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CHILD AND ADOLESCENT DISORDERS (TD BENTON, SECTION EDITOR)

Mental Health in the Young Athlete

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Abstract

Purpose of Review The goal of the present paper is to provide a comprehensive overview of mental health concerns in young athletes, with a focus on common disorders, as well as population-specific risk factors.

Recent Findings Athletes experience similar mental health concerns as non-athlete peers, such as anxiety, depression and suicidal ideation, ADHD, eating disorders, and substance abuse. However, they also experience unique stressors that put them at risk for the development or exacerbation of mental health disorders. Student athletes have to balance academics with rigorous training regimens while focusing on optimal performance and managing high expectations. Physical injuries, overtraining, concussion, sleep disorders, and social identity are some of the factors that also impact the mental health of student athletes.

Summary Existing literature highlights the need to develop proactive mental health and wellness education for young athletes, and to develop services that recognize the unique needs of this population.

Keywords Athletes · Sport · Mental health · Injury · Risk factors

Introduction

Approximately 8 million youth participated in interscholastic high school sports in the 2018–2019 school year in the USA, and 57.6% (54.0–61.2) of high schoolers played on at least one school or community sports team in the last 12 months [1, 2]. In addition, there are more than 460,000 NCAA student athletes competing in 24 different sports every year [3]. In addition to the physical benefits of participating in sports, numerous mental health and social benefits have been shown to be associated with participation in youth sport, including feelings of competence and confidence; emotional control and regulation; positive self- and social concept, body and self-esteem, and self-efficacy; physical and psychological resilience; positive social skills, functioning, and interactions; a sense of belonging, cooperation, connectedness, and teamwork; sportsmanship and conflict resolution skills; and development of character and sense of self [4]. Sport participation has also been shown to be related to less emotional distress, hopelessness, depressive symptoms, and suicidality in some studies [5–7], and team sports may be particularly related to better health [4]. However, young athletes are afflicted with the same behavioral health concerns as non-athletes [8], and in some instances, at higher rates, such as in the case of eating disorders. While physical activity and sport have been shown to benefit both physical and mental well-being [4, 9, 10], there are times when participation in sport and sport-related stressors may contribute to decreases in behavioral health functioning.

Mental health conditions are increasingly prevalent among US adolescents, and recent epidemiologic data suggest that rates of disorders are increasing. Epidemiologic studies of anxiety disorders among youth estimate that more than 30% will be affected during their lifetimes and that greater than 14% will be affected by depression or a mood disorder [11•]. Furthermore, suicide remains the second leading cause of death for US adolescents [12]. Several well-designed

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studies describe prevalence and incident rates for anxiety and depressive disorders among youth; however, few well-designed studies document the prevalence of these conditions among competitive and elite athletes. Existing studies on the mental health of young athletes compared with the general population of age matched non-athletic peers suffer from inconsistent methodologies, variations in definitions of depression/anxiety, small populations, and other design challenges that have produced mixed results [13]. Early studies suggested that student athletes were less likely to experience mental health conditions than non-athletes when transitioning to college because of sports participation. It was believed that student athletes had higher self-esteem and more social connectedness because of their status, and that these factors were protective of mental health [14]. However, more recent studies have shown that athletes are no less likely to experience mental illness than the general population [15, 16]. With increased prevalence of mental health conditions in the general adolescent and young adult population, prevalence in student athletes is also likely increasing.

Adolescence and young adulthood is a sensitive developmental stage with periods of developmental (e.g., changes in growth, maturation, and brain reorganization) and social transition (e.g., middle school to high school and high school to college). As youth enter adolescence and young adulthood, sports become more competitive, academics become more challenging, abstract and future thinking are developed, and peer and family relationships and social networks are often changing. It is a time when coping mechanisms can be challenged, and concurrently, it is when many mental health concerns begin to emerge or become exacerbated, such as depression, anxiety, eating disorders, substance abuse, and suicide. While some young athletes use sport to manage behavioral health problems, others succeed in sport despite behavior health disorders, and for others, sport participation may contribute to behavioral health problems. Further, some sport-specific characteristics can contribute to behavioral health concerns, such as lack of playing time, playing with or recovering from physical injury, concussion, overtraining and sport-specialization, preparation for participating "at the next level," hazing, sleep deprivation, changing of interest or retiring from a sport when that sport is part of the student athlete's identity and social network, and conflicts with coaches and teammates and even parents. In addition, high school training expectations and media exposure are increasing at younger ages, contributing the professionalization of youth sports when athletes may not be developmentally ready to manage such pressures [17•]. There is little research on the impact of these factors on the young athlete's mental health.

Characteristics of young athletes need to be considered when assessing, diagnosing, and treating mental health conditions. Athletes are often held to high functional standards and have perfectionistic attitudes, and they often minimize the notion of anything that can be perceived as flawed or weakness. Further, there is a culture of putting on a "game face" and young athletes are often encouraged to "suck it up," which may inhibit disclosure of concerns or injuries, thereby delaying seeking care. Also, athletes often have rigorous training schedules, routines, and eating habits aimed at achieving peak performance, which can also mask an actual mental illness. Athletes may also minimize symptoms for fear that they will need to stop participating in their sport to receive treatment. Balancing academics and athletics schedules can also leave the perception of little time to engage in therapeutic care. In addition, young athletes may face greater stigma, stereotypes, and barriers to treatment than the general population [18••]. For example, given research on the benefits of exercise and physical activity on mental health and overall functioning, athletes, parents, coaches, and clinicians may not identify a behavioral health problem or athletes may have difficulty accessing appropriate services because of the mindset that athletes are "immune" to behavioral health diagnoses. Those with sub-clinical symptoms may be at particular risk, thus inhibiting identification and preventative treatment. Research has shown that stakeholders such as athletes' parents, coaches, teammates, athletic trainers, administrators, and the sporting environment facilitate or inhibit athletes' attitudes and opinions and behavior toward mental health services [18••]. Another reason athletes may not obtain appropriate care is the lack of research in this special population due to the assumption of a low prevalence of behavioral health conditions. Further, athletes may receive inequitable care, particularly lower rates of prescription of medication to improve mental health functioning due to considerations of National Collegiate Athletic Association (NCAA) and World Anti-Doping Agency (WADA) standards, safety for use in athletic activity, and considerations that they do not hinder performance or are ergogenic [8] (i.e., performance enhancing).

