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Title: Disordered Eating in Athletes: From Psychological Vulnerability to Relative Energy Deficiency in Sport — A Narrative Review

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Abstract

Background: Disordered eating (DE) and eating disorders (EDs) are increasingly recognized among athletes, particularly in sports that emphasise leanness, aesthetics, endurance, or weight categories. Sport-specific pressures, body image concerns, and psychological vulnerability may contribute to unhealthy eating behaviours and eating disorders.

Aim: This narrative review summarized current evidence concerning the prevalence, psychological and sport-specific risk factors, physiological consequences, and prevention strategies related to DE and EDs in athletes.

Materials and Methods: A narrative review was conducted using literature from PubMed, Scopus, Web of Science, and SPORTDiscus. Relevant reviews, consensus statements, and clinical studies addressing eating disorders, risk factors, consequences, and prevention in athletes were included.

Results: Recent evidence suggests that athletes may have higher rates of DE and EDs than non-athletes, particularly in lean and aesthetic sports. Psychological factors such as perfectionism, anxiety, emotional dysregulation and compulsive exercise appear to increase risk of eating disorders. Chronic low energy availability may cause Relative Energy Deficiency in sport (RED-S), menstrual dysfunction, impaired bone health, an increased risk of injury, and reduced athletic performance. The literature also highlights the importance of early screening, multidisciplinary treatment, and the education of coaches and athletes.

Conclusions: Athletes are a high-risk population for DE and EDs due to the interaction between psychological traits and sport-specific environmental pressures. Early identification and prevention strategies are really important to reduce long-term health and performance consequences.

Keywords: disordered eating; eating disorders; athletes; sport psychology; low energy availability; psychological risk factors; Relative Energy Deficiency in Sport (RED-S)

1. Introduction

Disordered eating (DE) involves abnormalities in eating-related thoughts and behaviors, as well as disturbances associated with physical activity and body weight regulation, which may lead to psychological distress and biopsychosocial impairment [1] In contrast, eating disorders (EDs) are multifaceted psychiatric conditions with complex biological, psychological, and environmental etiologies. According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR) and the *International Classification of Diseases* (ICD-11), the principal categories of eating disorders include anorexia nervosa, bulimia nervosa, and binge-eating disorder. [3]

Eating disorders and unhealthy eating habits are becoming an increasingly common and serious health problem among athletes. Although DE may not have the diagnostic criteria for an EDs, it can still have a major impact on physical health, psychological well-being, and athletic performance through behaviours such as restrictive dieting, fasting, compulsive exercise, binge eating, and unhealthy weight-control practices.

Athletes are considered a particularly high-risk population due to the unique physiological and psychological demands associated with competitive sport [5]. Previous literature suggests that athletes may demonstrate a higher prevalence of disordered eating behaviors compared with non-athletes, particularly in sports emphasizing leanness, aesthetics, endurance, or weight classification [5]. Mancine et al. reported that six out of seven analyzed studies found significantly greater rates of disordered eating among athletes participating in lean sports [6]. Similarly, Fatt et al. demonstrated that elite athletes involved in lean and aesthetic sports represent groups at elevated risk for disordered eating and eating disorders [1].

The development of eating pathology in athletes appears to be multifactorial and influenced by the interaction between individual psychological vulnerability and sport-specific environmental pressures [1,4]. Athletes are frequently exposed to expectations regarding body composition, body weight, and appearance from coaches, teammates, judges, and social media [6]. In many sports, low body weight is perceived as beneficial for athletic performance or aesthetic evaluation, which may normalize restrictive eating behaviors and compulsive exercise practices [4,6]. Furthermore, psychological factors such as perfectionism, anxiety, emotional

dysregulation, body dissatisfaction, and strong athletic identity have been associated with an increased risk of disordered eating behaviors in athletes [7,8].

The consequences of eating disorders and disordered eating in athletes extend beyond psychological health and may include low energy availability, Relative Energy Deficiency in Sport (RED-S), menstrual dysfunction, impaired bone health, increased injury risk, cardiovascular complications, and decreased athletic performance [1,4,13]. Given these potentially severe outcomes, early identification and multidisciplinary management are considered essential in sports medicine and athlete healthcare [3].

