



## *Elliot Orthopaedic Surgery Specialists* **Sports Injury & Sports Injury Prevention**



*Contributed by: Jonathan Mack, MD*

**E**fforts to understand and prevent sports-related injuries have been driven by the significant impact that these injuries have on society. The medical cost for sports injuries has been estimated to exceed \$282 million in the US each year. The Center for Disease Control and Prevention estimates that sports injuries account for 16% of all unintentional injuries treated in hospital-based emergency departments.

The injury rate secondary to sports participation is thought to exceed the injury rate from motor vehicle accidents.

The greatest predictor of injury risk in sports and recreational injury is the nature of the activity itself, with contact sports carrying the biggest risk of injury. However, even in full-contact sports, up to 40% of injuries are the result of overuse mechanisms. It is believed that more than 50% of all sports-related injuries are due to overuse. Factors such as age, gender, level of competition, and level of fitness are felt to influence the frequency of injury. To better understand the predisposing causes of sports injuries, risk factors are frequently divided into extrinsic and intrinsic categories.

Extrinsic risk factors are characterized by the effect that environment has on injury risk. They can be modified in a variety of ways, including rule changes in sports, use of protective equipment, taping and bracing, and athletic equipment changes. The elimination of “spear tackling” in football, when tacklers use the top of their helmets to initiate contact, has reduced the incidence of paralysis or death in this sport to essentially zero. The use of helmets has been

shown to decrease injury in team sports of football, hockey, and baseball. The use of mouth guards has been shown to reduce the potential for dental injury. External ankle stabilization through taping may help prevent first-time ankle injuries, but scientific literature more clearly demonstrates the success of external ankle supports for preventing re-injury. Studies indicate that rigid ankle supports provide more ankle stability than athletic tape, and the capacity for ankle taping to limit range of motion is significantly diminished after 20 minutes of moderate to vigorous exercise. Athletic equipment changes in baseball and softball, such as the use of safety (breakaway) bases, softer balls, and protective faceguards have all been shown to be very effective in reducing injury.

Intrinsic risk factors are characterized by the effect of training and individual factors on injury prevention. They are defined by the individual's history of injury, fitness level, participation in conditioning and stretching programs, and motor control. The previous injury history of an athlete is thought to be the most significant predictor of future injury. Historically, it has been felt that greater fitness and conditioning will reduce the risk of sports-related injury. However, conclusive evidence to support this idea is lacking. There is not sufficient evidence to endorse or discontinue routine stretching before or after exercise to prevent injury among competitive or recreational athletes. Motor control training programs, which include education, stretching, strengthening, plyometrics, and sports-specific agility drills designed to replace the traditional warm-up, may have a direct benefit in decreasing the number of anterior cruciate ligament injuries in female soccer players.

Typically there are numerous risk factors that an individual must face with exercise and sports participation. However, when weighing the risks versus benefits of

exercise and sports participation, it is important to consider that the benefits of exercise in preventing obesity and complications from inactivity-related disease dramatically outweigh the risks of exercise. Individuals who are routinely inactive have a 100 fold increased risk of sudden cardiac death when they exercise vigorously. However, exercise in moderation offers all of the health benefits and a significantly reduced risk of sudden cardiac death. Similarly, the risk of bone, muscle, and joint injuries can be reduced by avoiding high-risk sports and common exercise mistakes, such as rapid increases in training duration, frequency and intensity.

Future advancements in the understanding and prevention of sports-related injuries are contingent on additional well-designed randomized studies. There is a considerable amount to be learned about topics such as preseason medical screenings, warm-up activities, proprioceptive training, stretching, muscle strengthening, taping, protective equipment, rehabilitation programs and education interventions. Further knowledge in these areas will help promote a safer and more enjoyable environment for sports participation.

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