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Psychological health in gymnastics: a systematic review of disordered eating, body image, mental well-being, and psychological resources

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ABSTRACT

Competitive and developmental gymnastics involve intensive training, performance evaluation, and, in several disciplines, explicit body-shape and weight expectations. These conditions may create psychological risks, but evidence is dispersed across disordered eating, body image, mental health, and psychological-skills research. This systematic review synthesised empirical evidence on psychological health in gymnasts across competitive, recreational, developmental, and post-competitive contexts published between 2021 and 2026. The review followed PRISMA 2020 and used Scopus, PubMed, and ScienceDirect. Eligible studies were peer-reviewed empirical investigations involving gymnasts and reporting at least one psychological or mental-health outcome. From 398 records identified, 11 duplicates were removed; 387 records were screened, 47 full texts were assessed, and 20 studies were included. Methodological quality was appraised using the MMAT 2018, with domain-level ratings retained for transparency and no study excluded solely because of quality. The synthesis identified three analytical themes: (1) disordered eating, body image, and weight pressure; (2) mental health and psychological consequences; and (3) psychological skills and regulatory resources. The evidence indicates that disordered eating and body-image concerns are concentrated in higher-pressure contexts, whereas adaptive self-talk, task-involving motivational climates, supportive coach relationships, and regulated perfectionism are potential protective resources. Because most studies were cross-sectional and heterogeneous, the findings should not be interpreted causally and no meta-analysis was conducted. Prospective longitudinal, intervention, and multi-method studies are needed, particularly in under-represented disciplines and among male gymnasts.



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Introduction

Physical activity is generally associated with psychological benefits, but the mental-health consequences of sport are context dependent. Competitive and developmental sport can provide belonging, competence, and structured physical activity while simultaneously exposing athletes to performance evaluation, selection pressure, intensive training, and other stressors. The psychological consequences therefore depend not only on participation in sport but also on the demands, social climate, developmental stage, and resources available within the sport environment.

Gymnastics provides a particularly relevant context for examining these processes because several disciplines combine high technical demands with judged performance and, in some settings, strong expectations concerning body shape, weight, and appearance. The included literature documents these concerns in rhythmic, artistic, and acrobatic gymnastics, but it also shows that risk is not uniform: recreational and child samples can show neutral or favourable body perceptions compared with non-gymnast peers. This variation supports a context-sensitive approach rather than treating gymnastics itself as inherently harmful.

Recent gymnastics research has examined both risk and adaptation. Studies of disordered eating and body image have linked competitive level, weight pressure, perfectionistic reactions to imperfection, and body-related concerns with adverse outcomes (Donti et al., 2021; Kontele et al., 2022; Yoshitani-Kuwabara et al., 2025). In parallel, psychological-skills studies have examined self-talk, motivational climate, achievement motivation, executive functions, and burnout, indicating that psychological resources may influence both well-being and performance (Laureys et al., 2023; Santos-Rosa et al., 2022; Sriwahyuniati et al., 2025; Feng & Yuan, 2021).

A central gap is fragmentation. Evidence on eating behaviour and body image is often reported separately from research on self-talk, motivation, perfectionism, burnout, and coach athlete relationships. The included studies also differ substantially in gymnastics discipline, age, competitive level, and study design. Such heterogeneity makes it difficult to determine which risks are context specific, which findings are generalisable across disciplines, and which protective resources are potentially modifiable.

A second gap concerns methodological design. Most included studies are cross-sectional, limiting causal inference and making it difficult to examine how psychological stressors and protective resources interact over time. The longitudinal studies indicate that point-prevalence estimates may miss within-athlete change, while qualitative evidence after retirement suggests that psychological consequences can extend beyond active competition (Edlund et al., 2024; Montero et al., 2026). A systematic synthesis that explicitly distinguishes risk factors from protective resources is therefore warranted.

Accordingly, this review synthesises the 2021–2026 evidence base using a transparent PRISMA 2020 process and a thematic synthesis suited to heterogeneous empirical designs. The review does not assume that gymnastics is uniformly harmful; instead, it examines how psychological outcomes vary across disciplines, competitive contexts, and developmental stages.

Accordingly, this review synthesises the 2021–2026 empirical evidence on psychological health in gymnastics using a transparent PRISMA 2020 process and a thematic synthesis suited to heterogeneous study designs. The synthesis is designed to identify where psychological risk is concentrated, which factors appear protective or modifiable, and where evidence remains insufficient for causal conclusions. The review therefore avoids treating gymnastics participation as uniformly harmful and instead considers discipline, competitive context, developmental stage, and the balance between demands and psychological resources. This review is guided by three research questions:

RQ1: Which psychological and mental-health constructs have been examined in gymnasts between 2021 and 2026, and how are they distributed across gymnastics disciplines, participant contexts, and study designs?

RQ2: What does the evidence indicate about psychological stressors and mental-health risks, particularly disordered eating, body-image disturbance, weight pressure, competitive anxiety, burnout, and longer-term well-being?

RQ3: Which psychological resources, skills, and contextual factors, including motivation, self-talk, perfectionism regulation, and coach athlete relationships, are associated with well-being and performance-relevant outcomes in gymnasts?

By addressing these questions, the review contributes an integrated map of psychological constructs in gymnastics, distinguishes modifiable risks from protective resources, and translates the synthesised evidence into concrete guidance for coaches, clinicians, and sport organisations.

Method

Research Design and Framework

A systematic literature review was conducted to identify, appraise, and synthesise empirical evidence on psychological health in gymnastics. Reporting followed the PRISMA 2020 statement, and thematic synthesis was used because the included studies differed in design, population, and outcome measurement. The unit of analysis was the primary empirical study rather than individual participants. No *a priori* sample-size or statistical-power calculation was performed because, in a systematic review, corpus size is determined by the prespecified search strategy and eligibility criteria rather than by statistical power.

