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

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Abstract

The American Medical Society for Sports Medicine (AMSSM) convened a panel of experts to provide an evidence-based, best practices document to assist sports medicine physicians and other members of the athletic care network with the detection, treatment, and prevention of mental health issues in competitive athletes. This statement discusses how members of the sports medicine team, including team physicians, athletic trainers, and mental health providers, work together in providing comprehensive psychological care to athletes. It specifically addresses psychological factors in athletes including personality issues and the psychological response to injury and illness. The statement also examines the athletic culture and environmental factors that commonly impact mental health, including sexuality and gender issues, hazing, bullying, sexual misconduct and transition from sport. Specific mental health disorders in athletes, such as eating disorders/disordered eating, depression and suicide, anxiety and stress, overtraining, sleep disorders and attention-deficit/hyperactivity disorder, are reviewed with a focus on detection, management, the effect on performance, and prevention. This document uses the Strength of Recommendation Taxonomy (SORT) to grade level of evidence.

I. Background and Purpose

While participation in athletics has many benefits, the very nature of competition can provoke, augment, or expose specific psychological issues in athletes. Certain personality traits can aid in athletic success, yet these same traits can also be associated with mental health (MH) disorders. The athletic culture may have an impact on performance and psychological health through its effect on existing personality traits and MH disorders. This paper will focus on the competitive athlete, from the youth and collegiate athlete to the

Olympian and professional athlete, and how the athletic care network[1] and MH care providers can assist with the detection and treatment of psychological issues in this population.

Unique signs and symptoms in athletes, prevalence in the athlete population, and utilization of available screening tools will be reviewed. Specific Diagnostic and Statistical Manual of Mental Disorders (DSM-5) diagnostic criteria and the pathophysiology of MH disorders will not be discussed. The discussion of management may include psychosocial approaches and pharmacological treatments, emphasizing the selection of the most effective treatments with the fewest side effects of relevance for athletic performance. Lastly, this paper will present recommendations for prevention, including the identification and possible elimination of risk factors in the athlete population.

II. Methods

The AMSSM Board of Directors appointed co-chairs (CJC, MP) to assemble a writing group that was carefully selected to include a balanced panel of sports medicine physicians and other professionals experienced in managing MH issues in athletes, actively engaged in research, and with demonstrated leadership in the topic. Important members of the panel included an athletic trainer, a clinical psychologist and a sport psychiatrist. The co-chairs generated the outline and the writing group subsequently conducted an in-depth literature review using PubMed, SportDiscus, and the Cochrane database for each topic. The writing group engaged in conference calls and written communications to discuss the evidence and compile the manuscript. The panel used the Strength of Recommendation Taxonomy (SORT) to grade level of evidence.[7] (Table 1)

This AMSSM position statement is novel in several respects in its contribution to the topic, including:

- addressing topics not fully explored in previous publications about MH issues in athletes, including key personality issues, demographic and cultural variables, and environmental conditions,

- discussing the interaction and impact of these variables both positively and negatively on competitive athletes, and how to monitor the athletic environment that may precipitate or exacerbate MH issues, and
- defining the level of evidence and the knowledge gaps in this rapidly expanding field.

Table 1. Strength-of-Recommendation Taxonomy (SORT)

Strength of Recommendation	Basis for Recommendation
A	Consistent, good-quality patient-oriented evidence
B	Inconsistent or limited-quality patient-oriented evidence
C	Consensus, disease-oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

III. How Teams Work

In many sport settings, the team physician, working with athletic trainers and other members of the athletic care network, provides medical care to athletes; this should include management of health and wellness issues, including MH disorders[2].The team physician often coordinates multiple aspects of the athletes' overall care and may oversee MH treatment, including psychiatric medication management[3]. The MH care network [4, 5] includes clinical or counseling psychologists, neuropsychologists, psychiatrists, licensed clinical social workers, MH nurses, licensed MH counselors, and primary care physicians with core competencies (i.e., additional expertise) to treat MH disorders. It is critical that members of the MH care network and athletic care network have clear, established guidelines of how to best communicate in order to optimize the treatment of the athlete.

It is important that team physicians attempt to normalize health-seeking behaviors and understand that there may be barriers in seeking care that athletes uniquely experience. Providing screening for depression, anxiety, eating disorders, and substance use, as part of pre-participation sports physical examinations, can help in normalizing discussions regarding these important MH disorders. It is also important that team physicians include

protocols to allow for both routine MH referrals as well as MH emergencies, as part of the emergency MH action plan[3].

IV. Personality Issues and Athletic Culture

There is an interactive relationship between athlete personality characteristics and the athletic culture that may have both positive and negative effects on the individual athlete as well as the team or sport environment. This relationship between internal and external variables is fluid and may mirror changes in culture as a whole and changing developmental patterns of individuals in their time of athletic engagement. Internal variables may include traits such as perfectionism, pessimism, or introversion, while external variables may include factors such as coaching culture, team performance, or socioeconomic status.

For example, the internal trait of perfectionism may contribute to anxiety about physical appearance in the athletic environment[6]while the external coaching environment may also influence athlete anxiety[7]. Or the internal trait of pessimism, in addition to the external factor of low socioeconomic status, may result in adjustment and performance issues. An athlete's personality traits may also influence the athletic culture. For example, athletes who engage in aggressive or high-risk behaviors may see a performance benefit in sport, while simultaneously possibly being prone for substance use disorders, hazing or other behavioral issues outside of sport because they are high-risk takers.

The following sections will provide insight into some of the key personality and environmental issues that impact athletes and their MH. Consequently, it is important for team physicians to be attuned to personality styles that may have a higher risk of dysfunctional behaviors, and athletic environments that may trigger or exacerbate MH disorders in the athletes under their care.

a. Personality Issues

Detection in Athletes

There has been much interest in whether or not there is an "athletic personality" that is particularly conducive to success or failure in sport. Personality in general is defined as the stable, consistent aspects of one's thinking, emotions, and behaviors. Findings regarding athletic personality have been inconsistent[8]. There is no single personality profile that reliably appears in athletes or predicts athletic success or failure. However, many studies suggest that athletes generally show more positive personality characteristics than do non-athletes[9, 10]. Specifically, athletes show greater extraversion and conscientiousness and less hastiness and anger[10, 11]. Athletes also generally show higher sensation-seeking tendencies than do non-athletes[9]. Contact sport athletes and male athletes express higher tendencies toward sensation-seeking than non-contact sport athletes and female athletes, respectively[12].

Research looking at individual versus team-sport athletes also demonstrates some personality differences. Individual sport athletes demonstrate more conscientiousness and autonomy[13]. Team sport athletes score higher on agreeableness and a tendency to attend to and depend on others for personal satisfaction[13].

Perfectionism is defined as an achievement-related personality trait that includes the setting and pursuit of excessively high standards of performance together with overly critical self-evaluations[14, 15]. Some distinguish *positive* perfectionism, with the underlying motivation being to obtain a favorable outcome, from *negative* perfectionism, which seeks to avoid adverse consequences[16]. Both types may be risk factors for the development of eating disorders in athletes[8].

Athlete identity is the degree to which an individual views themselves within the athletic role and looks to others for confirmation of that role[17]. High athletic identity has been associated with both positive outcomes, such as better athletic performance, and negative outcomes, such as overtraining and the use of performance-enhancing drugs[17]. Strong tendencies for athletes to evaluate themselves exclusively according to their athletic performance may be associated with depression[18].

Personality testing of individual athletes is not typically undertaken in the clinical setting, as unstructured clinical interview is typically the preferred method for the assessment of personality traits and disorders[19, 20]. However, a variety of validated instruments are available for objective assessment or research[21]. One such instrument is the Minnesota Multiphasic Personality Inventory-2 (MMPI-2)[22].

Management

By definition, personality traits and disorders are long-standing issues. If deemed problematic for athletes, they may be addressed via psychotherapy[23].
Comorbid psychiatric disorders should be treated with medication, psychotherapy, or a combination[23]. Unique challenges related to personality issues have been described when undertaking psychotherapy with high-level athletes in particular[23]. Because this population may be accustomed to being in charge, with others around them giving them special attention and being solicitous of their opinions due to their celebrity status, a "situational narcissism" can develop that can contribute to entitlement regarding scheduling of appointments and payment of fees for services[23]. It is important for healthcare providers to be aware that establishing a relationship that does not follow usual treatment parameters may lead to boundary violations.

Effect on Performance

Athletes who compete at professional levels have higher self-esteem and sensation seeking tendencies than those who do not compete at that level[9]. Additionally, lower levels of self-esteem and sensation seeking in athletes have been associated with greater risk for depression, anxiety, social anxiety, and negative physical symptoms, all of which may impede performance[9]. Extremes of athletic identity, either too much or too little, may limit performance[18]. Externally-driven perfectionism, i.e., perfectionism encouraged by parents, coaches, teammates or others, is likely more problematic for performance than is internally-driven perfectionism. Externally driven perfectionism is associated with negative mood, anxiety, anger, and hostility, all of which can decrease performance[24]. If perfectionism leads to eating disorders, there can also be negative performance effects.

b. Sexuality and Gender Issues

Detection in Athletes

Athletes may be adversely affected by discrimination and other environmental factors in sport related to sexuality and gender. For example, there may be discrimination against sexual minorities, defined as sexual groups other than heterosexuals (including members of the lesbian, gay, bisexual, transgender, and questioning/queer (LGBTQ) populations). The masculine "culture of toughness" can also contribute to stigma that prevents athletes from seeking MH treatment.

The psychological issues experienced by sexual minority athletes may be associated with the anxiety of "coming out", the fear of being ridiculed by teammates, pressures from others to be "normal", or because they may have been a victim of or witnessed homophobic behaviors. The 2012 National Collegiate Athletic Association (NCAA) Campus Pride Report Score Card indicated 4.6% of student-athletes identified as either lesbian, gay, bisexual, or questioning compared to 6.2% of college students[25]. Sexual minority athletes have long been subjected to negative, homophobic attitudes of other athletes and fans. Thirty-two percent of males and 14% of females recall sexuality-related bullying when engaged in school athletics[26]. Lesbian, gay, bisexual, or transsexual identification is a risk factor for harassment and abuse in sport[27]. Gay male athletes have concerns that their teammates and coaches will discover their sexual identity and they fear being "outed"[28]. The term "lesbian" may be used inappropriately to stereotype female athletes[29]. Across genders, sexual minority student-athletes have reported experiences of negative MH harm in the last 12 months in significantly greater numbers than their heterosexual peers[30].

There appear to be more homophobic attitudes in male-dominated sports than in female sports[31]. If they are aware of these negative attitudes before entering the athletic realm, some sexual minority males will attempt to avoid sport all together[26, 32, 33]. When analyzing the differences between male and female sexual minority student-athletes, researchers found that females reported lower rates of negative MH outcomes than their

male and non-athlete peers[30]. However, females were more likely to report use of both illicit and prescription drugs when compared with heterosexual female student-athletes, and as a group, sexual minority student-athletes have reported a greater likelihood of use of illicit drugs than have heterosexual student-athletes. Student-athletes identifying as sexual minority have an increased risk for poor health, possibly due to avoidance of athletics and associated lower rates of physical activity and increase in drug use. This subsequently leads to poor MH and an increased risk of chronic medical diseases such as obesity and cardiac issues[30].

Athletes of any sex, gender identity, and sexual orientation suffer from stigma regarding mental illness, in part related to the masculine culture of toughness, and thus may have difficulty admitting to psychiatric symptoms and asking for and accepting treatment for those symptoms[34]. Athletes attempt to avoid displaying vulnerability on the playing field, making it hard to transition to being able to admit vulnerability and accept help when off the field. Moreover, athletes perceive that they risk playing time, starting roles, or endorsements if discovered seeking treatment for mental illness[34].

Management

Healthcare providers should ask athletes about any concerns related to gender and sexuality, and athletes should be educated about the role of sexuality- and gender-related issues in sport and informed that they are not immune from mental MH disorders. The creation of a supportive environment that is welcoming to sexual minorities is key to the health of athletes and their teams. Sensitivity training for student-athletes and coaches[26], debunking stereotypes, increasing exposure to LGBTQ community, creating open and educational discussions, and using correct terminology[35] are important[36]. Having gender-neutral locker rooms available to sexual minority athletes and uniforms that allow all participants to be comfortable are also important[26]. Policies and laws can have a role; for example, anti-discrimination policies in university settings can protect against homophobic actions[37].

