

Psychosocial Impacts of Sports-related Injuries in Adolescent Athletes

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Abstract

Adolescence represents a time of tremendous physical, social, and emotional growth, and sport participation can provide significant mental health benefits for young athletes. Injuries are unfortunately common in sports and represent a threat to the short- and long-term health of athletes. While injury management has typically revolved around the minimization of pain and the restoration of physical function, emerging evidence suggests that the psychological consequences of injury may be significant, potentially jeopardizing return to play, increasing subsequent reinjury risk, and even leading to the development of mental health disorders. The majority of this research has been conducted in adult athletes and less is known about outcomes in youth athletes following injury. This review examines what is known about the psychosocial impact of sports injuries in youth athletes to identify areas of future research and to aid clinicians in the management of this population.

Introduction

In the United States, approximately 60 million children and adolescents participate in organized sports, with 3.5 million injuries resulting in time lost from sport per year (1). High school sport participation has increased dramatically in recent decades, growing from 4 million participants in the 1971 to 1972 school year to a nearly 8 million in 2018 to 2019 (2,3). From a public health perspective, physical activity has tremendous physical and mental health benefits in childhood and adulthood, and adolescents who are physically active tend to be more active throughout their lives (4). As time spent in physical education and free play continues to decrease, organized sports have become the primary mode for children and adolescents to obtain the amount of physical activity recommended for physical and psychosocial health benefits (5). Adolescent participation in sports is positively correlated with multiple indicators of physical health, decreased anger, positive developmental outcomes, increased sleep, and a more varied

diet (6–8). Furthermore, sport participation has a beneficial effect on depression symptoms, hopelessness and suicidality, stress, and competence-based self-esteem in adolescents (9,10).

Nonetheless, sport participation also has an associated risk of injury that threatens the short- and long-term overall health of athletes. Athletic injuries are concerning not only because of the pain and disability from the injury themselves but also because more severe injuries can result in time lost from sport participation, school, and other important activities for adolescents. Psychological responses following injury can include negative emotions, fear of reinjury, lack

of confidence, failure-based depression, mood disturbance, devastation, restlessness, and feelings of being cheated (11–13). Sport participation is also an important social activity for adolescents, and the loss of social connections following injury may have long-term impacts on psychosocial health. There is growing evidence in adults that injuries can significantly impair quality of life (QOL) beyond physical function, and that they increase the risk of a number of mental health conditions, including anxiety, depression, and post-traumatic stress disorder (14–16). Athletes are often left to establish their own coping strategies following injury, although research in injured athletes suggests that the social and psychological aspects of recovery should be a part of the rehabilitative process following injury (17).

Research regarding the prevalence of mental health disorders or psychosocial impacts of musculoskeletal injury in athletes has largely been focused on the collegiate or professional level (14–16,18,19), with far less available information in the adolescent athlete population (20). Given the wide-ranging positive benefits of sport participation in childhood, along with the increasing awareness of the potential for athletic injury to lead to negative psychosocial outcomes in adult athletes, it is important to understand the psychosocial impact of sports injury on adolescents. Understanding these impacts has the potential to optimize care of our injured adolescent athletes, reduce the risk of deleterious psychosocial outcomes, facilitate their return to play, perhaps even reduce reinjury risk, and ultimately facilitate the long-term benefit of sports participation in childhood.

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Mental Health in Adolescent Athletes

Psychiatric morbidity in adolescents is a major public health issue. Adolescence represents a stage of transformative physical, social, and psychological development. As a result, the consequences of disorders, such as depression for adolescents, can be severe in terms of long-term outcomes (21). Depressive symptoms include fatigue, irritability, inability to make decisions, somatic problems, lack of interest in day-to-day activities, and suicidal thoughts (22). Because these symptoms can interfere with psychosocial development during this important developmental stage, untreated depression in the adolescent can have negative lifelong consequences (23).

The prevalence of depressive symptoms in adolescents varies between studies, but it has been reported that as many as one in four females and one in eight males report depressive symptoms high enough to meet criteria for a major depressive episode (24). One study estimated that in 2011 to 2012 there were 2.6 million children age 6 to 17 years with either anxiety or depression and an additional 760,000 with both (25). These numbers are on the rise, where the prevalence of major depressive episodes among adolescents increased from 8.7% in 2005 to 11.3% in 2014 (26). While physical activity and sport participation have been shown to have significant mental health benefits, the incidence of mental health disorders among adolescent athletes specifically is less well known.