Search Strategy

First, by using the PICOS framework, the research questions were broken down into elements in order to identify key concepts and phrases that would be used for searching the literature. This is a systematic and reliable way of identifying search terms for a topic. a) Population (P): Gymnasts across competitive, recreational, developmental, and former/post-competitive contexts, including artistic, rhythmic, aerobic, acrobatic, and trampoline gymnastic; b) Interest (I): Psychological and mental-health constructs and their correlates, risk factors, or interventions.; c) Comparison (C): Non-gymnast controls, other athletes, or comparisons across competitive levels where reported; a comparator was not required for inclusion; d) Outcome (O): Psychological or mental-health outcomes (e.g., disordered eating, body image, anxiety, depression, well-being, motivation, self-talk, perfectionism, burnout); and e) Study design (S): Empirical primary studies using quantitative, qualitative, or mixed-methods designs.

Each PICOS element was translated into keywords and synonyms and combined into a database-adapted Boolean strategy. The Scopus string below is the master string documented in the review. Database-specific syntax was adapted for PubMed and ScienceDirect while preserving the same population and outcome concepts. The exact search date(s) must be entered from the search log before submission: [INSERT SEARCH DATE(S)].

SCOPUS MASTER STRING: TITLE-ABS-KEY (("gymnast" OR "rhythmic gymnastic*" OR "artistic gymnastic*" OR "aerobic gymnastic*" OR "acrobatic gymnastic*" OR "trampolin*") AND ("psycholog*" OR "mental health" OR "well-being" OR "body image" OR "body dissatisfaction" OR "eating disorder*" OR "disordered eating" OR "anxiet*" OR "depress*" OR "perfectionism" OR "burnout" OR "motivation" OR "self-talk" OR "coping" OR "resilien*")) AND PUBYEAR > 2020 AND PUBYEAR < 2027 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))*

PUBMED SYNTAX-EQUIVALENT STRING: ((gymnast[Title/Abstract] OR "rhythmic gymnastics"[Title/Abstract] OR "artistic gymnastics"[Title/Abstract] OR "aerobic gymnastics"[Title/Abstract] OR "acrobatic gymnastics"[Title/Abstract] OR trampolin*[Title/Abstract]) AND (psycholog*[Title/Abstract] OR "mental health"[Title/Abstract] OR "well-being"[Title/Abstract] OR "body image"[Title/Abstract] OR "body dissatisfaction"[Title/Abstract] OR "eating disorder"[Title/Abstract] OR "disordered eating"[Title/Abstract] OR anxiet*[Title/Abstract] OR depress*[Title/Abstract] OR perfectionism[Title/Abstract] OR burnout[Title/Abstract] OR motivation[Title/Abstract] OR "self-talk"[Title/Abstract] OR coping[Title/Abstract] OR resilien*[Title/Abstract])) AND (2021/01/01:2026/12/31[Date - Publication]) AND english[Language] AND journal article[Publication Type]*

SCIENCEDIRECT SYNTAX-EQUIVALENT STRING: (gymnast OR "rhythmic gymnastics" OR "artistic gymnastics" OR "aerobic gymnastics" OR "acrobatic gymnastics" OR trampolin*) AND (psycholog* OR "mental health" OR "well-being" OR "body image" OR "body dissatisfaction" OR "eating disorder*" OR "disordered eating" OR anxiet* OR depress* OR perfectionism OR burnout OR motivation OR "self-talk" OR coping OR resilien*) with publication years 2021 2026, English language, and journal-article filters applied. [VERIFY THESE PLATFORM-SPECIFIC QUERIES AGAINST THE SAVED SEARCH HISTORY BEFORE SUBMISSION.]*

The asterisk truncation was used to capture morphological variants. Field restrictions were applied to the title, abstract, and keyword fields where supported. The date and document-type filters operationalised the eligibility criteria. The outcome cluster was deliberately restricted to psychological and mental-health concepts because preliminary broad searches retrieved many injury- and physiology-only records.

Database and Information Sources

Searches were conducted in Scopus, PubMed, and ScienceDirect. For reproducibility, the final manuscript should report the exact search date(s), the number of records returned by each database, and the exported-search filenames or accession records used to construct the PRISMA flow. Scopus was treated as the main interdisciplinary database, PubMed provided biomedical coverage, and ScienceDirect provided additional sport- and psychology-related coverage.

Eligibility Criteria

Table 1. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Population	Gymnasts (artistic, rhythmic, aerobic, acrobatic, trampoline), including current, recreational, or former athletes	Non-gymnast athletes or general/clinical populations; gymnastics used only as an exercise intervention for non-athletes

Criterion	Inclusion	Exclusion
Outcome	Reports at least one psychological or mental-health construct	Injury, biomechanical, or physiological outcomes only, with no psychological measure
Study design	Empirical primary study (quantitative, qualitative, mixed methods)	Reviews, protocols, editorials, case reports, conference abstracts
Language	English	Non-English (full text)
Publication period	2021-2026	Before 2021
Document type	Peer-reviewed journal article	Book chapter, thesis, grey literature
Accessibility	Full text retrievable	Full text not retrievable

Study Selection Process

Study selection comprised deduplication, title/abstract screening, and full-text eligibility assessment. Deduplication used DOI matching and normalized-title matching. At each screening stage, decisions were based on the predefined eligibility criteria. The screening audit trail should be used to report the number of reviewers and inter-rater agreement: Cohen's kappa for title/abstract screening was [INSERT κ], and the procedure used to resolve disagreements was [INSERT DISAGREEMENT-RESOLUTION PROCEDURE]. If the original screening was conducted by a single reviewer, do not invent a kappa; instead, state that limitation explicitly and consider independent re-screening of the corpus before resubmission.

Quality Assessment

Methodological quality was appraised with the Mixed Methods Appraisal Tool (MMAT), Version 2018 (Hong et al., 2018). Each study was first assigned to its appropriate MMAT design category and then assessed against the five criteria specific to that category. Q1-Q5 were retained as domain-level judgments so that readers can inspect which methodological criteria were met, partially met, or not met. No study was excluded because of MMAT quality; the appraisal was used descriptively to contextualize confidence in the evidence. The prior numerical totals are therefore descriptive summaries only and are not treated as weights in the thematic synthesis. Inter-rater agreement for the quality appraisal should be reported from the audit trail as [INSERT κ OR OTHER AGREEMENT STATISTIC].

