis. This formal assessment made sure that the studies included were of significant and relevant evidence rather than incidental reference to the constructs of interest.

### Data Extraction Procedure

We used one extraction template for all studies that we included to keep the information consistent and comparable. The template took down the name(s) of the author(s), the year of publication, the country of the first author's affiliation, the study design, sample characteristics, the psychological construct or theme that was

studied, the measurement tools or intervention that were used, and the most important results related to the questions of the research. Extraction was done straight from the full texts, and the extracted fields filled the descriptive tables that were shown in the results. Extraction form - pilot testing - cross-check - verification. Arranging extraction in this way made it possible to do a systematic comparison between different designs and gave us the raw data for the following thematic synthesis.

### **Network and Bibliometric Analysis Methodology**

Due to the limited number of studies that satisfied the inclusion criteria, a formal bibliometric network analysis for example co-authorship, co-citation or keyword co-occurrence mapping using specialized software was not statistically justifiable, as the resulting networks would have been too thin to allow for reliable conclusions. Instead, a descriptive bibliometric characterization of the included studies was performed, highlighting the timeline of the publications, the location of the first authors' institutions, and the psychological constructs that were most frequently studied. These descriptive analyses correspond to Figures 1 to 3 and illustrate the shape of the evidence base in a very transparent way, without exaggerating the level of accuracy that can be obtained from a small body of literature.

### **Data Analysis and Synthesis**

Since the studies included in the review differed greatly in their design, the population they targeted and the way they measured their variables, it would have been inappropriate to do a quantitative meta-analysis and a thematic synthesis was therefore carried out in line with the method of Thomas and Harden (2008). Firstly, all the findings of the research were coded one line at a time based on the research questions; then the codes were grouped into descriptive themes that illustrated the main patterns across the studies; and lastly, the descriptive themes were transformed into analytical themes which directly answered the review questions. Instead of documenting the results of each study separately, the synthesis intentionally looked for agreements, contradictions and subtle differences among the studies. Themes were deduced from the data that were extracted and verified against the original texts to ensure that the interpretation was not too far-fetched.

From a practical point of view, the use of three analytical themes led to the identification of three main research questions: how readiness is conceptualised and measured, the nature and factors influencing readiness-outcome relation, and its role in return-to-sport practice. The coding was not only based on the content of the studies but also on the level of evidence and design robustness supporting the claims, e.g. conclusions from prospective cohort studies were given more weight than those based on cross-sectional correlations. When studies investigated similar constructs with different tools the analysis emphasised the construct rather than the tool, however, measurement differences that could have led to divergent results were noted. This way of organising according to the main constructs allowed evidence from athletic populations that were comparable but not quite the same as volleyball ones, to be used to answer volleyball-specific questions without confusing different sport requirements.

### **Reporting and Documentation**

The review was carried out according to the PRISMA 2020 checklist which details the necessary items for clear and transparent reporting of systematic reviews in the various sections of title, abstract, introduction, methods, results, discussion and other-information (Page et al., 2021). The tracking of records from finding to including them in the study is first given in numbers in the study selection results and then illustrated with the PRISMA 2020 flow diagram below. The numbers in the story and in the diagram are mutually consistent.

### **PRISMA 2020 Flow Diagram**

The PRISMA 2020 flow diagram of record flow through identification, screening, eligibility and inclusion phases is presented in Figure 1. It numerically agrees with the study-selection narrative below and with the counts summarised in the Abstract and Methods.

Based on Figure 1 there are 783 records identified in Scopus, 11 duplicates were removed, leaving 772 records screened by title and abstract. After 703 records were excluded as irrelevant, 69 full texts were assessed for eligibility, of which 59 were excluded with reasons-28 because volleyball or a comparable athletic population was not the study focus, 19 because no psychological-readiness or return-to-sport outcome was reported, and 12 because of an ineligible document type, language or inaccessible full text. Ten studies satisfied all criteria and were included in the synthesis.

As depicted in the diagram, the drastic reduction from 772 records screened to 10 included is mainly due to the wide scope of the search rather than a lack of evidence: the population keyword was intentionally broad to retrieve a large number of irrelevant records, which were then clearly excluded according to the specified criteria. The main reason for the exclusion of studies at the full-text stage was that the focus was not volleyball or a directly comparable population, thus highlighting the population-specific evidence gap mentioned in the Introduction.

