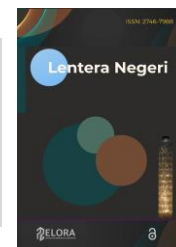




Contents lists available at [Elora Center](#)

Lentera Negeri

Journal homepage: <https://lentera.eloracenter.org/lentera>



Affect, cognition, and interpersonal predictors of performance in beach volleyball: a systematic review

Rudyanto Rudyanto^{*)}, Eval Edmizal, Jeki Haryanto

Universitas Negeri Padang, Indonesia

Article Info

Article history:

Received Sept 03rd, 2026

Revised Sept 06th, 2026

Accepted Sept 07th, 2026

Keyword:

Beach volleyball,
Sport psychology,
Competitive anxiety,
Mental fatigue,
Decision-making

ABSTRACT

Beach volleyball is a physically and psychologically demanding sport in which performance is produced by two interdependent athletes under variable environmental and competitive demands. This systematic review synthesized empirical evidence on psychological states and processes associated with competitive and technical-tactical performance in beach volleyball. Following PRISMA 2020, Scopus was searched on 21 August 2026 using predefined terms covering psychological states and processes. Of 403 records identified, 15 duplicates were removed, 388 records were screened, 98 reports were assessed in full text, and 22 studies met the eligibility criteria. Eligible studies were peer-reviewed English-language empirical investigations involving beach volleyball athletes, dyads, or teams and examining affect, anxiety, mood, mental fatigue, cognition, decision-making, motivation, coping/resilience, personality, or interpersonal processes. Thematic synthesis identified four broad clusters: affect, anxiety and mood; mental fatigue and cognition; decision-making and psychological momentum; and psychological skills, personality, and interpersonal processes. The evidence suggests that anxiety interpretation and self-confidence may be more informative than anxiety intensity alone, whereas mental fatigue and sleep restriction are consistently associated with poorer attack or perceptual-cognitive performance. Decision-making is influenced by contextual information, prior outcomes, and probability biases, while partnership quality and interpersonal regulation appear relevant to team functioning. However, the evidence base is heterogeneous, frequently cross-sectional, and based on small samples. Findings should therefore be interpreted as associations rather than universal causal effects. Future research should prioritize longitudinal, dyad-sensitive, ecologically valid, and technology-assisted designs with standardized assessment and replication.



© 2026 The Authors.

This is an open access article under the CC BY-NC-SA license
(<https://creativecommons.org/licenses/by-nc-sa/4.0>)

Corresponding Author:

Rudyanto Rudyanto,

rudyanto@unp.ac.id

Introduction

Beach volleyball is an Olympic sport characterized by high physical demands, environmental variability, and competition between two-player teams. Matches are played on sand and are affected by heat, wind, and glare, while play alternates between brief high-intensity actions and recovery periods (Đurković et al., 2024; Natali et al., 2019; Palao et al., 2012). These characteristics create a distinct performance environment in which athletes must continuously perceive opponents, select tactical responses, regulate affect, and coordinate with a single partner. The two-person structure is particularly relevant to sport psychology because individual actions and psychological states can immediately influence the partner and the joint performance process.

Psychological demands in beach volleyball include the regulation and interpretation of competitive anxiety, maintenance of concentration, decision-making under time pressure, coping with mistakes, and management of fatigue and recovery. Earlier research has examined anxiety and self-confidence, while more recent work has addressed mental fatigue, sleep, decision-making, and interpersonal processes. Because beach volleyball is a tightly interdependent dyad, psychological processes cannot always be understood at the individual level alone. The relevant unit of analysis may shift between the athlete, the action, and the athlete-partner dyad depending on the research question.

Existing studies provide evidence across several psychological domains. Perceptual-cognitive research has shown differences in anticipatory skill and gaze-related decision-making between athletes with different levels of expertise (Cañal-Bruland et al., 2011; Klostermann et al., 2015). Other work has examined the integration of visual and auditory information during sport decision-making (Klatt & Smeeton, 2020), while performance-analysis research has described technical-tactical indicators in young elite players (Pérez-Turpin et al., 2019). Together, these studies indicate that perception and decision-making are important components of beach volleyball performance, but they do not by themselves provide a synthesis of affective, cognitive, and interpersonal evidence.

A second body of research has focused on affective and motivational characteristics and on the quality of athlete-partner relationships. Studies of anxiety and self-confidence suggest that the interpretation or direction of competitive symptoms may be more informative than intensity alone (Raudsepp & Kais, 2002; Kais & Raudsepp, 2004). Other studies have examined affective zones, coping, motivation, personality, emotion regulation, attachment, and partnership quality. These constructs have generally been studied separately, using different instruments, samples, and designs. The resulting evidence is therefore broad but fragmented, making it difficult to determine which psychological processes are consistently associated with performance and under which conditions.

Recent methodological developments also create opportunities to study psychological states closer to the moment of performance. Athlete-monitoring approaches can track perceived well-being and autonomic measures (Nakamura et al., 2022), while electronic tracking systems can quantify movement and workload during competition (Marzano-Felisatti et al., 2024). Field-based measurement of mental fatigue using smartphones has also been demonstrated in world-class beach volleyball players (Da Costa et al., 2023). Such approaches may help address a central limitation of one-time questionnaires: anxiety, fatigue, arousal, and attention can fluctuate within and across matches. Repeated, context-sensitive assessment may therefore provide a more ecologically valid representation of psychological-performance relationships.

Despite these advances, the beach volleyball psychology literature remains heterogeneous in constructs, measurement instruments, samples, and study designs. Some studies use cross-sectional questionnaires, whereas others use controlled fatigue manipulations, notational datasets, mixed methods, or qualitative interviews. The heterogeneity limits direct quantitative pooling and makes it necessary to distinguish associational findings from evidence obtained through experimental manipulation. A systematic synthesis is therefore needed to map the psychological constructs studied, identify their reported relationships with performance, and evaluate methodological gaps.

A further gap concerns the dyadic and dynamic nature of beach volleyball. Cross-sectional individual-level designs provide useful information but are limited in capturing changes across rallies, sets, and matches or reciprocal processes between partners. Research on gaze and social interaction, partnership quality, leadership, and emotion regulation suggests that interpersonal processes may shape how athletes respond to pressure (Nicklas et al., 2022; López-Gajardo et al., 2021; Poczwadowski et al., 2020). Intervention studies have also produced mixed results, emphasizing the importance of ecological validity and adequate pressure manipulation when evaluating psychological techniques.

Accordingly, this systematic review was designed to synthesize empirical evidence on psychological states and processes in beach volleyball and their relationships with competitive or technical-tactical performance. The review uses a broad construct framework while retaining the methodological distinctions among cross-sectional, experimental, observational, and qualitative evidence.

Three research questions guided the review. RQ1 examined which psychological states and processes have been studied and how the evidence is distributed. RQ2 examined how these psychological states are associated with, or experimentally related to, competitive and technical-tactical performance. RQ3 examined the assessment methods, study designs, interventions, and methodological gaps identified across the literature.

Because this is a systematic review rather than a primary athlete study, no participant recruitment, prospective sample-size calculation, or statistical power analysis was applicable. Instead, the sampling frame was defined through explicit database, population, language, publication-type, psychological-construct, and date-range eligibility criteria.

The review was reported according to PRISMA 2020 and used thematic synthesis because the included studies were heterogeneous in design, measurement, population, and outcome. The review does not assume that all psychological states have uniform effects across athletes or contexts; rather, it evaluates the direction, design, and conditionality of reported relationships.