Existing literature highlights the need to develop proactive mental health and wellness education for young athletes, and to develop services that recognize the unique needs of this population [19]. Mental health in young athletes is being increasingly recognized and addressed, although much more research is needed in this population. In 2015, an interassociation consensus statement was published on developing a plan to recognize and refer secondary school student athletes with psychological concerns [20]. In 2016, the NCAA outlined *Mental Health Best Practices* that collegiate athletic departments should enact, including creating procedures for pre-participation mental health screenings, creation of identification and referral systems of qualified and licensed clinicians who are easily accessible, create mechanisms to awareness of mental health services availability, and promoting an environment that supports mental well-being and resilience [21]. This review will broadly focus on common clinical mental health conditions in the young athlete, as well as risk factors that may

contribute to the development or exacerbation of mental health disorders.

Anxiety Disorders

Anxiety disorders are the most common mental health conditions of adolescence affecting more than 30% of youths ages 13 to 17 years among the general population of youth and the most common college student mental health problem [22]. Epidemiologic studies show that 11.9% of college students suffer from anxiety disorders at any point in time, with social phobia (a form of specific phobia) having the earliest age of onset and panic disorder, generalized anxiety disorder (GAD), obsessive-compulsive disorder (OCD), and post-traumatic stress disorder (PTSD) occurring later. These findings suggest that many students may in fact develop panic, GAD, and PTSD as older adolescents during their college years [23]. According to the American College Health Association's annual survey, 1 in 6 college students had been diagnosed with an anxiety disorder or had been treated for that condition within the year prior to the survey [24]. They further found that 62% of the undergraduate population reported experiencing overwhelming anxiety at some time during the academic year. Fewer studies have focused specifically on student athletes. For college athletes, one study found that over 85% of athletic trainers believed that anxiety was a problem among their student athletes. However, when comparing student athletes with their non-athlete peers, across eight surveys from 2008 to 2012, fewer student athletes reported experiencing anxiety within the last 12 months. Among student athletes, 31% of males compared with 40% of male non-athletes, and 48% of female student athletes compared with 56% of female non-athletes reported anxiety. Although not as high as non--athletes, a substantial portion of athletes reported experiencing anxiety, which may cause impairment in physical, academic, and social functioning [25•]. It is notable that for student athletes, rates of anxiety are generally higher for female athletes compared with their male student-athlete counterparts.

Depression and Suicide

Depression rises sharply as children transition to adolescence —when rates of depression begin to approach those of adult levels. Data from the National Comorbidity Survey suggests that 11.7% of adolescents will meet criteria for a lifetime major depressive disorder [26] with more recent data reporting increasing rates of depression among American youth. In a recent study examining depression among 12- to 20-year-olds in the USA, the 12-month prevalence rates of depression were found to have increased from 8.7 to 11.3% between 2005 and 2014 [11•]. Similar trends have been noted on college campuses with rates of depression ranging from 21 to 36.4% of college students reporting depression. A recent study completed by the World Health Organization of 14,317 college freshmen found self-reported lifetime prevalence rates of 21.5% for lifetime major depression and 18.5% in the previous 12 months [27].

Reported prevalence rates for depression vary widely for student athletes ranging from 10 to 23.7% Studies of depression among student athletes have yielded inconsistent findings with some reporting rates of depression that are much lower than non-athletes [14–16, 28] and others suggesting rates that are similar to the population of non-athletes [29, 30]. Studies examining depression and anxiety among athletes have used inconsistent study designs and instruments to measure depression and anxiety with varying levels of validity. However, studies consistently report higher levels of depression among female athletes than their male counterparts. In a well-designed study, Wolanin et al. used the Center for Epidemiological Studies Depression Scale (CES-D) to assess depression among 465 college athletes over 3 years. Results indicated that 23.7% of athletes reported clinically relevant level of depressive symptoms, with 6.3% reporting moderate to severe depression, similar to rates among non-athletes [29]. They further found that females, especially those involved in track and field, had the highest rates of depression on the CES-D, suggesting that the type of sport might play a role. Several studies suggest that athletes competing in individual sports were more likely to become depressed than those in team sports, potentially linked with attribution after failure [8]. Drew and colleagues [31] assessed depression and anxiety among 185 student athletes finding that 31% endorsed symptoms of depression and/or anxiety, with depression prevalence findings lower than college non-athletes.

Suicide, while not a psychiatric disorder, is the second leading cause of death among college students. A recent large survey of more than 8000 college students found that 6.7% reported suicidal ideation, 1.6% reported having a suicide plan, and 0.5% reported making an attempt in the last year [32]. Similar to other studies of student athletes, suicide rates and non-suicidal self-injurious behaviors appear to occur much less commonly among student athletes than among college students who are not athletes [33••]. In a retrospective cohort study examining suicide incidence among NCAA athletes, Rao and colleagues found incidence rates of 0.93/100,000 for student athletes compared with 7.5 suicides/100,000 among non-athletes. These findings are similar to the studies of suicide risk for high school athletes [34, 35].