Numerous organizations have developed educational programs to assist athletes/teams, coaches, officials, administrators, institutions, and other sport-related groups in overcoming the challenges of discrimination and stigma. The NCAA LGBTQ Inclusion Initiative[38] reports that one of its core values is a commitment to diversity, inclusion, and gender equity in collegiate sport, and available on its website is a document outlining best practices and sample policies and resources for allies and sexual minority student-athlete groups[39]. GLSEN (formerly known as Gay, Lesbian, and Straight Education Network)[40, 41] provides educational resources for parents, schools, and teams aimed at creating and maintaining an athletic climate that is based on respect, safety, and equal access for all students regardless of sexual orientation or gender identity. Go! Athletes is an online social support network consisting of current and former sexual minority collegiate and high school athletes and coaches[42]. AthleteAlly is an online forum designed to provide support for the sexual minority athlete community, with its mission to eliminate homophobia and transphobia in sports[43].

Effect on Performance

There are minimal data evaluating the effect on performance, though it is likely that negative attitudes related to sexuality and gender negatively impact sports performance. Females and sexual minority athletes may be deterred from participating in sports. One study demonstrated that 46% of female athletes felt their involvement in sports led others to conclude that they were lesbian[29], and this may lead to hesitation to become involved in certain sports in particular. If they identify as LGBTQ, some athletes report that they cannot be open with their sexuality for fear of losing sponsorships[29]. Athletes may also feel the need to guard against any behavior that suggests close relationships with teammates of the same sex. With the masculine culture of toughness making it difficult for many athletes to reach out for help, these potentially distracting issues and associated potentially untreated MH disorders are likely to have a negative impact on physical performance.

c. Hazing

Detection in Athletes

The terms hazing and bullying are often used together; however, it is important to differentiate these two forms of interpersonal violence[44]. Hazing is any non-repetitive, humiliating, or dangerous activity expected of a student (irrespective of their willingness to participate) in order to become part of the group[45, 46]. Bullying will be discussed in the next section of the paper.

Although cases of extreme hazing result in significant morbidity and mortality and receive considerable public attention, the true incidence of hazing that occurs in sports is thought to be common but is not well known. Greatest reporting rates have been seen in higher levels of competition, team sports, and contact sports[47]. Rates appear equal across genders, although boys tend to be subjected to more physical forms of hazing[48]. It remains largely unclear why certain personal demographics, sports, or levels of participation lead to more or fewer hazing-related activities. Populations at higher risk for any type of abuse involve elite athletes, children, LGBTQ groups, disabled athletes[49], and those with a lower grade point average[50]. These characteristics may also place these individuals at a higher risk for hazing specifically. Team characteristics that lead to a higher risk of hazing include denial or failure to recognize the authority of the coaching staff, an unsupervised team area or locker room, and an imbalance of power shifted towards masculine authority[49].

Eighty percent of National Collegiate Athletic Association (NCAA) athletes experienced some form of hazing during college, while 42% of these same athletes also reported a history of being hazed in high school[51]. A similar study almost a decade later revealed that 74% of student-athletes experienced at least one form of hazing while in college[46]. Given that there are over 380,000 student-athletes participating in NCAA sports[52], it is likely that 280,000 student-athletes were potential victims of hazing in college athletics alone.

In youth sports, the incidence of hazing is reported to increase with age, starting with 25% of high school athletes reporting their first incident occurring before the age of 13[53].

Rates of hazing in sport ranged from 5% to 17.4% in middle schools and 17.4% to 48% at the high school levels[48, 54].

Although athletes may endorse participation in activities that meet criteria for hazing, hazing itself is grossly underreported. In fact, 60% to 95% of college athletes who were the victim of hazing stated that they would not report their incident[46, 51]. Some of the reasons espoused for the refusal to report included allegiance to fellow teammates, fear of retribution, uncertainty of trust with authority, normalization or positive perception of hazing behavior, and victim blaming, with the perception that participants choose to be involved with hazing activities[46, 51, 53, 55-57].

Management

The management of hazing requires a global investment from athletes, coaches, administrators, and healthcare providers all playing key and specific roles as outlined in Table 2. Although adults must set the tone of zero tolerance towards hazing and promote an environment of respect and dignity, it is crucial that athletes take ownership of the process. A comprehensive approach that involves education, incorporation of programs with validated measures, and the establishment of clearly defined policies and penalties will allow the necessary shift from reacting to incidents to preventing them.

Early engagement of MH providers is critical to care for the victims of hazing. Engagement of the athletic care network, coaching staff, athletes, and administration is important to address factors that allowed hazing to happen. Creating support networks and open lines of communication are important parts of providing advice and help for athletes regarding issues of hazing. A NCAA survey demonstrated that men were most likely to turn first to teammates (27%), while women were most likely to turn first to their parents (29%)[58].

One of the most significant roles for the team physician is to recognize a problem has occurred, followed by appropriate response, reporting, and referral. The team physician should encourage open disclosure by serving as an empathetic, non-judgmental listener

who creates an environment of support for the athlete, where they can feel safe to discuss events that have occurred.

All forms of hazing (physical, psychological, and/or substance-related) are maltreatment and include the potential for significant harm, which can be underestimated. Of those who experienced hazing, 71% reported awareness of negative consequences, including relationship difficulties and physical and psychological symptoms[59]. Psychological sequelae include anxiety, depression, eating disorders, suicidal thoughts and behaviors, loss of confidence and self-esteem, aggression towards self and/or others, delinquency, criminality, interpersonal conflicts mostly centered on trust issues, sexual difficulties, emotional instability, substance use, and changes in weight, energy, sleep, and concentration, all of which can lead to several additional health issues[59, 60]. The treatment of some of these selected issues will be discussed in detail in other sections of this paper.

Effect on Performance

Cycles of hazing may be perpetuated by those who believe these activities support team building. However, it has been shown that as hazing increases, the less attraction, team bonding, and team closeness is felt by the athlete[61]. Conversely, there were higher levels of team social cohesiveness if an athlete participated in appropriate team building activities that promote dignity, positive MH, and teamwork as opposed to victimization[61]. Therefore, the dangerous consequences of hazing provide no added benefit to the concept of team unity, and may likely have a paradoxical effect, theoretically resulting in a poorer individual and team performance.

Prevention

Properly addressing the needs of athletes requires the development of an extensive prevention plan regarding hazing. This plan should be centered on a zero-tolerance policy for all types and degrees of hazing and incorporate principles and practices that safeguard the health and wellness of the athlete. In one study, only 39% of college students were introduced to anti-hazing policies when joining teams or organizations, and just 15%

attended hazing prevention workshops hosted by either adults or peers[46]. However, recent NCAA data show that over 70% of college athletes indicated that a coach or athletic department official had talked to them about hazing[58].

For meaningful change to be enacted, the culture of hazing within sport needs to be addressed. It should be understood that hazing is an inappropriate and misguided example of a traditional initiation. There should be no allowance of inappropriate language or "a little hazing", which can lead to more severe forms of hazing. Situations that involve secrecy, alcohol and other substances, and power imbalance should be eliminated, as these are ripe conditions for hazing incidents to occur. Finally, it is important to encourage spheres of influence (e.g., media, professional teams) to avoid intentionally or unintentionally delivering messages that promote hazing.

Table 2: Key roles in hazing awareness and prevention
(Adapted with permission from Wilfert. Copyright 2007 by the National Collegiate Athletic Association)[97]

Administrators	**Coaches**	**Student-athletes**	**Team captains**
Dispel myths/set the record straight	Create environment of total respect and dignity for all	Understand what constitutes hazing	Encourage others to speak up without fear of retribution
Ensure comprehensive approach	Address topic/consequences early and consistently	Insist on open communication among teammates and coaches	Understand potential level of accountability
Provide appropriate resources/support	Involve the team in process; be supportive	Plan alternate activities that enhance bonding	Ensure new members feel supported
Establish protocols and procedures for the process (reporting, investigating, adjudicating)	Help develop positive traditions that are significant and meaningful	Understand team acceptance and success should be based on strong work	Help develop positive traditions that are significant

		ethic, positive attitude, positive relationships	and meaningful
Enforce clearly defined sanctions	Discuss expectations about character and values on/off field	Discuss among your team how to report potential incidents	Create conduct guidelines along with coaches
	Take it seriously	Make caring about each other a high priority	Accept role as leader; set proper tone with your actions and words
	Avoid creating division between veterans and new players	Seek advice from trusted adults/leaders	

d. Bullying

Detection in Athletes

Bullying in athletics is another under-researched topic. Defining the term can be difficult because actions and comments that one athlete perceives as bullying may be experienced by another athlete, who responds positively to negative feedback, as motivating. Bullying has been defined as "abuse and mistreatment of someone vulnerable by someone stronger, more powerful."[62]. This negative behavior can be exhibited by teammates or coaches, and includes yelling, physically trying to overpower an individual, or using body language to intimidate an athlete. It can also involve a coach making an athlete feel that they are worthless, despised, inadequate, or valued only as a result of their athletic performance[63].

Bullying has been reported to be less prevalent in sport than in school and occurring at a relatively low frequency overall[64]. Participants who reported experiencing one or more acts of bullying on their team reported weaker connections with peers. Detecting bullying in athletics can be difficult, as both the athlete and the coaching/team environment need to be observed. Swigonski et al provided advice to parents to look for four defensive behaviors

by the coach that may help determine if their child's coach is a bully[65]. The first behavior is moral justification of their actions by attempting to explain their poor behavior as part of the athletic culture. A second is the coach offering a "backhanded" apology when called out about their poor behavior. The third defensive behavior is an attempt to shift the focus of the conversation away from the bullying behavior to something more severe like physical contact; by doing so, they are explaining that the behavior is not as bad as it could be. The fourth is the coach trying to escalate the situation by attempting to "back the complainant into a corner" so that they will stop questioning the coach's behavior.

Cyberbullying is another form of bullying, with one study reporting that 38% of students knew someone who had been cyberbullied, while almost nine percent reported cyberbullying someone else[66]. In the 2017 NCAA Study of Student Athlete Social Environments report, 12% of male and four percent of female student-athletes reported receiving negative or threatening messages from fans via social media[67]. Black student-athletes reported receiving negative or threatening messages at twice the rate of white student-athletes[68]. Negative social media engagement is not limited to college-age student-athletes; student-athletes in secondary schools are also victims.

Athletes may present with changes in sleeping and eating patterns, frequent mood swings, aggressive behavior, apprehension about attending team functions, or physical symptoms such as feeling ill prior to practices[69]. Depending on the severity of the bullying, athletes may present with unexplained injuries, loss of personal items, frequent headaches, or faking illness or injuries[59]. They may also contemplate and/or attempt suicide, exhibit poor psychosocial adjustment, experience difficulty with academics that once came much easier, or display rebellious behaviors such as skipping practices or misusing substances.

No screening tool specifically designed for assessing bullying in athletics exists; however, the Bullying and Ostracism Screening Experience and School Climate (BOSS-E) short form[70] is a 16 item self-report questionnaire that healthcare providers and administrators may consider for implementation. It is used to provide a quick indicator of school climate for boys and girls 10 to 14 years old. A second screening tool available to

assess bullying behaviors is the three-part California Bully Victimization Scale (CBVS) instrument[71].

Management

The management of bullying starts with athlete, parent, school/athletic administrator, athletic care network, and coach intervention. All stakeholders must be aware of both the psychological signs and the physical symptoms that can be exacerbated by bullying and exhibited by an athlete, in order to intervene on their behalf.

The athletic care network should work with affected athletes to help resolve the issue at both the individual and system levels. Possible resolutions include acting as an advocate for the athletes, referring them to counseling, offering educational programs to the athletics department, or reporting the behavior of the bully up the administrative chain while adhering to any confidentiality requirements. Creating an overall supportive environment where all stakeholders agree that bullying is unacceptable is the key to preventing repeat occurrences and providing a safe environment in which athletes can participate.

Effect on Performance

Since most research uses the terms bullying and hazing interchangeably, effect on performance is discussed under the hazing section above.