Table 2. Quality assessment summary (MMAT, Version 2018)

Author(s), Year	Study design	Q1	Q2	Q3	Q4	Q5	Total	Category
Edlund & Melin (2024)	Quant. non-randomized	1	1	1	1	0.5	4.5	High
Donti & Donti (2025)	Quant. descriptive	1	1	1	1	1	5	High
Núñez & Pérez (2024)	Quant. non-randomized	1	1	1	1	0.5	4.5	High
Besson & Edouard (2024)	Quant. descriptive	1	0.5	1	0.5	1	4	High
Buzzi & Verardi (2025)	Quant. descriptive	1	1	0.5	1	0.5	4	High
Portas-Núñez & Ayán-Pérez (2026)	Quant. descriptive	1	0.5	1	1	1	4.5	High
Yoshitani-Kuwabara & Nagai (2025)	Quant. non-randomized	1	1	1	1	1	5	High
Montero & Adams (2026)	Qualitative	1	1	1	1	1	5	High
Rommel & Tillmann (2024)	Quant. non-randomized	1	1	1	1	0.5	4.5	High
Laureys & Lenoir (2023)	Quant. non-randomized	1	1	1	0.5	1	4.5	High
Sriwahyuniati & Susila (2025)	Quant. non-randomized	1	0.5	1	1	0.5	4	High
Rommel & Tillmann (2021)	Quant. descriptive	1	1	1	1	0.5	4.5	High
Feng & Yuan (2021)	Mixed methods	1	0.5	1	0.5	0.5	3.5	Medium
Kontele & Donti (2022)	Quant. descriptive	1	1	1	1	1	5	High
Polak & Zadarko-Domaradzka (2022)	Quant. descriptive	1	1	1	1	0.5	4.5	High
Amato & Baldassano (2021)	Quant. randomized/controlled	1	0.5	0.5	1	1	4	High
Santos-Rosa & Cervelló (2022)	Quant. descriptive	1	1	1	1	1	5	High
Donti & Psychountaki (2021)	Quant. descriptive	1	1	1	1	1	5	High
Gómez-Landero & Cervelló (2026)	Quant. non-randomized	1	1	1	1	0.5	4.5	High
Bouza & Padulo (2025)	Quant. randomized/controlled	1	1	0.5	1	1	4.5	High

Note. Q1-Q5 are the five MMAT criteria specific to the study's design category. "Yes," "Can't tell/Partial," and "No" were coded as 1, 0.5, and 0 respectively for descriptive summarisation. Q1-Q5 should not be interpreted as interchangeable constructs across design categories. The review did not exclude studies solely because of quality, and no numerical quality score was used as an analytical weight.

Data Extraction Procedure

A structured extraction form recorded author/year, location where explicitly reported, study design, sample characteristics, gymnastics discipline, psychological construct(s), measurement instrument(s), and principal

findings. At the study level, psychological outcomes were operationalised using the instruments reported by the primary investigators; examples in the included corpus include EAT-26, EDE-Q, the Weight-Pressures in Sport-Females scale, EDI-3 subscales, the Compulsive Exercise Test, the MADRS-S, and body-image or self-talk measures. Because the review synthesised heterogeneous primary studies, no single instrument was imposed across all studies. Study location was coded only when explicitly reported in the source; otherwise it was coded as “not reported.”

Descriptive Corpus Mapping

A descriptive corpus mapping was performed to characterise the evidence base rather than to conduct inferential bibliometric analysis. Publication year, gymnastics discipline, and reported study location were tabulated, and construct co-occurrence was used only to support the thematic cluster visualisation. No co-citation, centrality, or other inferential network statistics were calculated.

Data Analysis and Synthesis

Because the included studies were heterogeneous in design, population, measurement, and outcome, a thematic synthesis was conducted following Thomas and Harden (2008). First, findings were extracted from each study. Second, line-level or result-level statements were coded inductively. Third, related codes were grouped into descriptive themes. Fourth, descriptive themes were consolidated into three analytical themes aligned with the research questions: (i) disordered eating, body image, and weight pressure; (ii) mental health and psychological consequences; and (iii) psychological skills and regulatory resources. Themes were compared across disciplines and participant contexts for convergence, contradiction, and nuance. The thematic coding procedure was independently checked by [INSERT NUMBER OF REVIEWERS]; agreement for thematic coding was [INSERT AGREEMENT STATISTIC OR QUALITATIVE CONSENSUS PROCEDURE].