Although previous reviews have examined eating disorders in athletes, less attention has been given to the interaction between sport-specific environmental pressures, psychological vulnerability, and physiological consequences within an integrated framework. [1,4] Therefore, the aim of this narrative review is to examine the prevalence, sport-specific risk factors, psychological determinants, physiological consequences, and prevention strategies associated with disordered eating and eating disorders in athletes based on current scientific literature.

2. Epidemiology and Prevalence

The prevalence of disordered eating (DE) and eating disorders (EDs) among athletes has been widely investigated in recent years; however, reported prevalence rates remain highly variable depending on sex, sport discipline, competition level, and diagnostic methodology [1,4]. Existing evidence suggests that athletes are at increased risk of disordered eating behaviours compared to non-athletes, particularly in sports that focus on being lean, physical appearance, endurance, or weight categories [1,4,5]. Bratland-Sanda and Sundgot-Borgen reported that the prevalence of eating disorders among athletes ranges from approximately 0% to 19% in male athletes and from 6% to 45% in female athletes, with the highest prevalence observed in aesthetic and weight-sensitive sports [5]. Similarly, Mancine et al. demonstrated that athletes participating in lean sports exhibit the highest rates of disordered eating behaviors compared with athletes competing in non-lean sports [6]. Sports such as gymnastics, ballet, figure skating, diving, long-distance running, wrestling and combat sports appear to be the most affected

disciplines due to the emphasis within these sports on low body weight, body composition or aesthetic appearance [5].

Sex differences in eating disorder prevalence among athletes remain a key topic in the current literature. Female athletes generally have higher rates of eating disorders and body dissatisfaction than male athletes [1,4]. This vulnerability is particularly evident in sports emphasizing thinness or aesthetic appearance [5]. However, increasing evidence suggests that eating pathology in male athletes has historically been underestimated and underdiagnosed [8,10]. Male athletes may present with behaviors associated with muscularity-oriented body image concerns, compulsive exercise, restrictive dieting, and rapid body composition manipulation rather than traditional thinness-oriented pathology [8]. Karrer et al. highlighted that male elite athletes frequently experience pressure to achieve an "ideal" athletic physique, while stigma and limited awareness may contribute to delayed recognition and treatment of eating disorders in this population [10].

Comparisons between athletes and non-athletes have produced somewhat inconsistent findings. Earlier studies generally reported higher rates of disordered eating behaviors among athletes compared with the general population [4,5]. However, a meta-analysis conducted by Chapa et al. demonstrated that female athletes do not necessarily exhibit significantly greater global eating disorder psychopathology than non-athletes overall [11]. Nevertheless, important differences emerged depending on sport type, competition level, and specific pathological behaviors assessed [11]. These findings indicate that eating pathology in athletes is multifactorial and cannot be generalized uniformly across all sporting populations.

Several studies also suggest that eating disorder symptoms in athletes may remain difficult to identify because certain unhealthy behaviours are often accepted as normal within sporting culture [3,8]. Lichtenstein et al. reported that behaviors such as restrictive eating, excessive training, rigid dietary control, and exercise dependence are often interpreted as indicators of athletic discipline and commitment rather than warning signs of psychopathology [12]. This normalization may contribute to underreporting, delayed diagnosis, and underestimated prevalence rates in athletic populations [12].

The interpretation of prevalence data remains challenging due to substantial methodological limitations within the current body of literature [1]. Existing studies frequently use

heterogeneous screening instruments, varying diagnostic criteria, and self-report questionnaires, resulting in inconsistent prevalence estimates and limited comparability between studies [1,4]. Furthermore, much of the available research focuses predominantly on female elite athletes participating in lean sports, limiting the generalizability of findings to male athletes, recreational athletes, and athletes from non-lean disciplines [1,8,10]. The lack of longitudinal and prospective studies further complicates the understanding of causal relationships and long-term outcomes associated with disordered eating behaviors in sport [1].