Prevention

Athletes need to be taught that bullying is not acceptable and should be reported to an uninvolved, trusted adult. Athletes should be encouraged to defend their teammates who are experiencing bullying or help remove them from the situation. Step UP! is an example of a prosocial behavior and bystander intervention program[72]. The NCAA website has details and links for Green Dot, Mentors in Violence Prevention, and Bringing in the Bystander educational programs[73].

e. Sexual Misconduct

Detection in Athletes

Another form of misconduct and maltreatment of athletes is sexual misconduct. The exact incidence of sexual misconduct (including sexual harassment, sexual abuse, gender harassment, and homophobic behaviors) in sports is difficult to determine because of a lack of reporting, particularly by boys. Sexual misconduct has been shown to occur in all sports across all ages and levels of participation[74]. It is estimated that two percent to 48% of athletes will experience sexual abuse and 19% to 92% will be subjected to some form of sexual harassment[27, 51, 54, 75, 76]. Peer athletes are far more likely than coaches to perpetrate sexual harassment[27]. Males are typically more often the offender, with 34% of women experiencing sexual harassment from men and 12% from women[77]. In one study, 13% of female athletes and 6% of male athletes had experienced sexual abuse in the sport setting[78].

Specifically regarding underage athletes, in one study, three percent of coaches admitted to having intimate relations with an athlete under the age of 18[79]. Two percent to 22% of children and teens are victims of sexual abuse through sport, with 98% of cases being perpetrated by those in positions of power such as coaches, teachers, and instructors, with victims more often being male[80].

The prevalence of sexual abuse appears to be higher in elite level athletes where the risks of being sexually exploited by coaches and team support staff are higher[54, 75]. It is unclear whether this is due to intrinsic changes in the athlete-coach relationship or reflects greater exposure to high-risk situations[80-82]. In athletes who compete in individual sports, the period of “imminent achievement” is a distinctly vulnerable period. In this developmental phase, athletes are considered pre-elite but have not yet acquired an elite level status. There is often a heightened level of stress and dependence on coaches and training staff, which in turn may leave the athlete more vulnerable to predation. The pre-elite athlete is also more likely to tolerate inappropriate behaviors rather than compromise pending

achievement[83]. Athletes who specialize at a younger age, particularly around puberty, have been found to be highly vulnerable to sexual abuse[48].

Populations at higher risk for abuse in youth sport reflect trends in the general population. Disabled athletes are at two to three times increased risk as compared to young athletes in general, and LGBTQ athletes are also at markedly higher risk for abuse[84, 85]. Sport type, amount of touching, or degree of clothing cover during participation do not appear to correlate with rates of abuse[86, 87]. Unsupervised situations (locker room, travel/away trips, coach's car or home), times of isolation (individual training sessions), and group events that involve alcohol are particularly high-risk environments that increase the risk for sexual harassment and abuse[81, 82, 88, 89].

Psychological abuse often serves as the "gateway" to other forms of non-accidental violence[27], and 75% of youth athletes reported emotional abuse during organized sport[90]. Sexual abuse can be prefaced by "grooming behavior" where a coach shows preferential treatment toward an athlete, and sometimes even the parents, in efforts to gain favor and trust.

The victimized athlete may present with various non-specific and recurrent medical and somaticizing concerns including headaches, lethargy, sleep disturbances, bed wetting, acting out or engagement in risky behaviors, self-harm, weight fluctuations, and poorer general health satisfaction[74]. Previous sexual abuse results in an increased risk of developing a wide array of psychiatric conditions and substance abuse[74].

Management

The International Olympic Committee (IOC) has defined "safe sport" as an athletic environment that is respectful, equitable, and free from all forms of non-accidental violence to athletes[27]. Sporting organizations should foster the evolution and growth of the "safe sport" movement in order to properly address the culture of maltreatment and violence in sport, including all forms of physical, sexual, and psychological abuse. Barriers to

implementation include a lack of knowledge and resources as well as fear and administrative difficulties[91]. Therefore, it may be challenging to transfer policies that have been established at the sports federation or national governing body level to the local, individual club level[92, 93].

Recommendations have been directed primarily at administrative and athletic staff personnel, with a focus on education to prevent, recognize, and react to instances of abuse. In the US, Title IX in 1972 included that "No person in the United States shall, on the basis of sex…be subjected to discrimination under any education program or activity receiving Federal financial assistance"[94]. In recent legal proceedings, it has been an important litigation tool in challenging the power structure that has perpetuated instances of sexual violence in the sporting arena in the secondary school and collegiate levels[81].

Consequences of abuse may be physical, psychological, or both. The most important role for the team physician is the recognition of any potential abuse, with immediate and appropriate response. The first step is to encourage open disclosure and avoid any suggestive, directing, or leading questions. It is essential to consider that the victim may be experiencing feelings of shame, guilt, and/or fear[54, 95]. Active listening and creating an environment of psychological and emotional support for the athlete wherein they feel safe to discuss events are crucial. While certain emotions and negative feelings towards the perpetrator may be present, it is important to maintain a neutral tone[54]. It can be helpful to acknowledge the courage required to speak about abuse that may implicate teammates, coaches, or other seemingly respected members of the community. Lastly, it is critical to reinforce to the athlete that the victimization and abuse is not their fault, and that abuse is not a normal, healthy, or helpful part of the team or athletic structure[96, 97].

Be aware of the policies regarding the duty to report the sexual abuse to authorities depending on the legal statutes in the particular country/jurisdiction. Similarly, depending on privacy laws, providers should involve any and all medical, MH, administrative, and/or legal professionals in a timely manner. Failure to act appropriately may empower the perpetrator(s) and increase the psychological sequelae resulting from the abuse[98, 99].

Ensure accurate record completion and documentation. Despite the conflicting interests from multiple layers of stakeholders and unique pressures faced by members of the sports medicine team, there should be no lack of ethical clarity. The primary and only obligation is to the athlete's well-being.

Effect on Performance

Sexual abuse can have consequences that are psychological and physical in nature. Signs of abuse unique to athletics may also include the excessive taking of risk within their sport, loss of confidence, lack of concentration during participation, declining performance, skipping training sessions, self-injurious behaviors to avoid having to participate in sport, early dropout, excessive training to cope (which leads to burn-out), and unexplained injuries that are clinically atypical or fail to resolve[78, 100]. Those who have been sexually abused in the context of sport often have a variety of physical ailments and psychosocial concerns such as low self-esteem, strained relationships with their parents and peers, and higher rates of eating disorders, all of which can interfere with their athletic abilities[78].

Prevention

Detailed in Table 3, prevention efforts need to account for the three main categories of risk regarding sexual harassment and abuse in sport – athlete, coach, and sport[82, 89]. Several well-established strategies in the protection of minors can also be applied to help prevent sexual abuse in sport. Four key components of the grooming process in a coach-athlete relationship are the targeting of the victim, building trust and friendship, developing control and loyalty, and building and securing secrecy[74]. Creating early recognition and intervention at each of these levels has the potential to prevent abuse before it occurs. By maintaining a culture with open lines of communication without secrecy and ensuring the presence of adults who will legitimize an athlete's concerns and act on their behalf, grooming can be thwarted.

Criminal background checks should be required for all adults who will be interacting with young athletes, but additional assessments such as written applications, personal interviews, and reference checks should be instituted as well. An athlete protection policy,

including a written "statement of intent that demonstrates a commitment to create a safe and mutually respectful environment", should be created for every sporting organization[101]. Codes of conduct should be included that clearly establish expectations and boundaries of behavior for interactions with those less powerful, especially in terms of physical contact, dependency, and control[82]. Interventions include increasing sexual abuse awareness and training efforts, establishing policies on rules of behavior and procedures for filing complaints that guarantee prompt attention, disciplinary measures and follow-up, and providing resources and support for victims[74, 82, 89, 101].

Parents should be included in any written or electronic communication between coaching staff and youth athletes. All adult-child interactions, including medical examinations, should be viewed by others at all times. There should also be established policies for adult athletes that patient chaperones should be provided anytime when requested, or necessary, especially during sensitive examinations or procedures, in order to protect and enhance the athlete's comfort, safety, privacy, and dignity. Parents should be encouraged to ask organizations for copies of the existing safeguarding policies and procedures in place, including training, reporting, and monitoring. When travel is involved, athletes should use the buddy system, and detailed itineraries should be provided to parents prior to departure. There should be zero-tolerance of behaviors in sport that would not be held as acceptable in other youth environments. The culture can by changed by challenging those who behave or speak inappropriately, and all allegations or suspicions of child abuse or other inappropriate behavior by staff and volunteers must be reported to local law enforcement. While the vast majority of studies have looked at sexual misconduct from coaching staff, others who participate in the athlete's care, including medical personnel, can also be involved in sexual misconduct.

Table 3. Risk factors for sexual misconduct in sport[82, 89].

Athlete Variables	**Coach Variables**	**Sport Variables**
Female sex	Male sex	Weak employment controls

Younger age	Older age	No existence of parent and athlete contracts
Smaller physique	Larger physique	Weak or no codes of ethics
High performance status	Good qualifications	Increased opportunities for travel
Low self-esteem	High reputation	Limited opportunities for reporting concerns
Moderate to high medical problems	Unknown or ignored previous record of sexual abuse	
Weak relationship with parents	High trust from parents	
Low awareness of sexual abuse	Low commitment to codes of ethics	
Complete devotion to coach		

f. Transition from sport

Detection in Athletes

Athletes at all levels of competition transition out of sport for numerous reasons, including: 1) they have reached the end of their playing career, 2) they can no longer compete at the needed level, 3) they suffer a season- or career-ending or catastrophic injury, 4) the risk-reward ratio may no longer be worth it for them to play, 5) the game is no longer fun or 6) they develop other interests[102]. This transition can be a problem for some athletes, whether or not they made the decision to finish competing. As with most events in life, "those who perceive that they are in control of the decisions are less likely to experience a difficult transition than those who perceive they are not"[102]. A recent literature review demonstrated a correlation between voluntary retirement and a less difficult transition out of athletics[103].

Athletes from youth to elite levels transition from sport every day, and healthcare providers may want to assess the reasons their athlete is leaving a sport that has played a large role in

forming their identity. The British Athletes Lifestyle Assessment Needs and Career and Education scale (BALANCE) and the Transition Coping Questionnaire (TCQ) are available to assist athletic healthcare providers in recognizing an athlete who may be struggling with transitioning out of sport[104].

Management

Management of the difficulties associated with transitioning from sports will vary depending on the athlete's symptoms. Psychotherapy may be necessary if the athlete is diagnosed with anxiety or depression due to a loss of athletic identity and demonstrates a need for increased coping skills[102]. Short workshops like the NCAA Moving On![105] and the Mind Body and Sport[106] program teach coping and stress management skills to help athletes with this transition. Athletes should be encouraged to begin lifelong activities or join other groups or recreational teams if they are missing or craving the social support they once received from participating in sports[102, 107]. Different treatment methods will work with different patients, and athletes should be encouraged to try multiple alternatives to find the most fulfilling treatment or substitution for them.

While the majority of athletes transition out of athletics without much difficulty, some will have a much harder time with this process. For injured athletes, the adjustment period from participation to retirement has been reported to range from six months to one year[103,107]. Athletes who sustain career-ending injuries report lower life satisfaction for five to ten years following retirement[108]. MH disorders, negative coping skills such as substance use, and criminal activity have all been reported following athletic retirement[102, 109]. These negative coping strategies may continue throughout retirement. Research shows greater adjustment difficulties, lack of retirement planning, and more frequent and severe psychological issues in athletes with higher levels of athletic identity[103]. The athletic care network should be aware that a difficult transition may occur, and when possible educate and observe individuals in the months following retirement.

It is worth noting that positivity can come from this transition. Many athletes see the value in getting involved in other activities; those who spent more time on themselves, their education, and their future had a more balanced life[107]. Conversely, athletes who focus too much on sport may have difficulty with helplessness and feeling lost upon retirement[110]. These findings support the idea of a multidimensional identity as being a strong protective factor against the negative effects of retirement from sport. Additionally, participants with a broader self-identity reported an easier transition after an injury than those participants who had a strong athletic identity[107].

Prevention

A pre-retirement plan to assist athletes with issues surrounding the transition out of athletic participation may be helpful[103]. Having a life development intervention plan in place may mitigate some of the negative fallout surrounding an early retirement[104]. There is evidence that suggests transitioning out of sport can be effectively managed at the professional and/or national levels[104, 111]. Participation in a psychoeducational retirement planning intervention focused on diversifying athletic identity, enhancing coping skills, building social support, and initiating the grief process earlier may create a more positive athletic transition process for the athlete[103].

