Major Depressive Disorder and Depressive Symptoms

6

Paul Gorczynski

Introduction

In professional sport, the mental health of elite athletes is a major concern [1]. The term *elite athlete* has variably been used to refer to athletes on a continuum of competition, ranging from semi-elite (e.g. highly competitive youth programs, collegiate sport, professional top-level leagues) to world-class elite (e.g. Olympics, world championships, international-level competition) [2]. In recent years, several narrative and systematic reviews and meta-analyses have demonstrated the high rate of prevalence and severity of various mental health symptoms and disorders amongst elite athletes [3–8]. Such epidemiological evidence has also demonstrated the different consequences that mental health symptoms and disorders may have on athletes and sporting organizations [1, 9]. For athletes, consequences can be experienced physically (e.g. decreased performance, increased risk of injury), cognitively (e.g. loss of interest or pleasure), behaviourally (e.g. increased risk of exit from sport, increased risk taking), relationally (e.g. fragmented team dynamics and coaching relationships, tensions with family and friends), and financially (e.g. loss of sponsorship, inability to earn an income) and include a worsened state of mental health (e.g. other mental health symptoms may be exacerbated). For sporting organizations, the unmanaged mental health needs of athletes can result in reputational damage and financial losses with potential legal ramifications where duty of care was neglected. Also in recent years, several position statements on the topic of mental health in elite sport have confirmed the need to address the growing concerns with mental health symptoms and disorders amongst athletes (for a review, see: [10]). Researchers recommended providing assistance with raising awareness about mental health symptoms and disorders; providing on-going and culturally appropriate mental health literacy training; providing and using comprehensive, valid, and reliable strategies to identify and diagnose mental health symptoms and disorders; and creating and using clear care pathways to support athletes so that they may be able to receive treatment in a timely manner. Ultimately, provisions need to be established to help athletes begin a process of recovery. Such provisions are not only needed for current athletes, but also those who have retired or otherwise exited from professional sport [6].

Given its high prevalence and the potential for multifaceted and severe consequences, major depressive disorder is one of the greatest concerns with respect to the mental health of elite athletes. The purpose of this chapter is to provide a review of major depressive disorder and depressive symptoms within the elite sport research literature. Along with information on the epidemiology of depressive symptoms, risk and protective factors will also be examined. Strategies to enhance diagnosis, treatment, management, and recovery, including culturally situated mental health literacy, will also be discussed. The chapter will conclude with suggestions for future research and clinical and organizational intervention.

Major depressive disorder is typically characterized by low or depressed mood, along with a loss of interest or pleasure in most activities and accompanying physical, psychological, and cognitive symptoms over a continuous period of at least 2 weeks [11]. Most symptoms must be present most of the day and on a daily basis for this period of time. Although a diagnosis of major depressive disorder requires the individual to experience at least five symptoms over a 2-week period, of which at least one symptom must be a depressed mood or a loss of interest or pleasure in most activities, individuals may experience depressive symptoms without a major depressive disorder diagnosis. For a diagnosis of major depressive disorder, symptoms must have clearly worsened when compared to the individual's pre-episode condition, and symptoms must have caused significant distress or impairment in social, educational, occupational, or (as extrapolated to elite

P. Gorczynski (✉)
School of Human Sciences, University of Greenwich, London, UK
e-mail: Paul.Gorczynski@greenwich.ac.uk

C. L. Reardon (ed.), *Mental Health Care for Elite Athletes*, https://doi.org/10.1007/978-3-031-08364-8_6

Table 6.1 Diagnostic criteria for major depressive disorder episode

Diagnostic criteria for major depressive disorder episode [11]
• Five or more of the following symptoms must be present, including at least a low or depressed mood or a loss of interest or pleasure in most activities
• Depressed mood (in children and adolescents, this may be present as an irritable mood) • Loss of interest or pleasure in most activities • Significant unintentional weight changes (+/− weight change of >5% per month) or increased or decreased appetite • Disturbance in sleep (insomnia or hypersomnia) • Severe psychomotor changes (agitation or retardation) • Fatigue or loss of energy • Feelings of worthlessness or excessive or inappropriate guilt • Difficulties with thinking, concentrating, or making decisions • Recurring thoughts of death or suicide, or suicide attempts
• Symptoms have caused significant distress or impairment in social, educational, occupational, or sport areas of functioning • Symptoms have not been related to the physiological effects of a substance or another medical condition • Manic or hypomanic episodes have never occurred • Symptoms may not be better described by schizophrenia spectrum or other psychotic disorders

athletes) sport areas of functioning. Additionally, it must be shown that symptoms are not related to the physiological effects of a substance or another medical condition, and are not better described by schizophrenia spectrum or other psychotic disorders. Lastly, manic or hypomanic episodes must have never occurred. Full details of diagnostic criteria for major depressive disorder are listed in Table 6.1.

Epidemiology of Depressive Symptoms

Epidemiological evidence suggests the prevalence of depressive symptoms amongst elite athletes ranges from 4% [12] to 68% [13]. Prevalence ratings of depressive symptoms consistently have been reported to be higher for athletes who identify as female, and ratings are similar to non-athletes in the general population [4, 5]. Comparisons between active and retired athletes have shown that those who have retired have lower rates of prevalence of depressive symptoms [6]. Given most epidemiological studies that examined depressive symptoms within elite sport generally lacked clinical diagnosis and oversight and used a variety of methods to assess depressive symptoms, including different questionnaires with different cut-off values for severity, as well as varying sample sizes of different athletic levels and sports, caution must be taken with any epidemiological results, especially when any direct comparisons between populations are made [4, 5]. Most literature within sport has focused on athletes who have self-reported depressive symptoms, rather than athletes living with diagnoses of major depressive disorder.