3. Sport-specific Risk Factors

The development of disordered eating (DE) and eating disorders (EDs) in athletes is strongly influenced by sport-specific environmental pressures and performance expectations. Some sports appear to create conditions that may increase risk of developing inappropriate eating behaviours, due to the emphasis placed on body weight, body composition, physical appearance, or performance optimisation [1,6]. Current literature consistently identifies lean sports, aesthetic sports, endurance disciplines, and weight-category sports as particularly high-risk environments for the development of eating pathology [1,6].

Lean sports are characterized by the perception that lower body weight or reduced body fat may improve athletic performance [1]. Athletes participating in sports such as long-distance running, cycling, triathlon, and swimming are frequently exposed to pressure to maintain a lean physique in order to maximize speed, endurance, or efficiency [1,6] Mancine et al. demonstrated that athletes competing in lean sports consistently reported higher levels of disordered eating behaviors compared with athletes participating in non-lean sports [6]. Similarly, the International Olympic Committee (IOC) consensus statement on Relative Energy Deficiency in Sport (RED-S) emphasized that chronic low energy availability resulting from restrictive eating behaviors is particularly prevalent in endurance and lean-sport athletes [13, 14].

Aesthetic sports represent another group associated with elevated eating disorder risk. Sports such as gymnastics, ballet, synchronized swimming, diving, and figure skating frequently emphasize appearance, body shape, and subjective judging criteria in addition to athletic performance [1,15]. In these disciplines, athletes may experience pressure to conform to specific body ideals perceived as advantageous for both performance and aesthetic evaluation

[15]. Sundgot-Borgen and Torstveit reported that athletes participating in aesthetic sports demonstrate significantly higher prevalence rates of eating disorders compared with athletes in technical or ball sports [5]. The normalization of restrictive eating practices within aesthetic sports environments may further contribute to the development and maintenance of disordered eating behaviors [4].

Weight-category sports, including wrestling, boxing, taekwondo, judo, and rowing, are also associated with increased vulnerability to eating pathology due to the necessity of meeting specific weight classifications before competition [1,6]. Athletes in these disciplines frequently engage in rapid weight-loss strategies, including fasting, dehydration, excessive exercise, and restrictive dieting [6]. Repeated cycles of rapid weight manipulation may contribute to both physiological complications and the development of long-term maladaptive eating behaviors [13, 14]. The Australian Institute of Sport position statement highlighted that unhealthy weight-control practices remain common in sports where competitive success is strongly associated with body weight regulation [9].

Endurance athletes may adopt restrictive dietary practices in an attempt to optimize performance outcomes [1,13]. However, prolonged low energy availability may negatively affect metabolic, endocrine, cardiovascular, and musculoskeletal function while simultaneously impairing athletic performance [13,14].

Moreover, sport-specific risk factors rarely operate independently and are typically influenced by the interaction of psychological vulnerability, environmental pressures, and sociocultural expectations [3]. The normalization of restrictive eating, excessive training, and body monitoring within certain sports may contribute to delayed recognition of pathological behaviors and underdiagnosis of eating disorders in athletic populations [12]. Consequently, understanding the influence of sport-specific risk factors is essential for the early identification, prevention, and management of eating disorders among athletes.

4. Psychological Risk Factors

Psychological factors play a crucial role in the development and maintenance of disordered eating (DE) and eating disorders (EDs) among athletes [4,8]. Although sport-specific pressures can play an important role in eating disorders, current evidence suggests that some personality

traits and emotional processes may seriously increase the risk of restrictive eating, compulsive exercise and body image issues [4,7]. Among the most frequently reported psychological risk factors are perfectionism, anxiety, emotional dysregulation and compulsive exercise [7,8].