V. The Psychological Response to Injury and Illness

Relationship between injury, performance and MH

The relationship between injury, performance, and MH in elite sport is complex and an area of interest[4, 5, 112-115]. Elite sport brings with it specific stressors that potentially increase the likelihood of injury/illness, including MH disorders, and injury can potentially unmask and/or trigger MH disorders[116-122]. Finally, there may be MH disorders that increase the likelihood of, or complicate recovery from, injury[116-119]. There is minimal prospective research in this area with several, mostly unanswered, questions.

Detection in Athletes:

Certain physical and MH disorders may be more common in athletes compared with their non-athlete peers, including performance anxiety, disordered eating, menstrual dysfunction, and binge drinking[123-125]. The psychological response to injury may trigger and/or unmask MH disorders including depression/suicide, anxiety, gambling, disordered eating/eating disorders, and substance use/substance use disorders[126-138].

Certain psychological and sociocultural factors have been raised as potential *risk factors* for injury[120, 121, 139]. While there are limited prospective and/or conflicting results regarding some of these *risk factors,* stress consistently demonstrates a relationship with injury risk as well as with the ability to rehabilitate from injury and return to sport[116, 139-142]. A meta-analysis found that high stress response and history of negative stressors had the strongest association with injury rates[116]. Perceived negative life event stress from teammates and the coach was associated with an increased risk of acute and overuse injuries[141]. Another study of team sport athletes found an association between negative perceived recovery and the risk of both acute and overuse injuries[142]. Emotional reactivity and stressful life events are also associated with poor on-field performance and injury[117, 143, 144]. Athletes with high resiliency, self-efficacy, optimism, and a supportive social network respond more effectively to stress[118, 145-148].

Response to Injury

A systematic review looking at psychosocial factors associated with outcome in sport injury rehabilitation in elite athletes concluded that three athlete responses were most important: cognitions, emotions, and behaviors[139]. The *cognitive response*, or how the athlete interprets the injury/illness, may determine an *emotional response*, which may then affect an athlete's *behavioral response* (e.g. motivation, goal setting, compliance with treatment) as well as response to treatment. The cognitive and emotional responses to injury and illness can be considered either "normal" or "problematic".

Examples of problematic cognitive responses include concerns about re-injury ("I can't do this as it might increase my risk for injury"), doubts about competency ("I can't play this

sport"), self-efficacy ("I won't be good enough to start anymore"), loss of identity ("Who am I if I'm not an athlete") or concerns about the medical staff ("I don't think my medical staff is capable"). When an athlete is injured, one of the first responses is coping with and processing the medical information provided.

The emotional response to illness and injury includes sadness, isolation, lack of motivation, anger, irritation, frustration, changes in appetite and sleep, and disengagement. Injured athletes report a higher level of symptoms of depression and generalized anxiety disorder (GAD) compared to non-injured athletes[149]. The response of each person may differ, and the response may also vary within the same individual depending on the circumstances. Emotional responses to injury and illness can be normal. Problematic emotional responses are those that do not resolve, worsen over time, or in which the severity of symptoms seem excessive[4].

Management

Resiliency and “high mental toughness” are associated with lower injury rates; those athletes with higher resiliency have a lower incidence of depression, anxiety, stress, and obsessive-compulsive symptoms[150, 151]. Psychological aspects of recovery and rehabilitation can influence an athlete's perception of their injury, life outside of sport, expectation for long-term outcome, and satisfaction with healthcare providers[119, 152-156]. Prominent individual factors may impact outcome, including pain perception, optimism/ self-efficacy, and depression/stress[119, 152-156].

A systematic review identified three psychological elements (self-determination theory-autonomy, competence, and relatedness) as the factors most important in positive rehabilitation and return to pre-injury level of play[119]. Examples of strategies that support positive return to sport experiences include: 1) reducing re-injury anxieties using modeling techniques, 2) building confidence using functional tests and goal setting, 3) providing social support, 4) keeping athletes involved in their sport, 5) reducing stressors related to premature return to sport, and 6) foster athlete autonomy[155].

a. Self-medication in response to injury/illness

Detection in Athletes

Participation in sports can include a greater risk of experiencing injury-related pain and the loss of one's core identity due to earlier than expected retirement[157]. An athlete may seek unhealthy methods of coping, including self-medication. Determining that an athlete has a problem with self-medication can be difficult, but evidence can include uncharacteristic behavioral changes such as arriving for practice too early or too late, missing training altogether, or frequent heightened conflict with teammates.

Although unable to distinguish purely social consumption from self-medication, a recent study by the NCAA sheds some light on the status of student-athlete substance use[158]. Overall, around 80% of student-athletes reported alcohol use in the past year, similar to rates for same aged non-athletes[158]. The percentage of student-athletes drinking excessively has dropped over the past decade for both males (63% to 44%) and females (41% to 33%)[158]. It also showed that the use of recreational drugs such as tobacco, marijuana, and cocaine by student-athletes is generally less than their non-athlete college peers, with 22% of student-athletes reporting using marijuana compared to 33% of the general student body[158]. Cocaine use in high school sports peaked in the mid-1980s at 17%, but sharply fell to less than 2% in the 1990s[159].

Cannabis is viewed by many users as a way to experience anesthetic or relaxing effects, and as such is one of the most commonly used agents by athletes to self-medicate[159]. Contrary to use patterns in the general population, among athletes, marijuana appears to have taken the place of tobacco as the second most widely used drug after alcohol[160]. Given the association between the three variables of marijuana use, depression, and body image-related stress in athletes, this pattern can be exacerbated after illness or injury[161-163].

Perceived attempts at self-medication have been demonstrated in a survey of collegiate athletes, where a significant relationship exists between reported alcohol abuse and self-reported symptoms of depression and general psychiatric symptoms[127]. Athletes who affirmed ratings in the "severe" range for depression and other psychiatric symptoms had a significantly higher rate of alcohol abuse than those who had low depression scores and low or mild symptom ratings[127]. Conversely, subjects reporting higher rates of alcohol abuse also had more psychiatric symptoms[127]. Nevertheless, only 0.6% of NCAA athletes reported using alcohol to deal with the stress of athletics[164]. A possible explanation for this disparity is that sport-related coping motives contribute to excessive substance use among athletes, without athletes recognizing or explicitly identifying coping-related intentions[165]. However, athletes who acknowledged alcohol use as a coping mechanism also experienced more negative consequences as a result of that drinking[165].

Opioid use disorder involving prescription opioids is recognized as one of the most important health problems today in medicine and public health[166]. The use and misuse of opioids crosses all levels of competition from teens to professionals. Approximately 23% of NCAA student-athletes used prescription pain medication in the past year, with an additional six percent reporting use of these substances without an actual prescription[158]. Meanwhile, high school student-athletes who are involved in one competitive sport are at a greater risk of being prescribed, misusing, and being approached to divert opioid medications[167, 168]. Student-athletes who played more than three sports were three times more likely than non-sports participants to be approached to divert their opioid medications[169]. Diversion of controlled substances has been found to be associated with other forms of prescription drug misuse[170]. A study of opioid use among retired professional football players found that of the 52% who were prescribed opioids during their career, 71% misused their prescriptions; of these, 15% admitted to ongoing misuse, with pain, undiagnosed/unreported concussions, and heavy drinking all predicting current misuse[171]. An additional concern is that 63% reported getting prescription opioids from non-medical sources during their playing days[171].

Male adolescents participating in organized sports are more likely to be prescribed, use, and misuse opioids compared to their non-sport peers[160, 167]. While most sports in which adolescents participate during high school are not associated with the use of heroin or non-medical use of prescription opioids (NUPO), certain high contact sports such as wrestling and football show a greater risk for engagement in NUPO, with ice hockey players having an increased risk for concurrent heroin use and NUPO[172]. It is thought that injury may be a key driver in this association; however, normative behaviors among some athletes or the stress associated with high-level competition may also play a role in this greater risk[172].

Many athletes do not recognize prescription opioids as a potential health risk and are known to self-medicate without consulting a physician first[173]. One third of NCAA athletes believe there is nothing wrong with using "painkillers" to cope with pain associated with competition[174]. However, it has been demonstrated that prescription opioid misuse is a strong risk factor for heroin use[175]. The need for pain control after surgery or in the management of a variety of musculoskeletal-related injuries is an issue regularly faced by the athlete. Post-operative exposure to opioids correlates with long-term use and use disorders, and therefore the need to employ other strategies of pain management is of critical importance[176].

Management

A multidisciplinary approach involving both team physicians and MH providers using a variety of psychotherapeutic, psychosocial, and if indicated, pharmacological interventions should be employed. Management should span the spectrum from acute withdrawal syndromes to long-term addiction treatment services.

No clinical trials currently exist for the specific treatment of substance use disorders in athletes. Therefore, proven strategies from the general population should be employed that include addressing the underlying issues leading to substance use and the health problems caused by pain during and after an athletic career[159, 160]. Healthcare providers should recognize that some medications used in cocaine and opioid dependence treatment, such as modafinil and methadone, are banned substances in sport[159].

Healthcare providers should also have a general understanding of the differences that often exist between athletes and non-athletes, as this awareness improves not only relatability but effectiveness of interventions. A social norms-based intervention is likely more effective when other athletes rather than students in the general population are used as the reference group, especially as research suggests that perceived alcohol consumption among one's close friends who are athletes is a very strong predictor of personal consumption[157]. Targeted interventions that incorporate health and athletic performance considerations tend to resonate and be more successful for the athletic population as well[157].

Prevention

Like treatment, prevention must be comprehensive and systemic. Use of relaxation training, adequate social support, psychological counseling and other non-medication based pain control/stress management interventions should be promoted as healthier options for coping. Education is a key component of prevention and the documented risks and alleged benefits of substance use should be openly and honestly discussed, including as a routine topic at health maintenance and pre-participation physicals. There is also a clear need for depression and anxiety screening, especially after an athlete has experienced a challenging illness or injury, to detect conditions that may lead to self-medication. Using the idea of "pain" as the "fifth vital sign" may have contributed to opioid overprescribing, and therefore its use is no longer advocated by major US medical organizations[177]. Yet it remains important to understand and manage an athlete's pain with open lines of communication and standardized, validated reporting measures, in order to prevent self-medication. Direct questioning should be revisited if any evidence of substance use disorders, legal issues, or conduct issues arise. In addition, 60% of college student-athletes felt that drug testing was an effective deterrent for them and their peers and should be continued[158].

Administrators and coaches should promote clear and consistent team-based policies on substance use, and the inclusion of team leaders in the development of policy and the promotion of expectations to other team members has yielded a reduction in negative consequences from substance use as well as a positive impact on team performance[157].

Opioid over-prescription should be avoided, and alternative pain management solutions considered. In addition, based on diversion data, athletes should be educated on the proper use and disposal of opioid medications[169].

VI. Select Mental Health and Psychological Issues

a. Eating Disorders / Disordered Eating

Detection in Athletes

The diagnosis of eating disorders (ED) follows the DSM-5 guidelines[178]. Athletes demonstrate increased prevalence of ED and disordered eating (DE) behaviors compared with non-athletes across all age groups and genders[179]. Due to the harmful health and performance effects, it is important to identify those athletes at increased risk of DE as well those with clinical diagnoses of ED.

Two conditions that exist along the spectrum of eating disorders and disordered eating include the Female Athlete Triad and Relative Energy Deficiency in Sport (RED-S). The Female Athlete Triad has been described as the relationship between energy availability, menstrual function, and bone health[180]. RED-S relates the impact of energy deficiency on physiological function including, but not limited to, metabolic rate, menstrual function, bone health, immunity, protein synthesis, and cardiovascular health[181].

Athletes at increased risk of ED include those who participate in weight-restricted and aesthetic sports, as well as sports where having a low body weight is seen as an advantage. Additionally, female athletes have been shown to have different factors contributing to onset of ED compared with non-athletes[182]. While both groups had increased risk with low self-worth, peer issues, and comorbid psychiatric disorders, the athletes had sport-specific factors such as performance pressure, team weigh-ins, and injuries[182]. Some characteristics such as perfectionism are seen in the general population as being an increased risk for DE; in athletes, perfectionism may be problematic but can also be beneficial in sport, thereby complicating management of that risk factor.