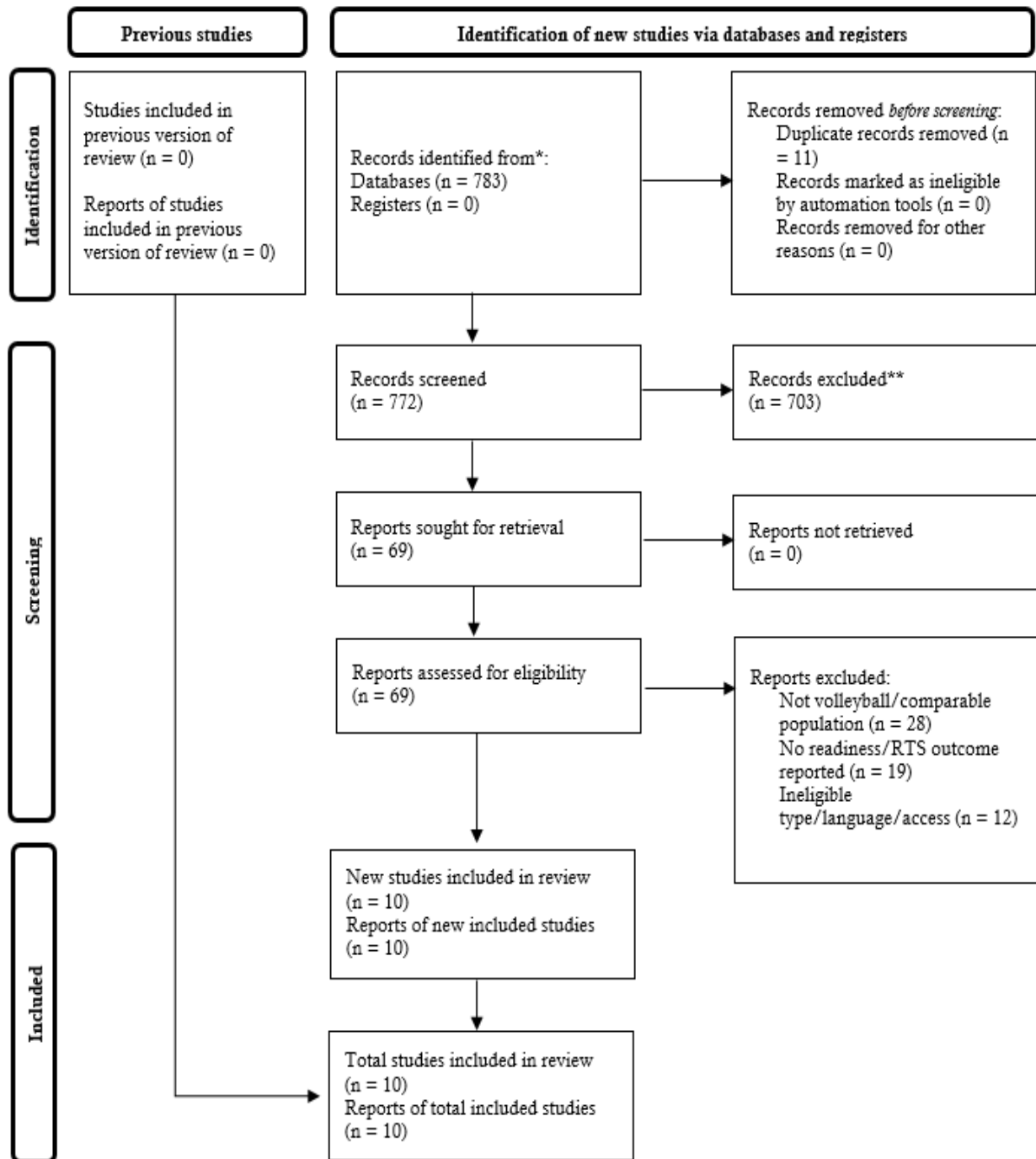


Figure 1 <PRISMA 2020 Flow Diagram of Study Identification, Screening, Eligibility and Inclusion>

## Results and Discussions

### Study Selection Results

We have got 783 pieces of information from the Scopus search. We found eleven duplicates that we removed. So, 772 unique entries got to the stage of title-and-abstract screening. Here, 703 entries were gone because they didn't discuss psychological readiness or return to sport, they didn't feature a relevant athletic population or they were outside of review scope in other ways. Then, the full texts of the rest 69 entries were found and checked for eligibility. Among them, 59 were eliminated with reasons given: 28 were not about volleyball or closely related athletic population, 19 had no psychological-readiness or return-to-sport outcome, and 12 were disqualified by document type, language or full-text availability. Ten articles met all the inclusion standards and were used in the synthesis. These data are the same in the Abstract, Methods, present section and the PRISMA flow diagram.

### Descriptive Characteristics of Included Studies

The ten studies included in the review were published between 2020 and 2025 and are briefly described in Table 2. They come from seven countries and four continents and use different types of research designs, cross-sectional surveys, prospective cohorts, qualitative interviews, psychometric validation and a single case report, illustrating the methodological diversity of a developing field. Table 3 categorizes the same studies according to research design, thematic focus, measurement instrument and main outcome.

Table 2 <Summary of the Ten Included Studies>

Title	Author(s)	Country	Method	Key findings
Pain and psychological readiness to return to sport in elite volleyball players	Gajardo-Burgos et al., 2023.	Chile	Cross-sectional (n = 107 elite male volleyball players)	Higher psychological readiness (PRRS) was correlated with lower perceived pain intensity during continental competition.
Mental toughness, pain self-efficacy and fear avoidance in elite injured athletes	Tawil et al., 2025.	Lebanon	Cross-sectional (n = 172 injured elite/competitive athletes)	Mental toughness beliefs mediated the relationship between pain self-efficacy and fear avoidance.
Validation of the Chinese injury-psychological readiness to return to sport scale	Liu et al., 2025.	China	Cross-cultural adaptation and psychometric testing	The Chinese I-PRRS showed acceptable reliability and validity for assessing readiness in Chinese-speaking athletes.
Barriers to and facilitators of ACL reconstruction rehabilitation	Walker et al., 2022.	Australia	Qualitative interviews (social constructionism)	Psychological factors were perceived as central; participants framed much of rehabilitation as being “between the ears.”
Predicting readiness for return to sport and performance after ACL reconstruction	van Haren et al., 2023.	Netherlands	Prospective multicentre cohort (n = 208)	Sport-specific psychological questionnaires contributed to models predicting initial and sustainable return to sport.
Return to sport after ACL graft rupture with nonoperative management	Chen., 2025.	Taiwan	Single case report (collegiate volleyball athlete)	A criterion-based, psychologically informed pathway supported successful return after graft rupture.
RTS test battery and second ACL injury risk factors	Butler et al., 2024.	United States	Retrospective case-control (adolescent athletes)	Kinesiophobia (Tampa Scale) combined with functional tests informed second-injury risk stratification.
Athletic identity and fear avoidance during injury rehabilitation	Ferman et al., 2024.	United States	Prospective cohort (n = 50 adolescent athletes)	Stronger athletic identity was associated with weaker fear-avoidance perceptions during the RTS phase.
In-season injury, quality of life and sleep in youth volleyball	Watson et al.	United States	Prospective cohort (n = 2073 female players)	Injury was associated with reduced quality of life and altered sleep, underscoring psychosocial impact.
Perceived competence, achievement goals and RTS outcomes	D’Astous et al., 2020.	United States	Cross-sectional mediation (n = 75 college athletes)	Task-approach achievement goals mediated the link between perceived competence and RTS outcomes.