ADHD

Attention-deficit/hyperactivity disorder (ADHD) is the most common neuro-developmental disorder diagnosed in childhood [36–38]. Although estimates have varied based on the specific samples being used and changing diagnostic criteria over time, a recent meta-analysis of 175 worldwide studies

with ADHD prevalence estimates yielded a pooled estimate of 7.2% [39]. The 2016 national survey data from the USA indicated higher numbers, estimating 6.1 million US children ages 2–17 (9.4%) were found to ever have had a diagnosis of ADHD in their lifetime [40]. Of those 6.1 million, 5.4 million currently had ADHD at the time of the survey which was 8.4% of all US children 2–17 years of age. Given these numbers, it stands to reason that ADHD within youth sports is likely to be common. A recent review of ADHD in young athletes found the prevalence ranging between 4 and 14.3%, which is consistent with overall youth prevalence rates [37].

Beyond prevalence rates, the impact of ADHD symptoms upon young athletes is quite significant. There has been much recent attention comparing the neurocognitive deficits of athletes with ADHD to the deficits associated with ADHD in the general population. Although no well-understood explanations have been posited, and despite consistent findings that the rates of ADHD is not greater in athletes compared with the general population, there does seem a relationship between ADHD and increased neurocognitive deficits in athletes as compared with the general population [37]. Given the increased attention upon concussions in youth athletics due to the significant impact of concussion symptoms on mental and physical health and future overall functioning, the impact of ADHD diagnosis and symptoms on concussion symptoms has also been closely investigated. In recent years, there has been emerging research demonstrating relationships between ADHD and concussions. Athletes with ADHD report increased concussion symptom severity [37] and duration [41] and are also at increased risk for suffering a concussion [37]. However, one complication is that studies have demonstrated that youth athletes with a history of ADHD produce lower scores on neurocognitive tests measuring the impact of sport-related concussion, such as the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT), thus requiring caution in interpreting test performances, as low scores may not solely reflect the impact of concussion, but also the impact of ADHD symptoms [42].

In summary, the prevalence of ADHD in youth athletes appears to be consistent with rates within the general population. However, the diagnosis of ADHD in youth athletes appears to be associated with more significant neurocognitive risk, including concussion symptoms, severity, and risk. However, the mechanisms for these associations is unclear and the ADHD diagnosis itself is more likely to complicate necessary testing of the impact of concussions themselves, thus more comprehensive investigation is needed.

Eating Disorders

Clinical eating disorders, defined by the Diagnostic and Statistical Manual, 5th edition (DSM-5), include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BE), and Other Specified Feeding or Eating Disorder (OSFED), affect athletes more so than non-athletes [43, 44]. Females are disproportionately affected, although males comprise 10–25% of individuals with EDs [45]. Disordered eating (DE) and EDs are more likely to occur, although not exclusively, in weight-sensitive (e.g., gymnastics, skating, diving, crew) and weight-category sports (e.g., wrestling). However, student athletes with an ED may also not be related specifically to their sport. Having low fat mass and being lean may be beneficial for sport performance, but can quickly become maladaptive when it impacts physical, social, or emotional functioning.

Like most mental health concerns, EDs result from a complex combination of genetic susceptibility, personality, sociocultural, and interpersonal factors. Further, features associated with a competitive/elite athlete's mindset (e.g., focus on performance, perfection, and control) in combination with the context of the sport environment have been shown to be associated with eating pathology, body dissatisfaction, and compulsive exercise [46]. These behaviors and disorders occur on a spectrum and individuals can move between AN, BN, and BED. EDs can have varying impact on the health and function of athletes, including decreased performance and increased injuries, dental decay, changes in cardiometabolic function, loss of bone mass, and, ultimately, death if left untreated or unresolved. Restrictive eating to prevent weight gain, purging to prevent weight gain, or insufficient intake to support growth in the growing child and adolescent are hallmark features of EDs. In addition, these individuals are pre-occupied with fears of gaining weight, as well as having body dissatisfaction with weight, shape, or size.

Assessing and diagnosing AN and BN can be difficult in athletes. Athletes may be of "normal" weight/body mass index and may not meet the DSM-5 criteria for "significantly low body mass" due to training that contributes to increase muscle mass, and the term "anorexia athletica" [47] has been coined to describe such a phenomena. Further, the Triad of Athletics (e.g., female athlete triad) is characterized by low energy availability, menstrual dysfunction in women (e.g., amenorrhea/oligomenorrhea), and alterations in bone mineral density (osteoporosis/osteopenia) [48] in athletes. The conceptualization of relative energy deficiency in sport (RED-S) extends the negative health outcomes included in the Triad of Athletics to also include alterations in the immune function, alterations in the function of protein synthesis, and changes in cardiovascular health [49]. These are all key physiological features that need to be screened for and indicate DE or the presence of ED. While "excessive exercise" is difficult to define in elite young athletes who participate in intensive training regimens, there is clearly a threshold when the risks and negative outcomes outweigh benefits to performance. In a recent consensus statement addressing relative energy deficiency in sport (RED-S), the International Olympic Committee (IOC) advocated

for research to inform treatment and return to play guidelines for athletes with EDs [50].