Reporting and Documentation

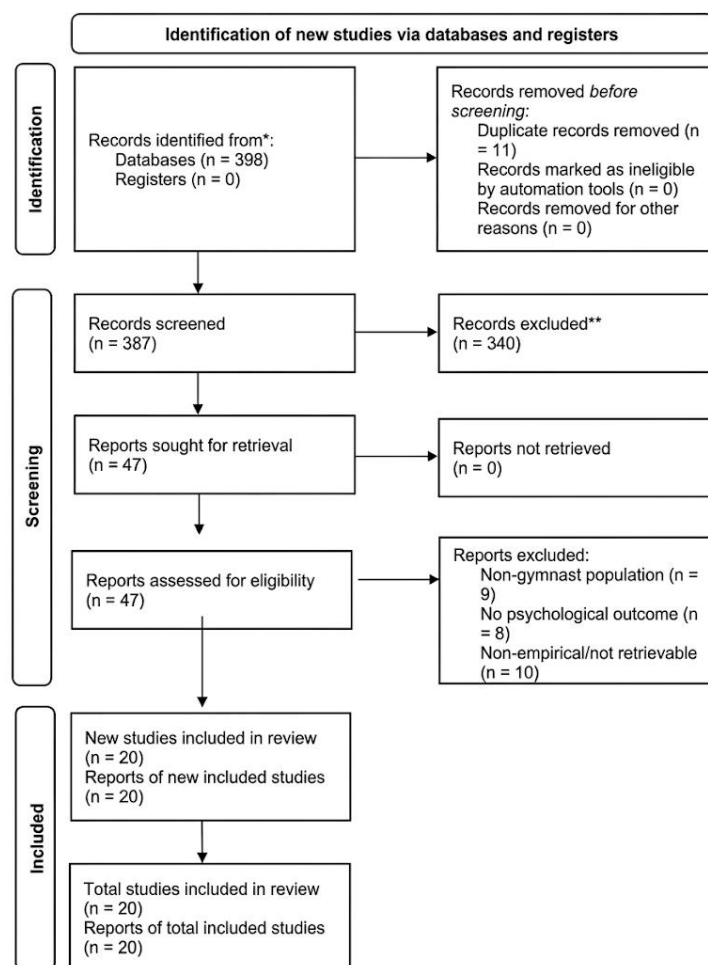


Figure 1. PRISMA 2020 flow diagram of the study selection process across Scopus, PubMed, and ScienceDirect. Counts are internally consistent: 398 identified, 11 duplicates removed, 387 screened, 340 excluded, 47 assessed at full text, 27 excluded, and 20 included

Results and Discussions

Study Selection and Corpus Overview

The three databases yielded 398 records. After 11 duplicates were removed, 387 unique records remained for title/abstract screening. Of these, 340 were excluded and 47 reports were sought for retrieval; all 47 were retrieved and assessed for eligibility. Twenty-seven reports were excluded at full text: 9 involved non-eligible populations, 8 lacked a psychological or mental-health outcome, 6 used non-empirical designs, and 4 were unavailable in full text or did not meet the language criterion. Twenty studies were therefore included in the review. The arithmetic is consistent across the PRISMA stages: $398 - 11 = 387$; $387 - 340 = 47$; and $47 - 27 = 20$.

The included studies were published between 2021 and 2026. Nine examined rhythmic gymnastics, five artistic gymnastics, two acrobatic gymnastics, one trampoline gymnastics, and three mixed or unspecified samples. Quantitative designs predominated, particularly cross-sectional and comparative studies; two controlled experimental studies, two longitudinal studies, one qualitative study, and one mixed-methods study were also included. Nineteen of the 20 studies were rated High and one Medium on the descriptive MMAT summary used in this review (Table 2).

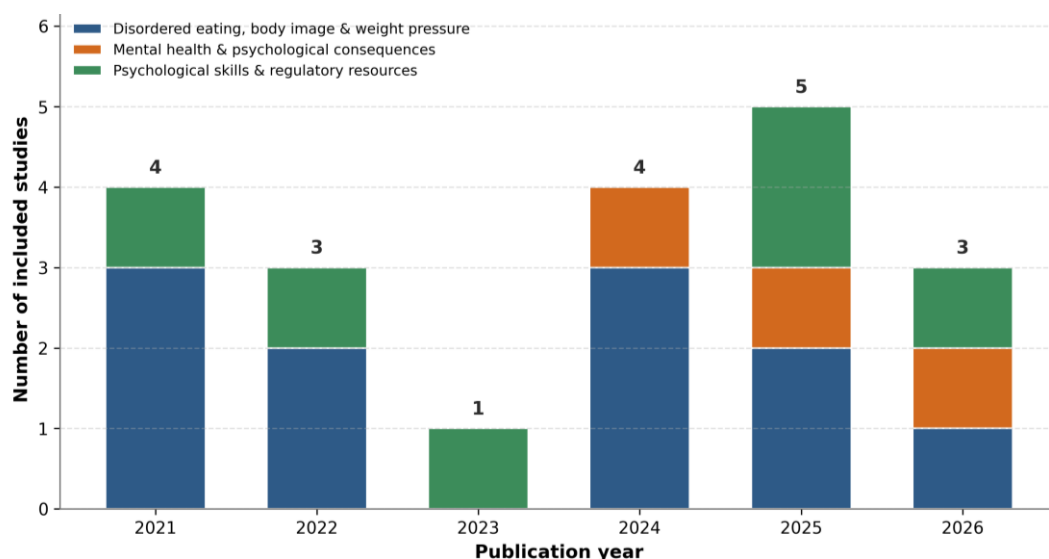
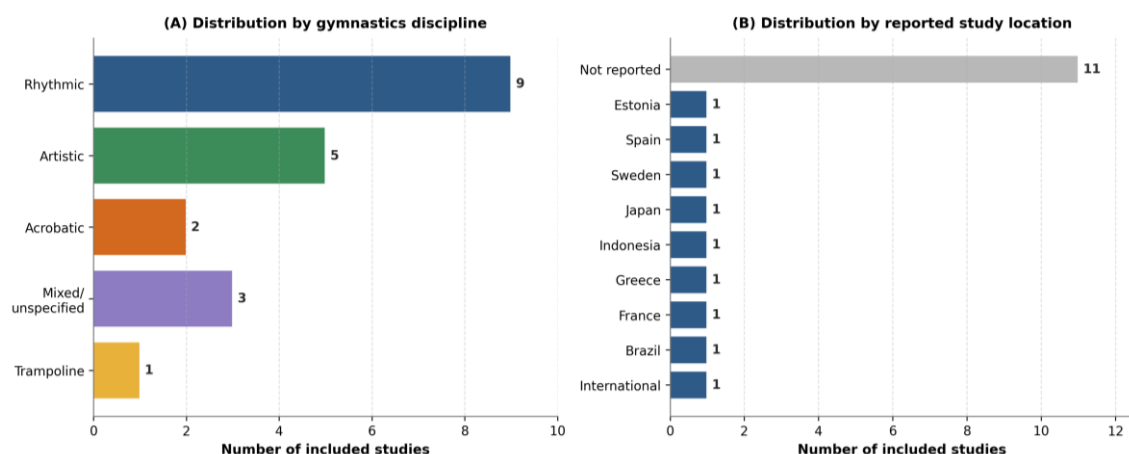


Figure 2. Temporal distribution of the 20 included studies by publication year and thematic focus (2021-2026).