RQ1: Which psychological states and processes have been empirically examined in beach volleyball athletes, and how are they distributed across the literature?

RQ2: How are these psychological states associated with, or shown to influence, competitive and technical-tactical performance in beach volleyball?

RQ3: Which assessment methods, study designs, and interventions have been used, and what gaps-including ecological, real-time monitoring-remain for future research?

Method

Research Design and Framework

A systematic literature review design was used to identify, evaluate, and synthesize empirical evidence on psychological states and processes in beach volleyball. The review was planned and reported in accordance with the PRISMA 2020 statement and its explanation and elaboration guidance (Page et al., 2021). The review followed predefined eligibility criteria, a reproducible Scopus search, a documented screening process, structured data extraction, and thematic synthesis.

Search Strategy

The search was conducted in Scopus on 21 August 2026 in the TITLE-ABS-KEY fields. Truncation was used to capture relevant morphological variants. The search string was:

TITLE-ABS-KEY ("beach volleyball") AND TITLE-ABS-KEY ("psycholog" OR "mental" OR "anxiety" OR "affect*" OR "mood" OR "cognit*" OR "decision*" OR "motivation" OR "emotion*" OR "resilien*" OR "coping" OR "mental fatigue" OR "personality")*

No language or document-type restrictions were applied before identification; eligibility restrictions were applied during screening according to the predefined criteria. English-language peer-reviewed empirical journal articles were eligible for the final synthesis. The search covered publications from 1998 through 21 August 2026.

Database and Information Sources

Scopus was selected as the sole bibliographic database because it provides broad multidisciplinary coverage of sport science, psychology, and sports medicine and supplies bibliographic metadata suitable for reproducible record management. The search date was 21 August 2026. No supplementary databases or grey-literature sources were searched. This single-database strategy is treated as a limitation rather than as a reason to classify the review as non-systematic.

Eligibility Criteria

Eligibility criteria were predefined using the PICOS framework (Table 1) and operationalized through the inclusion and exclusion criteria in Table 2. Psychological constructs were operationalized as affective, cognitive, motivational, coping/resilience, personality, or interpersonal/dyadic states or processes that were directly measured or systematically assessed in beach volleyball athletes, dyads, or teams.

Table 1. PICOS eligibility framework

Element	Definition applied in this review
Population (P)	Beach volleyball athletes, dyads, or teams (elite, sub-elite, or youth), of any sex
Interest (I)	Psychological states/processes: affect, anxiety, mood, mental fatigue, cognition and decision-making, motivation, coping/resilience, personality, interpersonal/dyadic dynamics
Comparison (C)	Where applicable (e.g., winners vs. losers, fatigued vs. control, experts vs. novices, high vs. low anxiety); not required

Element	Definition applied in this review
Outcome (O)	Competitive or technical-tactical performance, and/or psychological well-being indicators
Study design (S)	Primary empirical studies: cross-sectional, experimental/crossover, observational/notational, case study, mixed-methods, qualitative

Table 2. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Language	English	Non-English
Document type	Journal article (empirical)	Book, book chapter, note, erratum, conference review, non-empirical review
Population	Beach volleyball athletes/dyads/teams	Non-beach-volleyball or general athletes; coaches-only samples; non-athletes
Focus	Directly measures a psychological state/process	Injury, biomechanical, physiological, or epidemiological focus only
Publication period	1998–2026	Before 1998
Relevance	Directly addresses the review question	Tangential or off-topic subject area

Study Selection Process

Study selection involved duplicate removal, title/abstract screening, and full-text assessment. Records that clearly failed the population, psychological-focus, publication-type, language, date-range, or relevance criteria were excluded. Ambiguous records were retained for full-text assessment, and disagreements were resolved through discussion against the predefined eligibility criteria. The original screening dataset did not retain independent reviewer decisions; consequently, a retrospective Cohen's kappa cannot be validly calculated from the present record. This has been acknowledged as a methodological limitation.

Quality Assessment, FICO Framework

A structured FICO framework was used to assess whether each included report had an appropriate Focus, Information and sampling description, Context, and interpretable Outcomes. Studies were retained when the psychological focus, sample/instruments, beach-volleyball context, and empirical outcome reporting were sufficiently clear for synthesis. Because FICO is an author-applied framework rather than a validated risk-of-bias instrument and item-level scoring was not retained in the original dataset, the present review does not report a fabricated numerical quality threshold. For a stronger resubmission, the 22 studies should be re-appraised with a validated design-appropriate instrument such as MMAT or JBI before submission.

Data Extraction Procedure

A standardized extraction form captured authorship, publication year, country or setting, study design, participant characteristics, psychological variables, measurement instruments or interventions, performance outcomes, and principal findings. The extracted information was cross-checked against the full text and organized into the descriptive tables.

Data Analysis and Synthesis

Because the included studies differed substantially in design, psychological constructs, measurement instruments, populations, and outcomes, quantitative meta-analysis was not considered appropriate. Thematic synthesis was conducted using an inductive-deductive coding process informed by Braun and Clarke (2006) and Thomas and Harden (2008). Findings were coded by construct and outcome, grouped into thematic clusters, compared across study designs, and interpreted in relation to the three research questions. Causal language was reserved for experimental or crossover evidence; cross-sectional and observational findings were described as associations.

Reporting and Documentation

The review was reported according to PRISMA 2020. The PRISMA flow diagram reports the numbers of identified, screened, retrieved, assessed, and included records. Bibliographic information and DOI details were retained where available to support traceability.

PRISMA 2020 Flow Diagram

The study selection flow is shown in Figure 1. A total of 403 records were initially identified in Scopus, but only 15 duplicates were excluded before the screening, so 388 records were left. Of the remaining after title and abstract screening 290 were excluded and only the abstracts of the 98 papers were reviewed in full. After that, 76 articles were excluded for various reasons, leaving 22 studies that will be synthesized ultimately (Page, McKenzie, et al., 2021).