Treatment of EDs begins with close screening and identification, usually by astute parents, coaches, athletic trainers, strength and conditioning coaches, or physicians or via brief self-report questionnaires. Referral for a clinical interview by a licensed behavioral health professional is the most reliable method of diagnosis. DE and EDs can occur transiently, often related to training season (e.g., pre-season, in season, postseason) or more persistently in athletes, and treatment may need to vary as a result. Treatment of EDs require a multidisciplinary approach [51] (e.g., dietitians, psychologists, sports physician or primary care/internist, psychiatrists) and those who have close relationships with the athlete, such as parents, personal trainers, and coaches. The athlete's clinical and personal teams will need to closely evaluate, implement, and monitor dietary intake and reintegration of exercise, while behavioral health professionals focus on cognitions, cognitive restructuring, and behavior modification for implementing dietary and exercise recommendations. While exercise can be both physically and emotionally beneficial, it must be prescribed in a way that is safe, while reducing the risk of using it as a purging technique (i.e., finding the healthy balance) [51]. Athletes who have electrolyte imbalances, irregular heart rhythms, blood pressure abnormalities, or osteoporosis that is putting them at risk of stress fractures will need closer medical monitoring and may be prohibited from exercising at all. Here, again, is where behavioral health professionals will need to work with athletes in adjusting to potential changes and limitations being set by the medical team.

In summary, DE and EDs are some of the most common behavioral health concerns in athletics, and have life-threatening consequences. These disorders require close screening, monitoring, and an interdisciplinary team to treat and support athletes in their recovery and return to play.

Substance Use in Youth Athletes

Although many studies have found that engaging in athletics has a range of physical, psychological, and interpersonal benefits for adolescents [52], explicit findings from studies examining associations between participation in sports and rates of substance use in young athletes are divergent. Specifically, differences in rates of substance usage between young athletes and their non-participating peers are seen largely dependent on the substance examined, with variations in rates found for alcohol use, illicit substance use, and tobacco use.

When considering alcohol consumption, most studies have found that adolescents' participation in sports is positively associated with alcohol use. Young athletes report significantly higher levels of alcohol consumption than their non-participating peers [53], and have higher odds of positive screens for potential alcohol use disorders, as well as greater long-term odds of engaging in binge drinking after high school [54–56]. Some studies have gone so far as to identify specific sports that are associated with increased alcohol consumption, where hockey and soccer athletes report highest level of alcohol consumption (Ford, 2007), and crew and football athletes are most likely to have positive screens for potential alcohol use disorders later on [56].

Converse to increased alcohol consumption by athletes, studies have found that adolescents' participation in sports is negatively associated with illicit substance use, or that athletes are less likely to endorse illicit substance use than their non-participating peers. Notably, although some studies have explicitly examined marijuana use in relation to athletics, most studies have grouped other illicit substances together in their analyses, including cocaine, crack cocaine, amphetamines, psychedelics or hallucinogens, ecstasy, LSD, heroin and other opiates, and barbiturates. Peretti-Watel et al. [57] proposed a "U-curve" relationship between participation in sports and illicit substance use, where drug use is highest at low and high levels of sports participation, and lowest at intermediate levels of sports participation. However, this relationship was only found true for male athletes in relation to marijuana use. Finally, some research has also suggested that illicit substance use in athletes may vary based on team division, finding that Division I athletes endorse the lowest levels of illicit substance use and Division III athletes endorse the highest levels of illicit substance use [58].

Results from research examining tobacco use in young athletes have been more mixed. Studies have generally found that adolescents' participation in sports is negatively associated with cigarette use, or that young athletes report significantly lower levels of cigarette use than their non-participating peers [59], although some studies have suggested that cigarette use may be higher in athletes of particular sports compared to non-athletes, such as skateboarding, wrestling, and tennis [60]. These findings imply participation in sports may serve as a protective factor against smoking in adolescents. However, prior meta-analyses have determined that youth athletes are considerably more likely to use smokeless tobacco products than non-athletes [61]. Notably, most research investigating smokeless tobacco use in young athletes has examined usage of snuff and chewing tobacco; few, if any, studies have examined use of vaporizers for tobacco consumption. Thus, future work examining vaporizer usage in adolescents in relation to participation in sports is warranted.

In summary, findings from studies examining substance use in young athletes suggest that young athletes have higher rates of alcohol and smokeless tobacco consumption, but lower rates of illicit substance and cigarette consumption, than their non-participating peers. Notably, in addition to negative effects on performance, another potential influencing factor on young athletes' substance use may be policies or practices related to substance use, such as random drug testing. It is key

to consider that the stress associated with high-level athletic involvement may increase the use of substances for coping purposes. Future work could examine use of additional substances (e.g., tobacco vaporizers, energy drink consumption) and their prevalence rates in young athletes, as well as the longer-term effects of use of these substances in young athletes.

Concussion

As awareness of concussion has increased, there has also been an associated increased awareness of its relationship with mental health issues [62–65]. High rates of sports participation in youth have resulted in higher exposure and greater risk for sustaining a sports-related concussion and children, including athletes, often sustain concussions outside of sports [66]. In either context, since concussions are a common type of injury in childhood, clinicians should be aware of potential mental health issues associated with concussion and should screen accordingly since up to one fourth of children will experience psychological distress following concussion [67]. Athletes with concussion are more likely to have depression in the weeks following injury compared with healthy controls [68]. When compared with controls with an orthopedic injury such as anterior cruciate ligament (ACL) tear, both populations experience depression after injury. While the injury-associated depression in concussed patients appears to resolve within 2 weeks, it appears to persist for months in patients with ACL injury [69].