Participation in athletics by adolescents has many associated positive health benefits. Boys age 12 to 18 years who participate in organized athletics are 26% less likely to develop depressive symptoms (27), and Lam et al. (28) found that adolescent athletes report significantly higher QOL than a healthy group of adolescent nonathletes, particularly with respect to psychosocial, emotional, and social functioning. In fact, given the consistently higher QOL scores in adolescent athletes, it has been suggested that athletes be considered a unique patient population when considering psychosocial health, particularly when being evaluated after an injury (28).

On a population level, the positive benefits of sports participation on mental health have been well established (9). In a study comparing highly involved high school athletes and their nonathlete counterparts, it was found that the athletes had a significantly lower relative risk of hopelessness and suicidality than the nonathletes. Furthermore, it was concluded that the social support and integration experienced by athletes played a role in their overall risk mitigation, rather than the physical activity itself (10). However, understanding psychosocial health in elite athletes is complicated by the fact that many athletes' psychological well-being is closely related to their athletic performance and can potentially play a detrimental role to psychological health. A descriptive study in elite collegiate swimmers found that 68% of the athletes in the study had experienced a major depressive episode in the past 36 months, a staggering number largely thought to be attributable to demanding schedules, pressure to perform, and less perceived social support (13).

Epidemiology of Sports Injuries

Injuries represent an unfortunate risk with athletic activity and represent a significant concern among elite adolescent athletes. Recent estimates suggest that injuries among adolescent athletes are a significant economic burden in the United States, accounting for an annual estimated direct and indirect cost of more than 8 billion dollars (29). High school athletes alone

account for an estimated 2 million injuries, 500,000 doctor visits, and 30,000 hospitalizations annually, at a rate of 2.4 injuries per 1000 athlete exposures (individual training sessions and competitions) (2). In a recent 52-wk cohort study of high school competitive athletes, it was found that nearly 3 of 10 elite adolescent athletes self-reported an injury every week, and 57.4% of all athletes reported an injury during the year-long data collection (30). Serious injuries are unfortunately not uncommon, with season- and career-ending injuries in young athletes accounting for 6.0% of all injuries in the High School Reporting Information Online database (31).

In addition to the economic burden and physical symptoms of injuries, they can result in time lost from sports participation, school, and other important developmental activities for children. It is estimated that every fifth injury in high school competitive athletes results in an absence from regular training for more than 2 months (30). While sports injuries are widely acknowledged as a risk of athletic participation and a threat to performance, management typically centers around the physical consequences of the injury itself, with less attention provided routinely to the proper treatment of the psychosocial impact of the injury. Attention to the mental health needs of athletes has been increasing in collegiate and professional populations with more resources. However, youth athletes may have less access to psychological evaluation and treatment to optimize care and facilitate return to play following an injury.

Sport Participation and Adolescent Psychosocial Development

Athletic participation during adolescence can play an important role in psychosocial development and can have a significant impact on how individuals react to adversity and social pressures. In adolescence, sport participation provides an early opportunity to have a sense of freedom and independence, where the young athlete relies less on parental feedback and more on their peers as a frame of reference for behavior (32). At the same time, adolescents are often preoccupied with physical and psychosocial changes, including body image, motor skills, and social standing, and may have reactions to injuries that are out of proportion with the severity of the physical injury. Adolescents rely more on their peers for social support than adults, use peer feedback to set goals, and, particularly later in adolescence, use sport participation and success to impress others or achieve social status (33). Given the already challenging psychological developmental phase that adolescence represents, children may be more vulnerable to the psychological impacts of injury than adults.

Psychosocial Impacts of Injury

Quality of Life

Sports injuries have been shown to have both acute and chronic psychosocial impacts on adult athletes, particularly if the injury is severe, but there is less information available regarding the impact on adolescent athletes. Health-related QOL is a patient-reported measure used to gain a better understanding of a person's multidimensional well-being related to physical, mental, emotional, and social health. Immediately following the diagnosis of a serious sports-related knee injury, female athletes age 13 to 23 years report decreased QOL up

to 6 months following the injury (34,35). In collegiate athletes, a serious injury is a predictor of lower QOL in domains including mental health, physical function, emotional role, and vitality (14). When injured college athletes and matched uninjured controls were assessed using measures of depression, anxiety, and self-esteem during the preseason and again following a significant injury prohibiting athletic participation, injured athletes reported a period of significant emotional distress spanning 2 months following their injury (15). It also has been shown that injured collegiate athletes who were able to continue participating in their sport had better QOL than those who were injured and could not play. However, the injured athletes who continued to participate in their sport while injured nonetheless exhibited decreases in QOL, suggesting that there is a psychosocial impact of sports injury beyond the inability to participate in sport and the physical injury itself (18).