Risk Factors for Depressive Symptoms

There are many risk factors that may cause or exacerbate depressive symptoms in elite athletes (for a review, see [14]). Risk factors for depressive symptoms can be mapped along an ecological framework, spanning intrapersonal, interpersonal, and environmental levels [15–21]. The ecological model also allows for a broader understanding of risk factors, including how factors may interconnect, and at times, collectively exacerbate depressive symptom severity. Furthermore, the ecological model also serves as a reminder to explore mental health from a holistic lifespan perspective [22, 23], where an athlete is understood to be multidimensional with both athletic and non-athletic lived experiences.

Intrapersonal-level risk factors include the physical and psychological characteristics of an individual. For example, this would include female sex [13], injury [24], surgery [25], concussion [26], adverse/critical life events [25], greater demonstrated need for psychotherapy [27], osteoarthritis [28], pain [29], age younger than 25 years [30], chronic stress [31], burnout [31], perfectionism [32], competitive anxiety [32], poor sleep [33], negative attribution after failure [34], negative coping strategies [35], negative stress-recovery strategies [35], career dissatisfaction [36], contemplating retirement [30], competitive failure [37], and athletic identity [38]. Some athletes will have a family history or a genetic predisposition to experiencing major depressive disorder or depressive symptoms [1, 39, 40].

Interpersonal-level risk factors include interactions with other individuals, either in sport or outside of sport. This may include family, friends, teammates, coaches, referees/officials, athletic directors, organizational personnel, healthcare professionals, and fans. Evidence of poor, strained, or unsupportive interpersonal relationships has implications for athletes experiencing depressive symptoms. For example, this would include low social support from teammates [41], coach conflict [42], and relationship difficulties within families, such as separation or divorce [42]. Some athletes have also demonstrated that social phobias may increase the risk of depressive symptoms [32].

Environmental-level risk factors are broadly defined and incorporate various aspects of a sporting institution or organization. This would include the physical environments where sport is practiced and played, the sport's cultural practices and norms, and regulatory policies at local, national, and international levels. For example, this would include participating in individual (versus team) sports [30], aesthetic or fine motor sport [12], less match experience [27], position (e.g. forwards, goalies) [42], level of play [42], forced/involuntary retirement [43], and experiencing non-accidental violence [44].

The majority of research in sport concerning risk factors pertaining to depressive symptoms amongst athletes has focused on the individual, specifically situated within the intrapersonal level. To a degree, parts of this body of literature have constructed a form of *life-style theory of disease* narrative within sport [16, 45], where depressive symptoms may be the result of some form of personal occurrence or personal failure. Considerably less research has investigated risk factors at the interpersonal or environmental levels. This lack of research at these two levels means we do not understand well the interaction of multiple risk factors that may cause depressive symptoms. Ultimately, this lack of research limits the types of interventions that may be designed to prevent or eliminate multiple risk factors associated with depressive symptoms. Unfortunately, the *life-style theory of disease* narrative often contributes to perceptions that depressive symptoms may only be addressed by the athlete, rather than by interpersonal or environmental means. This can partially be addressed through exploration of protective factors associated with depressive symptoms.

Protective Factors Against Depressive Symptoms

Protective factors, like risk factors, can be mapped along an ecological framework. Intrapersonal-level protective factors include male sex [13], older age [30], and career satisfaction [36]. Interpersonal-level protective factors have included having social support from significant others and teammates [41], having support from coaches [42], and having supportive family [42]. The establishment of positive therapeutic relationships with mental health practitioners may be associated with fewer depressive symptoms, but further research is needed [46]. Environmental-level protective factors have included participating in team sports [30], employment status [47], and ending one's career on one's own terms [43].

Non-functional Overreaching and Overtraining and Depressive Symptoms

Effective and optimal performance is enhanced through careful training and planned rest or recovery, and this requires attention paid to training load in terms of frequency, intensity, time, and type [48, 49]. An increased training load with insufficient rest or recovery may result in physiological and psychological symptoms that may decrease short- or long-term performance or result in a form of injury [1, 50, 51]. Non-functional overreaching is defined as a short-term decrease in performance and results from an accumulation of increased training load, insufficient rest or recovery, and non-training stressors [51]. Non-training stressors may include environmental factors (e.g. adjustment difficulties to heat, cold, humidity, or altitude), occupational or sport related challenges, poor nutrition, sleep disturbances, general poor health, and interpersonal challenges [51]. Decreased performance may last from several days to several weeks. Overtraining is considered a more severe form of non-functional overreaching, where decreased performance may last longer, spanning from several weeks to several months [51, 52]. Overtraining is also associated with more severe physiological and psychological symptoms than non-functional overreaching. Both non-functional overreaching and overtraining are associated with depressive symptoms, including low or depressed mood, loss of pleasure, loss of motivation, irritability, fatigue, poor concentration, sleep disturbances, changes in weight, and changes in appetite [48, 51–55]. Definitions or diagnostic criteria of non-functional overreaching and overtraining are not standardized, and recommendations for recovery remain limited [51]. Athletes should rest to address non-functional overreaching and overtraining. In certain cases, a reduced training load may be sufficient to alleviate depressive symptoms.

Suicide

Suicide is defined as a death that was caused by an injury to oneself where the intention was to die [56]. In sport, suicide has far reaching consequences and is a tragedy that affects families, friends, teams, sporting organizations, and fans [57]. A better understanding of and treatment options for mental health symptoms and disorders, especially depressive symptoms, is key to preventing suicide. Recurring thoughts of death or suicide, or suicide attempts, are symptoms of major depressive disorder, and research has shown that individuals with major depressive disorder are at a higher risk of suicide ideation, suicide planning, and suicide attempts than those without a diagnosis of major depressive disorder [58].