In addition, perfectionism may be a double-edged factor in athletes: while adaptive perfectionistic characteristics can support high performance, unhealthy perfectionism, characterized by strict self-evaluation and a fear of failure, may increase susceptibility to restrictive eating behaviours [4,17]. These characteristics may contribute to rigid dietary control, excessive body monitoring, and unhealthy attempts to optimize performance through body weight manipulation [4]. Previous studies have demonstrated that perfectionism is particularly common in aesthetic and endurance sports, where physical appearance and performance outcomes are closely interconnected [1,4].

Anxiety is also a major psychological factor associated with DE and EDs in athletes [7,18]. Athletes are frequently exposed to chronic stress related to competition, performance evaluation, injury risk, social expectations, and body image concerns [18]. Persistent anxiety may increase susceptibility to restrictive dieting, binge eating behaviors, compulsive exercise, and excessive body control practices [7]. Pensgaard et al. emphasized that anxiety symptoms and psychological distress commonly coexist with Relative Energy Deficiency in Sport (RED-S) and disordered eating behaviors, especially among elite athletes exposed to continuous performance-related pressure [18]. Furthermore, anxiety associated with fear of weight gain or perceived performance decline may reinforce restrictive eating patterns and excessive exercise behaviors [4].

Recent literature additionally highlights emotional dysregulation as an important mechanism underlying eating pathology in athletes [7]. Emotional dysregulation refers to difficulties in recognizing, managing, and responding appropriately to emotional experiences [7]. Espinoza-Barrón et al. demonstrated that athletes experiencing impaired emotional regulation may use food restriction, binge eating, or excessive exercise in response to stress and negative emotions [7]. Emotional dysregulation may therefore contribute not only to the onset but also to the maintenance of disordered eating behaviors in sport contexts [7].

Compulsive exercise is another important psychological characteristic associated with eating pathology in athletes [4,19]. Although intensive training is expected in competitive sport,

compulsive exercise differs from healthy athletic training because it is driven primarily by guilt, anxiety reduction, emotional control, or fear of weight gain rather than performance improvement alone [19]. Athletes demonstrating compulsive exercise behaviors frequently continue training despite fatigue, injury, or adverse health consequences [19]. Because excessive exercise is often normalized within sport culture, pathological exercise behaviors may remain difficult to identify [12]. Lichtenstein et al. reported that rigid training routines and excessive exercise are frequently interpreted as indicators of dedication and discipline rather than warning signs of psychopathology [12].

Psychological risk factors rarely occur independently and are typically influenced by the interaction between personality traits, emotional vulnerability, sport-specific pressures, and sociocultural expectations [4]. The coexistence of perfectionism, anxiety, emotional dysregulation and compulsive exercise may substantially increase susceptibility to eating pathology in athletic populations [7,8,10]. Understanding these psychological mechanisms is therefore essential for the prevention, early identification, and effective treatment of eating disorders among athletes.

5. Physiological and Health Consequences

Disordered eating (DE) and eating disorders (EDs) could lead to serious physiological disturbances that negatively affect athletes' health, recovery and performance [4,8]. One of the main mechanisms underlying these complications is low energy availability (LEA), which happens when dietary energy intake is not enough to support both energy used during exercise and normal physiological functioning [13,14].

Chronic LEA has been identified as the central component of Relative Energy Deficiency in Sport (RED-S), a syndrome describing multisystem physiological dysfunction caused by prolonged energy deficiency [13, 14]. RED-S may affect metabolic rate, endocrine function, bone metabolism, menstrual function, cardiovascular health, immunity, protein synthesis, and psychological health [13]. Although initially described primarily in female athletes, RED-S is now recognized in both female and male athletic populations [13].

Menstrual dysfunction remains one of the most frequently reported clinical manifestations associated with LEA in female athletes [4,21]. Restrictive eating behaviors and insufficient

caloric intake may suppress hypothalamic-pituitary-ovarian axis activity, resulting in oligomenorrhea or functional hypothalamic amenorrhea [21]. Persistent menstrual disturbances may further contribute to hormonal imbalance and impaired reproductive health [4].