There is considerably less data concerning QOL in adolescent athletes than in adult athletes, and the available studies are exclusively cross-sectional. Adolescent athletes with self-reported recent injuries report lower QOL, largely beyond their physical symptoms (34,36). These lower QOL scores are notably in social and global function, suggesting that injured athletes feel that their injuries inhibit their ability to fulfill societal roles and expectations, and affect their ability to participate in social activities. Adolescents with anterior cruciate ligament (ACL) tears also demonstrated lower QOL scores in various areas, suggesting that self-esteem, mental health, emotional role, and social limitation are all affected by significant knee injuries (37).

Return to Play and Fear of Reinjury

While most athletes are eager to return to preinjury participation following an injury, psychological factors can delay return to play and increase the risk of reinjury. As sport plays a larger role in young athletes' lives, they may feel more pressure to return to play quickly following an injury. ACL injuries represent a severe and unfortunately common injury in young athletes, which is often associated with an inability to return to the preinjury level of sport participation. In fact, Schmale et al. (38) found that less than 50% of adolescents who underwent ACL reconstruction surgery were able to maintain their preinjury levels of play 4 years after surgery. They found that one of the main contributing factors to low return to play rates was a difference in lifestyle following the injury, leading to lower activity rates in general. In adults, return to sport following ACL reconstruction surgery is affected by a combination of activity level, sport, self-reported knee instability, and psychosocial factors. With a low return to sport rate of 56.4% among nonelite adult athletes who have undergone ACL reconstruction, those who did not return cited fear of reinjury as the main reason (39). Earlier return to sport following an injury increases risk of reinjury, and fear of reinjury may prevent athletes from returning to play at all (12), suggesting that the psychosocial factors following injury may have long-term effects on sports participation and activity level later in life.

A number of psychological antecedents have been identified as injury risk factors in adults and adolescent athletes, including stress, mood, sleep, and negative life events (40). For example, a study of elite adolescent soccer athletes found that decreased mood was a significant predictor of injury the same day, even after adjusting for training load (41). In light of the fact that

well-being and sleep may be negatively affected following an injury, and that these consequences may outlast physical recovery, failure to identify and address these psychosocial impacts may increase the risk of reinjury following return to play. In fact, a small study of adolescents and young adults who returned to sport after ACL reconstruction found that those individuals with higher fear of reinjury were much more likely to suffer an ipsilateral ACL retear than those with less fear (42). Furthermore, high school athletes who underwent ACL reconstruction reported psychosocial barriers to return to sport rather than physical barriers, including an association of the sport with injury, fear of not making a full recovery, and social comparison to others with injury by parents and coaches (43). While this evidence is limited, it seems to suggest that the lingering psychological effects of severe injuries may increase the risk of subsequent injury, even after recovery and return to sport.

Mental Health Disorders

For athletes, the ability to participate in sport has an important influence on mental health, and studies investigating the psychosocial impacts of injuries in adult athletes have identified significant mental health impacts. Major life events causing a disruption to sport participation, including injury and chronic stress, are associated with higher rates of distress, anxiety and depression in adult athletes (44,45). Multiple studies in adults have found that athletes with season- or career-ending injuries experience emotional distress, anger and frustration (15,19), and trauma-related symptoms (16).

Given the fact that millions of adolescents suffer sports injuries every year, there is surprisingly little information regarding the effect of injuries on the risk of developing mental health disorders in adolescents. In a single small study, athletes 21 years of age or younger who suffered an ACL rupture were found to have very high rates of post-traumatic stress disorder (PTSD) symptoms, including avoidance, hyperarousal, and intrusion (46). Interestingly, the psychological trauma among athletes 15 to 21 years old was greater than those 14 years or younger. A small prospective study in adolescent athletes found that emotional outcomes were significantly negatively affected in athletes who suffered an injury causing them to miss three or more weeks of participation in their sport. It was found that female gender, greater injury severity, higher positive stress, and higher athletic identity were associated with higher rates of depression symptoms (20). We are aware of no research, however, which has attempted to identify the incidence of mental health outcomes, such as depression, anxiety, or PTSD, among adolescent athletes following injury.