When compared to non-athletes, athletes are at a lower risk of suicide. For instance, an analysis of suicides amongst National Collegiate Athletic Association (NCAA) collegiate athletes found a rate of suicide of 0.93/100,000 per year [59]. In comparison, in 2019, females aged 15–24 years in the United States had a suicide rate of 5.5/100,000 per year, while males aged 15–24 years had a suicide rate of 22.0/100,000 [60]. Within the sporting environment, there are a number of risk factors for suicide. These factors include: male sex; middle and older age; white race; risk taking behaviours; bullying and hazing; experiencing sexual assault; financial difficulties; injury; concussion; taking performance enhancement drugs; and retirement from sport [57].

With respect to suicide prevention, several steps can help athletes. For instance, strategies can help identify and manage stress, distress, and other mental health symptoms and disorders, like major depressive disorder [61, 62]. Mental health literacy strategies can help raise awareness of risk factors associated with suicide amongst athletes, coaches, support staff who work with athletes, and parents. Social support structures should be built within the lives of athletes and should include support from family and friends, teammates, other athletes, coaches, and other staff [63–65]. Understanding environmental stressors is also key, including setting and establishing expectations within sport, addressing financial concerns, and providing assistance with transition to retirement [57].

Diagnosis and Management

A recent scoping review of depressive symptom assessment tools in sport research revealed that 28 different tools have been used with athletes [66]. Some of the most frequently used tools have included the Beck Depression Inventory (BDI) (all versions, including BDI—Fast Screen, BDI—II, BDI-Short Form) (n = 46 studies) [67], the Center for Epidemiologic Studies Depression Scale (CES-D) (all versions, including CES-D-10 (short version), CES-DC (for children), CESD-R (revised)) (n = 37 studies) [68], and the Patient Health Questionnaire (PHQ) (all versions, PHQ-2 and PHQ-9) (n = 19) [69]. Although each of these tools has been validated, researchers have argued that depressive symptom questionnaires should be validated specifically for athletes. Both the Baron Depression Screener for Athletes [70, 71] and the Stress Response Scale for Athletes - depression scale [72] have been designed specifically for athletes. Currently, the PHQ-9, found within the IOC Sport Mental Health Assessment Tool 1 (SMHAT-1), [73] a standardized assessment tool developed to help identity elite athletes 16 years or older at risk of or already experiencing distress and various mental health symptoms and disorders, has been adapted for use with athletes. The PHQ-9 was chosen for the SMHAT-1 given it is a commonly used depressive symptom questionnaire that has been used in research with elite athletes and has been found to be valid across multiple languages.

Treatment

Psychotherapy

The treatment of major depressive disorder consists of psychotherapy and often includes psychiatric medication [1]. Psychotherapy involves the use of psychological methods, with each method rooted in various therapeutic principles, structures, and techniques, in order to help an individual experience personal growth through the exploration of their own behaviours, needs, beliefs, thoughts, and emotions [1, 74, 75]. Psychotherapy can be essential in helping athletes manage both subclinical and clinical mental health symptoms. Individuals who are qualified to deliver psychotherapy can include psychiatrists, clinical psychologists, social workers, and licenced mental health counsellors [76]. Following evaluation and diagnosis, the athlete and the mental health professional must establish treatment goals [77]. Treatment goals help establish a therapeutic alliance—a collaborative relationship between the athlete and mental health professional—where an agreement on outcomes for treatment is established, a course of action is refined, and commitment to treatment is discussed [77, 78]. Research has suggested that the therapeutic alliance between clients and mental health professionals acts as an important mediator associated with helping reduce symptoms [78].

There are different types of psychotherapy, including individual psychotherapy, couple/family psychotherapy, and group psychotherapy [74, 75]. Individual psychotherapy is delivered in a one-on-one setting between the athlete and mental health professional. Psychotherapy can also be delivered virtually, through Zoom, Skype or other communications software [79]. Cognitive behaviour therapy, delivered in an individual setting, may be appropriate for athletes who are experiencing depressive symptoms. The structure of cognitive behaviour therapy, one rooted in self-directed practice, is similar to athletic training and exercise [80]. Cognitive behaviour therapy explores connections between thoughts, emotions, and behaviours, and is designed to help individuals identify and change their thoughts, beliefs, attitudes, and behaviours in order to improve emotional regulation [81].

Couple/family psychotherapy involves the inclusion of partners, significant others, and family members of athletes in the psychotherapeutic process [74, 75, 82]. Couple/family psychotherapy helps athletes and their significant others better understand how their relationship may be affecting their own and collective mental health. Group psychotherapy for major depressive disorder has been assessed in the general population and shown to be efficacious when compared to untreated controls [83]. Further research is needed in better understanding this modality of treatment for major depressive disorder in athletes.

Psychiatric Medication

With respect to psychiatric medication prescription to athletes, clinicians must consider the side effects of the medication and any physical performance impairments it may cause, any safety concerns (given athletes will train and perform at high intensities of exercise), and any potential performance

enhancement properties and whether the medication is on the Prohibited List of the World Anti-Doping Agency (WADA) or other governing body for a particular sport [1, 84–86]. For major depressive disorder, without anxiety or bipolar disorder, sport psychiatrists generally prefer bupropion [85]. Bupropion is a norepinephrine-dopamine-reuptake inhibitor (NDRI) and is commonly used to treat major depressive disorder [87]. Bupropion is considered an energizing medication that is not associated with weight gain and does not impair performance [1, 85, 86]. Bupropion is included in the WADA 2021 Monitoring Program and is not considered a prohibited substance. Currently, further evidence is being collected on its performance enhancement properties [84]. Bupropion should not be prescribed for athletes with eating disorders that involve restricting and/or purging as it may increase the risk of seizures [1, 86, 88]. Other preferred psychiatric medications prescribed for major depressive disorder in athletes include selective serotonin reuptake inhibitors (SSRIs) (e.g. escitalopram, fluoxetine, sertraline) and serotonin-norepinephrine reuptake inhibitors (SNRIs) (e.g. venlafaxine) [1, 85, 86].