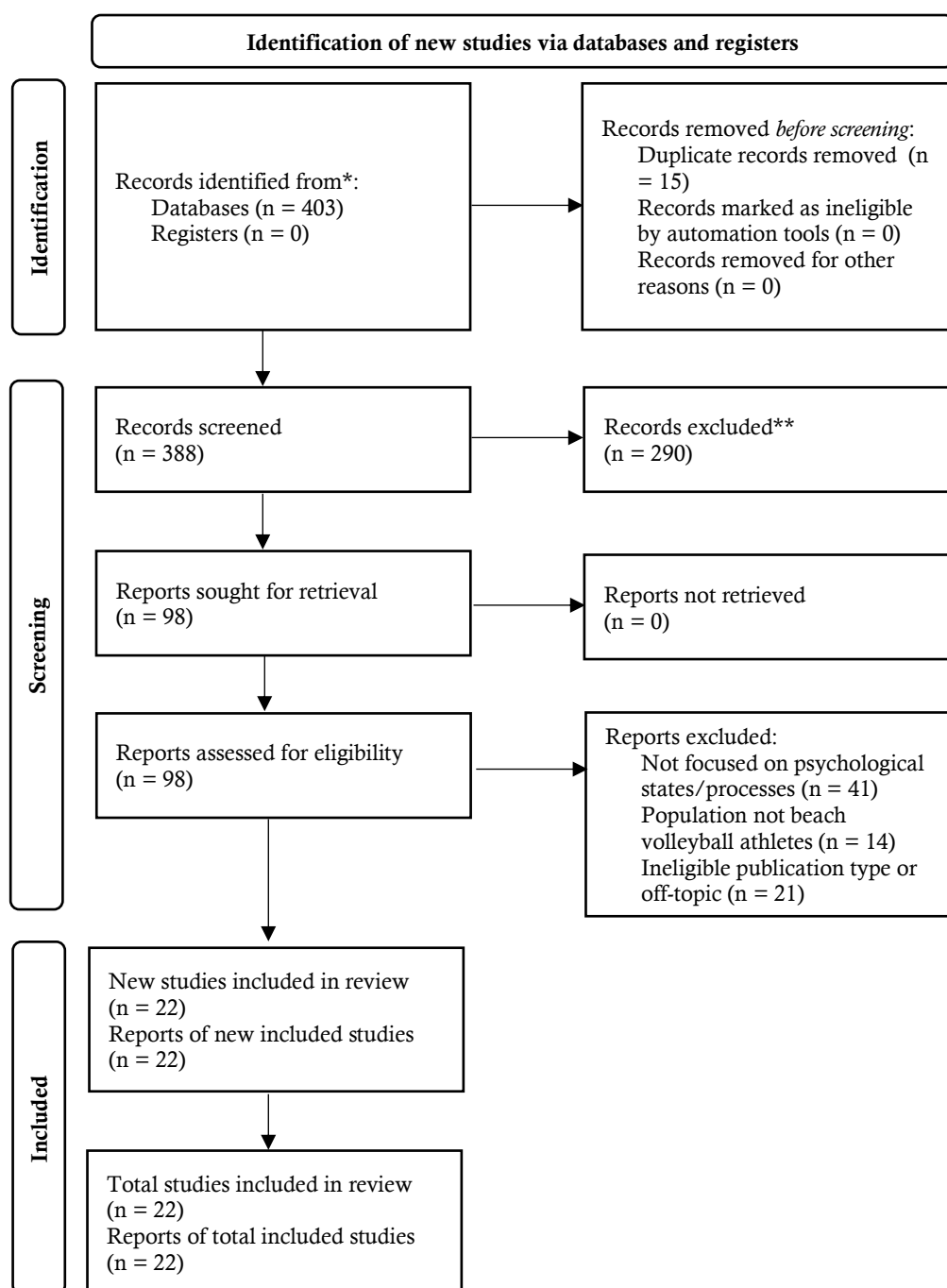


Figure 1. PRISMA 2020 flow diagram of the study selection process (Page, McKenzie, et al., 2021).

Results and Discussions

Study Selection Results

Scopus yielded 403 records. After 15 duplicate records were removed, 388 records underwent title and abstract screening. A total of 290 records were excluded at this stage, leaving 98 reports for full-text assessment. Seventy-six reports were subsequently excluded: 41 did not focus on psychological states or processes, 14 did not involve beach volleyball athletes, 13 did not meet the publication-type criteria, and 8 were outside the intended topic area. Twenty-two studies therefore met the eligibility criteria and were included in the synthesis. The included studies were published between 2002 and 2026 and used cross-

sectional, experimental/crossover, observational/notational, mixed-methods, case-study, and qualitative designs.

Descriptive Characteristics

Table 3 summarizes the 22 included studies, while Table 4 classifies them by thematic cluster, psychological construct, research design, and primary outcome. Figure 2 shows temporal distribution, Figure 3 shows the geographic distribution of study settings, and Figure 4 summarizes the frequency of psychological constructs.

Table 3. Summary of included studies

Title	Author(s) & Year	Country	Method / Design	Key findings
The relationship between state anxiety and performance in beach volleyball players	Raudsepp & Kais (2002)	Estonia	Cross-sectional; CSAI-2 (intensity + direction), 54 male players	Directional interpretations of pre-competitive cognitive and somatic anxiety and self-confidence were positively related to performance; higher-level players interpreted anxiety as more facilitative.
Cognitive and somatic anxiety and self-confidence in athletic performance of beach volleyball	Kais & Raudsepp (2004)	Estonia	Cross-sectional; modified CSAI-2, video-rated performance, 66 male players	Direction subscales of cognitive/somatic anxiety and self-confidence predicted performance (42% of variance); original intensity subscales did not predict performance.
Affect and performance of an expert beach volleyball player according to an idiosyncratic probabilistic method	Raudsepp, Rikberg & Kais (2008)	Estonia	Single-case idiographic; individual affect-related performance zones (IAPZ)	A player's optimal affect zones (arousal, pleasure) differed by skill (attack vs. serve) and fluctuated across matches, supporting an idiosyncratic affect-performance link.
Congruence of actual and retrospective reports of precompetition affect and anxiety for young volleyball players	Rikberg, Raudsepp & Kais (2011)	Estonia	Randomized (video vs. no video); CSAI-2 + affect grid, 38 youth players	Retrospective recall of affect/anxiety was significant in both conditions; video feedback of precompetition preparation improved recall accuracy of anxiety and arousal.
Comparison of pre-competition mood state between winners and losers: A study with young beach volleyball athletes	Costa et al. (2023)	Brazil	Comparative; Profile of Mood States before simulated competition, 16 male youth	Both groups showed an 'iceberg' profile; winners reported significantly lower confusion than losers, while other mood dimensions did not differ by result.
The impact of sleep quality on mood in beach volleyball athletes: A cross-sectional study	da Silva et al. (2023)	Brazil	Cross-sectional; Brazilian Mood Scale + sleep report, Bayesian analysis	Poor sleepers were markedly more likely to report elevated fatigue; sleep quality was associated with mood but not directly with match outcomes.
Prevalence of depression and anxiety symptoms among elite female beach volleyball players in the FIVB top 200	Niering et al. (2026)	Germany	Cross-sectional survey; STAI-T and BDI-II, 52 top-200 female players	Elite female players reported clinically relevant anxiety and depressive symptoms linked to financial insecurity, dyadic team dynamics and limited social support.
Mental fatigue measured in real-world sport settings: A case study of world-class beach volleyball players	Da Costa et al. (2023)	Brazil	Field case study; smartphone digital VAS across 30 official matches, 7 world-class players	Perceived mental fatigue increased pre- to post-match and was higher after losing, and was associated with technical-tactical effort in real competition.
The mental fatigue impaired beach volleyball attack	Domingos-Gomes et al. (2024)	Brazil	Randomized crossover; Stroop-induced fatigue vs.	Experimentally induced mental fatigue reduced attack coefficient of performance and