Indeed, Table 2 shows that volleyball is really only backed by a handful of recent studies which are then supplemented by the import of knowledge from related groups of injured athletes, particularly those recovering from ACL injuries. Most of the first authors were affiliated with organizations in the US while the remainders were spread across Chile, Lebanon, China, Australia, the Netherlands and Taiwan, showing the worldwide interest through the construct, even when there is a shortage of dedicated volleyball samples in most countries. The predominance of studies derived from non-volleyball populations indicates that current evidence remains largely indirect. Consequently, the psychological readiness framework applied in volleyball is still heavily

dependent on findings from ACL-reconstructed athletes and other pivoting sports, highlighting a substantial evidence gap requiring volleyball-specific prospective investigations.

Table 3 <Classification of Included Studies by Design, Theme, Instrument and Outcome>

Author(s)	Country	Research design	Theme/focus	Instrument/ Intervention	Outcome
Gajardo-Burgos et al., 2023.	Chile	Cross-sectional	Psychological readiness & pain	PRRS questionnaire	Negative PRRS–pain association
Tawil et al., 2025.	Lebanon	Cross-sectional	Fear avoidance & coping	AFAQ, PSEQ, mental toughness scales	Mediation by mental toughness
Liu et al., 2025.	China	Psychometric validation	Measurement of readiness	I-PRRS (Chinese)	Valid, reliable instrument
Walker et al., 2022.	Australia	Qualitative	Rehabilitation experience	Semi-structured interviews	Psychological barriers/facilitators
van Haren et al., 2023.	Netherlands	Prospective cohort	Readiness prediction	Multivariable prediction models	Psychology improves prediction
Chen., 2025.	Taiwan	Case report	Criterion-based RTS	Functional + psychological criteria	Successful nonoperative RTS
Butler et al., 2024.	United States	Case-control	Kinesiophobia & re-injury	Tampa Scale + hop tests	Predicts second ACL injury
Ferman et al., 2024.	United States	Prospective cohort	Athletic identity	AIMS, AFAQ	Identity–fear inverse relation
Watson et al.	United States	Prospective cohort	Well-being & sleep	PedsQL, sleep duration	Injury lowers QoL
D’Astous et al., 2020.	United States	Cross-sectional	Motivation & competence	Achievement-goal inventories	Goals mediate RTS outcomes

Psychometric validation study and a qualitative research existed besides the quantitative one which shows that the domain psychometric still determining its measurement base while simultaneously starting to investigate experience. The dominance of cross-sectional studies limits causal inference regarding psychological readiness and return-to-sport outcomes. Consequently, current evidence is more suitable for identifying associations than determining causal relationships. Future longitudinal and intervention-based studies are therefore required to strengthen the evidence base.

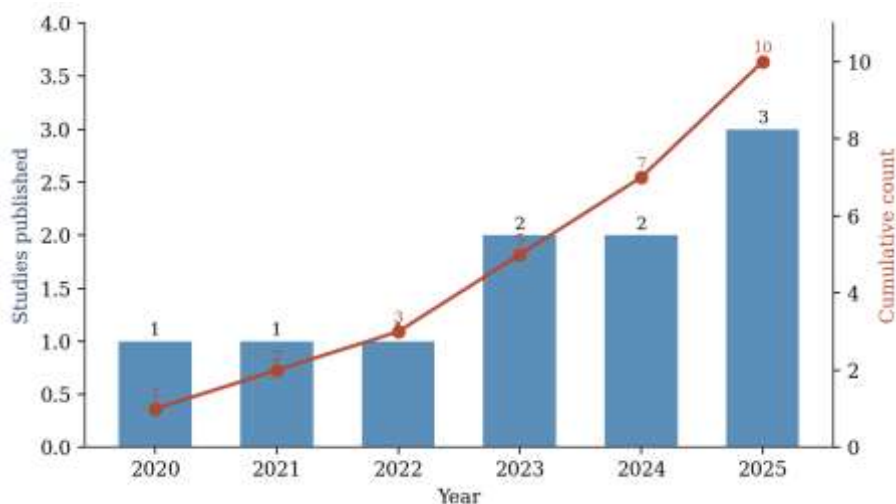
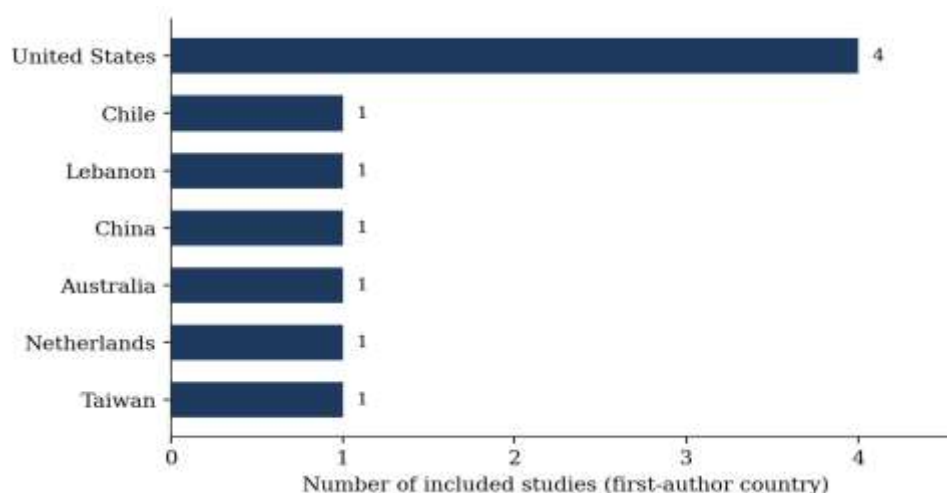