Mental Health Literacy

Mental health literacy is a key strategy to better understanding, recognizing, preventing, treating, and managing mental health symptoms and disorders in athletes [89, 90]. Mental health literacy focuses on knowledge, beliefs, and attitudes of mental health and mental health symptoms and disorders that ultimately facilitate symptom recognition, address public- and self-mental health stigma, and help individuals set intentions to seek and maintain support [91]. Mental health literacy incorporates several cognitive and social skills that are used to not only help individuals seek out the support they need, but also help organizations establish key policies that will help prevent and manage mental health symptoms and disorders [90, 92, 93]. Ultimately, mental health literacy can be seen as a form of individual and collective empowerment, whereby individuals advocate for their own mental health and collectively for the mental health of others [94]. Research in mental health literacy in sport has shown that interventions were associated with improved knowledge of mental health symptoms and disorders, increased professional knowledge, reduced stigma, improved referral confidence, and improved intentions to seek support [95–98].

Within elite sport, progressive mental health literacy strategies need to be further established, to raise awareness of mental health symptoms and disorders amongst athletes, help battle stigma, create clear pathways to support, and establish policies to address interpersonal and environmental risk factors of mental health symptoms and disorders. Given the prevalence and consequences of depressive symptoms amongst athletes, mental health literacy strategies need to be focused in this particular area. This requires collective action and coordination amongst various mental health professionals, educators, families, and sport staff; early and on-going pedagogically sound training about mental health, including depressive symptoms; mental health literacy interventions that are culturally and contextually appropriate to the sport; and designing interventions that reduce public and self-mental health stigma [89, 90, 99].

Discussion and Summary

There are several areas that require further research to help mental health researchers and practitioners better understand, prevent, and treat major depressive disorder and depressive symptoms in athletes. This will require focused and rigorous research in the areas of descriptive and analytical epidemiology, diagnosis, treatment and management, and mental health literacy. Strategies should aim to prevent major depressive disorder and find ways to better facilitate recovery and return to play.

Epidemiology is concerned with the study of the distribution, patterns, and determinants of health and illness within clearly defined populations [100]. The key goals of epidemiology are not only to identity the causes of illness but also to prevent and/or treat them in the most effective ways. Epidemiological research must evolve from descriptive epidemiological studies (i.e. understanding the prevalence and incidence of illness) to analytical epidemiology (i.e. understanding the risk factors of illness) [101, 102]. To date, most research that has explored depressive symptoms in athletes has been cross-sectional, based on self-report questionnaires, and heavily reliant on student or collegiate populations [66]. Further research needs to be conducted longitudinally, involve both self-report questionnaires as well as confirmed diagnoses of major depressive disorder, and examine elite athletes from various sports, levels of play, times of season, transitions, ages, and cultures. Further research should also investigate major depressive disorder and depressive symptoms amongst individuals with various definitions of gender, sexualities, socioeconomic classes, races, ethnicities, (dis)abilities, and geographic locations (e.g. low- and middle-income countries) [90, 103]. Furthermore, consistent use of self-report or clinician-administered questionnaires, with expanded and detailed demographic collection forms, is essential to allow comparisons across sports and populations and better understand not only sport-related factors but also broader cultural factors associated with major depressive disorder and depressive symptoms. The creation of the SMHAT-1 will hopefully help facilitate this type of data collection and analysis across cultures [73]. Clear guidelines on improvements to methods of recording and reporting epide-

miological data on injury and illness in sport have recently been established by a consensus group organized by the International Olympic Committee (for a review, see: [104]).

With respect to treatment and management of major depressive disorder and depressive symptoms, continued research into both psychotherapy and psychiatric medication is essential. This will involve formulating research programs that rely on confirmed diagnoses of major depressive disorder amongst athletes, as well as examinations of different modalities of treatment with carefully constructed therapeutic alliances against appropriate controls. Additionally, designing and evaluating mental health literacy strategies, which focus on athletes and organizations, will require appropriate design considerations of unique cultural factors, adequate sample sizes, valid and reliable questionnaires, and rigorous evaluations [90]. Strategies will need to be developed to help athletes feel knowledgeable, confident, and comfortable in seeking support [105]. Rigorous randomized controlled studies are needed to facilitate treatment, management, and prevention of mental health symptoms and disorders amongst athletes [106]. Collective action amongst mental health researchers and practitioners, as well as athletes, coaches, staff, and their families, can help drive continual improvements in the prevention and treatment of major depressive disorders and depressive symptoms.