Title	Author(s) & Year	Country	Method / Design	Key findings
technical-tactical performance: A crossover and randomized study			control, 12 young males	efficiency during simulated matches relative to control.
Mental fatigue and sleep restriction effects on perceptual-cognitive performance in trained beach volleyball athletes	Barbosa et al. (2025)	Brazil	Randomized crossover; four conditions (control, MF, SR, SR+MF), LED visuomotor tests, 14 athletes	Mental fatigue and sleep restriction independently and additively slowed reaction time on sport-specific defensive and blocking visuomotor tasks.
Courting on the beach: How team position implicitly influences decision-making in beach volleyball serves	Noël et al. (2016)	Germany	Two experiments; implicit perception of receiver positioning	Receivers' asymmetrical positioning implicitly biased servers toward the larger court area even without awareness; attentional focus moderated the effect.
Performance streaks in elite beach volleyball-Does failure in one sideout affect attacking in the next?	Link & Wenninger (2019)	Germany	Notational/big-data analysis; 965 FIVB matches, 28,974 sideout sequences	After misses, players changed attacking technique significantly more often, indicating that prior failure shapes subsequent tactical choices (psychological momentum).
Sequential decision making in beach volleyball-A mixed-method approach	Ittlinger et al. (2024)	Germany	Mixed-methods (three studies); coach survey, Olympics data, athlete experiment	Coaches and players believed in the 'hot hand' and followed sequential-choice predictions, yet lacked a shared, accurate understanding of how to exploit base rates.
How cognitive biases affect winning probability perception in beach volleyball experts	Ittlinger et al. (2025)	Germany	Mixed-methods; 43 national-team members estimated set-winning probabilities vs. 6,571-match empirical baseline	Experts overestimated winning probability when trailing and underestimated it when leading; optimism and confirmation bias significantly shaped these biased estimations.
Regulation of activation levels in high performance beach volleyball: A case study with olympic champions	Stefanello (2007)	Brazil	Case study; self-report feedback instrument across six world-tour phases, Olympic champion dyad	Olympic champions sustained an optimal activation level across most games and deployed individualized psychological strategies to regulate activation in-game.
Impact of coping strategies on resilience of elite beach volleyball athletes	Belem et al. (2014)	Brazil	Cross-sectional; ACSI-28 and CD-RISC, 48 circuit athletes, regression	Coping resources-personal resources, coping with adversity, confidence/motivation-significantly predicted resilience; national-team invitees showed higher resilience.
The 5C's model of successful partnerships in elite beach volleyball dyads	Poczwardowski et al. (2020)	United States	Qualitative (interpretative phenomenological analysis); interviews with 4 Olympic-level players	Successful athlete-athlete partnerships were built on compatibility, commitment, complementarity, coorientation and closeness, yielding a 5C's partnership model.
Investigating cumulative effects of pre-performance routine interventions in beach volleyball serving	Wergin et al. (2020)	Germany	Randomized controlled experiment; PPR intervention vs. control, 54 players, pressure manipulation	No differences in serving accuracy emerged between cumulative and isolated PPR use or versus control, possibly reflecting insufficient pressure induction.
Leadership, mental toughness, and	Caruzzo et al. (2021)	Brazil	Cross-sectional path analysis; CAAS, MTI,	Perceived secure coach-athlete attachment was positively

Title	Author(s) & Year	Country	Method / Design	Key findings
attachment relationship in the world beach volleyball context	Knoblochova et al. (2021)	Czech Republic	LSS, 65 World Tour athletes	associated with athletes' mental toughness; leadership style did not mediate this relationship.
Achievement goal orientations, sport motivation and competitive performance in beach volleyball players			Cross-sectional survey; SMS-6 and Perception of Success Questionnaire, 128 players, regression	Task and ego orientations related differently to self-determined motivation and performance, with intrinsic motivation linked to more adaptive competitive outcomes.
Personality traits and emotion regulation styles of elite beach volleyball dyads: Examination of intra-team differences, performance and satisfaction levels			Cross-sectional; Big Five Inventory, Personality Adjective Scale, Affective Style Questionnaire, 82 elite players	Successful athletes showed higher warmth, liveliness and emotional stability and lower neuroticism; dyads used varied emotion-regulation styles and reported high satisfaction.
Dealing with failure in junior elite beach volleyball teams: Why trying to help can make things worse	Wergin et al. (2026)	Germany	Qualitative (reflexive thematic analysis); semi-structured interviews, 23 junior elite athletes	One athlete's failure triggered attentional shifts and heightened pressure in the partner; misaligned interpersonal support could accelerate collective performance decline.

Table 4. Study classification by theme, construct, design, and outcome

Author(s) & Year	Thematic cluster	Psychological construct	Research design	Primary outcome
Raudsepp & Kais (2002)	Affect, anxiety & mood	Competitive state anxiety, self-confidence	Correlational	Objective skill performance
Kais & Raudsepp (2004)	Affect, anxiety & mood	Anxiety direction/intensity, self-confidence	Correlational/regression	Rated skill components
Raudsepp, Rikberg & Kais (2008)	Affect, anxiety & mood	Affective states (arousal, pleasure)	Case study	Attack and serve performance
Rikberg, Raudsepp & Kais (2011)	Affect, anxiety & mood	Precompetition affect and anxiety recall	Experimental	Recall congruence
Costa et al. (2023)	Affect, anxiety & mood	Pre-competition mood (POMS)	Cross-sectional comparative	Match result
da Silva et al. (2023)	Affect, anxiety & mood	Mood states, sleep quality	Cross-sectional	Mood/fatigue, match statistics
Niering et al. (2026)	Affect, anxiety & mood	Anxiety and depressive symptoms	Cross-sectional	Symptom prevalence/severity
Da Costa et al. (2023)	Mental fatigue & cognition	Subjective mental fatigue	Case study (field)	Technical-tactical effort
Domingos-Gomes et al. (2024)	Mental fatigue & cognition	Mental fatigue	Experimental crossover	Attack performance/efficiency
Barbosa et al. (2025)	Mental fatigue & cognition	Perceptual-cognitive performance	Experimental crossover	Reaction time
Noël et al. (2016)	Decision-making & momentum	Implicit perception, decision-making	Experimental	Serve placement decision
Link & Wenninger (2019)	Decision-making & momentum	Psychological momentum	Observational (notational)	Technique change, hit rate
Ittlinger et al. (2024)	Decision-making & momentum	Sequential decision-making, hot-hand belief	Mixed-methods	Serve allocation strategy

Author(s) & Year	Thematic cluster	Psychological construct	Research design	Primary outcome
Ittlinger et al. (2025)	Decision-making & momentum	Cognitive bias, probability perception	Mixed-methods	Set-winning probability estimates
Stefanello (2007)	Psych. skills & interpersonal	Activation regulation	Case study	Perceived activation level
Belem et al. (2014)	Psych. skills & interpersonal	Coping, resilience	Cross-sectional/regression	Resilience scores
Poczwardowski et al. (2020)	Psych. skills & interpersonal	Dyadic partnership quality	Qualitative	Interpersonal partnership themes
Wergin et al. (2020)	Psych. skills & interpersonal	Pre-performance routines, choking	Experimental (RCT)	Serving accuracy under pressure
Caruzzo et al. (2021)	Psych. skills & interpersonal	Attachment, mental toughness, leadership	Cross-sectional/SEM	Mental toughness
Knoblochova et al. (2021)	Psych. skills & interpersonal	Achievement goals, motivation	Cross-sectional/regression	Competitive performance
Klatt et al. (2021)	Psych. skills & interpersonal	Personality, emotion regulation	Cross-sectional	Performance, satisfaction
Wergin et al. (2026)	Psych. skills & interpersonal	Interpersonal emotion regulation, team collapse	Qualitative	Coping with failure under pressure

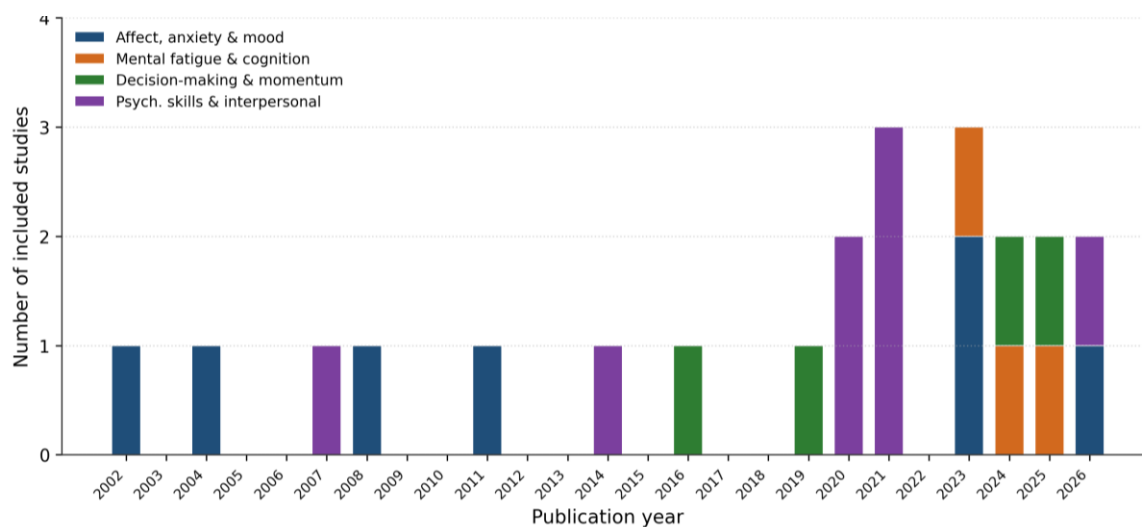


Figure 2. Temporal distribution of the 22 included studies by thematic cluster.