Pre-existing depression and anxiety have also been identified as factors that may increase the risk of having mental health issues after concussion and may be associated with a prolonged recovery from concussion [62, 70]. Athletes with a history of depression before concussion have been demonstrated to be more likely to have either depression or anxiety after concussion compared with those who do not have a pre-existing history [71]. They are also at risk for having prolonged recovery [62, 70, 72]. In addition, concern has arisen regarding the potential for late effects on mental health from repeated concussions or subconcussive blows to the head, in light of studies involving former professional American football players where increased rates of depression are observed in a dose-response effect with numbers of self-reported concussion [65, 73]. Chronic traumatic encephalopathy (CTE) has been described post mortem on autopsy in professional athletes with such histories and has been associated with a constellation of mental health issues including depression, emotional lability, and even suicide [74]. More still remains to be understood about late effects, however, since broad studies of both former professional, college, and high school American football and collision sport athletes indicate that, as a group, they do not have higher rates of depression than the general public [75–77]. In any of the previously described contexts, however, the treatment of the mental health issue would be the same, regardless of the history of concussion or subconcussive hits, including behavioral management and pharmacotherapy as indicated.

In light of these data, obtaining a thorough clinical history is necessary in order to identify any pre-existing mental health issues that might influence the course or management of concussion. Emerging data indicate that a prior history of anxiety and presenting with difficulty remembering may predict the persistence of psychological distress in children with concussion at 4 weeks post-injury and acute disorientation predicted ongoing psychological distress at 3 months [67]. For those without a pre-existing history of mental health issues, such identification would help athletes and families anticipate any new issues arising with concussion, ensuring follow-up and attention with appropriate specialists. Providing guidance to patients and families who have had previous issues with mental health that concussion may exacerbate ongoing depression or anxiety is helpful in allowing temporary increased support if needed and framing expectations for recovery trajectory after concussion in case of a longer recovery.

Overtraining

With high levels of youth sports participation and increasing rates of early youth sports specialization, the issues of overtraining and burnout are increasingly evident in youth athletes [78–80]. Overtraining typically presents with increasing fatigue with exercise combined with decreased performance despite adequate recovery time, and likely represents a combination of physiological and psychological factors at play [81, 82]. Burnout has been defined as the result of chronic stress causing a youth athlete to discontinue participation in a sport that was previously enjoyable [79, 83]. An estimated 20–30% of youth athletes experience overtraining at some point in their athletic career [84–86]. While training load or volume of sports activity may be the primary contributors to overtraining syndrome, additional factors may include both intrinsic and extrinsic factors. Intrinsic personality traits including perfectionism, higher levels of stress and anxiety, fear of failure, as well as a unidimensional sports identity may contribute to overtraining and burnout [79, 87]. Extremely high training loads with early sports specialization with associated feelings of disempowerment of unrealistic expectations may be some of the extrinsic factors that may contribute to overtraining and burnout [78, 79].

Addressing issues of overtraining and burnout in youth athletes requires a multimodal approach including careful monitoring of training load and recovery time [88]. The Recovery Stress Questionnaire for Athletes (RESTQ-Sport) is a reliable and valid questionnaire that measures the balance between stress and recovery, examining associated behaviors and psychological states with poorer scores predicting

overtraining [89, 90]. Identifying athletes at risk for overtraining early provides the opportunity for intervention with adjustments in training load. Reframing expectations of sports participation for both youth athletes and parents, emphasizing fun and skill development rather than competition and winning, as well as modifying parental expectations for youth sports participation and promoting positive feedback on youth sports performance may help to mitigate the influence of extrinsic factors contributing to overtraining and burnout. Addressing associated issues related to sleep and mood disturbances, including depression and anxiety, is also essential, first taking a behavioral approach before instituting any pharmacologic therapies as needed [79, 91••].

Injury and Mental Health

With youth sports participation come sports injuries, which can have a significant impact on youth athletes, including time loss from sports [92]. With a background rate of depression estimated at 2.1% in children ages 3 to 17 years [36], and up to 20% in collegiate athletes [93], in addition to experiencing new depression after an injury, an injured athlete may experience the exacerbation of a pre-existing problem [94, 95]. Females and those with an injury within the last year appear to have higher rates of depression while emerging evidence indicates that collegiate athletes with pre-existing anxiety may have a higher risk of injury [18••]. Greater restriction from sports participation due to injury has been associated with greater depressive symptoms at both acute (1 week) and chronic (3 months) timepoints [96]. Participation in individual sports may also predispose to depressive symptoms after injury [97], whereas participation in team sports may provide more peer support that mitigates the effects of injury on mental health [98]. In the context of sports injuries that may require surgical intervention or extensive rehabilitation, it is important to consider the behavioral health impacts of injury on a youth athlete and their ultimate functional and quality of life outcomes. When comparing athletes with ACL reconstruction to athletes with concussion, while concussed patients had more symptoms of depression early, their symptoms generally resolved by 2 weeks whereas athletes with ACL had longer-lasting depressive symptoms [69]. Understanding the patterns of these behavioral health needs in youth athletes provides a framework with which to identify mental health issues and intervene to improve outcomes.

In the context of a musculoskeletal sports injury, screening and identification of mental health issues is paramount when caring for a youth athlete. Various screening tools for depression may be used after sports injury including the Patient Health Questionnaire (PHQ-9) or Generalized Anxiety Disorder screen (GAD-7), or for younger children, PROMIS Anxiety or Depression scale can be used down to age 8 [99, 100]. In addition, considering the incorporation of these screening tools into the routine pre-participation sports physical for youth athletes may also be clinically valuable. Interventions to improve resilience and decrease the stigmatization among athletes of seeking care for mental health issues may improve outcomes as well [100, 101].