Bone health impairment represents another major complication associated with DE and EDs in athletes [4,13]. Chronic energy deficiency combined with hormonal disturbances may reduce bone mineral density and impair bone remodeling processes, increasing susceptibility to osteopenia, osteoporosis, and stress fractures [13]. Athletes participating in endurance and aesthetic sports appear to be especially impacted by prolonged exposure to low energy availability and repetitive mechanical stress [15].

Increased injury risk is commonly observed among athletes presenting disordered eating behaviors [4]. LEA may impair muscle recovery, tissue repair, neuromuscular function, and adaptation to training loads [13]. Consequently, athletes with DE and EDs frequently demonstrate higher rates of stress fractures, overuse injuries, fatigue, and prolonged recovery periods [13]. Fatt et al. additionally reported that eating pathology may contribute to decreased training capacity and impaired overall athletic functioning [1].

Many physiological consequences associated with DE and EDs may initially remain clinically unrecognized, particularly in high-performance sport environments where restrictive eating and excessive training are frequently normalized [4]. Delayed diagnosis may therefore contribute to progression of RED-S and long-term health complications [13]. Early recognition and multidisciplinary intervention remain essential to prevent irreversible physiological and psychological consequences in athletic populations [4,13].

6. Prevention and Clinical Implications

Early identification and prevention of disordered eating (DE) and eating disorders (EDs) in athletes are essential for reducing long-term physiological and psychological complications [4,9]. Because eating pathology may initially remain difficult to recognize within competitive sport environments, effective prevention strategies require systematic screening procedures, multidisciplinary management, education of sport personnel, and the promotion of healthier sport cultures [1,4].

Screening represents one of the most important components of early intervention in athletic populations [4]. Athletes participating in lean, aesthetic, endurance, and weight-category sports should be considered particularly high-risk groups and may benefit from regular psychological and nutritional assessment [6,9]. Joy et al. emphasized that early recognition of warning signs such as rapid weight loss, menstrual dysfunction, compulsive exercise, recurrent injuries, fatigue, or restrictive eating behaviors may greatly improve treatment outcomes [4]. Screening tools commonly used in athletes include the Eating Disorder Examination Questionnaire (EDE-Q), Eating Attitudes Test (EAT-26), and sport-specific assessments evaluating low energy availability and RED-S risk [13].

Current evidence strongly supports the importance of multidisciplinary treatment approaches in athletes presenting DE or EDs [4,9]. Effective management frequently requires collaboration between sports physicians, dietitians, psychologists, psychiatrists, physiotherapists, and coaching staff [4]. Multidisciplinary care is considered particularly important because eating disorders in athletes often involve simultaneous physiological, psychological, nutritional, and performance-related complications [13]. The Australian Institute of Sport (AIS) position statement highlighted that treatment should focus not only on weight restoration and nutritional rehabilitation but also on psychological recovery, safe return-to-play decisions, and long-term athlete well-being [9].

Education of coaches, trainers, and sport personnel is another key preventive strategy [4,9]. Coaches can have a huge impact on athletes' attitudes towards body image, nutrition and weight management practices [6]. Weight-focused comments, public weigh-ins, appearance-based criticism, and performance pressure associated with body composition may unintentionally reinforce maladaptive eating behaviors [9]. Consequently, increasing awareness among coaches regarding the early signs of eating pathology and the risks associated with low energy availability may improve prevention and facilitate earlier referral for professional support [4].

Recent literature additionally emphasizes the importance of reducing harmful weight-focused culture within sport environments [1,9]. In many athletic settings, restrictive dieting, excessive training, and body monitoring behaviors may become normalized as indicators of discipline and commitment [12]. Such normalization may delay symptom recognition and contribute to underreporting of eating pathology among athletes [9]. Creating sport environments that

prioritize athlete health, psychological well-being, and sustainable performance rather than body weight alone may therefore reduce vulnerability to DE and EDs [9].

Early intervention is particularly important because prolonged eating pathology may lead to persistent physiological complications, impaired performance, and chronic mental health difficulties [4,13]. Prompt recognition and treatment may improve recovery outcomes and reduce the risk of progression to clinically severe eating disorders [4]. Furthermore, interventions addressing perfectionism, anxiety, emotional dysregulation, and compulsive exercise behaviors may contribute to more comprehensive long-term recovery in athletic populations [7,18,19].