Note. Study location was coded only where explicitly stated in the retrieved title/abstract; "Not reported" denotes records without an explicit location in the source metadata.

Figure 3. Distribution of included studies by gymnastics discipline (A) and reported study location (B).

Location was coded only where explicitly stated in source metadata.

Characteristics and Findings of Included Studies

Table 3 presents the full characteristics of the 20 included studies, reporting complete study titles, author(s) and year, reported study location, study method, thematic classification, and the principal findings of each study. Table 4 then classifies the studies by theme and method to expose the structure of the evidence base.

Table 3. Summary of included studies (n = 20)

Study title / Author(s), Year / Location	Method	Theme	Key findings
Assessment of eating disorder symptoms, compulsive exercise, body dissatisfaction and depression in Swedish national team gymnasts, with a one-year follow-up <i>Edlund & Melin (2024) - Sweden</i>	Longitudinal cohort (1-year follow-up), quantitative	Mental health & disordered eating	Among elite national-team gymnasts, body dissatisfaction increased over 12 months while eating-disorder and depression symptoms stayed low; drive for thinness, exercise for weight control and depressive symptoms were independently associated with body dissatisfaction.
Eating Disorder Symptoms and Energy Deficiency Awareness in Adolescent Artistic Gymnasts: Evidence of a Knowledge Gap <i>Donti & Donti (2025) - Not reported</i>	Cross-sectional survey, quantitative descriptive	Disordered eating & energy-deficiency awareness	20.2% of adolescent artistic gymnasts exceeded the EDE-Q cut-off; high-level gymnasts reported more severe disordered-eating symptoms than lower-level peers, yet RED-S knowledge was low and did not differ by level.
Body Dissatisfaction among Young Girls in Recreational Rhythmic Gymnastics <i>Nuñez & Pérez (2024) - Not reported</i>	Cross-sectional case control, quantitative	Body image	Body dissatisfaction did not differ between young recreational rhythmic gymnasts and matched non-gymnasts, suggesting that recreational practice at a young age is not associated with heightened body dissatisfaction.
Long-term consequences of practicing high-level women's artistic gymnastics: A retrospective study of 27 former high-level gymnasts <i>Besson & Edouard (2024) - France</i>	Retrospective questionnaire survey, quantitative	Long-term mental & physical health	In retired high-level women's artistic gymnasts, 16 of 27 exceeded the mental-health risk threshold and social-functioning and general-health scores were below general-population norms, indicating lasting mental, physical and social consequences.
Quality of life and level of perfectionism of rhythmic gymnastics athletes <i>Buzzi & Verardi (2025) - Brazil</i>	Cross-sectional correlational, quantitative	Perfectionism & quality of life	Social relationships in the sport environment most influenced gymnasts' quality of life, and perfectionism correlated significantly with quality of life in adults; competitive and personal demands were seen to interfere with athletes' quality of life.
Prevalence of eating disorder, body image dissatisfaction and musculoskeletal complaints among former spanish rhythmic gymnasts: a retrospective study <i>Portas-Núñez & Ayán-Pérez (2026) - Spain</i>	Retrospective cross-sectional survey, quantitative	Disordered eating & body image (retirement)	Among former rhythmic gymnasts, eating-disorder risk was relatively low (10.6% above EAT-26 threshold) but body dissatisfaction was highly prevalent (68.1%), with higher BMI predicting body dissatisfaction.
High Proportions of Low Body Mass Index and Menstrual Dysfunction among Rhythmic Gymnasts: Association with Body Image Distortion and Eating Behaviors and Attitudes <i>Yoshitani-Kuwabara & Nagai (2025) - Japan</i>	Cross-sectional comparative, quantitative	Body image & disordered eating	Rhythmic gymnasts showed higher rates of low BMI and menstrual dysfunction, greater body-image distortion and higher EAT-26 scores than non-aesthetic athletes and non-athletes; body-image distortion and disordered eating attitudes were associated with these health risks.
The impact of sport retirement on mental health and sleep: A qualitative study with female ex-gymnasts <i>Montero & Adams (2026) - Not reported</i>	Qualitative (semi-structured interviews, reflexive thematic analysis)	Retirement, mental health & wellbeing	Interviews with female ex-gymnasts surfaced four themes-abuse within the coach athlete relationship, disruptive post-retirement change, inadequate mental-health/sleep education, and potential for change-linking coach-originated pressure to poor post-career wellbeing.
High Serum Irisin Concentration Is Associated with More Disturbed Behavioural Eating Pattern	Cross-sectional comparative, quantitative	Disordered eating (biobehavioural)	Adolescent rhythmic gymnasts reported more restrained eating than untrained controls, and disturbed behavioural eating