Poor Sleep and Sleep Disorders

Sleep disturbances are often observed when an individual is experiencing various mental health concerns, including depression, anxiety, eating disorders, and additionally, in athletes, when they are experiencing overtraining [79, 102] or in response to concussion [63]. Sleep disturbances may contribute to the development of a mental health problem or may be an outcome, and as such, need to be screened for in all competitive athletes. The relationship between sleep and mental health functioning is well established [103–105], as is the relationship among sleep deprivation, physical health, and performance [106, 107]. However, investigations of this relationship among high school and collegiate athletes in their daily life is sparse. Poor sleep and sleep disorders are of increasing concern in adolescents and young adults [108]. Poor sleep quality has been reported in 42–78% of adolescent and collegiate athletes [109, 110]. Sleep disturbances that result in insufficient sleep or poor quality of sleep are associated greater variation in mood and emotional dysregulation [111]. Further, cognitive functioning such as reaction time, decision-making and executive functioning, fine motor movement, and memory, such as consolidation of motor tasks, are also recognized as being impaired in those with sleep problems [111, 112]. Unique to athletes, individuals with poor sleep experience reduction in sports-specific skill execution, submaximal sustained exercise bouts, and muscular and anaerobic power [113], and are also at increased risk of injury and recovery time from injury [112, 114]. Further, moderate to severe insomnia has been associated with at least two times per month increased risk of sustaining a concussion in collegiate athletes [115], and research suggests that those who have poor sleep prior to concussion have worse post-concussive symptoms [111]. In addition, a report by the NCAA revealed that ~ 10.3% of miscellaneous substance abuse was accounted for by sleep medication [116] with the prevalence increasing up to 18.3% in some sports [117], indicating athletes may be searching for treatments to improve sleep problems. Further, in a study of collegiate and young adult athletes, 38% defined themselves as "snorers," a symptom of obstructive sleep apnea (OSA), and 8% reported witnessed apneas [110]. Athletes in certain sports, such as American football, rugby, weight lifting, and heavy-weight wresting, are at higher risk for OSA, likely due to increased BMI from upper-body muscular hypertrophy and large, muscular necks. The neurobehavioral and physical consequences of untreated OSA in youth are well established [118, 119]; however, there is very little research on

the prevalence of OSA in youth athletes nor on the impact of OSA on neurobehavioral and performance functioning of athletes.

Public health recommendations for sleep in youth aged 12–18 years are 8–10 h and 7–9 h in young adults, with < 7 h per night being associated with negative physical and mental health outcomes [108]. In a large sample of Division I US collegiate student athletes, self-reported sleep duration was 6.98 h per night with 39.1% of the sample sleeping < 7 h [109]. This amount of sleep, while insufficient, is similar to non-athletes; athletes also experience poorer sleep quality with more awakenings, less sleep efficacy, and 28% reported excessive daytime sleepiness than non-athletes [110]. Training and game schedules, combined with academic demands, likely play a role in the reduced number of hours of sleep that student athletes obtain, making them more susceptible to the development of mental health concerns or exacerbation of an existing mental health condition.

The bidirectional relationship of the demands of being a student athlete negatively impacting sleep, and sleep disturbances significantly negatively impacting the health and well-being of athletes is being increasingly recognized and addressed by national and international sport governing bodies, including the National Collegiate Athletic Association Interassociation Task Force on Sleep and Wellness [120•] and the International Olympic Committee [121••]. A detailed review of specific clinical sleep disorders on mental health in athletes including insomnia and circadian rhythm disorders and treatments of sleep disturbances in athletes is beyond the scope of this review and the reader is referred to Brauer et al. [111].

Bullying, Hazing, and Victimization in Student Athletes

Bullying is a prominent issue facing youth, with a recent report estimating that approximately 47% of students experience some form of bullying before graduating high school [122]. The experience of bullying or peer victimization is associated with a range of adverse short- and long-term outcomes across physical, emotional, social, and academic domains for which athletes are not immune. For instance, students who have experienced bullying or peer victimization report greater psychosomatic complaints, exhibit increased rates of both internalizing and externalizing psychopathology (e.g., depression and anxiety, suicidal ideation and attempts, aggression toward others, and substance use), display difficulties in psychosocial adjustments during adulthood, and have low school attendance and poor academic achievement [123].

Notably, participation in athletics may increase an individual's risk of experiencing bullying or hazing, a targeted form of bullying specific to a group or team context. Indeed, data from a national survey of intercollegiate varsity athletes found that 79% of students reported having experienced some form of hazing in relation to their sports participation [124]. Further, collegiate participation in extracurricular activities generally was found to be associated with increased risk for experiencing harassment; however, participation in intramural athletics specifically was found to be associated with highest risk for experiencing both generalized and sexual harassment, beyond participation in all other extracurricular activities, such as fraternity or sorority involvement or school club involvement [125]. Importantly, research has begun to examine experiences of hazing in younger athlete populations, with one study by Gershel et al. (2003) identifying hazing behaviors in athletes throughout high school but as young as sixth grade [126]. Results of the present study also found hazing to occur across all sports, although rates were highest for gymnastics, cheerleading, and swimming. Lastly, no differences were found in hazing frequency between girls and boys (17.6% vs. 17.4%, respectively) [126].