Figure 2 <Publication Trend of Included Studies by Year (2020–2025), with the Cumulative Count Overlaid>

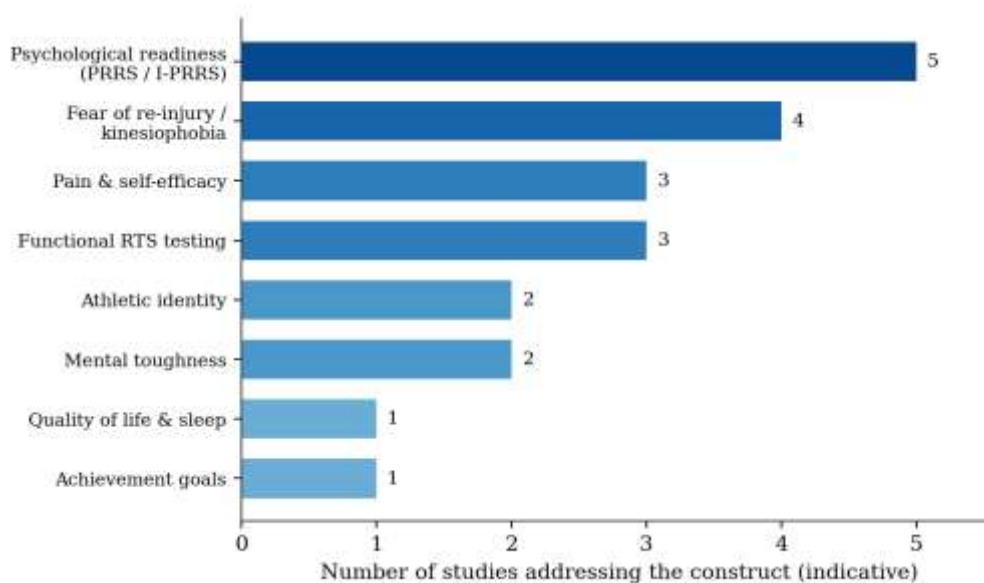
Figure 2 shows the time distribution of the studies included in the sample. There is a clear upward trend: the area of research generated scattered studies at the beginning of the decade and by the end of the decade it has accelerated, with the highest number of studies in a single year coming from the latest year of the search period.

The distribution shows a single study in each of 2020, 2021 and 2022, two studies in each of 2023 and 2024, and three in 2025, indicating accelerating scholarly attention to psychological readiness in volleyball and comparable populations. The fast increase in Figure 2 aligns with the overall development of return-to-sport psychology as a research field and implies that the volleyball-related research, although currently limited, is growing rather than remaining unchanged. This time trend makes the case even stronger for a comprehensive review now, before the volume of literature gets to a point where it would be almost impossible to compile. This increasing publication trend reflects growing recognition that psychological recovery represents an essential component of successful rehabilitation. Nevertheless, despite increasing publication numbers, volleyball-specific investigations remain scarce, indicating that research growth has been concentrated primarily in ACL and mixed-sport populations rather than volleyball itself.



**Figure 3 <Geographic Distribution of Included Studies by First-author Country>**

Figure 3 summarises the geographic distribution of the included studies by the country of the first author's affiliation. The United States contributed four studies, with single contributions from Chile, Lebanon, China, Australia, the Netherlands and Taiwan, reflecting a geographically dispersed but thinly populated evidence base.



**Figure 4 <Thematic Distribution Of Psychological Constructs Across The Included Studies, Sized by the Number of Studies Addressing Each Construct>**

The fact that most of the output comes from the United States while six other countries from South America, the Middle East, East Asia, Oceania and Europe contribute single pieces makes it clear that there is no single

national research culture dominating the topic and that the research on readiness relevant to volleyball is being carried out in parallel in different sporting systems worldwide. This spread of research is a good sign for the future generalizability of the results but it also accounts for the diversity of instruments and populations seen throughout the body of work. The geographical dispersion demonstrates increasing international interest; however, the absence of studies from many volleyball-dominant countries suggests unequal research development and potential geographical bias.

Figure 4 represents the relative frequency with which specific psychological constructs were investigated across the included studies. Psychological readiness (assessed via PRRS/I-PRRS) and fear of re-injury or kinesiophobia were the most frequently examined, followed by pain and self-efficacy, functional return-to-sport testing, athletic identity, mental toughness, quality of life and sleep, and achievement goals.

As Figure 4 shows, the majority of the text is focused on two main concepts, the concept of global readiness itself and the concept of fear of re-injury, which is the most potent factor that diminishes the global readiness. Besides, a few other concepts (pain, self-efficacy, functional testing, athletic identity) keep showing up in different studies. These concepts are not single elements but layers of a single, intertwined web itself, which is further explained in the thematic synthesis below. The concentration of studies on fear of re-injury and psychological readiness indicates that these constructs currently dominate the literature. Conversely, relatively limited attention has been devoted to resilience, coping strategies, emotional regulation, and psychological interventions, suggesting important directions for future research.

### **RQ1 - Conceptualisation and Measurement of Psychological Readiness**

Psychological readiness was described by some of the studies as a complex concept that includes various aspects along with an athlete's trust in the healing of the injured body part, the stability of emotions in the athlete towards the return to the competition, and the consideration of the risk of re-injury. The most common way of measuring psychological readiness was through the use of recognized self-report questionnaires. The Injury-Psychological Readiness to Return to Sport scale, which was initially designed to measure confidence at the moment of return (Glazer, 2009), appeared repeatedly in the studies and its cross-cultural version was further developed by the validation of a Chinese-language version that showed satisfactory reliability and validity (Liu et al., 2025). Along with the general ones, particularly the ACL-Return to Sport after Injury scale and its short form were used also to measure the psychological aspects of injuries (Webster et al., 2008; Webster & Feller, 2018) while the related concepts were assessed through the Tampa Scale for Kinesiophobia (Woby et al., 2005), the Re-Injury Anxiety Inventory (Walker et al., 2010) and the Athletic Identity Measurement Scale (Brewer et al., 1993).