Study title / Author(s), Year / Location	Method	Theme	Key findings
in Adolescent Rhythmic Gymnasts <i>Rommel & Tillmann (2024)</i> - Not reported			patterns were positively correlated with serum irisin concentration.
A one-year follow-up of the cognitive and psycho-behavioural skills in artistic gymnastics <i>Laureys & Lenoir (2023)</i> - Not reported	Longitudinal (1-year follow-up), quantitative	Psycho-behavioural & cognitive skills	Executive functions and psychological characteristics of developing excellence in artistic gymnasts developed non-linearly across ages, with executive functions maturing early then plateauing and marked inter-individual variability in developmental trajectories.
Achievement motivation in gymnastics athletes based on the Achievement Motivations Scale for Sports Environments: a study of gender differences <i>Sriwahyuniati & Susila (2025)</i> -Indonesia	Comparative (causal-comparative), quantitative	Achievement motivation	No significant gender difference in achievement motivation emerged among gymnastics athletes, though male gymnasts scored slightly higher on average, underscoring motivation as a shared psychological driver of performance.
The associations of body image perception with serum resistin levels in highly trained adolescent estonian rhythmic gymnasts <i>Rommel & Tillmann (2021)</i> - Estonia	Cross-sectional correlational, quantitative	Body image (biobehavioural)	In adolescent rhythmic gymnasts, body-attitude (image-perception) scores correlated positively with serum resistin, and resistin plus BMI explained 40.8% of body-attitude variance, a link absent in controls.
Research on burnout level of juvenile trampolinists and relevant affecting factors <i>Feng & Yuan (2021)</i> -Not reported	Mixed methods (survey, interview, statistics)	Burnout	Overall burnout in juvenile trampolinists was below moderate, with reduced sense of achievement the most salient dimension; overload, personal and situational factors correlated strongly with exhaustion, pointing to communication, self-regulation and social support as remedies.
Weight Pressures and Eating Disorder Symptoms among Adolescent Female Gymnasts of Different Performance Levels in Greece <i>Kontele & Donti (2022)</i> - Greece	Cross-sectional survey, quantitative	Weight pressure & disordered eating	Competitive gymnasts reported higher weight pressures and EAT-26 scores than recreational peers; sport/coach and appearance/performance weight pressures plus BMI explained 30.3% of disordered-eating variance in competitive gymnasts.
Anorexic Readiness Syndrome in Elite Female Acrobatic Gymnasts-International Study <i>Polak & Zadarko-Domaradzka (2022)</i> - International (6 countries)	Cross-sectional international survey, quantitative	Disordered eating (anorexic readiness)	A high level of Anorexic Readiness Syndrome was found in 9.8% of elite female acrobatic gymnasts, strongly associated with fasting/dieting, macronutrient restriction, guilt after eating and appearance-improvement motives.
Analysis of body perception, preworkout meal habits and bone resorption in child gymnasts <i>Amato & Baldassano (2021)</i> - Not reported	Controlled experimental (meal crossover) + cross-sectional, quantitative	Body image & nutrition	Child artistic gymnasts reported higher body-appearance satisfaction than sedentary peers, and a pre-workout high-carbohydrate meal attenuated bone resorption more than a high-protein meal, suggesting a positive body self-perception in young gymnasts.
Positive and negative spontaneous self-talk and performance in gymnastics: The role of contextual, personal and situational factors <i>Santos-Rosa & Cervelló (2022)</i> -Not reported	Cross-sectional path analysis (pre post competition), quantitative	Self-talk, anxiety & performance	In rhythmic-gymnastics ensembles, task-involving climate and positivity predicted positive self-talk and self-confidence, whereas ego climate predicted negative self-talk and, via cognitive anxiety, poorer performance-positive situational self-talk enhanced and negative self-talk impaired performance.
Are they too perfect to eat healthy? Association between		Perfectionism & disordered eating	International-level adolescent rhythmic gymnasts scored higher on disordered eating

Study title / Author(s), Year / Location	Method	Theme	Key findings
eating disorder symptoms and perfectionism in adolescent rhythmic gymnasts <i>Donti & Psychountaki (2021)</i> -Not reported	Cross-sectional survey, quantitative		and perfectionism than recreational peers; negative reactions to imperfection, BMI and training experience explained 33.2% of disordered-eating variance.
Do Different Interdependencies within a Sport Affect the Perceived Motivational Climate, Use of Spontaneous Self-Talk, Positivity or Precompetitive Anxiety? <i>Gómez-Landero & Cervelló (2026)</i> -Not reported	Cross-sectional comparative, quantitative	Motivational climate, self-talk & anxiety	Comparing individual and team rhythmic gymnastics, team gymnasts perceived greater ego climate and used more positive training self-talk; negative training self-talk and positivity predicted competitive anxiety in both groups, highlighting self-talk in anxiety management.
The impact of video feedback on motor skill and motivation in acrobatic gymnastics through the use of digital tools in physical education <i>Bouzid & Padulo (2025)</i> -Not reported	Controlled experimental trial (video vs verbal feedback), quantitative	Motivation & motor learning	In an acrobatic-gymnastics physical-education programme, video feedback produced markedly greater gains in motor performance and higher situational motivation than verbal feedback alone, supporting digital feedback tools for engagement and skill learning.

Note. Study location was coded only where explicitly reported in the retrieved title/abstract; "Not reported" indicates no explicit location statement in the source metadata.

Table 4. Classification of included studies by theme and method

Analytical theme	Studies (No.)	n	Predominant method
Theme 1 - Disordered eating, body image & weight pressure	1, 2, 3, 6, 7, 9, 12, 14, 15, 16, 18	11	Cross-sectional & comparative quantitative
Theme 2 - Mental health & psychological consequences	4, 5, 8	3	Retrospective survey & qualitative
Theme 3 - Psychological skills & regulatory resources	10, 11, 13, 17, 19, 20	6	Comparative, path-analytic & experimental

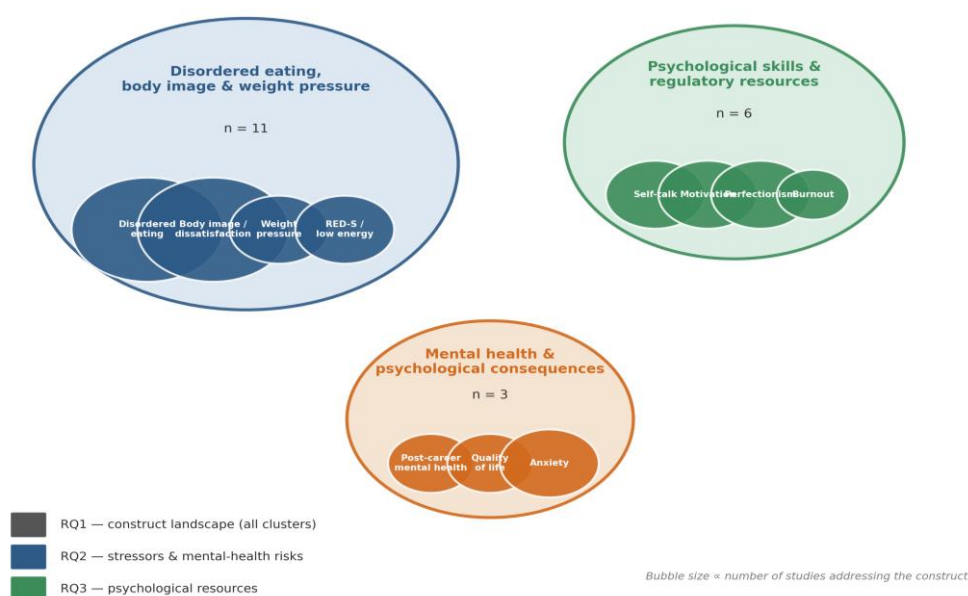


Figure 4. Thematic cluster map of psychological constructs examined in competitive gymnasts, mapped to the three research questions.