References

1. Reardon CL, Hainline B, Miller Aron C, Baron D, Baum AL, Bindra A, et al. Mental health in elite athletes: International Olympic Committee consensus statement. Br J Sports Med. 2019;53(11):667–99. https://doi.org/10.1136/bjsports-2019-100715.
2. Swann C, Moran A, Piggott D. Defining elite Athletes: issues in the study of expert performance in sport psychology. Psychol Sport Exerc. 2015;16(1):3–14. https://doi.org/10.1016/j.psychsport.2014.07.004.
3. Currie A, Gorczynski P, Rice SM, Purcell R, McAllister-Williams RH, Hitchcock ME, et al. Bipolar and psychotic disorders in elite athletes: a narrative review. Br J Sports Med. 2019;53(12):746–53. https://doi.org/10.1136/bjsports-2019-100685.
4. Golding L, Gillingham RG, Perera NKP. The prevalence of depressive symptoms in high-performance athletes: a systematic review. Phys Sports Med. 2020;48(3):247–58. https://doi.org/10.1080/00913847.2020.1713708.
5. Gorczynski PF, Coyle M, Gibson K. Depressive symptoms in high-performance athletes and non-athletes: a comparative meta-analysis. Br J Sports Med. 2017;51(18):1348–54. https://doi.org/10.1136/bjsports-2016-096455.
6. Gouttebarge V, Castaldelli-Maia JM, Gorczynski P, Hainline B, Hitchcok M, Kerkhoffs GM, et al. Occurrence of mental health symptoms and disorders in current and former elite athletes: a systematic review and meta-analysis. Br J Sports Med. 2019;53(11):700–6. https://doi.org/10.1136/bjsports-2019-100671.
7. Rice SM, Gwyther K, Santesteban-Echarri O, Baron D, Gorczynski P, Gouttebarge V, et al. Determinants of anxiety in elite athletes: a systematic review and meta-analysis. Br J Sports Med. 2019;53(11):722–30. https://doi.org/10.1136/bjsports-2019-100620.
8. Rice SM, Purcell R, De Silva S, Mawren D, McGorry PD, Parker AG. The mental health of elite Athletes: a narrative systematic review. Sports Med. 2016;46(9):1333–53. https://doi.org/10.1007/s40279-016-0492-2.
9. Mountjoy M, Brackenridge C, Arrington M, Blauwet C, Carska-Sheppard A, Fasting K, et al. International Olympic Committee consensus statement: harassment and abuse (non-accidental violence) in sport. Br J Sports Med. 2016;50(17):1019–29. https://doi.org/10.1136/bjsports-2016-096121.
10. Vella S, Sutcliffe J, Swann C, Schweickle M. A systematic review and meta-synthesis of mental health position statements in sport: scope, quality and future directions. Psychol Sport Exerc. 2021;55(4):101946. https://doi.org/10.1016/j.psychsport.2021.101946.
11. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5). Washington, DC: American Psychiatric Publishing; 2013.
12. Schaal K, Tafflet M, Nassif H, Thibault V, Pichard C, Alcotte M, et al. Psychological balance in high level athletes: gender-based differences and sport-specific patterns. PLoS One. 2011;6(5):e19007. https://doi.org/10.1371/journal.pone.0019007.
13. Hammond T, Gialloreto C, Kubas H, Hap Davis H. The prevalence of failure-based depression among elite athletes. Clin J Sport Med. 2013;23(4):273–2777. https://doi.org/10.1097/JSM.0b013e318287b870.
14. Kuettel A, Larsen CH. Risk and protective factors for mental health in elite athletes: a scoping review. Int Rev Sport Exerc Psychol. 2020;13(1):231–65. https://doi.org/10.1080/1750984X.2019.1689574.
15. Bronfenbrenner U. Toward an experimental ecology of human development. Am Psychol. 1977;32(7):513–31. https://doi.org/10.1037/0003-066X.32.7.513.
16. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. Health Educ Q. 1988;15(4):351–77. https://doi.org/10.1177/109019818801500401.
17. McLaren L, Hawe P. Ecological perspectives in health research. J Epidemiol Community Health. 2005;59(1):6–14. https://doi.org/10.1136/jech.2003.018044.
18. Reupert A. A socio-ecological framework for mental health and well-being. Adv Ment Health. 2017;15(2):105–7. https://doi.org/10.1080/18387357.2017.1342902.
19. Schinke RJ, Stambulova NB, Si G, Moore Z. International society of sport psychology position stand: Athletes' mental health, performance, and development. Int J Sport Exerc Psychol. 2018;16(6):622–39. https://doi.org/10.1080/1612197X.2017.1295557.
20. Scarneo-Miller S, Kerr Z, Kroshus E, Register-Mihalik J, Hosokawa Y, Stearns R, et al. The Socioecological framework: a multifaceted approach to preventing sport-related deaths in high school sports. J Athl Train. 2019;54(4):256–360. https://doi.org/10.4085/1062-6050-173-18.
21. Purcell R, Gwyther K, Rice SM. Mental health in elite athletes: increased awareness requires an early intervention framework to respond to athlete needs. Sports Med Open. 2019;5:46. https://doi.org/10.1186/s40798-019-0220-1.
22. Stambulova N, Wylleman P. Athletes' career development and transitions. In: Papaioannou AG, Hackfort D, editors. Routledge companion to sport and exercise psychology: Global perspectives and fundamental concepts. New York: Routledge; 2014. p. 605–20.
23. Wylleman P, Reints A, De Knop P. A developmental and holistic perspective on athletic career development. In: Sotiaradou P,

