

Sport-Related Concussions: Paranoia or Legitimate Concern?

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Sport is very popular in today's society, and millions of athletes participate in a variety of youth, high school, collegiate, professional, and recreational sports. For younger participants, the sport experience provides an environment that can help them grow and develop physically, mentally, emotionally, and socially. With public health concerns such as increasing incidences of obesity, cardiovascular disease, and diabetes, it is important to encourage youth to find physical activities that are enjoyable and that can be retained lifelong for the maintenance of a healthy lifestyle. However, recent media reports about the dangers of concussions in sport have led many parents to withdraw their children from contact sports such as football, hockey, lacrosse, and soccer. The concern for safety is understandable, yet the pendulum has perhaps swung too far in the direction of paranoia [1].

Caution is certainly warranted, given published studies suggesting that there is an increased risk of subsequent concussion after an athlete has sustained prior concussions [2], as well as increased risks of mild cognitive impairment [3] and depression [4] among retired professional football players who sustained 3 or more concussions. Other reports suggest that playing contact sports increases the risk of neurodegenerative diseases such as chronic traumatic encephalopathy (CTE) [5], but education and counseling about these conditions are paramount, as there is still much controversy about risk factors—especially for CTE. Currently there is no methodology for identifying individuals who are at high risk of developing CTE, in part because the case-only descriptions of CTE symptomatology are confounded by the retrospective nature of the data collection and by selection factors.

Given that no prospective studies have connected repetitive head trauma to CTE, more work is needed to understand if a cause-and-effect relationship exists.

Although media reports would suggest that there has been an increase in concussions occurring on playing fields across the United States in recent years, this is not the case. While incidence rates for reported concussions may be slightly higher over the past 5 years, this can be attributed to increased awareness, more concussions being identified and diagnosed in emergency departments, and better data collection methods [6]. Concussion legislation began sweeping the nation in 2009, leading to 50 states now requiring concussion education that emphasizes the importance of reporting symptoms, prevents same-day return to play following a suspected concussion, and mandates clearance by a trained clinician. The emphasis placed on the proper management of concussions has resulted in the hiring of more certified athletic trainers at the secondary school level and more consistent use of validated concussion assessment tools for the detection and management of concussions.

Given that there are currently no proven interventions to prevent concussions, a renewed focus on concussion prevention is warranted. Despite attempts by manufacturers to create a concussion-proof helmet, the dynamic properties of the involved neurological tissues and the biomechanics of head impacts make this impossible. While helmets may reduce the forces applied to the brain and skull to prevent catastrophic head injuries such as skull fractures, brain contusions, and brain hemorrhages, they do not reduce the forces necessary to prevent concussions. Therefore, it is important for all coaches, par-

ents, and athletes to understand that there is currently no athletic equipment that fully prevents concussive injuries.

Turning the attention toward prevention, we might consider that recent technological advances have allowed for accelerometers to be placed in sports helmets in order to directly assess the force and magnitude of head collisions in real time. A review of the clinical usefulness of helmet accelerometers by Guskiewicz and Mihalik [7] reported that concussions may occur at lower magnitudes than was originally thought, and athletes with a high number of head impacts over the course of a season may never have a diagnosed concussion. While helmet accelerometer data are not yet useful for diagnosis of concussions, the data may have utility as a behavior modification tool (ie, illustrating to athletes and coaches the location and characteristics of head impacts during tackling, blocking, and other contact encounters), which could promote techniques that reduce the frequency and magnitude of head impacts. New types of technology, including helmet accelerometers, hold great promise for improving the safety of athletes of all ages.

Coaches are a crucial part of the concussion prevention initiative, as they can teach and enforce proper technique. This is especially important in collision sports, where tackling and body checking are taught from an early age. Skill development is optimized through an interaction of the player, the environment, and the specific skill or technique being taught [8]. Heads Up Football, sponsored by USA Football, is an online program aimed at educating coaches about proper tackling fundamentals and reducing the amount of head contact [9]. These interventions, including behavior modification using accelerometer technologies, have shown great promise but must be carefully studied to better understand their utility.

In the meantime, there is little debate that educating players, parents, and coaches about concussions—and emphasizing the importance of minimizing head contact

during sport participation—will improve player safety and reduce the risk of concussions. **NCMJ**

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