The studies agreed that readiness is best conceptualized within an integrated biopsychosocial model where psychological response interacts with physical and social components throughout the recovery path (Wiese-Bjornstal et al., 1998). In a volleyball sample only, psychological readiness measured by the PRRS was considered a quantifiable characteristic that changed significantly among elite players and was, therefore, physically experienced by them in a systematic way (Gajardo-Burgos et al., 2023). The results of qualitative research were added to this numerical scenario, as the athletes, themselves, viewed readiness mainly as a mental state and considered the major problem during rehabilitation, in their own words, to be "the battle that goes on in the mind" (Walker et al., 2022; Podlog et al., 2015).

A more detailed comparison of the different instruments helps to explain the conceptual space. I-PRRS measures one overall readiness level by asking for a global confidence judgement which is very convenient for clinical use but masks the different facets which contribute to the index (Glazer, 2009). On the other hand, ACL-RSI was created to differentiate between feelings, confidence in performance and estimation of re-injury risk, and the factor structure of the tool has been investigated and applied to other injuries such as the shoulder (Webster et al., 2008; Olds & Webster, 2021). Kinesiophobia measures anchor the construct in a fear-avoidance theory borrowed from chronic-pain research (Woby et al., 2005), whereas re-injury anxiety questionnaires emphasize the self-involving, situational characteristic of the fear (Walker et al., 2010). Consequently, these tools should not be considered substitutes: they touch on different, although partly overlapping, areas of the readiness concept, and the decision to use one of them significantly determines what a particular piece of research is capable of finding.

However, there was clear diversity in the measurement. One study considered readiness as a single unit, while other studies divided it into components like confidence, fear and risk-appraisal. Besides, some studies used generic instruments whereas others used injury-specific ones. This measurement diversity, on the one hand, shows the method diversity of the field and, on the other hand, makes it hard to compare the studies directly and has been a central issue in the assessment of the field. Validation of language-specific adaptations such as the Chinese I-PRRS is a good move to address this fragmentation, because cross-culturally invariant instruments are a pre-condition for pooling evidence across the geographically dispersed literature mapped in Figure 2 (Liu

et al., 2025). To sum up, the response to RQ1 is that psychological readiness is seen as a multidimensional, confidence-centred construct overshadowed by fear of re-injury, and that measures used for such readiness are primarily a group of validated self-report scales that are being translated and adapted for particular languages and sports more and more. Although both I-PRRS and ACL-RSI evaluate psychological readiness, they assess different dimensions. I-PRRS primarily measures overall confidence, whereas ACL-RSI incorporates emotional responses and perceived reinjury risk. This conceptual heterogeneity partly explains differences reported across studies.

### **RQ2 - Psychological Factors Associated with Return-to-Sport Outcomes**

The second research question was about which psychological elements are linked to return-to-sport results and their direction. The analysis pointed out that higher psychological readiness and lower fear of re-injury were constantly linked with better outcomes, whereas high kinesiophobia and re-injury anxiety were linked with non-return and increasing the risk of the second injury. In a sample of elite volleyball players, psychological readiness was found to correlate with less pain perceived during competition, indicating an inverse relationship between the psychological and pain aspects of recovery (Gajardo-Burgos et al., 2023). Fear of re-injury has been recognized as a major limiting factor for returning to competitive sports that can be changed by intervention (Sheean et al., 2023; Kvist & Silbernagel, 2022).

In addition to readiness being a significant predictor of outcome, many studies have also found protective psychological factors that affect the recovery path. Mental toughness was the psychological factor that best explained the relationship between pain self-efficacy and fear avoidance in elite injured athletes, meaning that having a strong inner resource to withstand pain can lessen the negative emotional impact of pain (Tawil et al., 2025). A well-developed athletic identity not only lessened fear-avoidance thoughts among adolescent athletes during rehabilitation (Ferman et al., 2024), but also the mediation of adaptive task-oriented achievement goals between perceived competence and return-to-sport outcomes was demonstrated by D'Astous et al. (2020). Psychological and physical evidence further support these psychological associations: for instance, kinesiophobia when coupled with physical tests, provided valuable information for second-injury risk stratification (Butler et al., 2024), psychological readiness was able to predict the level of sport preinjury that patients were able to reach one year after reconstruction (Kitaguchi et al., 2020), and psychological factors were correlated with landing asymmetry after reconstruction (Peebles et al., 2021; Della Villa et al., 2021).

Two cross-cutting subtle elements complicate this overall pattern. The first one is about timing: a person's preparedness doesn't remain unchanged but rather develops during the entire rehabilitation period, to the point that one cross-sectional measurement might just reveal a temporary state instead of a constant disposition, and the prospective research works in the corpus had a better potential to unveil this changing aspect as compared to the cross-sectional ones that were the majority (van Haren et al., 2023; Kitaguchi et al., 2020). The second one is about the working: the repeated link between readiness and lower pain is very likely to be a two-way street. On the one hand confidence reduces the threat appraisal, which is the cause of pain perception, and on the other hand less pain means more confidence (Gajardo-Burgos et al., 2023; Kvist & Silbernagel, 2022). The type of injury also was a factor in influencing readiness. Non-contact and contact mechanisms seemed to lead to a different level of confidence in the injured person (Presley et al., 2021; Della Villa et al., 2021). Such subtleties warn here from considering the readiness, outcome relationship as just a single, simple main effect.