Bosscher VD, editors. Managing high performance sport (foundations of sport management). New York: Routledge; 2013. p. 159–82.
24. Appaneal RN, Levine BR, Perna FM, Roh JL. Measuring postinjury depression among male and female competitive athletes. J Sport Exerc Psychol. 2009;31(1):60–76. https://doi.org/10.1123/jsep.31.1.60.
25. Schuring N, Kerkhoffs G, Gray J, Gouttebarge V. The mental wellbeing of current and retired professional cricketers: an observational prospective cohort study. Phys Sports Med. 2017;45(4):463–9. https://doi.org/10.1080/00913847.2017.1386069.
26. Du Preez EJ, Graham KS, Gan TY, Moses B, Ball C, Kuah DE. Depression, anxiety, and alcohol use in elite rugby league players over a competitive season. Clin J Sport Med. 2017;27(6):530–5. https://doi.org/10.1097/JSM.0000000000000411.
27. Junge A, Prinz B. Depression and anxiety symptoms in 17 teams of female football players including 10 German first league teams. Brit J Sport Med. 2019;53(8):471–7. https://doi.org/10.1136/bjsports-2017-098033.
28. Schuring N, Aoki H, Gray J, Kerkhoffs GMMJ, Lambert M, Gouttebarge V. Osteoarthritis is associated with symptoms of common mental disorders among former elite athletes. Knee Surg Sports Traumatol Arthrosc. 2017;25(10):3179–85. https://doi.org/10.1007/s00167-016-4255-2.
29. Yang J, Peek-Asa C, Corlette JD, Cheng G, Foster DT, Albright J. Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. Clin J Sport Med. 2007;17(6):481–7. https://doi.org/10.1097/JSM.0b013e31815aed6b.
30. Beable S, Fulcher M, Lee AC, Hamilton B. SHARPSports mental health awareness research project: prevalence and risk factors of depressive symptoms and life stress in elite athletes. Aust J Sci Med Sport. 2017;20(12):1047–52. https://doi.org/10.1016/j.jsams.2017.04.018.
31. Frank R, Nixdorf I, Beckmann J. Analyzing the relationship between burnout and depression in junior elite athletes. J Clin Sport Psychol. 2017;11(4):287–303. https://doi.org/10.1123/JCSP.2017-0008.
32. Jensen SN, Ivarsson A, Fallby J, Dankers S, Elbe AM. Depression in Danish and Swedish elite football players and its relation to perfectionism and anxiety. Psychol Sport Exerc. 2018;36:147–55. https://doi.org/10.1016/j.psychsport.2018.02.008.
33. Gerber M, Holsboer-Trachsler E, Pühse U, Brand S. Elite sport is not an additional source of distress for adolescents with high stress levels. Percept Mot Skills. 2011;112(2):581–99. https://doi.org/10.2466/02.05.10.PMS.112.2.581-599.
34. Nixdorf I, Frank R, Beckmann J. Comparison of athletes' proneness to depressive symptoms in individual and team sports: research on psychological mediators in junior elite athletes. Front Psychol. 2016;7:893. https://doi.org/10.3389/fpsyg.2016.00893.
35. Nixdorf I, Frank R, Hautzinger M, Beckmann J. Prevalence of depressive symptoms and correlating variables among German elite athletes. J Clin Psychol. 2013;7(4):313–26. https://doi.org/10.1123/jcsp.7.4.313.
36. Foskett RL, Longstaff F. The mental health of elite athletes in the United Kingdom. J Sci Med Sport. 2018;21(8):765–70. https://doi.org/10.1016/j.jsams.2017.11.016.
37. Reardon CL. Psychiatric comorbidities in sports. Neurol Clin. 2017;35(3):537–46. https://doi.org/10.1016/j.ncl.2017.03.007.
38. Sanders G, Stevinson C. Associations between retirement reasons, chronic pain, athletic identity, and depressive symptoms among former professional footballers. Eur J Sport Sci. 2017;17(10):1311–8. https://doi.org/10.1080/17461391.2017.1371795.
39. Sullivan PF, Neale MC, Kendler KS. Genetic epidemiology of major depression: review and meta-analysis. Am J Psychiatr. 2000;157(1):1552–62. https://doi.org/10.1176/appi.ajp.157.10.1552.
40. Bigdeli T, Ripke S, Peterson R, Trzaskowski M, Bacanu S-A, Abdellaoui A, et al. Genetic effects influencing risk for major depressive disorder in China and Europe. Transl Psychiatry. 2017;7:e1074. https://doi.org/10.1038/tp.2016.292.
41. Gouttebarge V, Frings-Dresen MH, Sluiter JK. Mental and psychosocial health among current and former professional footballers. Occup Med. 2015;65(3):190–6. https://doi.org/10.1093/occmed/kqu202.
42. Prinz B, Dvořák J, Junge A. Symptoms and risk factors of depression during and after the football career of elite female players. BMJ Open Sport Exerc Med. 2016;2:e000124. https://doi.org/10.1136/bmjsem-2016-000124.
43. Wippert PM, Wippert J. The effects of involuntary athletic career termination on psychological distress. J Clin Sport Psychol. 2010;4(2):133–49. https://doi.org/10.1123/jcsp.4.2.133.
44. Mountjoy M, Brackenridge C, Arrington M, et al. International Olympic Committee consensus statement: harassment and abuse (non-accidental violence) in sport. Br J Sports Med. 2016;50:1019–29. https://doi.org/10.1136/bjsports-2016-09612.
45. Tesh S. Disease causality and politics. J Health Polit Policy Law. 1981;6(3):369–90. https://doi.org/10.1215/03616878-6-3-369.
46. Doherty S, Hannigan B, Campbell MJ. The experience of depression during the careers of elite male athletes. Front Psychol. 2016;7:1069. https://doi.org/10.3389/fpsyg.2016.01069.
47. Gouttebarge V, Aoki H, Verhagen E, Kerkhoffs G. Are level of education and employment related to symptoms of common mental disorders in current and retired professional footballers? Asian J Sports Med. 2016;7(2):e28447. https://doi.org/10.5812/asjsm.28447.
48. Birrer D. Rowing over the edge: Nonfunctional overreaching and overtraining syndrome as maladjustment-diagnosis and treatment from a psychological perspective. Case Stud Sport Exercise Psychol. 2019;3(1):50–60. https://doi.org/10.1123/cssep.2019-0006.
49. Gabbett TJ. The training-injury prevention paradox: should athletes be training smarter and harder? Br J Sports Med. 2016;50(5):273–80. https://doi.org/10.1136/bjsports-2015-095788.
50. Halson SL, Jeukendrup AE. Does overtraining exist? An analysis of overreaching and overtraining research. Sports Med. 2004;34(14):967–81. https://doi.org/10.2165/00007256-200434140-00003.
51. Meeusen R, Duclos M, Foster C, Fry A, Gleeson M, Nieman D, et al. Prevention, diagnosis, and treatment of the overtraining syndrome: joint consensus statement of the European College of Sport Science and the American College of Sports Medicine. Med Sci Sports Exerc. 2013;45(1):186–205. https://doi.org/10.1249/MSS.0b013e318279a10a.
52. Roy B. Overreaching/overtraining. ACSMs Health Fitness J. 2015;19(2):4–5. https://doi.org/10.1249/FIT.0000000000000100.
53. Armstrong LE, Van Heest JL. The unknown mechanism of the overtraining syndrome—clues from depression and psychoneuroimmunology. Sports Med. 2002;32(3):185–209. https://doi.org/10.2165/00007256-200232030-00003.
54. Kreher JB. Diagnosis and prevention of overtraining syndrome: an opinion on education strategies. J Sports Med. 2016;7:115–22. https://doi.org/10.2147/OAJSM.S91657.
55. Richardson SO, Andersen M, Morris T. Overtraining athletes: personal journeys in sport. Champaign: Human Kinetics; 2008.
56. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Facts about suicide. https://www.cdc.gov/suicide/facts/index.html. Accessed November 26, 2021.