Several effective screening tools have been developed to identify EDs *specific* to athlete populations: Athletic Milieu Direct Questionnaire (AMDQ), Brief Eating Disorders in Athletes Questionnaire (BEDA-Q), Compulsive Exercise Test – Athlete Version (CET-A), Female Athlete Screening Tool (FAST), and Psychologic Screening Test (PST)[183, 184]. These screening tools were all developed using DSM-IV criteria and were validated in female athlete populations; however, they may not accurately reflect today's diagnostic standards and may not translate well into screening male athletes. There is significantly less literature surrounding male athlete EDs, and there may be different characteristics or issues that a female-based screening tool would miss. While often used in real-world clinical practice as ED screening tools, the SCOFF[185] and the Eating Disorder Examination interview (EDE-16)[186] are not athlete-specific.

Current pre-participation screening recommendations vary. The Preparticipation Physical Evaluation (PPE) Monograph, 4th edition, asks four gender-neutral questions regarding DE, three regarding menstrual history, and one regarding history of stress injuries, while the 2014 female athlete triad coalition consensus statement adds three additional questions (see Table 4)[180, 187].

Table 4

Questions common to both PPE-4 and the Female Athlete Triad Coalition Consensus ☐ Do you worry about your weight? ☐ Are you trying to or has anyone recommended that you gain or lose weight? ☐ Are you on a special diet or do you avoid certain types of foods? ☐ Have you ever had an eating disorder? ☐ Have you ever had a menstrual period? ☐ How old were you when you had your first menstrual period? ☐ How many periods have you had in the past 12 months? ☐ Have you ever had a stress fracture?
Female Athlete Triad Screening Questions ☐ When was your most recent menstrual period? ☐ Are you presently taking any female hormones (estrogen, progesterone, birth control pills)? ☐ Have you ever been told you have a low bone density (osteopenia or osteoporosis)?

To date, there have been no studies that identify the ideal time to screen. Considerations would include how young to start screening, how frequently to screen, and at what time point(s) relative to a sport season (i.e., pre-season, during season including at pre-established time points or during routine visits for injuries/illness, or post-season) an athlete should be screened.

Management

The goal of ED management in athletes is to empower the athlete to be able to safely perform as much of their sport or physical activity as possible while taking the steps to undergo treatment. ED and DE behaviors often have deep roots with multiple co-morbidities. The care of an athlete with DE is a long-term process that requires careful monitoring.

Sport participation criteria are outlined in the 2014 Triad Coalition Consensus Statement[180]. Risk factors such as energy availability, body mass index (BMI), menstrual history, bone mineral density, and bony stress injuries are evaluated to provide a cumulative risk stratification to help determine clearance and return-to-play (RTP) guidelines. RED-S also presents a similar model for risk assessment (Table 5)[181]. The Coalition statement includes a decision-based RTP model (Figure 1)[180] that considers medical factors, sport risk modifiers, and other decision modifiers when determining RTP.

Table 5: Relative Energy Deficiency in Sport risk assessment model for sport participation

High risk: no start red light	Moderate risk: caution yellow light	Low risk: green light
▶ Anorexia nervosa and other serious eating disorders ▶ Other serious medical (psychological and physiological) conditions related to low energy availability ▶ Extreme weight loss techniques leading to dehydration induced haemodynamic instability and other life-threatening conditions	▶ Prolonged abnormally low % body fat measured by DXA or anthropometry using The International Society for the Advancement of Kinanthropometry ISAK[141] or non-ISAK approaches[142] ▶ Substantial weight loss (5–10% body mass in 1 month) ▶ Attenuation of expected growth and development in adolescent athlete	▶ Healthy eating habits with appropriate energy availability
	▶ Abnormal menstrual cycle: FHA amenorrhoea >6 months ▶ Menarche >16 years ▶ Abnormal hormonal profile in men	▶ Normal hormonal and metabolic function
	▶ Reduced BMD (either from last measurement or Z-score < −1 SD). ▶ History of 1 or more stress fractures associated with hormonal/menstrual dysfunction and/or low EA	▶ Healthy BMD as expected for sport, age and ethnicity ▶ Healthy musculoskeletal system
	▶ Athletes with physical/psychological complications related to low EA/ disordered eating - ECG abnormalities- Laboratory abnormalities ▶ Prolonged relative energy deficiency ▶ Disordered eating behaviour negatively affecting other team members ▶ Lack of progress in treatment and/or non-compliance	

BMD, bone mineral density; DXA, dual-energy X-ray absorptiometry; EA, energy availability; FHA, functional hypothalamic amenorrhoea; ISAK, International Society for the Advancement of Kinanthropometry

[Mountjoy M, et al. Br J Sports Med 2014;48:491–497. Used with permission]

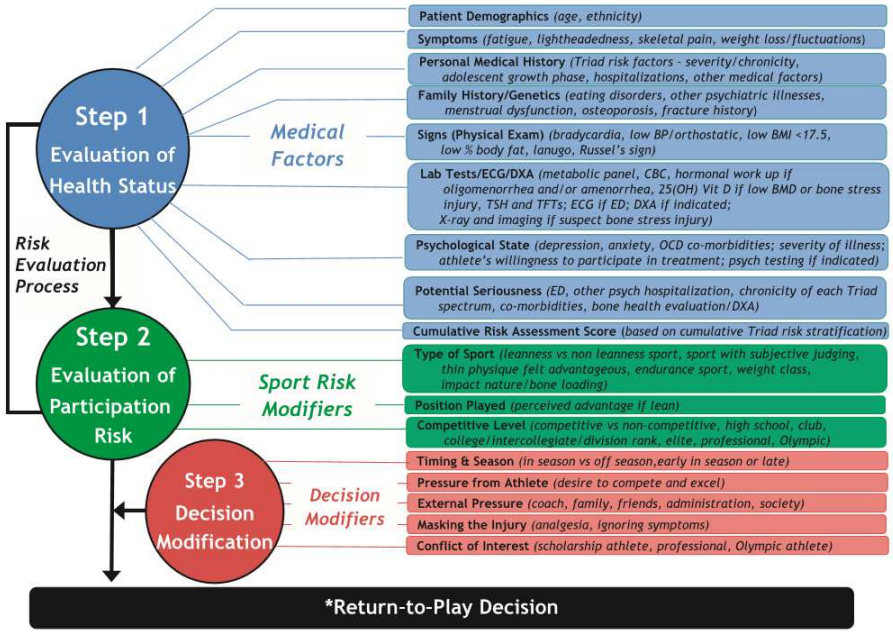

Figure 1: Decision-Based Return-to-Play (RTP) Model for the Female Athlete Triad. *RTP decision is determined by the primary care or team physician, and is based on a complex and comprehensive synthesis of health status, cumulative risk assessment, participation risk, sport and decision modifiers. 25(OH) Vit D, 25-hydroxyvitamin D; BMI, body mass index; BP, blood pressure; CBC, complete blood count; DXA, dual-energy X-ray absorptiometry; ED, eating disorder; OCD, obsessive compulsive disorder; TFTs, thyroid function tests; TSH, thyroid stimulating hormone [De Souza MJ, *et al* 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad: 1st International Conference held in San Francisco, California, May 2012 and 2nd International Conference held in Indianapolis, Indiana, May 2013.*Br J Sports Med* 2014;48:289.Used with permission]

Risk stratification, physical examination, laboratory workup, and electrocardiography (ECG) can help to determine if the athlete can continue with any level of sport participation, as well as identify those who should be managed at a higher level of care due to increased risk. Not all athletes are safe to manage as outpatients; some require increased levels of care, including intensive outpatient, partial hospital, residential, and inpatient care. Ultimately, these decisions are based on the athlete's medical and psychiatric stability. Importantly, an endurance athlete's low resting heart rate may not be the same indicator of depressed vital signs as it would be in a non-athlete. Unstable vital signs or inappropriate response to exercise and recovery may be more useful to measure in an athlete. Athletes who are suicidal and unable to contract for safety should be managed in an inpatient setting.

The treatment of ED in athletes should involve a multi-disciplinary team including a team physician, nutritionist, and MH care provider, preferably all with experience in taking care of athletes. If an athlete is part of a team or setting that includes a certified athletic trainer (AT), that AT is a key member of the athletic care network who often has closer, regular interaction with the athlete, and a better understanding of team and coach dynamics. An athlete's support team may also include parents, teammates, coaches, academic advisors, and others.

The initial goal of treatment, particularly for those who are underweight, is weight restoration aiming for at least 90% of ideal body weight. Psychotherapy has been found to be beneficial in treatment of eating disorders, with cognitive behavioral therapy (CBT) the primary modality for treatment. However, in a study of adolescents still at home, family-based therapy (Maudsley Family Therapy) was just as effective as individual therapy by the end of treatment and demonstrated a greater persistence effect over time[188]. Newer studies are looking at electronic CBT programs, which would help eliminate potential time and privacy barriers associated with attending counseling in person. However, the evidence on their effectiveness is currently equivocal[189].

The Food and Drug Administration has approved fluoxetine for bulimia nervosa and lisdexamfetamine for binge eating disorder, as there is some evidence to support their use for those conditions[190]. Importantly, stimulants such as lisdexamfetamine are banned in higher levels of sport without appropriate documentation and/or therapeutic use exemptions. In situations with comorbid MH diagnoses, psychotropic medications may have benefit in treatment of the comorbid conditions.

Exercise is beneficial in many MH disorders, and a review on exercise as treatment in ED demonstrated benefit in some individuals[191]. If continued exercise is felt safe for a given athlete, then clear guidelines, close monitoring, and possibly written contracts are suggested. This may be a way to empower a patient with disordered eating to commit to and participate in their treatment program.

Effect on Performance

Some athletes and coaches feel that calorie restriction and weight loss can improve sport performance. This is particularly prevalent in endurance sports such as cross-country and cycling. There are two theories that support an initial short-term improvement in sport performance with weight loss, including up-regulation of the hypothalamic-pituitary-adrenal axis, and potential increased maximum oxygen uptake[192]. However, long-term continuation of calorie restriction leads to progressive deterioration of sport performance[193].

The complications of DE can range from low energy to dehydration to potential electrolyte abnormalities. All of these can have negative impacts on sport performance[194]. Fogelholm outlined four pathways of reduced performance[193]: 1) Glycogen depletion can cause reduced physical and psychological capacity; 2) Increased circulating lactate can produce increased muscular pain with exercise; 3) Dehydration can limit performance through early fatigue, as well as through increased risk of muscle cramps and heatstroke; and 4) Loss of lean mass can lead to decreased muscle strength and aerobic performance.

Athletes who engage in excessive compulsive exercising may exercise more than they can recover and are at risk of overtraining syndrome (OTS). As athletic performance declines, this can exacerbate the psychological stressors leading to the excessive training in the first place. In a study of high school athletes with EDs, those with EDs were twice as likely to sustain a musculoskeletal injury. In another study that classified athletes according to risk category using the 2014 Consensus Statement, female athletes with moderate risk were twice as likely to sustain a bone stress injury compared to those classified as low risk, and high-risk athletes were four times as likely to sustain a stress injury compared to low risk athletes[195]. The direct impact on sport performance, as well as the indirect impact caused by injuries leading to time-loss from sport, are important consequences of EDs in athletes.

Prevention

Several studies have evaluated the impact of ED prevention interventions, with most showing a reduction in risk factors and decreased behaviors associated with DE. However, only one study evaluated the outcome of new ED diagnoses following a prevention program[196]. The one-year intervention was based on a social-cognitive framework, with a focus on enhancing self-esteem by strengthening self-efficacy. The nine-month follow-up showed no new cases of EDs in the intervention group, while 13% of female athletes in the control group developed EDs diagnosed by DSM-IV. While the authors evaluated female and male athletes, the data were significant only in females.

Other programs that have shown reduced behaviors of DE include peer-led educational programs, education targeted at coaches, and electronic programs[189, 196, 197]. Future research on prevention programs should focus on diagnostic outcomes and evaluate optimal timing to initiate interventions and retention of behavior improvements.

b. Depression and Suicide

1. Depression

Detection in Athletes

There is minimal data specific to athletes in terms of the prevalence of depression and suicide. Depression rates in college athletes are likely similar to their non-athlete peers in college populations. 23.7% of college athletes reported clinically significant depressive symptoms over a 5 year time period using a validated depression screening tool (the Center for Epidemiological Studies Depression scale) in the largest published study to date in the sports medicine literature[198].

Females are at higher risk for reporting depression symptoms than males in the general population and in the limited studies in athletes. In the available studies of depression in college athletes by gender, female athletes are twice as likely to report clinically significant depression symptoms compared to male athletes. Freshman college athletes appear to be more likely to report depressive symptoms when compared to upper classmen[199].