The literature was not completely consistent, however. Associations were mostly made from cross-sectional studies, which do not allow determining causality; also, the size of the effects depended on population, instrument and type of injury. Besides the psychosocial burden of injury, evidence emerged about a women's volleyball cohort (large prospective) whose in-season injuries were linked to a lowering of life quality as well as to changes in sleep, thus positioning readiness within the broader context of athlete well-being (Watson et al., 2021). Similar results in soccer, Gaelic games, judo as well as skiing confirmed the cross-sport consistency of the readiness-outcome link (Kunnen et al., 2019; O'Connor et al., 2021; Lambert et al., 2023; Podlog et al., 2023). To conclude, the response to RQ2 is that psychological readiness, confidence, and other adaptive personal resources have a positive relationship with return-to-sport outcomes, while fear of re-injury and kinesiophobia not only have a negative relationship with these outcomes but also are connected with an increased risk of sustaining a second injury. Despite consistent associations between psychological readiness and return-to-sport outcomes, most evidence originates from observational studies. Therefore, causality remains uncertain, emphasizing the need for prospective cohort studies and randomized psychological intervention trials.

### **RQ3 - Integrating Psychological Readiness into Return-to-Sport Practice**

The third research question focused on how psychological readiness measures can fit into return-to-sport tacking and rehabilitation plans. The studies that were included showed a very declarative path from the use of physical clearance criteria alone to the introduction of criterion-based frameworks that combine functional performance testing with validated psychological assessment. Prospect cohort evidence showed that the addition of sport-

specific psychological questionnaires improved not only the prediction of the return to sport but also the prediction of Kiwi's sustained return to sport after reconstruction (van Haren et al., 2023). A return-to-sport test battery that combined kinesiophobia in the lineup along with hop testing, helped with second-injury risk stratification (Butler et al., 2024). Chen (2025) has reported a volleyball-specific case that has shown a criterion-based, psychologically informed pathway can make a successful return possible even after the most difficult scenario of a graft rupture managed without surgery.

The research also indicated a move towards more ecologically valid and technologically enhanced assessment. The idea of adding secondary cognitive and dual-task challenges to return-to-sport testing comes from understanding that competition not only strains the body but also the attention, and that performing tests in a very relaxed cognitive state could lead to an overestimation of the level of readiness (Chaaban et al., 2023). In the case of volleyball, in particular, the advent of wearable inertial sensors has made it possible to objectively measure the jump load and landing mechanics in both training and competition (Charlton et al., 2017; Damji et al., 2021). Also, the biomechanical studies of spike jumps give us a clear idea of the knee forces that an athlete who is going back to sport will be facing (Wang et al., 2021; Liu et al., 2021). Combining such objective load monitoring with psychological readiness testing would seem to be a reasonable way towards making personalised, evidence-based return decisions.

However, implementing this integrative vision as a usual practice is not without challenges. The very studies that have been incorporated here mostly reveal those challenges indirectly. Test batteries based on criteria require time, various tools and a sound knowledge of psychology among other things. These prerequisites are not always available at different playing levels of volleyball, for example, a professional environment that is well-resourced as opposed to school and leisure settings where sport psychologists are seldom or unreasonably accessible. The qualitative data shows that athletes understand the psychological side of healing and potentially desire its detailed evaluation, which is a factor that makes implementation possible (Walker et al., 2022; Kunnen et al., 2019). Nevertheless, a joint decision-making concerning the return implies that clinicians, coaches and athletes must equally interpret the readiness scores and the heterogeneity in measurement reported in RQ1 impedes this very shared interpretation (Arden et al., 2016; Gomez-Espejo et al., 2022).

Integration is still something to be aimed for rather than something that is completely standardized. There was no reporting in any study that a fully validated, volleyball specific protocol that integrated functional, psychological, and load-monitoring data into a single decision algorithm had been developed, and the consensus literature keeps recommending shared decision-making that not only considers the psychological side but also the physical one (Arden et al., 2016). Hence the response to RQ3 is that psychological readiness can and in fact will have to be integrated through criterion-based batteries that not only use validated psychological tests but functional tests as well, and looking ahead, also will involve wearables for load monitoring, however, a fully integrated protocol that is volleyball-specific is still to be formulated. Current evidence supports integrating psychological assessment into return-to-sport protocols; however, no standardized volleyball-specific algorithm has yet been validated. Consequently, clinicians continue relying on multidisciplinary clinical judgment rather than evidence-based integrated decision models.

### **Comparative and Critical Analysis**

Looking at the whole, the papers show a methodological profile characteristic of an emerging discipline. Cross-sectional designs are the main ones, allowing quick snapshots of links but very little the obtaining of causation or temporal change. Prospective cohorts, even reduced in number, are the main source of evidence on prediction and trajectory (van Haren et al., 2023; Watson et al., 2021), at the same time good qualitative and case-based work contributes with ecological perspective and depth that quantitative designs lack (Walker et al., 2022; Chen, 2025). A psychometric validation study among the papers shows that the field is still very much invested in the measurement infrastructure (Liu et al., 2025). The least used designs are quite obvious: randomised or controlled intervention trials focusing on psychological readiness in volleyball are lacking from the corpus, as well as longitudinal designs continuously tracking readiness from injury through to return.

Sample characteristics are an additional factor that dampens the level of inference strength. The collection of studies varied from a single-athlete case report to a prospective cohort of more than two thousand youth players, and this discrepancy in scale means that the most generalisable findings about psychosocial burden come from populations that are not exclusively volleyball-specific, whereas the most volleyball-specific findings often rely on quite small samples (Watson et al., 2021; Gajardo-Burgos et al., 2023; Chen, 2025). Age and competitive level were highly varied, as there were adolescents as well as elite adults, and since athletic identity is a major factor in the development of younger athletes, it is quite possible that determinants of readiness may not be the same throughout life (Ferman et al., 2024; D'Astous et al., 2020). This kind of diversity is typical of a nascent discipline and indeed, it strengthened the argument for standard, sufficiently powered, sport-specific research designs.

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Across the search window, one can observe a distinct methodological evolution. In the past, researchers usually treated psychological constructs as independent variables. More recent studies, on the other hand, have started to include them in multivariable prediction models and criterion-based test batteries, and also have begun to consider cognitive and technological factors. The same trend can be seen in return-to-sport science at large. It implies that the next set of volleyball-specific research will probably be more integrative, prospective, and technologically instrumented, unlike the mostly cross-sectional base of present evidence.