Possible Mediators of Psychosocial Impacts

Athlete Identity

Adolescent athletes are navigating changes in independence, identity, and athletic development. An injury that compromises their ability to participate in their sport removes them from one of their main social networks, potentially threatening the portion of their identity drawn from both being an athlete as well as being a part of an important peer group. Adolescents participating in team sports develop strong social support systems and athletic self-concepts that create a positive feedback loop of physical and psychosocial health (32). The athletic self-concept, known as athletic identity, is a social role, and is

defined by the degree to which an individual identifies with the athlete role and looks to others for the acknowledgement of it (47). This identity increases from childhood through adolescence and into adulthood, and decreases when and if the individual ends their competitive athletic career (48). Athletic identity also appears to be tied to an individual's ability to participate in their sport, where it has been shown to decrease in athletes who suffer injuries that cause a significant disruption in their ability to participate in their sport. In a study of athletes age 14 to 54 years who underwent ACL reconstruction, there was significant reduction in athletic identity scores from preoperative to 6, 12, and 24 months postsurgery. Furthermore, those who experienced slower recovery times had the greatest drop in self-perceived athletic identity (49). Athletes 21 years or younger with a stronger sense of athletic identity experience more emotional trauma following injury that causes them to miss participation days in their sport (46). Brewer et al. suggest that the decrease in athletic identity following severe injury may be self-protective, such that the athlete can maintain their positive self-image at a time during which they are unable to participate in their sport (49).

Nonetheless, research suggests that a higher athletic identity is associated with a less stable individual identity and self-esteem (50). Consequently, when an injury disrupts the role that athletic identity plays in such an individual, the injury provokes a loss of identity, and causes greater psychological distress (49). In adolescent athletes who have experienced an ACL injury, for example, those with the highest athletic identity suffer more psychological trauma than those who identify less with their athleticism (46). We are aware of no studies focusing on developing the nonathletic identity in athletes, and evidence regarding the role that athletic identity plays in the psychological consequences of injury in adolescent athletes is quite limited and remains an important area of future research.

Sport Specialization

Factors including college scholarships, playing professional sports, or the desire for talent recognition have led to increasing rates of sport specialization among young athletes, with fewer youth multi-sport athletes (51,52). As sport specialization in youth athletes increases, it has been suggested that this may result in potential negative consequences, such as burnout, perfectionism, overuse injury, and overtraining (52). Specializing and devoting the majority of an adolescent's free time to one sport can potentially have negative consequences. Specialized athletes often devote significant time to their sport, tie their self-esteem to their sport performance, and report impaired sleep, impaired well-being, higher rates of burnout, and a greater risk of injury (52). While early sport specialization is often motivated by a perceived path toward success in sport, it has not been shown to improve future athletic performance (53).

Interventions to Reduce Psychosocial Impacts of Injury

Despite the potential psychosocial impacts of injuries in adolescent athletes, we are aware of no studies which have evaluated the efficacy of interventions to mitigate this risk. Interest in the mental health of athletes continues to grow, but the evidence regarding the efficacy of psychological interventions are limited to adult athletes. Prior adult studies have focused on improving psychological recovery following injury using relaxation, mindfulness, imagery, goal setting, and stress

management (11). Of these strategies, the interventions that employed goal-setting and enhanced social support resulted in increased psychological coping skills. In a group of injured 17- to 39-year-old athletes, a 5-wk intervention of either social support or goal-setting did not yield significantly better outcomes compared with the control group (54). In adult athletes who underwent ACL reconstruction, participants who attended guided imagery and relaxation sessions for 6 months following their injury experienced greater knee recovery and lower fear or reinjury anxiety compared with controls (55).

The use of psychological interventions in youth athletes is mostly limited to injury risk reduction. Among healthy adolescent athletes, there is evidence that mindfulness interventions may decrease in-season injury risk (56), though the evidence is limited. A separate recent study found that a stress reduction program for adolescent male soccer players, led by a clinical psychologist, which included stress management skills, muscle relaxation, breathing, imagery, and attention focus training, resulted in significantly fewer injuries in the treatment group than the control group (57). While these initial results are encouraging, we are aware of no research which has evaluated the efficacy of a psychological intervention to improve mental health outcomes, further develop the nonathletic identity, facilitate return to play or reduce reinjury risk following sport-related injuries among adolescent athletes. Given the impact that childhood sport participation can have on outcomes later in life, psychological interventions to improve outcomes in injured youth athletes remain an important area of research to help guide clinical decision-making and optimize care.

Conclusions

Sport participation plays a formative role in the lives of millions of adolescents, and the benefits of youth athletics are numerous, serving as a positive influence on both physical and psychological well-being. Unfortunately, sports injuries remain common, and prolonged absence from sport due to injury can lead to serious consequences for athletes. Although there is less information available regarding the acute and chronic psychosocial effects of injury in adolescent athletes than in adults, the psychosocial consequences of injuries in youth athletes may be significant. Because adolescence is a time of dramatic psychological and physical development, serious injuries during this time may lead to negative, long-term effects on QOL, return to play, reinjury risk, activity levels in adulthood, and even the development of mental health disorders. Future research should focus not only on the factors that may mediate the psychosocial impacts of injuries in this vulnerable population but also identify interventions that can minimize these negative consequences, optimize care, and promote a safe and healthy return to sport participation for adolescent athletes.

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