Other than age and gender, there are risk factors for depression that are more unique to athletes and may increase the likelihood of depression. Athletes can face expectations, both external and internal, that their non-athlete counterparts do not. These unique risk factors can be grouped into four categories: 1) an injury causing time away from sport (both competition and practice), 2) the time demands on student athletes (up to 40 hours per week can be spent in athletic commitments for a college athlete), 3) performance expectations (self-imposed or imposed by others such as coaches, peers, and family), and 4) an identity intrinsically linked to athletic participation[138].

The type of sport may also be a factor in likelihood of reporting depression symptoms. In one large study it was found that track and field college athletes reported a statistically significant higher rate of clinical depression symptoms than those in team-based sports. The authors noted that in an individual-based sport such as track there is only one winner in any given event, while in a team-based sport half the participants are winners[198].

The signs and symptoms of depression may be atypical in athletes. For example, a report of "lack of focus" in the athlete may not be a "lack of interest" in the sport but rather a sign of cognitive functional impairment resulting from depression. Anger, insomnia or hypersomnia, fatigue, or a change from prior level of function or behavior at home or school, are other examples of signs and symptoms that may present in athletes. Healthcare providers, coaching staff, and families should watch for types of coping mechanisms used by athletes, as some, such as substance use, are less healthy than others.

A personal history and/ or a family history of depression and other mood disorders are important in the evaluation of an athlete with possible depression, in addition to evaluation of the risk factors noted previously. A good history of prior injuries, especially injuries that caused loss of time from sport, can be helpful; an assessment of how the injuries impacted the individual as an athlete is also important. A history of prior concussions may be a possible risk for depression later in life as noted in a study of retired NFL athletes, but this has not been reproduced yet in any other population as a unique risk factor[129].

Screening tools for depression – such as the Centers for Epidemiological Studies Depression (CES-D), the Beck Depression Inventory (BDI), and the Patient Health Questionnaire 2 and 9 (PHQ2 and PHQ9) – have all been validated in a non-athlete population[200]. These tools do not make the diagnosis of depression, but instead are useful tools to identify those at risk for depression based on the clinically relevant depressive symptoms that are reported. None of these screening tools have been validated in an athletic population.

Management

One of the first steps in treatment is early recognition of depression in athletes. Healthcare providers should recognize that a concern about "performance", whether reported by an athlete or a coach, might in fact be a symptom of an underlying clinical condition such as depression or anxiety. Unrecognized or undertreated depression can also interfere with optimal recovery from an injury or other illness and can delay return to play[119]. For the athlete with depression, there should be a multi-disciplinary team approach; the team may include a MH care provider, ideally one familiar with athletes, a team physician, an athletic

trainer, and with permission of the athlete, the family and coaching and other professional staff.

When considering prescription medication in the management of depression in an athlete, there are several factors to consider that are more unique to an athletic population. The prescribing clinician and the athletic health care team should be aware if a medication might have a potential negative impact on performance. The healthcare provider and team should also be familiar of any side effects that may place an athlete at increased risk for injury, illness, or adverse outcome. Weight gain, sedation, and adverse cardiac effects are potential consequences of antidepressant medications. In addition, the healthcare team should also be aware of any performance enhancing effects and the classes of medications banned by governing athletic bodies, and the need for specific documentation regarding such medications. As a general principle, a conservative approach to prescribing medication for depression is preferable in the athlete with depression.

In an athlete with depression without comorbid anxiety, if the decision to prescribe a medication has been made, bupropion can be considered. An alternative for a medication to assist in depression management in an athlete is fluoxetine; this choice may be helpful if there is a comorbid eating disorder. There is some research that supports that fluoxetine does not have a negative impact on performance[201]; other selective serotonin reuptake inhibitors (SSRIs) may be reasonable options as well. If there is an anxiety comorbidity in an athlete, the healthcare provider could also consider SSRIs, such as escitalopram, sertraline, or fluoxetine[201].

Non-pharmacological treatment can play a critical role in the management of depression. Cognitive behavioral therapy, acceptance based therapy, and mindfulness approaches have all been used to treat athletes. None have been shown to be more effective than the others in athletes[138]. The non-pharmacological approach, like the pharmacological approach, should be tailored to the individual athlete and their particular clinical situation.

Effect on Performance

Significant functional impairment can result from depression in athletes. Though not well studied in the sports medicine literature to date, if motor or cognitive dysfunction is present, this could result in decreased reaction times or coordination being affected. If the athlete is injured, their depression can lead to poor adherence to the rehabilitation program and thus a slower return to actual competition. A depressed athlete may be less engaged in their sport due to a loss of pleasure in activities they previously enjoyed. Suicidality may be increased in the depressed athlete. Depression may lead to a disruption in important relationships such as those with family, teammates, and coaches. In addition, depression can cause other impairments such as sleep disturbance, which can negatively impact performance.

Prevention

Early recognition may provide an opportunity for prevention of more serious effects of depression. Healthcare providers should consider baseline evaluation of the athlete population using a validated screening tool. Consider early detection efforts in subpopulations such as those with known risk factors, for example, via follow-up depression screening after an injury that causes time lost from sport, and in first year athletes. Minimizing or eliminating depression risk factors is an important part of a prevention-based approach. These can include injury prevention programs, early identification and treatment for sports related concussions, peer support groups, and education of peers, coaches, and staff to recognize signs and symptoms of depression in athletes.

Suicide

Detection in Athletes

In a study of NCAA college athletes and suicide, over a nine-year period, there were 35 deaths from suicide identified from a total of 477 student athletes' deaths and 3.7 million participant seasons[202]. Suicide represented 7.3% of all-cause mortality for the NCAA student athletes, and the overall suicide rate for these athletes was 0.93/100,000 per year. This is lower than the suicide rate of 7.5 /100,000 among all college students[202]. In the same study, the suicide incidence was higher in males than females (1.35/100,000 versus 0.37/100,000). Of note, football players had the highest rate by sport, 2.25/100,000, and a

relative risk of suicide of 2.2, compared to other male non-football athletes. A study of retired NFL players, spanning a 50-year period, also found a lower than expected rate of suicide compared to a matched population. There were 12 suicide deaths in this retired NFL population compared to an expected number of 25 over the same time period[203].

The interplay between participating in athletics, depression, and suicide is complex and not well understood. For example, while exercise is an accepted form of treatment for depression, college athletes are likely to report depressive symptoms at similar rates as their non-athlete peers[198]. This may be because athletes have unique risk factors for depression as a result of their athletic pursuits. Depression increases the risk for suicide but it is unclear if there is a cause and effect relationship rather than an associative one. Furthermore, participating in athletics in college may provide peer and other support for the individual – a good thing – but at the same time an athlete may be more willing to engage in high-risk behavior with peers, which could contribute to depression and suicide risk[138].

Management/Prevention

Treatment is focused on prevention and early identification and intervention, as with depression. Awareness of suicide in athletes and educational programs aimed at athletes, healthcare providers, coaches, staff, and families are critical for identification of the athlete at risk and appropriate intervention. Many universities are proactively addressing suicide risk in their communities. A public health approach to these preventable deaths can be appropriate in the athletic population. Organizations such as the NCAA are developing educational tools and resources to help their member institutions with preventive approaches to suicide in student athletes. As with depression, a multi-disciplinary care team approach is key to the management of suicidality in athletes, early identification of those at risk, and implementation of proactive prevention programs.

c. Anxiety and Stress

Detection in Athletes

Anxiety has the potential to enhance or hinder athletic performance. Because some level of anxiety may be normative to sports and competitive environments, it may be difficult to detect the behavioral, physical, and cognitive symptoms of pathologic anxiety in athletes. There are no known validated athlete-specific anxiety screening tools. The GAD-7 is a screening tool that has been utilized and validated in the general population[204]. Some studies using general population screening tools to investigate prevalence of different anxiety disorders in athletes have suggested a slightly higher prevalence of many forms of anxiety in high-level athletes. Among the most relevant for athletes are panic disorder, generalized anxiety disorder (GAD), social anxiety disorder, and specific phobias as well as anxiety-related disorders of post-traumatic stress disorder (PTSD) and obsessive-compulsive disorder (OCD).

GAD has dominant cognitive symptoms that may result in the inability of the athlete to be cognitively present or mindful of the moment at hand. GAD occurs in approximately 3.1% of the general population in a given year[205]. While there are minimal prevalence data in athletes, six percent of elite French athletes had clinically significant GAD symptoms[206], and 7.1% of Australian athletes had clinically elevated GAD symptoms[149].

Panic disorder may result in athletes being hypersensitive to their own physiological sensations, such as increases in heart rate, and may lead to avoidance of situations that may cause panic attacks, such as a performance or competition. The prevalence of panic disorder is 2.7% in the adult populations[205] and is likely to be similar in athletes, with lifetime prevalence of panic disorder of 2.8% as reported in the elite French athlete population[206].

In athletes, social anxiety may involve the avoidance of a situation in which one may have difficulty being able to escape, e.g. practice, competition, social interactions, team meetings and meals, and services in the athletic training room. Trait levels of social anxiety were related to social evaluative fears in sport, and social anxiety was positively correlated with avoidance of individual sports but not team sports[207]. Lifetime prevalence rate for social anxiety disorder in the U.S. is estimated at 13%[208]. There are no reliable estimates of

social anxiety disorder in athletes; however, clinically significant social anxiety symptom rates as high as 22.2% in a male collegiate athlete population and 37.3% in a female collegiate athlete population have been reported[209].

In athletes, OCD may involve intrusive thoughts and rigid use of routines that cause impairment. Prevalence of OCD is estimated at 1.6%[205] in the general population, and 5.2% of a U.S college athlete population met full OCD criteria[210]. PTSD in athletes involves physiological symptoms and avoidance of athletic situations or triggers that are associated with the trauma experience. There is a PTSD prevalence of 6.8%[205] in the general population. Prevalence of PTSD in athletes is unknown; however, case studies of PTSD in athletes post-injury[211, 212] suggest that post-injury PTSD does occur in athletes.

The athletic environment contains multiple risks for anxiety dysfunction. The most common and basic anxiety trigger is athletic competition and fear of failure, or perceived negative consequences of an athletic performance. Social judgment is also a risk factor for anxiety in athletes. Crowd effects, coach or teammate judgment, ambiguous scoring procedures, and any situation in which others judge an athlete have the potential for a heightened anxiety reaction. Additionally, higher numbers of past severe injuries, past surgeries, and recent life events, higher levels of career dissatisfaction, and lower levels of social support were related to the occurrence of anxiety symptoms among both current and former elite athletes[213].

Management

Some psychotropic medications may be used in athletes to treat anxiety; however, as with medications for depression, caution is noted to understand any potential negative impact on athletic performance, potential athletic performance-enhancing effects, and potential safety risks[214]. The use of selective serotonin reuptake inhibitors, such as fluoxetine, is recommended for athletes, based on preliminary evidence that buspirone may interfere with performance, and lack of such evidence for SSRIs[215]. In general, as-needed anxiolytics are not recommended for athletic performance anxiety[216]. Beta-blockers can

be either performance enhancing or performance inhibiting and have been banned in various Olympic sports because of their ability to improve fine motor control[217]. In an International Society for Sports Psychiatry (ISSP) membership survey, the most commonly prescribed medication for anxiety by sport psychiatrists was the SSRI escitalopram[201]. ISSP members previously reported that they avoided benzodiazepines because of sedation, dependence, impaired reflexes and balance, and cognitive impairment[218].

Cognitive-behavioral therapy (CBT) for the treatment of anxiety is the primary non-pharmacological intervention. While there are no randomized controlled trials of CBT interventions specifically within athletes, CBT is well established as an effective treatment method within many other clinical populations[219]. These interventions generally include a combination of cognitive interventions and exposure to anxiety stimuli and should be delivered by a qualified CBT clinician who has experience providing services to athlete populations. Additional adjunctive treatments such as exercise, sleep management, mindfulness training, and diet change may also be considered in the context of pharmacological and cognitive behavioral interventions.