### Discussion

Theoretically speaking, the combined findings of this review strongly support a biopsychosocial interpretation of return to sport, where psychological readiness is understood not simply as the result of physical healing or an isolated personality trait, but rather as a new state formed through the interaction of bodily recovery, emotional response and social environment (Wiese-Bjornstal et al., 1998). The continual opposite relationship found between readiness and fear of re-injury, and between readiness and pain, suggests that the mental and physical aspects of the healing process are so closely linked that one cannot exist without the other, instead of one being simply followed by the other. This reading of the results is at odds with any rehabilitation approach that views the mental clearance phase as a minor addition coming after the physical testing.

Conceptually, they use the integrated model of injury response as a framework and add to it by pinpointing exactly which psychological resources are most relevant for volleyball-specific populations confidence, mental toughness, adaptive achievement goals and athletic identity. Additionally, they identify fear of re-injury as the main modifiable barrier. Therefore, their practical suggestions are quite specific. Rehabilitation teams and coaches should not only depend on physical milestones but also should continuously assess psychological readiness using sport-specific tools. Fear of re-injury should be recognized as a separate and treatable issue. Moreover, return decisions should be based on criterion-based test batteries that combine functional testing with psychological assessment (van Haren et al., 2023; Butler et al., 2024; Ardern et al., 2016).

These practical tips are certainly translatable into the volleyball context. In this sport, the athlete is continually exposed to the maximum landing loads, the similar stress that the ACL fails to withstand during the injury, from the very first return-to-jump training session. So, assessing an athlete's readiness to return to the sport is most effective when the tests are performed multiple times along the rehab timeline rather than just once at discharge. Clinicians thus have an opportunity to find out if an athlete's confidence has plateaued or even fallen before being fully exposed to competition. If a sport psychologist is not always available, short validated questionnaires like the I-PRRS can be used by the coaching personnel after appropriate training for both administration and interpretation. Those with very high scores of kinesiphobia or re-injury anxiety should be the ones that get the referral for psychological support with specific therapy rather than simple reassurance (Glazer, 2009; Woby et al., 2005; Walker et al., 2010). The functional milestones of volleyball rehab such as single-leg hop symmetry, jump-landing technique, and sport-specific drills can be the basis for the diagnostic such that the biopsychosocial approach is put into practice without imposing a completely new assessment burden (Kitaguchi et al., 2020; Peebles et al., 2021).

In comparison to earlier reviews and consensus statements, largely focused on ACL-reconstructed and mixed sport populations, the present review, while confirming the importance of psychological readiness, also highlights the specific nature of volleyball with its emphasis on jumping. Previous reviews have found that fear of re-injury and lack of confidence are major factors in reducing return rates after injury in various sports, this review has made that general finding more specific by focusing on a population for whom competitive reality means unavoidable, repeated exposure to the landing loads that are the same as those that caused their injury (Charlton et al., 2017; Wang et al., 2021). The point of this localisation is that generic return-to-sport benchmarks that come from pivoting field sports may not be easily and directly applied to a sport in which the spike and block jump are not only the aim of the rehabilitation process but at the same time the main danger (Charlton et al., 2017; Wang et al., 2021). Literature divergences continue to exist, mainly about the readiness measurement, either as an overall construct or its decomposed subcomponents, and also about the strength and consistency of the relationships in cross-sectional as well as prospective designs, which might be the reflection of real differences in populations as much as methodological artifacts.

The mechanisms that connect psychological readiness with outcomes are still very much a topic to be explored. The findings align with a theory that fear of re-injury serves as a behavioural inhibitor, lessening the force, extent and self-assurance of movements during competition, and as a result both impairing performance and, quite unexpectedly, increasing biomechanical risk by means of guarded or asymmetric movement patterns. The fact that landing asymmetry is associated with psychological factors post-reconstruction is a strong indication of a psychomotor pathway by which the mind's perception of danger, influences the body's movements (Peebles et al., 2021; Della Villa et al., 2021). For a sport whose main feature is the repeated, maximal landing of the spike and block jump, such an integration of mind and body is not a coincidence but

rather a main point: the very actions that characterize volleyball are the ones most loaded with the risk of re-injury (Wang et al., 2021; Liu et al., 2021).

Contradictions in the literature should not be dismissed but rather analyzed thoroughly. When studies show differences in the strength of the readiness, outcome correlation, such differences are often the result of variations in design, instrument, and population, suggesting that what seems to be disagreement may be mostly due to measurement and sampling, excluding substantive disagreement about the phenomenon. For example, the inconsistency between high cross-sectional correlations and less strong prospective predictions fits the pattern of finding more accurate estimates through better experimental designs, which is common in maturing research fields (van Haren et al., 2023; Webster et al., 2019). Harmonized measurement and prospective replication will be needed to reconcile these accounts instead of more cross-sectional data accumulation.

Apart from that, this synthesis points out at least three research areas unexplored. First, very few volleyball cohorts are completely dedicated, and here most of the evidence is derived from basically similar but different basketball players, which therefore hardly allow to confidently making the inference for the specific sport. Second, tracing readiness through the full rehabilitation arc by research tests and prospective research works are so few that one can comfortably say are mostly dominated by cross-sectional snapshots. Third, an integrated protocol combining psychological, functional and wearable load-monitoring data for the decision of volleyball return has not yet been validated by any study. This review itself has at least three limitations. It relied on a single database (Scopus), which, although comprehensive, may have omitted records indexed only elsewhere; it was restricted to English-language journal articles, introducing potential language and publication bias; and small final corpus precluded meta-analysis and constrained the strength of quantitative inference.