Thematic Synthesis**Disordered eating, body image, and weight pressure (RQ1)**

The largest evidence cluster comprised 11 studies focused on disordered eating, body image, and weight pressure. Across adolescent and competitive samples, higher competitive demands and greater sport-, coach-, appearance-, or performance-related weight pressure were repeatedly associated with more adverse eating-related outcomes (Donti et al., 2021; Kontele et al., 2022; Polak et al., 2022; Donti et al., 2025). In adolescent artistic gymnasts, 20.2% exceeded the EDE-Q screening cut-off, while higher-level gymnasts reported more severe disordered-eating symptoms. Among elite acrobatic gymnasts, 9.8% met the study's high Anorexic Readiness Syndrome category. Body-image findings were more heterogeneous. Recreational rhythmic gymnasts did not differ from matched non-gymnasts in body dissatisfaction, while child artistic gymnasts in one study reported more favourable body-appearance satisfaction. By contrast, highly trained rhythmic gymnasts showed body-image distortion and higher EAT-26 scores, and former rhythmic gymnasts showed substantial body dissatisfaction after retirement. Longitudinal evidence further indicated increasing body dissatisfaction over 12 months among Swedish national-team gymnasts despite relatively stable eating-disorder and depression symptoms (Edlund et al., 2024). Together, the pattern supports a contextual interpretation: risk is concentrated in settings where performance demands and explicit weight or appearance pressures are high rather than being an inevitable consequence of gymnastics participation.

Regarding body-image-related outcomes, they have been found a bit different. Among gymnasts who do rhythmic, one study confirmed a higher rate of body dissatisfaction and another distortion in how their physical appearance is perceived, which could lead to various health complications if not addressed, like low body-mass index and menstrual abnormalities in contrast with those who are neither athletes nor sporty people (Yoshitani-Kuwabara et al., 2025). Additionally, biobehavioural work that looked into body-image perception and eating disorders related to changes in one's physical appearance together with disturbances of one's eating patterns have identified the presence of various physical markers such as resistin and irisin (Rommel et al., 2021; Rommel et al., 2024). On the other hand, the relationship between body dissatisfaction and disordered-eating symptoms has varied; recreational young rhythmic gymnasts showed the same level of body dissatisfaction as their healthy sedentary peers (Nuñez et al., 2024), while small artistic gymnasts even found better satisfaction with their bodies compared to sedentary friends (Amato et al., 2021). Moreover, data on young athletes in national teams revealed a trend for increasing body dissatisfaction without significant changes in eating disorder and depression symptoms. The factors correlated with this trend are mainly thinness drive and weight control through exercise (Edlund et al., 2024). Taken together, these findings seem to imply that the risk primarily emerges when one is under a high competitive pressure and the focus on weight loss is rather overt or explicit and this is not just an inherent feature of participating in such kinds of sports.

Mental health and psychological consequences (RQ2)

The second theme concerned broader mental health, quality of life, and longer-term consequences. Former high-level artistic gymnasts reported mental-health and social-functioning scores below population norms, while qualitative interviews with female ex-gymnasts highlighted coach-related mistreatment, difficult post-retirement adjustment, and gaps in mental-health and sleep education. Among active rhythmic gymnasts, social relationships within the sport environment were strongly related to quality of life, and perfectionism showed a significant relationship with quality of life in adults. Because these findings are largely retrospective or cross-sectional, they indicate associations and lived experiences rather than causal effects.

Psychological skills and regulatory resources (RQ3)

The third theme shifted from risk to psychological skills and regulatory resources. Positive self-talk and task-involving motivational climates were associated with self-confidence and performance, whereas ego-involving climates were linked to negative self-talk and anxiety-related performance decrements (Santos-Rosa et al., 2022). A later comparison of individual and team rhythmic gymnastics also highlighted self-talk and positivity in relation to precompetitive anxiety (Gómez-Landero et al., 2026). Achievement motivation did not differ significantly by sex in one gymnastics sample, while executive and psycho-behavioural skills showed heterogeneous developmental trajectories. Burnout in juvenile trampolinists was generally below moderate levels but was associated with overload and contextual factors. The controlled acrobatic-gymnastics study further suggested that video feedback can improve both motor performance and situational motivation. These findings identify potentially modifiable resources, but the small number of longitudinal and intervention studies limits conclusions about effectiveness or causality.

Comparative and Critical Analysis

Taken together, the three themes show an evidence base weighted toward documenting appearance-related risk, with comparatively fewer studies testing protective mechanisms. The strongest convergence is that disordered eating and body-image concerns are more prominent in higher-pressure and higher-competitive-level contexts. The clearest divergence is in body image among recreational and child samples, where neutral or favourable

findings caution against generalising elite-level risk to all gymnasts. Methodologically, the dominance of cross-sectional designs limits causal inference. The two longitudinal studies suggest that within-athlete trajectories can be missed by cross-sectional snapshots, while the controlled studies illustrate a promising direction for intervention research.

Interpretation and integration with prior evidence

The synthesis supports a context-sensitive model of psychological health in gymnastics. Weight and appearance pressure function as domain-specific stressors, while self-talk, motivational climate, supportive coach relationships, and adaptive perfectionism appear to operate as potential resources. However, the evidence is predominantly observational, so these factors should be described as associated with outcomes rather than established causal buffers. The review therefore extends beyond a risk-only framing by identifying modifiable psychological and contextual resources while retaining caution about the strength of causal claims.