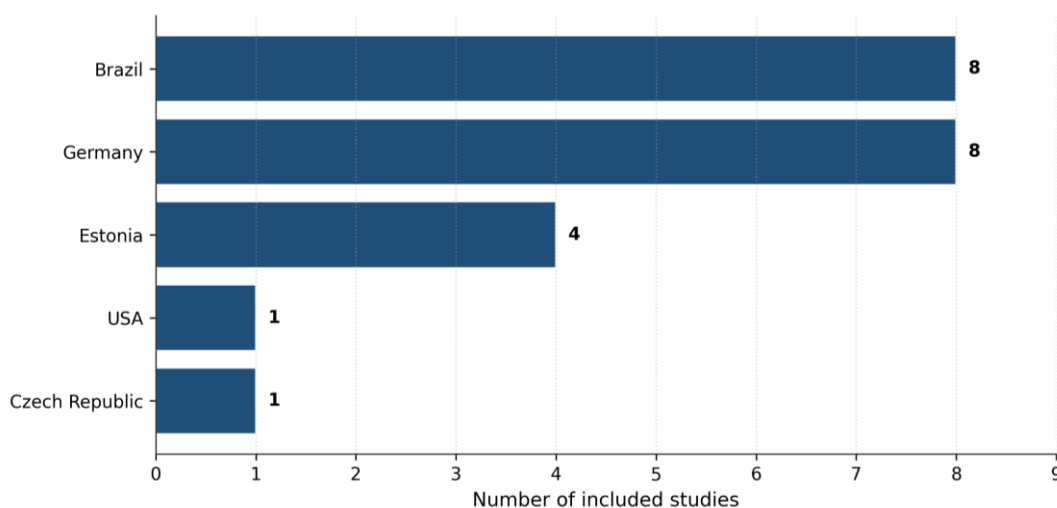


Figure 3. Geographic distribution of included studies by country of the study setting.

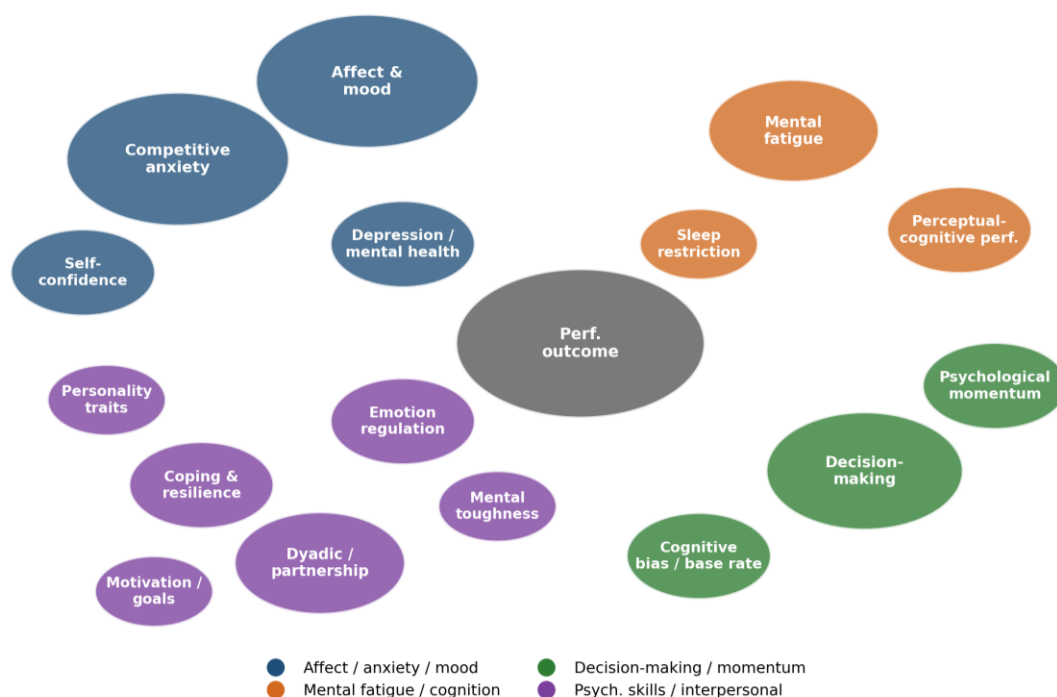


Figure 4. Thematic cluster map of psychological constructs examined across included studies; bubble size approximates construct frequency.

Thematic Synthesis

Findings for RQ1: Psychological states examined and their distribution

Four broad clusters emerged. The first comprised affect, competitive anxiety, and mood and included the earliest studies in the corpus. The second comprised mental fatigue, sleep, and perceptual-cognitive performance and became more prominent after 2023. The third comprised decision-making, contextual perception, cognitive bias, and psychological momentum. The fourth comprised psychological skills, coping and resilience, motivation, personality, emotion regulation, and interpersonal or dyadic processes. The corpus was therefore broad in scope but uneven in depth, with several constructs represented by only one or two studies.

Affect, anxiety, and mood were the longest-established topics. Anxiety studies indicated that cognitive and somatic anxiety may relate differently to performance depending on how athletes interpret these symptoms, while self-confidence was positively related to performance (Raudsepp & Kais, 2002; Kais & Raudsepp, 2004). The idiographic case study further indicated that optimal affective zones can vary across skills and matches (Raudsepp et al., 2008). Mood evidence was more selective: winners reported lower confusion than losers in one youth sample, whereas other mood dimensions did not differ (Costa et al., 2023). Sleep quality was associated with mood and fatigue, but not directly with match outcomes in the reported cross-sectional study (da Silva et al., 2023).

The temporal pattern suggests a shift from predominantly questionnaire-based research toward a more diverse portfolio that includes experimental manipulation, notational big-data analysis, mixed methods, and field measurement. However, the geographic distribution remains concentrated, particularly in Brazil and Germany, which may limit transferability to other competitive and cultural contexts.

Overall, RQ1 indicates a growing but methodologically uneven evidence base. Affect, anxiety, and mood are well represented relative to newer topics, whereas dyadic processes, motivation, resilience, and integrated multi-state models remain comparatively underdeveloped.

Findings for RQ2: Psychological states and competitive performance

For RQ2, the affective evidence suggests that the interpretation and direction of anxiety may be more relevant to performance than symptom intensity alone. Raudsepp and Kais (2002) and Kais and Raudsepp (2004) reported positive relationships involving directional interpretations of anxiety and self-confidence, while the idiographic evidence of Raudsepp et al. (2008) indicated that optimal affective states differed across skills. These findings argue against treating anxiety as uniformly harmful or beneficial.