Although these initial studies have identified bullying and hazing practices among student athletes, other research has identified a lack of correspondence between students' experiences of hazing and their willingness to use the term hazing to describe those experiences [127]. One possible explanation for this gap between rates of hazing and reports of experiencing hazing is that students may ascribe to a narrow definition of hazing that emphasizes extreme forms of these behaviors [128]. Specifically, the term hazing encompasses a wide range of behaviors, so behaviors that may have lower harm or risk (e.g., wearing clothing that is embarrassing, being yelled, screamed or cursed at by other team or organization members, or being told to associate with specific people and not others) may be overlooked in these situations. Relatedly, students may also fail to recognize some activities as "dangerous" and thus do not identify them as hazing, believing hazing requires physical risk. One study found that only 3% of students described some endured activities as "dangerous" and thus labeled them as hazing, although in actuality, 22% of students actually experienced hazing behaviors with the potential for serious physical harm [126]. Finally, some student athletes report that in cases where they have notified others of their experiences of bullying, or others have actually been present during these experiences, there has been minimal to no intervention or prevention of future hazing behaviors. For instance, students describe talking with friends (48%), other group members (41%), or family members (26%) about their hazing experiences, and report that in approximately 50% of these experiences, alumni were present or that coaches were actually aware of the hazing activity [129].

Studies examining bullying among underrepresented minority athletes and those with disabilities have produced mixed results. While some studies suggest higher rates of bullying among African-American and LatinX students [130, 131], others have found protective effects for the same

populations. Stigmatization and bias may exist based on the race or ethnicity of the athlete, particularly in relation to the makeup of the team or school environment. For example, if a student athlete is an underrepresented minority compared with the makeup of the team, school, or university, he or she may experience added pressures to perform and experience feelings of isolation, as well as experience racial discrimination; stereotypical biases about academic, social, and athletic capabilities; alienation; and segregation by peers, teammates, faculty, or coaches [130, 131]. Further, student athletes have reported that racial discrimination, although a sensitive issue, is unavoidable within the context of athletics [130]. Yet, a study examining moderators of bullying victimization stratified by race and ethnicity among high school students found that socioeconomic status, test scores, and athletic participation moderated the relationship between victimization and race/ethnicity [132]. Interestingly, sports participation was found to be associated with decreased bullying victimization for black and white athletes, while increasing risk for victimization of Asian and LatinX athletes [132]. In a study examining bullying victimization among 12–15-year-old female athletes in their sport environment compared with school settings, high rates of bullying victimization in the school setting were noted; however, no associations with race, ethnicity, or socioeconomic status were identified [133].

Studies of para athletes (those with physical impairments) suggest high rates of non-accidental injuries and victimization. In a recent systematic review mostly focused on visually impaired athletes, approximately half of studies reviewed described high rates of bullying of para athletes, and social implications for young athletes, which often included social exclusion [134]. Several studies showed high rates of physical and sexual psychological harm and sexual trauma among para athletes compared with athletes without visible physical impairments [134]. Generally, sports participation is perceived as supporting psychological development and self-esteem for youth with physical impairments; however, more research is needed to identify risk factors in the sports environment that promote negative outcomes.

In sum, bullying represents a form of peer-to-peer interpersonal conflict that can have very serious negative effects on an individual's short- and long-term well-being. Research has shown that bullying, and more specifically hazing, are prevalent in athletic settings above and beyond other extracurricular activity participation, and that bullying and hazing exists across sport type and regardless of student sex. Although working to increase students' abilities to recognize or identify their experiences of hazing behaviors may lend to the intervention on and prevention of these behaviors in the future, it is also imperative that coaches, alumni, athletic organizations, and institutions create anti-bullying and anti-hazing policies that will serve to condemn these behaviors and to foster safe and inclusive sport environments for their student athletes. Given associations between bullying experiences and these unfavorable consequences, research on bullying to inform prevention and intervention efforts is greatly needed. Further, having peer and faculty mentorship programs to support student athletes, particularly those who are from underrepresented backgrounds, as well as formal collaborations and events facilitated by the Offices of Student Academic Affairs and Diversity and Inclusion should be offered to address issues concerning student athletes' academic and social experiences, diversity, discrimination, and marginalization [130, 131].

Sports Participation and Athletics in Lesbian, Gay, Bisexual, Transgender, and Queer or Questioning (LGBTQ) Youth

While there have been few epidemiologic and nationally representative surveys of sexual orientation and gender identity in young populations, the Centers for Disease Control and Prevention's Youth Risk Behavior Survey estimates that approximately 7–9% of youth identify as members of the LGBTQ population, with 2% of youth specifically identifying as transgender [135]. Based on these estimates, there are approximately 3.2 million LGBTQ youth between the ages of 8 and 18, more than half of whom (52%) are youth of color [136]. Notably, LGBTQ youth are at higher risk than their heterosexual/cisgender peers for numerous adverse outcomes, including mental health issues such as anxiety, depression, and substance use [137], family rejection [138] and homelessness [136], and suicide attempts and deaths by suicide [139]. Importantly, participation in sports has been linked to better academic performance, increased self-esteem and self-confidence, reduced engagement in risky behaviors, and decreased rates of stress, anxiety, and depression in youths [140, 141]. Thus, participation in sports would likely serve as a protective factor for LGBTQ youth. However, LGBTQ youth participate in sports less frequently than their peers: whereas 68% of youths within the general population play on a sports team, only 24% of LGBTQ youth do, with rates of participation even lower in transgender boys and transgender girls, at 14 and 12%, respectively.