57. Rao AL. Athletic suicide. In: Hong E, Rao AL, editors. Mental health in the athlete. London: Springer Nature; 2020. p. 39–56.
58. Cai H, Xie X-M, Zhang Q, Cui X, Lin J-X, Sim K, et al. Prevalence of suicidality in major depressive disorder: a systematic review and meta-analysis of comparative studies. Front Psych. 2021;12:690130. https://doi.org/10.3389/fpsyt.2021.690130.
59. Rao AL, Asif IM, Drezner JA, Toresdahl BG, Harmon KG. Suicide in National Collegiate Athletic Association (NCAA) athletes: a 9-year analysis of the NCAA resolutions database. Sports Health. 2015;7(5):452–7. https://doi.org/10.1177/1941738115587675.
60. National Institute of Mental Health. Suicide. Available from https://www.nimh.nih.gov/health/statistics/suicide#part_2557. Accessed November 26, 2021.
61. Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A, et al. Suicide prevention strategies: a systematic review. JAMA. 2005;294(16):2064–74. https://doi.org/10.1001/jama.294.16.2064.
62. Patel V. Talking sensibly about depression. PLoS Med. 2017;14:e1002257. https://doi.org/10.1371/journal.pmed.1002257.
63. Hirsch JK, Barton AL. Positive social support, negative social exchanges, and suicidal behavior in college students. J Am Coll Heal. 2011;59(5):393–8. https://doi.org/10.1080/07448481.2010.515635.
64. Schroeder PJ. Changing team culture: the perspectives of ten successful head coaches. J Sport Behav. 2010;33(1):63–88.
65. Macalli M, Tournier M, Galéra C, Montagni I, Soumare A, Côté SM, et al. Perceived parental support in childhood and adolescence and suicidal ideation in young adults: a cross-sectional analysis of the i-Share study. BMC Psychiatry. 2018;18(1):373. https://doi.org/10.1186/s12888-018-1957-7.
66. Tahtinen RE, Shelley J, Morris R. Gaining perspectives: a scoping review of research assessing depressive symptoms in athletes. Psychol Sport Exerc. 2021;54:101905. https://doi.org/10.1016/j.psychsport.2021.101905.
67. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4(6):561–71. https://doi.org/10.1001/archpsyc.1961.01710120031004.
68. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas. 1977;1(3):385–401. https://doi.org/10.1177/014662167700100306.
69. Kroenke K, Spitzer RL. The PHQ-9: a new depression diagnostic and severity measure. Psychiatr Ann. 2002;32(9):509–15. https://doi.org/10.3928/0048-5713-20020901-06.
70. Baron DA, Baron SH, Tompkins J, Polat A. Assessing and treating depression in athletes. In: Baron DA, Reardon C, Baron SH, editors. Clinical sports psychiatry: an international perspective. Chichester: Wiley; 2013. p. 65–78.
71. Polat A, Cakir U, Karabulut U, Tural U, Baron D. Reliability and validity of Turkish form of baron depression screener for athletes. Bull Clin Psychopharmacol. 2015;25(1):134.
72. Hagiwara G, Iwatsuki T, Isogai H, Van Raalte JL, Brewer BW. Relationships among sports helplessness, depression, and social support in American College student-athletes. J Phys Educ Sport. 2017;17(2):753–7. https://doi.org/10.7752/jpes.2017.02114.
73. Gouttebarge V, Bindra A, Blauwet C, Campriani N, Currie A, Engebretsen L, et al. International Olympic Committee (IOC) Sport Mental Health Assessment Tool 1 (SMHAT-1) and Sport Mental Health Recognition Tool 1 (SMHRT-1): towards better support of athletes' mental health. Br J Sports Med. 2021;55(1):30–7. https://doi.org/10.1136/bjsports-2020-102411.
74. Stillman MA, Glick ID, McDuff D, Reardon CL, Hitchcock ME, Fitch VM, et al. Psychotherapy for mental health symptoms and disorders in elite athletes: a narrative review. Br J Sports Med. 2019;53(12):767–71. https://doi.org/10.1136/bjsports-2019-100654.
75. Stillman MA, Farmer H. Psychotherapeutic approaches to addressing mental health problems among elite athletes. In: Taiar R, editor. Contemporary advances in sports science. London: IntechOpen Limited; 2021. https://doi.org/10.5772/intechopen.96978.
76. Glick ID, Kamis D, Stull T. The ISSP manual of sports psychiatry. New York: Routledge; 2018.
77. McDuff DR, Garvin M. Working with sports organizations and teams. Int Rev Psychiatry. 2016;28(6):595–605. https://doi.org/10.1080/09540261.2016.1212820.
78. Baier AL, Kline AC, Feeny NC. Therapeutic alliance as a mediator of change: a systematic review and evaluation of research. Clin Psychol Rev. 2020;82:101921. https://doi.org/10.1016/j.cpr.2020.101921.
79. Humer E, Stippl P, Pieh C, Schimböck W, Probst T. Psychotherapy via the internet: what programs do psychotherapists use, how well-informed do they feel, and what are their wishes for continuous education? Int J Environ Res Public Health. 2020;17(21):8182. https://doi.org/10.3390/ijerph17218182.
80. Hays KF. Working it out: using exercise in psychotherapy. Washington: American Psychological Association; 2009.
81. Fenn K, Byrne M. The key principles of cognitive behavioural therapy. InnovAiT. 2013;6(9):579–85. https://doi.org/10.1177/1755738012471029.
82. Stillman MA, Brown T, Ritvo EC, Glick I. Sport psychiatry and psychotherapeutic intervention, circa 2016. Int Rev Psychiatry. 2016;28(6):614–22. https://doi.org/10.1080/09540261.2016.1202812.
83. McDermut W, Miller IW, Brown RA. The efficacy of group psychotherapy for depression: A meta-analysis and review of the empirical research. Clin Psychol. 2006;8(1):98–116. https://doi.org/10.1093/clipsy.8.1.98.
84. World Anti-Doping Agency. List of prohibited substances and methods. 2021. Available from https://www.wada-ama.org/sites/default/files/resources/files/2021list_en.pdf. Accessed November 27, 2021.
85. Reardon CL, Creado S. Psychiatric medication preferences of sports psychiatrists. Phys Sports Med. 2016;44(4):397–402. https://doi.org/10.1080/00913847.2016.1216719.
86. Reardon CL. Managing psychiatric disorders in athletes. In: Hong E, Rao AL, editors. Mental health in the athlete. London: Springer; 2020. p. 57–67.
87. Patel K, Allen S, Haque MN, Angelescu I, Baumeister D, Tracy DK. Bupropion: a systematic review and meta-analysis of effectiveness as an antidepressant. Therap Adv Psychopharm. 2016;6(2):99–144. https://doi.org/10.1177/2045125316629071.
88. Davidson J. Seizures and bupropion: a review. J Clin Psychiatry. 1989;50(7):256–61.
89. Gorczynski P, Gibson K, Thelwell R, Harwood C, Papathomas A, Kinnafick F. The BASES expert statement on mental health literacy in elite sport. Sport Exerc Sci. 2019;59:6–7.
90. Gorczynski P, Currie A, Gibson K, Gouttebarge V, Hainline B, Castaldelli-Maia JM, Mountjoy M, Purcell R, Reardon CL, Rice S, Swartz L. Developing mental health literacy and cultural competence in elite sport. J Appl Sport Psychol. 2021;33(4):387–401. https://doi.org/10.1080/10413200.2020.1720045.
91. Jorm AF, Korten AE, Jacomb PA, Christensen H, Rodgers B, Pollitt P. "Mental health literacy": a survey of the public's ability to recognise mental disorders and their beliefs about the effectiveness of treatment. Med J Aust. 1997;166(4):182–6. https://doi.org/10.5694/j.1326-5377.1997.tb140071.x.