The strongest evidence for a performance-related effect came from mental-fatigue studies. Experimental work reported reduced attack performance and efficiency after induced mental fatigue (Domingos-Gomes et al., 2024), while combined mental-fatigue and sleep-restriction conditions slowed sport-specific perceptual-cognitive responses (Barbosa et al., 2025). Field monitoring also showed higher perceived mental fatigue after matches and after losses and an association with technical-tactical effort (Da Costa et al., 2023). These findings support a more cautious conclusion that temporary cognitive states can impair specific performance components, rather than demonstrating a universal effect on match outcomes.

Decision-making studies showed that contextual information and prior outcomes can shape subsequent choices. Asymmetrical receiver positioning biased serve placement (Noël et al., 2016), previous sideout failure was associated with subsequent changes in attacking technique (Link & Wenninger, 2019), and experts demonstrated imperfect calibration of hot-hand beliefs and winning-probability judgments (Ittlinger et al., 2024; Ittlinger et al., 2025). These findings connect cognition with tactical behavior while also illustrating that observed biases do not necessarily imply poor overall expertise.

Across clusters, the relationship between psychological variables and performance was conditional rather than linear. The direction and magnitude of relationships varied by construct, measurement approach, skill, competitive context, and interpersonal environment. The dyadic evidence further suggests that the consequences of an athlete's psychological state may depend on how the partner interprets and responds to that state.

RQ2 is therefore answered conditionally: psychological states and processes are repeatedly associated with performance-related outcomes, but the evidence does not support a single universal psychological profile of successful beach volleyball performance. The clearest experimental evidence concerns temporary cognitive states, particularly mental fatigue.

Findings for RQ3: Methods, designs, interventions, and gaps

For RQ3, the methodological portfolio was dominated by cross-sectional and correlational studies using self-report measures, including work on anxiety, coping, attachment, motivation, and personality. Experimental and crossover studies were particularly important in the mental-fatigue literature, while notational big-data, mixed-methods, qualitative, and idiographic designs provided complementary evidence.

Intervention evidence was limited and inconsistent. The pre-performance routine experiment did not demonstrate a reliable improvement in serving accuracy under the study's pressure manipulation (Wergin et al., 2020), and an exergaming intervention did not improve state anxiety in healthy adult women (de Oliveira et al., 2024). These findings indicate that psychological interventions should not be assumed to transfer automatically from training contexts to competition.

The principal methodological gaps are small and uneven samples, limited representation of women in several studies, reliance on cross-sectional designs, limited replication, inconsistent measurement instruments, and insufficient modeling of dyadic interdependence. Field-based smartphone measurement demonstrates feasibility for real-time assessment (Da Costa et al., 2023), but repeated multimodal assessment across competitive phases remains uncommon.

Comparative and Critical Analysis

Comparative analysis across the 22 studies shows a clear methodological specialization. Questionnaire and interview studies provide information about affective and interpersonal experiences but have limited capacity for causal inference. Experimental and crossover designs provide stronger causal evidence for temporary cognitive states but may reduce ecological validity. Notational datasets offer scale but provide less direct information about subjective psychological states. Mixed-methods and dyad-focused qualitative studies help bridge these levels but remain relatively rare.

Sample characteristics also constrain generalizability. Individual athlete samples ranged from very small case-based or dyadic studies to 128 participants in the largest cross-sectional sample, while some studies used large match-level datasets rather than conventional participant samples. Several studies were male-dominated, and evidence from women, youth, and athletes outside Brazil, Germany, and Estonia was comparatively limited. Consequently, findings should be interpreted in relation to athlete level, sex, age, cultural setting, and competitive context rather than generalized to all beach volleyball athletes.

Discussion

The integrated evidence supports a process-oriented interpretation of beach volleyball psychology. Anxiety, affect, fatigue, decision-making, and interpersonal processes should not be treated as isolated predictors. Instead, their effects appear to depend on timing, interpretation, task demands, and the partner's response.

For example, directional interpretations of anxiety and individualized affective zones suggest that athletes may benefit from understanding their own functional responses rather than simply attempting to minimize anxiety (Raudsepp & Kais, 2002; Raudsepp et al., 2008).

Mental-fatigue findings provide a complementary mechanism: reduced cognitive resources may affect attack execution and perceptual-cognitive speed (Domingos-Gomes et al., 2024; Barbosa et al., 2025). Decision-making studies then demonstrate how contextual information, prior outcomes, and probability beliefs can shape tactical choices (Noël et al., 2016; Link & Wenninger, 2019; Ittlinger et al., 2024; Ittlinger et al., 2025). Interpersonal findings add a further level of explanation because psychological states are experienced within a two-person performance system (Poczwadowski et al., 2020; Klatt et al., 2021; Wergin et al., 2026).

This synthesis therefore suggests a provisional multilevel framework in which individual psychological states influence perception and action, while the dyadic environment can amplify, buffer, or redirect those effects. The framework is conceptual rather than empirically validated: the included studies did not test a single integrated model. It should therefore be treated as a hypothesis-generating contribution for future research, not as an established causal theory.

For practitioners, the evidence supports cautious consideration of anxiety interpretation, self-confidence, sleep and cognitive-load management, individualized activation regulation, and partner-level communication. However, these recommendations are preliminary because the evidence base contains small samples, heterogeneous measures, and limited intervention trials. Practitioners should therefore individualize psychological support and avoid treating any single construct as a universal performance determinant.

The review extends existing beach-volleyball research by bringing affective, cognitive, and interpersonal evidence into a single systematic synthesis. It complements work focused primarily on performance analysis, physical monitoring, and perceptual-cognitive behavior (Pérez-Turpin et al., 2019; Bellinger et al., 2021; Marzano-Felisatti et al., 2024). The contribution is primarily integrative: it identifies common methodological patterns and proposes a framework for future testing rather than claiming that the literature has already demonstrated an integrated mechanism.

Three priorities emerge for future research. First, studies should model dyadic interdependence explicitly using repeated-measures or multilevel approaches where appropriate. Second, psychological states should be measured repeatedly before, during, and after competition to capture temporal variation. Third, multimodal technology-assisted assessment should be combined with validated psychological instruments and objective performance indicators.

An additional priority is replication and standardization. Future studies should report sample characteristics, measurement reliability, effect estimates and uncertainty where available, and sufficiently detailed intervention procedures. Harmonizing measures of anxiety, affect, fatigue, and decision-making would improve comparability and create better conditions for future quantitative synthesis.

Limitations

Several limitations constrain the interpretation of this review. First, only Scopus was searched, so relevant studies indexed elsewhere may have been missed. Second, the final sample was restricted to English-language journal articles, which may introduce language and publication-selection bias. Third, the included studies were highly heterogeneous in design, measurement, sample, and outcome, preventing meaningful pooling of effect sizes. Fourth, the original screening process did not retain independent reviewer decisions, so a valid retrospective inter-rater reliability coefficient cannot be calculated. Fifth, the FICO framework used for appraisal was not a validated risk-of-bias instrument and item-level scores were not retained. Finally, the geographic and sample distribution was uneven, with several small or male-dominated samples. These limitations mean that the findings should be interpreted as a structured synthesis of the available evidence rather than as definitive estimates of causal effects.