Theoretical and practical implications

Theoretically, the results argue for integrative, resource-inclusive models of psychological health in aesthetic sport rather than risk-only framings, and for explicit attention to developmental timing given early specialisation (Laureys et al., 2023). Practically, the evidence supports safeguarding measures that reduce sport- and coach-originated weight pressure (Kontele et al., 2022; Montero et al., 2026), routine screening for disordered eating at higher competitive levels (Donti, Maraki, et al., 2025), education addressing energy availability and body image, and the deliberate cultivation of task-involving climates and adaptive self-talk (Gómez-Landero et al., 2026; Santos-Rosa et al., 2022). Attention to the post-retirement transition-identity, sleep, and mental-health support also emerges as a concrete priority (Besson & Edouard, 2024; Montero et al., 2026).

Contradictions and nuances

The most important nuance is that gymnastics is not uniformly harmful. Recreational and child samples sometimes show no elevation, or even more favourable body perceptions, whereas elite and high-pressure contexts concentrate more consistent risk signals. Perfectionism is also multidimensional: some forms or reactions to imperfection are associated with disordered eating, while other aspects relate to striving or quality of life. Regulation and context, rather than the mere presence of perfectionism, therefore appear more informative.

Research gaps

Several important gaps remain in the current evidence base. First, there is a scarcity of longitudinal and intervention-based research, as most available studies use cross-sectional designs, limiting the ability to establish causal relationships and to understand how psychological stressors and protective resources interact and change over time. Second, certain gymnastics disciplines, particularly aerobic gymnastics and trampoline, remain under-represented, while male gymnasts are also insufficiently studied, and few studies provide detailed comparisons across competitive levels within specific disciplines. Third, evidence concerning protective mechanisms remains relatively limited compared with the substantial volume of research documenting psychological risks. In particular, further investigation is needed into the role of coach athlete relationships, parental and appearance-related expectations, and mental health following retirement from competitive gymnastics. Addressing these gaps through more longitudinal, intervention-based, diverse, and ecologically valid research would strengthen understanding of both risk and resilience in gymnastics.

Limitations of this review

This review has several limitations that should be considered when interpreting its findings. First, no review protocol was pre-registered, which may increase the risk of post-hoc decisions during the review process; however, this limitation was mitigated by explicitly defining the eligibility criteria, master search strategy, PRISMA flow counts, MMAT assessment procedure, and thematic synthesis framework in the manuscript. Second, the internal validity of the primary evidence is constrained by the predominance of cross-sectional and self-report study designs, which introduce temporal ambiguity and may be susceptible to common-method variance when predictors and psychological outcomes are assessed using related self-report measures. Therefore, observed associations should not be interpreted as evidence of causation. Third, the external validity of the findings is limited by the concentration of evidence in rhythmic and artistic gymnastics, the under-representation of male gymnasts and certain gymnastics disciplines, and variations in cultural and competitive contexts. Furthermore, 11 of the 20 included studies did not explicitly report their study location in the retrieved metadata; therefore, the geographic profile presented in Figure 3 is incomplete and should not be interpreted as a definitive representation of the global distribution of evidence. Finally, the eligibility criteria were restricted to English-language, peer-reviewed articles indexed in three databases, meaning that relevant non-English studies and grey literature may have been overlooked. The substantial heterogeneity in study populations, measurement instruments, and outcomes also precluded quantitative pooling; consequently, I^2 statistics, pooled effect sizes,

and formal statistical tests of publication bias were not calculated. Publication bias was therefore not formally assessed and remains a potential limitation of the current evidence base.

Future directions

Direction 1. Prioritise prospective longitudinal and controlled intervention studies that test how weight pressure, self-talk, and motivational climate causally shape disordered eating, anxiety, and well-being over time; Direction 2. Broaden coverage to under-studied disciplines and to male gymnasts, and standardise reporting of discipline, competitive level, and study location to enable stronger cross-study comparison; and Direction 3. Investigate protective and contextual mechanisms-coach athlete relationships, perfectionism regulation, and post-retirement support-and evaluate safeguarding and psychological-skills programmes for effectiveness.

Answers to the Research Questions

RQ1. The evidence examines a compact set of psychological constructs-dominated by disordered eating and body image, with a secondary cluster of mental-health/quality-of-life outcomes and a growing set of psychological-skill constructs (self-talk, motivation, perfectionism, burnout, executive/psycho-behavioural skills). These are concentrated in rhythmic and artistic gymnastics and, methodologically, in cross-sectional and comparative quantitative designs, with limited longitudinal or experimental work. RQ2. Disordered-eating symptoms, body-image disturbance, and weight pressure are the principal psychological risks, scaling with competitive level and with sport/coach-originated pressure; competitive anxiety and burnout are documented but less pervasive, and long-term as well as post-retirement mental-health consequences are evident in retired athletes. Risk is not uniform, being attenuated in recreational and child samples. RQ3. Adaptive self-talk, a task-involving motivational climate, achievement motivation, supportive coach relationships, and the regulation (rather than absence) of perfectionism are associated with better psychological and performance-relevant outcomes; several of these resources are modifiable and, in initial controlled studies, trainable-making them promising targets for intervention.

Conclusions

This systematic review synthesised 20 empirical studies published between 2021 and 2026 on psychological health in gymnastics. The evidence was dominated by cross-sectional research and was concentrated in rhythmic and artistic gymnastics. The most consistent risks were disordered eating, body-image disturbance, and weight pressure, particularly in higher-pressure competitive contexts, while adaptive self-talk, task-involving motivational climates, supportive coach relationships, and regulated perfectionism emerged as potential protective resources. Because of methodological heterogeneity and the scarcity of longitudinal and intervention studies, these associations should not be interpreted causally. No quantitative meta-analysis or pooled effect was performed, and no I^2 statistic was calculated.

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