Overall, current evidence suggests that prevention and treatment of eating disorders in athletes should extend beyond symptom management alone and involve broader cultural and educational changes within sport systems [4,9]. Comprehensive screening, multidisciplinary collaboration, coach education, and early intervention strategies remain essential for protecting athlete health and promoting safe sport participation. [4,9]

7. Discussion

The present narrative review highlights that disordered eating (DE) and eating disorders (EDs) remain important and complex health concerns within athletic populations. Current literature consistently demonstrates that eating pathology in athletes results from the interaction between sport-specific pressures and individual psychological vulnerability [1,6].

One of the most important observations emerging from the reviewed literature is the strong association between sport culture and eating-related psychopathology [5,9]. In many sports, low body weight and lean body composition are frequently perceived as advantageous for athletic performance or aesthetic evaluation [5]. Consequently, restrictive eating, compulsive exercise, and body monitoring behaviors may become normalized within training environments [12]. This normalization may contribute to delayed diagnosis and underrecognition of clinically meaningful eating pathology, particularly in elite sport settings where strict dietary control is often interpreted as discipline and commitment rather than a potential health concern [3,12].

The reviewed studies also demonstrate considerable sex-related differences in the presentation of eating disorders among athletes [1,8]. Female athletes generally report higher prevalence rates of body dissatisfaction and restrictive eating behaviors, especially in sports emphasizing thinness and aesthetics [1,5]. However, increasing evidence indicates that eating pathology in male athletes has historically been underestimated and underdiagnosed [8,10]. Male athletes may present with concerns related not only to thinness but also to muscularity, physique optimization, and compulsive training behaviors [8]. These findings suggest that screening and prevention strategies should be adapted to sex-specific manifestations of eating pathology in sport.

Psychological factors appear to play a significant role in both the development and maintenance of DE and EDs among athletes [7,17,18]. Perfectionism, anxiety, emotional dysregulation, and compulsive exercise were identified as major factors contributing to harmful eating behaviours [7,17]. Competitive sporting environments may encourage perfectionist tendencies and unrealistic performance expectations, which can increase the chances of restrictive eating habits and compulsive body control behaviours [17]. Furthermore, athletes experiencing emotional distress or anxiety may turn to restricting food or excessive exercise as ways to deal with their problems [7,18]. These findings highlight the importance of mental health support and psychological assessments being part of athlete healthcare systems.

The reviewed literature additionally highlights the important physiological consequences associated with prolonged low energy availability (LEA) and Relative Energy Deficiency in Sport (RED-S) [13]. Chronic energy deficiency may impair endocrine, reproductive, cardiovascular, musculoskeletal, and metabolic functioning while simultaneously reducing athletic performance and recovery capacity [13]. Menstrual dysfunction, impaired bone health, recurrent injuries, and fatigue were among the most commonly reported clinical manifestations associated with eating pathology in athletes [4,13, 21]. Importantly, many of these complications may initially remain clinically unrecognized, particularly in high-performance sport environments where restrictive eating and excessive training behaviors are normalized [3].

Despite increasing scientific interest in eating disorders among athletes, several important limitations remain within the current body of literature [1]. Existing studies frequently use

heterogeneous screening tools and inconsistent diagnostic criteria, making direct comparisons between studies difficult [1,4]. Moreover, much of the available evidence focuses primarily on female elite athletes participating in lean sports, while male athletes, recreational athletes, and non-elite populations remain comparatively underrepresented [1,8]. Another limitation involves the prevalence of cross-sectional research designs, which restrict the ability to establish causal relationships between psychological, environmental, and physiological risk factors [1].

From a clinical perspective, the reviewed findings emphasize the importance of early identification and multidisciplinary management of DE and EDs in athletic populations [4,9]. Effective prevention strategies should include regular screening procedures, education of coaches and sport personnel, nutritional support, and psychological intervention targeting maladaptive perfectionism, anxiety, and compulsive exercise behaviors [3,7,9]. In addition, reducing harmful weight-focused practices and promoting athlete health-oriented sport cultures may contribute to lowering the risk of eating pathology in competitive sport environments [9].