In summary, RQ1 indicates four major clusters: affect/anxiety/mood; mental fatigue and cognition; decision-making and psychological momentum; and psychological skills, personality, and interpersonal processes. RQ2 is answered conditionally: psychological states are associated with performance, but relationships differ according to construct, timing, measurement, task, and dyadic context. RQ3 indicates that the field needs stronger longitudinal, dyad-sensitive, ecologically valid, and technology-assisted research with standardized measurement and replication.

Conclusions

This systematic review synthesized 22 empirical studies examining psychological states and processes in beach volleyball. The evidence indicates four broad domains: affect, anxiety and mood; mental fatigue and cognition; decision-making and psychological momentum; and psychological skills, personality, and interpersonal processes. Anxiety interpretation and self-confidence were associated with performance in earlier studies, while mental fatigue and sleep restriction showed more consistent effects on specific attack and perceptual-cognitive outcomes. Decision-making was influenced by contextual information, previous outcomes, and cognitive biases, and dyadic relationships appeared relevant to how athletes responded to pressure and failure. Nevertheless, the evidence base remains heterogeneous, frequently cross-sectional, and often based on small or uneven samples. The findings therefore do not justify universal causal claims. Future research should use validated and standardized measures, longitudinal and repeated-measures designs, explicit modeling of dyadic interdependence, ecologically valid competition-based assessment, adequately powered intervention trials, and replication across sex, age, skill, and cultural contexts.

Acknowledgments

The Authors would like to thank Faculty of Sport Sciences, Universitas Negeri Padang for providing excellent facilities, as well as for being very supportive of this research from the beginning. Authors also thank the team members who had generously shared their brilliant ideas, engaging discussion, and academic supports during the study.

References

- Bahr, R., & Reeser, J. C. (2003). Injuries among world-class professional beach volleyball players: The Fédération Internationale de Volleyball beach volleyball injury study. *The American Journal of Sports Medicine*, 31(1), 119–125. <https://doi.org/10.1177/03635465030310010401>
- Barbosa, B. T., de Lima-Junior, D., Moreira, A., Nakamura, F. Y., Batista, G. R., Faro, H., & Fortes, L. D. S. (2025). Mental fatigue and sleep restriction effects on perceptual-cognitive performance in trained beach volleyball athletes. *Frontiers in Psychology*, 16, 1537482. <https://doi.org/10.3389/fpsyg.2025.1537482>
- Belem, I. C., Caruzzo, N. M., do Nascimento Junior, J. R. A., Vieira, J. L. L., & Vieira, L. F. (2014). Impact of coping strategies on resilience of elite beach volleyball athletes. *Revista Brasileira de Cineantropometria e Desempenho Humano*, 16(4), 447–455. <https://doi.org/10.5007/1980-0037.2014v16n4p447>
- Bellinger, P. M., Newans, T., Whalen, M., & Minahan, C. (2021). Quantifying the activity profile of female beach volleyball tournament match-play. *Journal of Sports Science and Medicine*, 20(1), 142–148. <https://doi.org/10.52082/jssm.2021.142>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Cañal-Bruland, R., Mooren, M., & Savelsbergh, G. J. P. (2011). Differentiating experts' anticipatory skills in beach volleyball. *Research Quarterly for Exercise and Sport*, 82(4), 667–674. <https://doi.org/10.1080/02701367.2011.10599803>
- Caruzzo, N. M., Vissoci, J. R. N., Contreira, A. R., Caruzzo, A. M., & Fiorese, L. (2021). Leadership, mental toughness, and attachment relationship in the world beach volleyball context. *Sustainability*, 13(19), 10748. <https://doi.org/10.3390/su131910748>
- Costa, Y., Domingos-Gomes, J., Lautenbach, F., de Sousa Fortes, L., & Batista, G. R. (2022). Salivary hormone concentrations and technical-tactical performance indicators in beach volleyball. *Frontiers in Sports and Active Living*, 4, 830185. <https://doi.org/10.3389/fspor.2022.830185>
- Costa, Y. P., de Farias, R. P., da Silva, L. S., de Sousa Fortes, L., & Batista, G. R. (2023). Comparison of pre-competition mood state between winners and losers: A study with young beach volleyball athletes. *Motricidade*, 19(1), 1–10. <https://doi.org/10.6063/motricidade.23905>
- Da Costa, Y. P., Fortes, L., Santos, R., Souza, E., Hayes, L., Soares-Silva, E., & Batista, G. R. (2023). Mental fatigue measured in real-world sport settings: A case study of world-class beach volleyball players. *Journal of Physical Education and Sport*, 23(5), 1234–1243. <https://doi.org/10.7752/jpes.2023.05152>

- da Silva, G. M., de Moura Simim, M. A., Nakamura, F. Y., Coswig, V., Assumpção, C. O., & Medeiros, A. I. A. (2023). The impact of sleep quality on mood in beach volleyball athletes: A cross-sectional study. *Retos*, 48, 934–941. <https://doi.org/10.47197/RETOS.V48.96972>
- de Oliveira, V. N., Viana, R. B., de Freitas, J. V. R., Morais, N. S., & Andrade, M. S. (2024). A single session of a beach volleyball exergame did not improve state anxiety level in healthy adult women. *BMC Sports Science, Medicine and Rehabilitation*, 16, 45. <https://doi.org/10.1186/s13102-024-00859-9>
- Domingos-Gomes, J., Costa, Y. P., Lima-Junior, D., Lanzoni, I., & Batista, G. (2024). The mental fatigue impaired beach volleyball attack technical-tactical performance: A crossover and randomized study. *Cuadernos de Psicología del Deporte*, 24(2), 1–16. <https://doi.org/10.6018/CPD.582971>
- Đurković, T., Babok, D., & Rešetar, T. (2024). Differences in game dynamics between high-level volleyball and beach volleyball matches. *Journal of Functional Morphology and Kinesiology*, 9(1), 28. <https://doi.org/10.3390/jfmk9010028>
- Ittlinger, S., Lang, S., Link, D., & Raab, M. (2024). Sequential decision making in beach volleyball-A mixed-method approach. *Journal of Sport and Exercise Psychology*, 46(5), 255–265. <https://doi.org/10.1123/jsep.2024-0060>
- Ittlinger, S., Lang, S., Schubert, A., & Raab, M. (2025). How cognitive biases affect winning probability perception in beach volleyball experts. *Scientific Reports*, 15, 17770. <https://doi.org/10.1038/s41598-025-17770-z>
- Kais, K., & Raudsepp, L. (2004). Cognitive and somatic anxiety and self-confidence in athletic performance of beach volleyball. *Perceptual and Motor Skills*, 98(2), 439–449. <https://doi.org/10.2466/pms.98.2.439-449>
- Klatt, S., Rückel, L.-M., Wagener, S., & Noël, B. (2021). Personality traits and emotion regulation styles of elite beach volleyball dyads: Examination of intra-team differences, performance and satisfaction levels. *Frontiers in Psychology*, 12, 719572. <https://doi.org/10.3389/fpsyg.2021.719572>
- Klatt, S., & Smeeton, N. J. (2020). Visual and auditory information during decision making in sport. *Journal of Sport and Exercise Psychology*, 42(1), 15–25. <https://doi.org/10.1123/jsep.2019-0107>
- Klostermann, A., Vater, C., Kredel, R., & Hossner, E.-J. (2015). Perceptual training in beach volleyball defence: Different effects of gaze-path cueing on gaze and decision-making. *Frontiers in Psychology*, 6, 1834. <https://doi.org/10.3389/fpsyg.2015.01834>
- Knoblochova, M., Mudrak, J., & Slepicka, P. (2021). Achievement goal orientations, sport motivation and competitive performance in beach volleyball players. *Acta Gymnica*, 51, e2021.016. <https://doi.org/10.5507/ag.2021.016>
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions. *PLoS Medicine*, 6(7), e1000100. <https://doi.org/10.1371/journal.pmed.1000100>
- Link, D., & Wenninger, S. (2019). Performance streaks in elite beach volleyball-Does failure in one sideout affect attacking in the next? *Frontiers in Psychology*, 10, 919. <https://doi.org/10.3389/fpsyg.2019.00919>
- López-Gajardo, M. A., Pulido, J. J., Tapia-Serrano, M. A., Ramírez-Bravo, I., & Leo, F. M. (2021). Is perceived athlete leadership quality related to inside sacrifice and perceived performance in team sports? *Frontiers in Psychology*, 12, 662250. <https://doi.org/10.3389/fpsyg.2021.662250>
- Magnaguagno, L., & Beck, D. (2025). Decision-making process in game sports: What do top-level players think of current research? *Frontiers in Sports and Active Living*, 7, 1653834. <https://doi.org/10.3389/fspor.2025.1653834>
- Marzano-Felisatti, J. M., Martínez-Gallego, R., & Pino-Ortega, J. (2024). Analysing physical performance indicators measured with electronic performance tracking systems in beach volleyball. *Sensors*, 24(23), 7524. <https://doi.org/10.3390/s24237524>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7), e1000097. <https://doi.org/10.1371/journal.pmed.1000097>
- Nakamura, F. Y., Torres, V. B. C., da Silva, L. S., Gantois, P., Antualpa, K., & Nakamura, F. (2022). Monitoring heart rate variability and perceived well-being in Brazilian elite beach volleyball players. *Journal of Strength and Conditioning Research*, 36(8), 2229–2235. <https://doi.org/10.1519/JSC.0000000000003654>
- Natali, S., Ferioli, D., La Torre, A., & Bonato, M. (2019). Physical and technical demands of elite beach volleyball according to playing position and gender. *The Journal of Sports Medicine and Physical Fitness*, 59(5), 736–742. <https://doi.org/10.23736/S0022-4707.17.07972-5>