Effect on Performance

Anxiety has the potential to both enhance and hinder athletic performance based on the nature of the athletic task, appraisal of the anxiety by the athlete, and the physiological learning history of the athlete. The Yerkes-Dodson law states that an increasing level of anxious arousal has the potential to enhance performance up to a point, beyond which performance is decreased[220]. The behavioral, physical, and cognitive symptoms of anxiety may present particular symptom profiles that may hinder performance in unique ways. As the athlete attempts to control relevant thoughts, feelings, and body sensations (e.g., increased heart rate or respiration rate associated with athletic performance), the task of controlling anxiety may interfere with sport engagement. The result can be a cycle in which performance declines and distress increases. Specific implications of these problems often vary according to the forms of anxiety (e.g., panic, worry, etc.) that the athlete experiences. For example, athletes with GAD are likely to have performance difficulties or fail to perform to their potential due to continued worry and increased non-task related

cognitive activity; this may then hinder a state of flow or the ability to engage effectively over the course of a performance task. Athletes with panic disorder may misevaluate physiological responses that are a natural byproduct of their athletic task, and thus avoid performance situations.

Athletes with social anxiety disorder experience a shift of cognitive focus to self as opposed to task, as well as seek avoidance of certain social situations. This may lead to performance deterioration and increased risk of withdrawal from sport. Athletes with PTSD may have physiological symptoms resulting in increased muscle tension, hypervigilance, increased startle or fear response, and negative mood symptoms that may result in performance decline and potentially increased risk for injury. Additionally, athletes with PTSD symptoms may avoid triggers related to the trauma, which may include actions that are necessary for their sport performance (e.g., a specific route in football, set piece in soccer, or arm motion in baseball). Athletes with OCD may have impaired performance if intrusive thoughts interfere with present-moment attention or if they have extreme difficulty in stopping or completing the obsessive-compulsive routine in order to engage in the actual performance.

Prevention

Many athletes have normal 'state anxiety', meaning they become appropriately anxious before competition, but it does not permeate their entire life[221]. Consequently, primary prevention of anxiety may not be the most useful focus for elite athletes. Interventions exist to assist athletes in regulating anxiety prior to athletic performance, and preliminary studies have been done on secondary management of anxiety and rehabilitation following injury using mindfulness and CBT[222, 223].

d. Overtraining

Detection in Athletes

Overtraining syndrome (OTS) in athletes occurs when excessive training loads with inadequate rest or recovery periods lead to persistent sport-specific performance deficits combined with mood disturbances[224, 225]. Overtraining syndrome has been reported in

10% to 64% of athletes, appears to have increased risk at higher levels of sport, and has an increased risk of recurrence in an athlete who has been previously diagnosed[224]. Several confounding factors of the athlete lifestyle can contribute to increased risk for OTS including poor nutrition, illness, psychosocial stressors (work, school, coach, and team), and sleep disorders[224, 225].

Unfortunately, there are no current standardized diagnostic criteria for OTS. Performance testing using time-to-fatigue measures may be more sensitive for evaluating overtraining than graded exercise stress testing or anaerobic testing[226]. Baseline hormonal biomarkers have not been proven to help diagnose overtraining syndrome. However, a systematic review showed that athletes with overtraining syndrome (OTS) may have a blunted hormonal response to maximal exertion stress in prolactin, growth hormone (GH), and adrenocorticotropic hormone (ACTH) measurements[227]. While some athletes also had blunted catecholamine response to acute stress and others had exacerbated catecholamine response, this may be explained by the difference in endurance versus strength athletes[227]. A study in endurance athletes showed that changes in heart rate and lactate levels were useful to determine overreached athletes[228].

The psychological response to overtraining has been successfully evaluated using the Profile of Mood States (POMS) rating scale[224], a seven-question derivative called the Training Distress Scale (TDS), which may be more accurate[229], and a POMS energy index focused on the fatigue and vigor sub-scores[230]. Another test is the Recovery-Stress Questionnaire for Athletes (RESTQ-Sport) (see below)[231]. Perfectionistic concerns have been shown to predict training distress, which is a component of OTS[232]. Reaction time, attention measures, heart rate variability, and immune system function are all tests that have been evaluated for detection of overtraining without conclusive evidence at this time.

Management

There is also no single universal ideal biological marker to guide the management of OTS. Blood lactate level may be useful, as it has an inverse relationship with muscle and liver glycogen levels. Although lactate levels should not be used alone in monitoring OTS, one

finding is that athletes with OTS have diminished maximal lactate concentration levels, while submaximal levels are within normal limits[224]. Along with blood lactate, monitoring heart rate is important, and can identify almost 90% of athletes who may be developing OTS[224]. Measuring creatine kinase and heart rate variability are two other biologic markers that have been studied to manage OTS with mixed results[231].

Mood disturbances may be a part of the clinical diagnosis of OTS and should be monitored in the athlete with suspected OTS. The Recovery-Stress Questionnaire for Athletes (RESTQ-Sport) is one such tool. It is a 77-point form that inquires about stress (general, emotional, and social), conflicts and pressure, fatigue, lack of energy, and somatic symptoms as well as recovery scales and sport specific stress scales[231].

A management approach to the athlete with OTS should be individually developed. It should include relative or absolute rest depending on the clinical situation at the time. The use of medications (e.g., antidepressants) to assist in treatment is still controversial at this time, and they should be used with caution and a full awareness of the potential side effects. Good sleep hygiene and proper nutrition may be useful for the athlete in recovery. Of note, a high carbohydrate diet has been studied in a small cohort (n=56), with some promising results for the management of OTS[224].

The physical demands and the psychological factors that contribute to the development of OTS should be addressed as part of the individualized treatment plan of the athlete with OTS. Recovery from OTS, once properly recognized and managed, can be measured in weeks to months to years, adding to the challenge of this condition in athletes.

Effect on Performance

By definition, performance is negatively affected in the athlete with OTS. "Underperformance syndrome" has been used in the literature to more accurately describe the overtrained athlete. If the goal of training is to provide loads that result in performance improvement, then overtraining syndrome results in performance decrement. In OTS, there

is an accumulation of stress that causes longer-term decrease in performance, and that may include physiological and psychological changes as well as the consequences of dysfunction in these areas[233]. The difference between "overreaching" and "overtraining" described in the literature involves a two week cut off – i.e., a two-week period of adequate recovery that results in the resumption of prior performance levels is typically called overreaching in an athlete, and recovery requiring more than two weeks may raise the possibility of OTS[233].

A core component of OTS is the lack of ability to sustain intense exercise resulting in a decrement in performance capacity. Thus, an athlete with OTS may be able to start a training run at their normal pace but be unable to complete the normal training load. Performance testing can be used to measure the extent of this negative impact on performance in an athlete, and this may include time to fatigue tests, time trials, or sports specific performance tests.

Prevention

Monitoring training loads, getting adequate rest periods, and maintaining optimal nutrition and hydration status are all important in preventing the development of OTS[224]. Unfortunately, specific protocols are not known at this time, and this will likely require individual athlete program tailoring. Documenting training loads using rate of perceived exertion (RPE) and duration of training is important when athletes have shown different perceived training loads than their coaches may intend[234]. The use of psychological mood monitoring to guide training loads has been shown to decrease risk of staleness, a key risk component in OTS[235].

e. Sleep disorders

Detection in Athletes

There is a paucity of data associating sleep disorders in athletes with physical and MH disorders. In college students, there is a high prevalence of common mental disorders comorbid with sleep disorders; students who experienced poor sleep quality had a 2.4 times

higher odds of depression, anxiety, and somatoform disorder than those students with good sleep quality[236]. The prevalence of poor sleep quality with high levels of daytime sleepiness in athletes is as high as 50% to 83%[237, 238], and prevalent poor sleep quality has also been shown in elite athletes with disabilities[239].

Symptoms associated with insomnia can include lack of concentration, irritability, and depression. During yearly psychological evaluations of elite athletes assessed for insomnia symptoms, ongoing sleep problems were reported by just over 20%, with difficulty falling asleep and nocturnal waking reported more often in women[206].

Obstructive sleep apnea (OSA) has been linked to cognitive impairment and mood disorders[240, 241], but few studies look at the prevalence in athletes. Physical characteristics of athletes in certain sports such as American football and rugby may predispose them to OSA[238]. American football players exhibit several risk factors for OSA, including large neck circumference and high body mass index. The prevalence of sleep disordered breathing among collegiate football players is estimated to be eight percent[242], and the rate of OSA in professional football players exceeds the population with a 5 to 11 times greater risk[243].

The Athlete Sleep Screening Questionnaire is a specific screening tool for athletes with sleep disorders that has been clinically validated [244]. The Insomnia Severity Index[245] and the STOP-Bang Questionnaire[246] are two reliable and valid questionnaires designed for the general public that may also be used for athletes.

Management

High quality research, while not specific for athletes, has established that insomnia-specific cognitive behavioral therapy (CBTi) is first line treatment for sustained improvements in sleep in those with insomnia alone or insomnia comorbid with other conditions[247, 248]. One large study found that 60% of team sport athletes had no strategy to overcome poor sleep compared with 33% of individual athletes, who utilized simple relaxation and reading techniques[249].

Extending sleep to a minimum of 10 hours a night has been shown to improve mood in elite athletes[250, 251]. Sleep education and optimization programs have led to significant improvements in self-reported total sleep time, sleep efficiency, fatigue, and vigor in athletes[252].

Athletes may prefer a "natural" solution to assist with their sleep problems. Research studying the influence of nutritional interventions is minimal and somewhat inconclusive. A review of multiple studies, none specific to athletes, concluded that diets high in carbohydrate may result in shorter sleep latencies, those high in protein may result in improved sleep quality, and those high in fat may negatively influence total sleep time[253].

High quality randomized controlled trials (RCTs) exploring sleep medications' influence on reliable measures of athletes' mental and physical performance are lacking. With benzodiazepine sedative hypnotics, individuals can have a marked 'hangover' effect, and reaction time can be negatively impacted[254, 255]. There is mixed evidence as to whether non-benzodiazepine benzodiazepine receptor agonist hypnotics such as zolpidem show impairment on measures of psychomotor and physical performance[256-258].

Although melatonin is the first choice of psychiatrists for the treatment of insomnia in athletes[201], research investigating its use for primary insomnia is inconclusive. There is no evidence that melatonin is effective in the management of most primary sleep disorders with short-term use, although it may reduce sleep onset latency (the length of time it takes a person to go from complete wakefulness to the first stage of sleep) for persons with delayed sleep phase syndrome, where the sleep/wake cycle is delayed with respect to the external day/night cycle. Evidence does suggest that short-term use of melatonin is safe[259]. While no decrements in performance were observed the next morning after athletes ingested melatonin, it was not shown to improve their sleep quality[260]. Exogenous melatonin is not regulated by the Food and Drug Administration (FDA) and therefore elite athletes enrolled in a drug testing program must use this over-the-counter (OTC) supplement with caution as purity cannot be guaranteed. The prescription medication ramelteon, a melatonin

receptor agonist, carries a longer half-life than melatonin and therefore has a greater likelihood of causing hangover effect; it has also not been studied in athletes[261].

Although trazodone is approved in the United States for the treatment of depression, it is more commonly prescribed off-label for insomnia. No studies have been done in athletes, and only one RCT comparing treatment with trazodone, zolpidem, and placebo found an absence of significant efficacy for trazodone, but significantly more side effects including headache and somnolence[262].

Antihistamines and other first-generation antihistamines are often included in OTC sleep medications; however, they can have adverse anticholinergic properties (such as dry mouth and urinary retention), and a quicker onset of tolerance and longer duration of action than many prescription sleep aids. There is weak evidence demonstrating an absence of efficacy in the treatment of sleep onset insomnia, with minimal evidence of adverse events in excess of placebo[263].

The primary treatment for OSA is continuous positive airway pressure (CPAP) and weight loss as indicated, though the latter is impractical for athletes in certain sports. No athlete-specific studies have been performed.

Effect on Performance

Sleep plays a major role in recovery and performance capacity in elite athletes. Studies in athletes and non-athletes have linked decreases in both the quality and duration of sleep with detriments in overall health including impaired cognitive functioning and judgment, mood problems, and somatic symptoms[264], as well as an increase in perceived physical exertion and decrease in pain tolerance[265]. As sleep deprivation may cause or modulate acute and chronic pain, and pain may disturb sleep by inducing arousals during sleep, these two issues can augment each other, and a continuous pain cycle can develop[266].

Athletes diagnosed with OTS showed decreased sleep quality, leading to the conclusion that worsened sleep was likely a trigger[267]. Seventy percent of athletes who had disrupted

sleep prior to a competition had negative moods of fatigue and tension[268].