Therefore, three practical future paths are set out here. Primarily, potential volleyball-specific cohort studies should monitor the psychological readiness of players from the time of injury to their return in a longitudinal manner, thus enabling causality and trajectory-based inference. Secondly, clinical trials of interventions should determine if fear reduction of re-injury and development of protective mental resources like mental toughness result in improved return performance of volleyball athletes. Thirdly, scholars ought to create and verify combined decision-making systems that incorporate the use of reliable psychological tests along with functional testing and wearable load monitoring, thus taking full advantage of the blossoming of inertial sensing technology in volleyball (Charlton et al., 2017; Damji et al., 2021). In brief, RQ1 is fulfilled by discovering that readiness is a multidimensional, confidence-centred, and fear-shadowed notion measured through validated scales; RQ2 by identifying that readiness and adaptive resources are positively, while fear and kinesiophobia are negatively, associated with return to sport results and second-injury risk; and RQ3 by suggesting that readiness is most effectively integrated through criterion-based batteries supplemented, prospectively, by cognitive and technological assessment.

## Conclusions

ghness, and self-efficacy. Across the included studies, psychological readiness was predominantly assessed using validated self-report instruments, particularly the Injury-Psychological Readiness to Return to Sport (I-PRRS) and the ACL-Return to Sport after Injury (ACL-RSI) scales, although considerable variability remains in the conceptualization and operationalization of psychological readiness across studies. In response to the first research question (RQ1), the review demonstrates that psychological readiness is no longer viewed as a single psychological characteristic but rather as an integrated biopsychosocial construct that interacts continuously with physical recovery throughout rehabilitation. Confidence and fear of re-injury emerged as the two central dimensions underlying return-to-sport readiness, while additional constructs such as athletic identity, self-efficacy, achievement goals, and mental toughness contribute substantially to successful rehabilitation outcomes. Although several validated psychological instruments are currently available, the diversity of measurement approaches highlights the need for greater standardization to facilitate comparison across studies and improve evidence synthesis. Regarding the second research question (RQ2), the evidence consistently indicates that higher psychological readiness is associated with more successful return-to-sport outcomes, whereas fear of re-injury and kinesiophobia are negatively associated with return rates and are linked to an increased risk of recurrent injury. Protective psychological characteristics, including mental toughness, athletic identity, adaptive achievement goals, and pain self-efficacy, appear to facilitate rehabilitation by reducing avoidance behaviour and strengthening athletes' confidence during the return-to-sport process. Nevertheless, because most available evidence originates from cross-sectional and observational studies, causal relationships between psychological readiness and rehabilitation outcomes remain insufficiently established. For the third research question (RQ3), the review indicates that contemporary return-to-sport decision-making should no longer rely exclusively on physical performance criteria. Instead, evidence supports a criterion-based approach integrating functional performance testing with validated psychological assessments. Emerging technologies,

including wearable inertial sensors, biomechanical monitoring systems, cognitive dual-task assessment, and digital performance tracking, further demonstrate considerable potential for enhancing individualized return-to-sport decision-making. However, no validated volleyball-specific protocol currently integrates psychological, functional, biomechanical, and technological assessments into a comprehensive evidence-based decision model, representing an important gap in current rehabilitation practice. This review makes an important scientific contribution by providing one of the first comprehensive syntheses specifically examining psychological readiness to return to sport within the context of volleyball. Unlike previous reviews that primarily focused on anterior cruciate ligament reconstruction or mixed-sport populations, this review highlights the unique psychological and biomechanical characteristics of volleyball, where repetitive jumping, landing, and high-impact movements generate distinctive rehabilitation demands. Consequently, the findings provide a sport-specific perspective that may support the development of future volleyball rehabilitation guidelines and evidence-based return-to-sport protocols. From a theoretical perspective, the findings strengthen the biopsychosocial model of sports injury rehabilitation by demonstrating that psychological readiness should be regarded as an independent determinant of successful return-to-sport outcomes rather than merely a consequence of physical recovery. Psychological recovery and physical recovery should therefore be considered complementary processes that evolve simultaneously throughout rehabilitation.

Practically, the findings have important implications for coaches, physiotherapists, sports physicians, rehabilitation specialists, and sport psychologists. Return-to-sport decisions should routinely incorporate validated psychological readiness assessments alongside functional performance testing rather than relying solely on physical recovery indicators. Early identification of athletes experiencing fear of re-injury or low psychological confidence may facilitate targeted psychological interventions that improve rehabilitation outcomes, reduce premature return to competition, and minimize the likelihood of recurrent injury. Several limitations should be acknowledged. First, this review relied exclusively on the Scopus database, potentially excluding relevant studies indexed in other databases such as Web of Science, PubMed, or SPORTDiscus. Second, only English-language peer-reviewed journal articles were included, introducing potential language and publication bias. Third, considerable methodological heterogeneity among the included studies, including differences in research design, participant characteristics, injury types, and psychological assessment instruments, prevented quantitative meta-analysis. Finally, the relatively small number of volleyball-specific studies limits the generalizability of the findings and highlights the current shortage of high-quality evidence within volleyball populations. Future research should prioritize large-scale longitudinal cohort studies involving volleyball athletes throughout the entire rehabilitation process to better understand changes in psychological readiness over time. Randomized controlled trials evaluating interventions designed to reduce fear of re-injury and improve psychological confidence are also needed. Furthermore, future investigations should integrate wearable sensor technology, biomechanical monitoring, artificial intelligence, and machine learning approaches to develop comprehensive, volleyball-specific return-to-sport decision-support systems capable of improving rehabilitation precision and reducing recurrent injury risk. Overall, psychological readiness should be regarded as an essential component of return-to-sport evaluation rather than a supplementary consideration following physical rehabilitation. Integrating psychological assessment with functional performance testing offers a more comprehensive, individualized, and evidence-based approach for optimizing rehabilitation outcomes, minimizing reinjury risk, and facilitating safe, confident, and successful return to competitive volleyball.

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