- Nicklas, A., Rückel, L.-M., Noël, B., Varga, M., & Klatt, S. (2022). Gaze behavior in social interactions between beach volleyball players-An exploratory analysis. *Frontiers in Psychology*, 13, 945389. <https://doi.org/10.3389/fpsyg.2022.945389>
- Niering, M., Engel, N., Beurskens, R., & Seifert, J. (2026). Prevalence of depression and anxiety symptoms among elite female beach volleyball players in the FIVB top 200. *Discover Mental Health*, 6, 378. <https://doi.org/10.1007/s44192-026-00378-8>
- Noël, B., Hüttermann, S., van der Kamp, J., & Memmert, D. (2016). Courting on the beach: How team position implicitly influences decision-making in beach volleyball serves. *Journal of Cognitive Psychology*, 28(7), 868–876. <https://doi.org/10.1080/20445911.2016.1194847>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ*, 372, n160. <https://doi.org/10.1136/bmj.n160>
- Palao, J. M., Valades, D., & Ortega, E. (2012). Match duration and number of rallies in men's and women's 2000–2010 FIVB World Tour beach volleyball. *Journal of Human Kinetics*, 34, 99–104. <https://doi.org/10.2478/v10078-012-0068-7>
- Pérez-Turpin, J. A., Campos-Gutiérrez, L. M., Elvira-Aranda, C., & Gomis-Gomis, M. J. (2019). Performance indicators in young elite beach volleyball players. *Frontiers in Psychology*, 10, 2712. <https://doi.org/10.3389/fpsyg.2019.02712>
- Poczwadowski, A., Lamphere, B., Allen, K., Marican, R., & Haberl, P. (2020). The 5C's model of successful partnerships in elite beach volleyball dyads. *Journal of Applied Sport Psychology*, 32(1), 61–80. <https://doi.org/10.1080/10413200.2019.1573205>
- Qin, H. (2026). Application of deep reinforcement learning in real-time sports training feedback and adjustment. *International Journal of e-Collaboration*, 22(1), 1–18. <https://doi.org/10.4018/IJeC.415346>
- Raudsepp, L., & Kais, K. (2002). The relationship between state anxiety and performance in beach volleyball players. *Journal of Human Movement Studies*, 43(5), 403–416.
- Raudsepp, L., Rikberg, A., & Kais, K. (2008). Affect and performance of an expert beach volleyball player according to an idiosyncratic probabilistic method. *Gazzetta Medica Italiana Archivio per le Scienze Mediche*, 167(4), 143–150.
- Reeser, J. C., Verhagen, E., Briner, W. W., Askeland, T. I., & Bahr, R. (2006). Strategies for the prevention of volleyball related injuries. *British Journal of Sports Medicine*, 40(7), 594–600. <https://doi.org/10.1136/bjsm.2005.018234>
- Reigal, R. E., Vázquez-Diz, J. A., Morillo-Baro, J. P., Hernández-Mendo, A., & Morales-Sánchez, V. (2019). Psychological profile, competitive anxiety, moods and self-efficacy in beach handball players. *International Journal of Environmental Research and Public Health*, 17(1), 241. <https://doi.org/10.3390/ijerph17010241>
- Rikberg, A., Raudsepp, L., & Kais, K. (2011). Congruence of actual and retrospective reports of precompetition affect and anxiety for young volleyball players. *Perceptual and Motor Skills*, 112(1), 44–54. <https://doi.org/10.2466/05.20.PMS.112.1.44-54>
- Schrapf, N., Hassan, A., Wiesmeyer, S., & Tilp, M. (2022). An artificial neural network predicts setter's setting behavior in volleyball similar or better than experts. *IFAC-PapersOnLine*, 55(38), 612–617. <https://doi.org/10.1016/j.ifacol.2022.09.163>
- Stefanello, J. M. F. (2007). Regulation of activation levels in high performance beach volleyball: A case study with olympic champions. *Revista Brasileira de Cineantropometria e Desempenho Humano*, 9(4), 335–342.
- Steffen, K., Soligard, T., Mountjoy, M., Dallo, I., Gessara, A. M., Giesche, F., ... Engebretsen, L. (2020). How do the new Olympic sports compare with the traditional Olympic sports? Injury and illness at the 2018 Youth Olympic Summer Games. *British Journal of Sports Medicine*, 54(3), 168–175. <https://doi.org/10.1136/bjsports-2019-101040>
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8, 45. <https://doi.org/10.1186/1471-2288-8-45>

- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, 14(3), 207–222. <https://doi.org/10.1111/1467-8551.00375>
- Wergin, V. V., Beckmann, J., Gröpel, P., & Mesagno, C. (2020). Investigating cumulative effects of pre-performance routine interventions in beach volleyball serving. *PLOS ONE*, 15(1), e0228012. <https://doi.org/10.1371/journal.pone.0228012>
- Wergin, V. V., Beckmann, J., Kouba, J. A., & Haehl, W. (2026). Dealing with failure in junior elite beach volleyball teams: Why trying to help can make things worse. *Psychology of Sport and Exercise*, 72, 103144. <https://doi.org/10.1016/j.psychsport.2026.103144>
- Young, W. K., Briner, W., & Dines, D. M. (2023). Epidemiology of common injuries in the volleyball athlete. *Current Reviews in Musculoskeletal Medicine*, 16(6), 229–234. <https://doi.org/10.1007/s12178-023-09826-2>