Sleep loss is associated with an increase in both sympathetic activity and catecholamine levels, which, over time, may lead to altered stress system responsiveness, similar to that seen in mood disorders[269]. Sleep deprivation is also a risk factor for illicit substance and alcohol use, violence-related behaviors, and motor vehicle accidents[270-272]. While this can certainly affect performance, whether or not this translates to athletes is unknown.

Prevention

The prevention of sleep disorders and poor sleep habits starts with the identification and elimination of risk factors and behaviors that would reduce the quantity and quality of sleep, establishing and maintaining a regular sleep routine, and ensuring adequate sleep duration depending on age and hours of training each day. Healthcare providers should discourage the use of computers and other tech devices, and the watching of screens before bedtime, as these may perpetuate sleep deficiency and disrupt circadian rhythms, which can have adverse impacts on athletic performance[273]. Recognize that excessive worry and anxiety related to training, competition, academics, or personal relationships may cause significant emotional reactions that decrease sleep quality.

While athletes are often advised to not exercise prior to bedtime due to potential overstimulation, evening exercise (two to four hours before bed) has not been associated with worse sleep[274, 275]. High exercise levels are also related to improved sleep and psychological functioning. Adolescent athletes who trained almost 18 hours a week (versus 4.5 hours a week for the control group) reported better sleep patterns including higher sleep quality, shortened sleep onset latency, and fewer awakenings after sleep onset. They also reported less tiredness and increased concentration during the day, and significantly fewer anxiety and depressive symptoms[276].

f. Attention-Deficit/Hyperactivity Deficit (ADHD)

Detection in Athletes

Attention-Deficit/Hyperactivity Deficit (ADHD) is an important issue for the team physician taking care of athletes. The healthcare provider should be familiar with making the diagnosis of ADHD, the basic management of ADHD, and how medications used to treat ADHD impact exercise and performance[277-280]. The diagnosis of ADHD should be made when the individual meets the DSM-5 criteria and after the careful evaluation and consideration of competing comorbid diagnoses.

Management

The optimal management and treatment approach for ADHD is an individualized one that includes behavioral therapies and consideration of medications[280-286]. Assessment of the athlete's history and background, support structures, psychiatric and medical comorbid diagnoses, and prior responses to interventions including compliance and medication side effects, is recommended.

The decision to use medications during sport is one that should be made on an individual basis, and team physicians should be aware of the effects of medication treatment options on certain sport and athlete-specific situations. The fear of potential misuse of stimulants or other recreational drugs is not justification for withholding pharmacologic treatment of ADHD[287-289] unless there are other risk factors for substance misuse in an individual athlete. There is also some data to suggest that exercise in and of itself can improve cognitive performance in children with ADHD[290].

Though groups offer different guidelines, there is insufficient evidence to recommend routine electrocardiogram (ECG) or additional cardiac testing in athletes without cardiac disease who are on medications for ADHD, unless they are simultaneously on other medications that may impact cardiac health, such as tricyclic antidepressants. The American Heart Association (AHA) recommends ECG with nearly all treatments for ADHD[291]. The American Academy of Pediatrics (AAP) states that there is no need for ECG with stimulant treatment unless there is concern for cardiac disease[292-294]. If an athlete is at risk by history, family history, and/or physical examination, then ECG and additional work up is indicated[295]

There is also no evidence to support withholding stimulant treatment for ADHD due to a fear of sudden cardiac death; however, athletes should be monitored for signs and symptoms suggestive of cardiac disease[296-298]. A very large retrospective cohort study of over 1.2 million children and young adults and 2.5 million person years follow up, including almost 375,000 person years of current use of ADHD drugs, did not find any increased risk of cardiovascular events for users of ADHD drugs[299].

Team physicians should be aware of and educate athletes on regulations and requirements with pharmacologic treatments of ADHD. Team physicians and athletes should use resources provided by the International Olympic Committee (IOC)[300], National Collegiate Athletic Association (NCAA)[301], and World Anti-doping Association (WADA)[302], depending on their level of competition, to determine what medications and/or methods are permissible and/or require a Therapeutic Use Exception (TUE) in order to participate. The IOC and WADA allow for the use of stimulant medication, with a therapeutic use exemption (TUE) form completed. At the NCAA level, stimulants are only allowable for ADHD if institutions are able to submit the "NCAA Medical Exception Documentation Reporting Form to Support the Diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) and Treatment with Banned Stimulant Medication" and supporting documentation to the NCAA in the event the athlete tests positive for stimulants. This documentation must include: comprehensive clinical evaluation using DSM-5 criteria; blood pressure and heart rate readings and comments; diagnosis, medication(s) and dosage; and confirmation that non-stimulant medications have been considered.

Effect on Performance

The athletic care network must be aware of the athlete's medications and how the athlete is taking them, as use may vary with individual athlete preference. Some athletes will only take medications episodically for school testing or for studying purposes, whereas others feel that their sport performance is improved on stimulants. Some athletes temporarily stop taking them so that their sports play appears more random or unpredictable to opponents, which they feel improves their performance[303]. When an athlete first starts taking

medication, it is important to consider that the medication may affect exercise and performance; thus, medication is best initiated in a low stress (e.g., captain's practice) versus high stress (e.g., game) activity[277].

There may be an increased risk of heat injury in athletes taking medications for ADHD, specifically stimulants and buproprion (the latter has been used off-label to treat ADHD)[201]. Some evidence suggests that athletes taking stimulant medications have elevated core temperatures while exercising, though an increased incidence of exertional heat injury or heatstroke in these groups has not been reported[304-307]. Although evidence for the ergogenic effect of medications to treat ADHD is unclear, these medications are often used and misused because of this perception[201, 308-310].

VII. Summary

The primary goal of this AMSSM position statement is to assist the team physician and other members of the athletic care network with the detection, treatment, and prevention of a select range of psychological issues and MH disorders in athletes. An important component of management is an understanding of pharmacological treatment options including those that may be the most effective with the fewest side effects. This document also addresses topics not fully explored in previous publications about MH in athletes. Critical insight is needed into key personality issues (e.g., “athlete identity”), demographic and cultural variables (e.g., sexual orientation, gender identification), and environmental conditions (e.g., hazing, bullying, sexual abuse) that can impact athletes, and how interactions among these variables may contribute to MH issues. It is important for the athletic care network to be attuned to risk factors for MH disorders, and to monitor athletic environments that may trigger or exacerbate psychological issues in athletes under their care.

We acknowledge the limited evidence-based data specifically addressing the athlete, and AMSSM supports continued research in this area to validate the optimal strategies for the detection, management, and prevention of MH disorders in athletes. Although not specifically addressed due to the already large scope of this position statement, AMSSM also

supports research looking at the potentially increased risk of depression and other MH disorders after sports-related concussions in athletes.

The following summary conclusions and recommendations include:

Personality Issues

1. High athletic identity is associated with both positive and negative health and performance outcomes. (SORT B)[8]
2. Personality traits and disorders deemed problematic for athletes may be best addressed via psychotherapy. (SORT C)[9]

Sexuality and Gender Issues

1. The creation of a strong supportive environment that is welcoming to sexual minorities is key to the MH of the athlete and the sports team. (SORT A)[10-11]
2. Reducing the risk of negative health consequences for the sexual minority athlete starts with education of all stakeholders associated with athletic participation. (SORT C)[12-14]

Hazing

1. Hazing leads to both short- and long-term health ramifications that can affect an individual's athletic success and ability to participate in sport. (SORT C)[15].
2. The prevention and management of hazing requires a global investment from athletes, coaches, administrators, and healthcare providers centered on a zero-tolerance policy for any form of maltreatment and a focus on positive team building activities that promote dignity and teamwork as opposed to victimization. (SORT C)[16]

Bullying

1. Bullying in athletics can take on many different forms and be the actions of teammates or coaches. Signs and symptoms of being bullied may vary greatly. (SORT C)[17]
2. Preventing bullying is the responsibility of all the stakeholders in athletics. Educational programs can be found on the NCAA website. (SORT C)[17]

Sexual Misconduct

1. Authority figures are more often perpetrators of sexual abuse, but peer athletes are far more likely than coaches to be perpetrators of sexual harassment. (SORT C)[18, 19]
2. Populations at higher risk for sexual abuse in youth sports reflect trends in the general population. Those participating at higher levels of competition are also at an increased risk. Sport type, amount of touching, or degree of clothing cover during participation do not appear to correlate with higher rates of abuse. (SORT C)[20-23]

Transitioning from Sport

1. Athletic departments, national governing bodies and professional leagues should assist athletes who are retiring from their sport with development of a comprehensive pre-retirement plan addressing issues surrounding their transition out of athletic participation. (SORT A)[24]
2. Long-term psychological effects of career-ending injuries are common for many athletes. (SORT C)[25]

Psychological Response to Injury and Illness

1. Psychological and sociocultural factors have been raised as potential *risk factors* for injury. Stress consistently demonstrates a relationship with injury risk as well as the ability to rehabilitate from injury and return to sport (SORT B)[25, 26]
2. Cognitive, emotional and behavioral responses to injury are important in determining outcome. (SORT C)[27].

Self-Medication in Response to Injury/Illness

1. Limited data exist on the use of self-medication by athletes as a coping mechanism. However, certain demographics of athletes are emerging as higher risk groups for medication misuse and for negative MH and other consequences of their use. (SORT C)[28, 29]
2. Targeted interventions that incorporate health and athletic performance considerations tend to be more successful for the athletic population, and this includes addressing the underlying issues leading to substance use/self-medication. (SORT C)[30-32]

Eating Disorder/Disordered Eating

1. Annual pre-participation screening for eating disorders in athletes should be routine. SORT C[33-39]
2. Eating disorder prevention programs have benefit in reducing risk for eating disorders. (SORT B)[33-36, 39-42]
3. Cognitive behavioral therapy (CBT) and family therapy are recommended as treatments for eating disorders in athletes. (SORT B)[33-36, 40, 43]

Depression and Suicide

1. Athletes have unique risk factors for depression compared to non-athletes. Early recognition and appropriate management of depression in athletes lead to improved clinical and performance outcomes. (SORT C)[44]
2. College student-athletes report depression symptoms at a higher prevalence than previously reported; these rates are comparable to non-athlete college students. (SORT B)[45]
3. Suicide incidence in college student athletes is lower than in college student non-athletes. Football has the highest suicide rate by sport in college athletes. (SORT B)[46]

Anxiety/Stress

1. Cognitive-behavioral therapy (CBT) for the treatment of anxiety is the optimal non-pharmacological intervention. CBT is an established and effective treatment method for many clinical populations with different types of anxiety disorders, but there are no randomized controlled trials of CBT interventions specifically within athletes. (SORT B)[47]
2. While selective serotonin reuptake inhibitors may be considered, as-needed anxiolytics are not recommended for athletic performance anxiety. (SORT B)[48-49]

Overtraining

1. A management approach to the athlete with overtraining syndrome should be individually developed and should include evaluation for MH stressors and relative or absolute rest depending on the clinical situation at the time. (SORT C)[50]
2. Monitoring training loads, getting adequate rest periods, and maintaining optimal nutrition and hydration status are all important in preventing the development of overtraining syndrome. (SORT C)[51]

Sleep

1. While not specific for athletes, insomnia-specific CBT is first line treatment for sustained improvements in sleep in those with insomnia alone or insomnia comorbid with other MH disorders (SORT A)[52-53]
2. Benzodiazepine sedative hypnotics are not recommended for athletes because of their marked 'hangover' effect, which includes a negative impact on reaction time (SORT A) [54-55]
3. While melatonin has not been shown to improve sleep quality in athletes, short-term use is safe with no decrements in performance. (SORT A)[56-57]. Because melatonin is not regulated by the FDA, caution for the presence of impurity is necessary and it should be purchased as a single-ingredient product from a reputable company.

Attention Deficit Hyperactivity Disorder (ADHD)

1. The optimal management approach for ADHD is individualized and may include behavior therapies, academic accommodations, pharmacotherapy (e.g. atomoxetine, amphetamine salts, or methylphenidate formulations), and psychological interventions to manage associated features and comorbid diagnoses. (SORT C)[58-61]
2. The risk of heat illness may be increased in athletes taking ADHD medications. Those taking stimulant medications have elevated core temperatures while exercising, although an increased incidence of exertional heat injury or heatstroke in these groups has not been reported. (SORT C)[62-65]
3. Team physicians should be aware of and educate the athlete on regulations and requirements regarding medication treatment of ADHD. (SORT A)[66-68]

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