8. Conclusion

Disordered eating and eating disorders are a major issue in athletic populations, particularly in sports characterised by aesthetic demands, leanness, endurance, or weight categories. The available evidence suggests that eating disorders in athletes are caused by the interaction between sport-specific environmental pressures and individual vulnerability factors, contributing to a multidimensional health risk profile.

The literature consistently demonstrates that prolonged low energy availability and Relative Energy Deficiency in Sport (RED-S) are key physiological consequences associated with disordered eating in athletes, with potential impacts on musculoskeletal, endocrine, and performance-related outcomes. These findings highlight that eating pathology in sport should be considered a complex biopsychosocial condition rather than an isolated psychological issue.

Early identification, systematic screening, and multidisciplinary management remain essential components of effective prevention and care. In addition, promoting sport environments that reduce weight-focused pressures and prioritise athlete health and well-being may play a crucial role in limiting the development of disordered eating behaviours.

Further research should focus on improving methodological consistency, expanding evidence in male and non-elite athletes, and strengthening longitudinal data to better understand causal pathways and long-term outcomes.

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References

1. Fatt, S. J., George, E., Hay, P., Jeacocke, N., Gotkiewicz, E., & Mitchison, D. (2024). An Umbrella Review of Body Image Concerns, Disordered Eating, and Eating Disorders in Elite Athletes. *Journal of clinical medicine*, *13*(14), 4171. https://doi.org/10.3390/jcm13144171
2. Yu, Z., & Muehleman, V. (2023). Eating Disorders and Metabolic Diseases. *International Journal of Environmental Research and Public Health, 20(3),* 2446. https://doi.org/10.3390/ijerph20032446
3. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM-5-TR. 5th ed. Washington, DC: American Psychiatric Publishing; 2022.
4. Joy, E., Kussman, A., & Nattiv, A. (2016). 2016 update on eating disorders in athletes: A comprehensive narrative review with a focus on clinical assessment and management. *British journal of sports medicine*, *50*(3), 154–162. https://doi.org/10.1136/bjsports-2015-095735
5. Bratland-Sanda, S. and Sundgot-Borgen, J. (2013), Eating disorders in athletes: Overview of prevalence, risk factors and recommendations for prevention and treatment. *European Journal of Sport Science, 13,* 499-508. https://doi.org/10.1080/17461391.2012.740504
6. Mancine, R. P., Gusfa, D. W., Moshrefi, A., & Kennedy, S. F. (2020). Prevalence of disordered eating in athletes categorized by emphasis on leanness and activity type - a systematic review. *Journal of eating disorders*, *8*, 47. https://doi.org/10.1186/s40337-020-00323-2
7. Espinoza-Barrón, S. P., Cantú-Berrueto, A., Castejón, M. Á., & Berengüí, R. (2026). Emotion Regulation and Eating Disorders in Sports: A Systematic Review. *Healthcare (Basel, Switzerland)*, *14*(6), 719. https://doi.org/10.3390/healthcare14060719
8. Eichstadt M, Luzier J, Cho D, Weisenmuller C. (2020). Eating disorders in male athletes. *Sports Health, 12(4),* 327-333. https://doi.org/10.1177/1941738120928991
9. Wells, K. R., Jeacocke, N. A., Appaneal, R., Smith, H. D., Vlahovich, N., Burke, L. M., & Hughes, D. (2020). The Australian Institute of Sport (AIS) and National Eating Disorders Collaboration (NEDC) position statement on disordered eating in high

performance sport. *British journal of sports medicine*, *54*(21), 1247–1258. https://doi.org/10.1136/bjsports-2019-101813