92. Canadian Alliance on Mental Illness and Mental Health (CAMIMH). Mental health literacy in Canada: phase one report mental health literacy project. Ottawa: CAMIMH; 2007.
93. Kutcher S, Wei Y, Coniglio C. Mental health literacy: past, present, and future. Can J Psychiatr. 2016;61(3):154–8. https://doi.org/10.1177/0706743715616609.
94. Jorm AF. Mental health literacy: empowering the community to take action for better mental health. Am Psychol. 2012;67(3):231–43. https://doi.org/10.1037/a0025957.
95. Breslin G, Shannon S, Haughey T, Leavey G. A systematic review of interventions to increase awareness of mental health and well-being in athletes, coaches and officials. Syst Rev. 2017;6:177. https://doi.org/10.1186/s13643-017-0568-6.
96. Chow GM, Bird MD, Gabana NT, Cooper BT, Swanbrow Becker MA. A program to reduce stigma toward mental illness and promote mental health literacy and help-seeking in National Collegiate Athletic Association Division I student-athletes. J Clin Sport Psychol. 2021;15:21.
97. Bu D, Chung PK, Zhang CQ, Liu J, Wang X. Mental health literacy intervention on help-seeking in athletes: a systematic review. Int J Environ Res Public Health. 2020;17(19):7263. https://doi.org/10.3390/ijerph17197263.
98. Oftadeh Moghadam S, Gorczynski P. Mental health literacy, help-seeking, and mental health outcomes in women rugby players. Women Sport Phys Act J. 2021. https://doi.org/10.1123/wspaj.2020-0066
99. McCabe T, Peirce N, Gorczynski P, Heron N. Narrative review of mental illness in cricket with recommendations for mental health support. BMJ Open Sport Exerc Med. 2021;7:e000910. https://doi.org/10.1136/bmjsem-2020-000910.
100. Porta M. A dictionary of epidemiology. 6th ed. New York: Oxford University Press; 2014.
101. Merikangas KR, Nakamura EF, Kessler RC. Epidemiology of mental disorders in children and adolescents. Dialogues Clin Neurosci. 2009;11(1):7–20. https://doi.org/10.31887/DCNS.2009.11.1/krmerikangas.
102. Gorczynski P, Webb T. Developing a mental health research agenda for football refees. Soccer Soc. 2021;22(6):655–62. https://doi.org/10.1080/14660970.2021.1952695.
103. Gorczynski P, Fasoli F. LGBTQ+ focused mental health research strategy in response to COVID19. Lancet Psychiatry. 2020;7(8):E56. https://doi.org/10.1016/S2215-0366(20)30300-X.
104. Bahr R, Clarsen B, Derman W, Dvorak J, Emery CA, Finch CF, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). Br J Sports Med. 2020;54(7):372–89. https://doi.org/10.1136/bjsports-2019-101969.
105. Coyle M, Gorczynski P, Gibson K. "You have to be mental to jump off a board any way": elite divers' conceptualizations and perceptions of mental health. Psychol Sport Exerc. 2017;29:10–8. https://doi.org/10.1016/j.psychsport.2016.11.005.
106. Chang C, Putukian M, Aerni G, Diamond A, Hong G, Ingram Y, et al. Mental health issues and psychological factors in athletes: detection, management, effect on performance and prevention: American Medical Society for Sports Medicine Position Statement-Executive Summary. Br J Sports Med. 2020;54(4):216–20. https://doi.org/10.1136/bjsports-2019-101583.