When asked, LGBTQ youth attribute their lack of participation to concerns of being rejected on teams based on their LGBTQ identities [142]. Indeed, rejection by teammates and coaches, as well as discrimination or bias-based bullying, are existing barriers to LGBTQ youths' participation in sports. A majority of Americans (84%) report having witnessed or experienced anti-LGBTQ attitudes in sports, and 11% of LGBTQ youth report feeling unsafe in the locker room related to their identity, including 34% of transgender girls and 41% of transgender boys [143]. Importantly, without the support of their teammates and coaches, LGBTQ youth drop out of sports almost twice as often as their peers [140]. Further,

beyond concerns of peer rejection and victimization, exclusionary policies and environments in athletics can pose additional barriers for LGBTQ individuals, particularly for transgender and gender expansive youths. Existing policies for adult transgender athletes aim to reduce the competitive advantage that increased levels of testosterone may provide to athletes in women's divisions. However, as hormone levels do not differ significant between sexes prior to puberty [144], gender segregation in children's sports predominantly serves a social function. The Transgender Law & Policy Institute's Guidelines for Creating Policies for Transgender Children in Recreational Sports recommends that K-12 transgender youth be allowed to play sports based on their affirmed gender [145], although policies vary by state and school district. Additional federal policies or initiatives aimed to reduce discrimination or bias-based bullying in youth athletics, such as allowing transgender students to access locker rooms consistent with their gender identity, creating LGBTQ-inclusive travel and uniform policies, holding players, coaches, teammates, and fans accountable for non-inclusive language, and promoting allyship and respect both on and off the field, are warranted to increase inclusion of LGBTQ youth in sports.

Recommendations for Addressing the Mental Health Needs of the Student Athlete

The athletic community recognizes the increasing prevalence of mental health conditions among adolescents and young adults, and that circumstances specific to interscholastic sports may exacerbate an existing condition. While public attention has increasingly focused upon the mental health of college students, many of the disorders of adolescence begin in high school, but become problematic in the context of transition to college. For student athletes, struggling performance, injuries that result in loss of playing time or ending of a career, and conflicts with peers and coaches can all exacerbate a pre-existing mental health condition [20, 94]. In recognition of these factors, members of the athletic community, national organizations, health professionals, and coaches have formed a multidisciplinary team of experts to develop recommendations in the form of a consensus statement to support the mental health of secondary school and collegiate student athletes. The premise underlying these recommendations are that the most important factors in supporting student athletes with mental health concerns are education, early identification of a concern, and prompt referral for care to a mental health professional. These guidelines developed by the interassociation work group establish best practices for organizations to become more effective in supporting young athletes by developing plans to recognize and refer student athletes with psychological concerns [20, 94].

Implementation of these recommendations requires that a clear education plan be developed for coaches, healthcare professionals, school administrators, and others about the mental health conditions impacting adolescents and young adults including anxiety disorders, mood disorders, eating disorders, substance use, and ADHD, and other conditions impacting adolescent health. Education will also have to focus on the identification of triggering events that are unique to the student athletes. For example, student athletes are at increased risk for sleep disturbances due to academic and sports demands, or fatigue and irritability from overtraining [28]. The stressors of being a student athlete can trigger a new concern or exacerbate an existing mental health condition. The National Collegiate Athletic Association provides guidance for triggering events and behaviors to watch for [3, 101, 146].

Best practices recommend that schools use the preparticipation physical examination as a time to ask about mental health concerns such as anxiety, depression, learning disabilities, and eating disorders. Any affirmative answers should be identified for further examination by the physician to determine if follow-up evaluation, care, or medications might be needed. Furthermore, it is recommended that each school have a team in place, consisting of the team physician, athletic trainer, school nurses, counselors, and community-based mental health professionals that include a psychologist and psychiatrists to handle referral for the student athlete for psychological evaluation and care. There should also be an emergency plan in place with access to a crisis intervention specialist.

Athletic trainers will have to become comfortable with approaching student athletes with their concerns, which can be challenging. Stigma remains a barrier to mental health treatment, especially given that student athletes are less likely to use mental health services than same-aged peers. However, having an identified individual in advance, consistent with the NCAA recommendations, may facilitate engagement [25•]. Empathic listening and asking open-ended questions can engage the athlete in sharing what is happening. The NCAA provides a guide for asking questions when approaching the student athlete with potential mental health concerns [101]. When discussing mental health assessment and treatment with a student athlete, it is important to understand the limits of confidentiality and to discuss with the student what must be shared with authorities or with families in the case of mandated reportable events or risk of harm to the student such as suicidal behaviors or self-injury. An emergency plan should be in place in the event of injury or harm to the student athlete, a crisis plan should be in place in the event of a stressful or traumatic event, and crisis information including how to immediately access care should be provided for the student athlete.

A proactive, positive environment that supports mental health and wellbeing among student athletes will ensure engagement of the young athlete in self-care. Coordination of care with a multidisciplinary team that understands the

importance of athletics for the young athlete and the culture of sports will be effective partners in supporting academic, athletic, and social success.

Conclusion

In summary, young athletes experience similar mental health concerns as non-athlete peers, and in some cases, at higher rates. In addition, they also experience unique stressors that put them at risk for the development or exacerbation of mental health disorders. These factors include balancing academics with rigorous training regimens while focusing on optimal performance and managing high expectations. Further, incurring and recovering from physical injuries as well as overtraining, concussion, sleep disorders, and racial and social identity are some of the factors that also impact the mental health of student athletes. Existing literature highlights the need to develop proactive mental health screenings and wellness education for young athletes, and to develop services that recognize the unique needs of this population.

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Compliance with Ethics Guidelines

Conflict of Interest M.S.X., T.B., J.L., J.A.C., and C.L.M. each declare no potential conflicts of interest.

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- •• Of major importance

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