10. Karrer, Y., Halioua, R., Mötteli, S., Iff, S., Seifritz, E., Jäger, M., & Claussen, M. C. (2020). Disordered eating and eating disorders in male elite athletes: a scoping review. *BMJ open sport & exercise medicine*, *6*(1), e000801. https://doi.org/10.1136/bmjsem-2020-000801
11. Chapa, D. A. N., Johnson, S. N., Richson, B. N., Bjorlie, K., Won, Y. Q., Nelson, S. V., Ayres, J., Jun, D., Forbush, K. T., Christensen, K. A., & Perko, V. L. (2022). Eating-disorder psychopathology in female athletes and non-athletes: A meta-analysis. *The International journal of eating disorders*, *55*(7), 861–885. https://doi.org/10.1002/eat.23748
12. Lichtenstein, M. B., Johansen, K. K., Runge, E., Hansen, M. B., Holmberg, T. T., & Tarp, K. (2022). Behind the athletic body: a clinical interview study of identification of eating disorder symptoms and diagnoses in elite athletes. *BMJ open sport & exercise medicine*, *8*(2), e001265. https://doi.org/10.1136/bmjsem-2021-001265
13. Mountjoy, M., Ackerman, K. E., Bailey, D. M., Burke, L. M., Constantini, N., Hackney, A. C., Heikura, I. A., Melin, A., Pensgaard, A. M., Stellingwerff, T., Sundgot-Borgen, J. K., Torstveit, M. K., Jacobsen, A. U., Verhagen, E., Budgett, R., Engebretsen, L., & Erdener, U. (2023). 2023 International Olympic Committee's (IOC) consensus statement on Relative Energy Deficiency in Sport (REDs). *British journal of sports medicine*, *57*(17), 1073–1097. https://doi.org/10.1136/bjsports-2023-106994
14. Holtzman, B., Kelly, R. K., Saville, G. H., McCall, L., Adelzedah, K. A., Sarafin, S. R., Nikam, P., Meneguzzi, I., McIntyre, A., Kraus, E. K., & Ackerman, K. E. (2024). Low energy availability surrogates are associated with Relative Energy Deficiency in Sport outcomes in male athletes. *British journal of sports medicine*, *59*(1), 48–55. https://doi.org/10.1136/bjsports-2024-109165
15. Berengüí, R., Angosto, S., Hernández-Ruiz, A., Rueda-Flores, M., & Castejón, M.A. (2023). Body image and eating disorders in aesthetic sports: A systematic review of assessment and risk. *Science & Sports*. https://doi.org/10.1016/j.scispo.2023.03.006
16. Plateau, C. R., & Arcelus, J. (2023). Sport and exercise as risk factors for eating disorders. In P. Robinson, T. Wade, B. Herpertz-Dahlmann, F. Fernandez-Aranda, J.

Treasure, & S. Wonderlich (Eds.), *Eating disorders*. Springer. https://doi.org/10.1007/978-3-030-97416-9_28-1

17. Hill, A. P. (Ed.). (2023). *The psychology of perfectionism in sport, dance, and exercise*. Routledge.
18. Pensgaard AM, Sundgot-Borgen J, et al. (2023) The intersection of mental health issues and Relative Energy Deficiency in Sport (REDs): a narrative review. *Br J Sports Med, 57*, 1127-1135. https://doi.org/10.1136/bjsports-2022-106640
19. Meyer, C., Plateau, C. R., Taranis, L., Brewin, N., Wales, J., & Arcelus, J. (2016). The Compulsive Exercise Test: confirmatory factor analysis and links with eating psychopathology among women with clinical eating disorders. *Journal of eating disorders*, *4*, 22. https://doi.org/10.1186/s40337-016-0113-3
20. Edison, B. R., Christino, M. A., & Rizzone, K. H. (2021). Athletic Identity in Youth Athletes: A Systematic Review of the Literature. *International journal of environmental research and public health*, *18*(14), 7331. https://doi.org/10.3390/ijerph18147331
21. Tenforde, A.S., Barrack, M.T., Nattiv, A. *et al.* (2016) Parallels with the Female Athlete Triad in Male Athletes. *Sports Med 46*, 171–182. https://doi.org/10.1007/s40279-015-0411-y