

# HEALTH ALLIES

## THE ORGANIZED YOUTH SPORTS MOVEMENT

### PROCEED WITH CAUTION

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**W**e know that participation in physical activity and sports has widespread benefits for young athletes. While studies suggest that many children and adolescents are not achieving sixty minutes of daily physical activity as recommended by the U.S. Department of Health and Human Services, the available outlets for organized sports participation beyond traditional school-associated activities have continued to increase over the past several decades. Optimizing activity levels and participation across all social and geographic subsets of the pediatric population continues to be an elusive social and public health goal.

Numerous studies point to the positive psychosocial effects of organized sports in the growing athlete. Consistent with other published reports, a recently published survey conducted by our team at Scottish Rite for Children Sports Medicine found that kids tend to have less anxiety and may be more resilient if they are involved in multiple sports. Public health leaders, musculoskeletal developmental experts and even parents themselves recognize the benefits of early exposure to a variety of sports and different activities during childhood and adolescence, but school-based, progressive physical education may be decreasing in frequency. Furthermore, kids themselves often report the desire to participate in multiple activities at a young age. To that end, a variety of organizations collaborate to raise awareness and improve access to youth sports with a goal of increasing participation rates in all ages.

### The Youth Sports Industry – Double-Edged Sword

The increasingly competitive nature and monetization of youth sports often leads to a counter-result in which growing athletes tend to commit to a single sport at an early

age and, in many cases, over-commit to training. Parents and youth athletes often become enamored with the thought of exceptional achievement in sports, and dream of a sports career. As of 2021, even college athletes are now being offered astronomical payments for their “name, image and likeness.” Unfortunately, they often follow a misguided perception that early specialization will result in achieving the professional athlete goal. While many youth athletes may have the skill and drive to achieve these perceived rewards at the end of the sports rainbow, the reality is that only a very small percentage may reach that level. Studies have demonstrated that early sports specialization is most often not the way to achieve this result.

### Pediatric Musculoskeletal Overuse Injuries

The unintended response to these modern demands includes behaviors such as early specialization, year-round participation and overtraining even in the youngest athletes. These are known contributors to conditions referred to as overuse injuries. These injuries that are felt to be secondary to high repetitions of supra-physiologic loading without variation and appropriate rest intervals. Conditions caused by overuse may often be preventable.

### Overuse Injuries of the Elbow

While overuse injuries can manifest throughout the developing pediatric musculoskeletal system, the elbow in throwing and upper extremity weight-bearing youth athletes serves as a prime example of a susceptible area for overuse. Hours of repetitive forces on vulnerable, developing cartilage structures of the elbow lead to overload on these structures and contribute to stress injuries.

### Capitellar Osteochondritis Dissecans

Repetitive impact directly on the articular cartilage of the humeral capitulum of the elbow can lead to shear-force structural injury and decreased vascularity within the developing epiphyseal cartilage and subsequent alteration of subchondral bone formation – often leading to instability of the cartilage surface. The resultant condition referred to as an osteochondritis dissecans (OCD) lesion can result in fragmentation and degradation of the articular surface.

### Radial Head Stress Fractures

Alternatively, forces may result in overload on the opposing radial head surface can lead to stress fractures of the developing radial head epiphysis.

A recently published investigation of gymnasts treated at the Scottish Rite described unique features of subjects and elbows (N = 58) of these two conditions. Differences in elbow anatomy, skeletal maturity and activity level were identified and correlated with the different injuries. This foundational data will facilitate further investigations, including injury surveillance and/or injury prevention strategies to reduce the risk of these types of injuries in young athletes playing upper-extremity-dominant sports.

### Osteochondritis Dissecans of the Knee

Similar stresses have been found to affect the knees of athletes in other sports. Overuse injuries affecting the joint surface of the knee are more common in high-volume running, pivoting and jumping sports. Osteochondritis dissecans lesions may also occur in the developing knee and lead to similar, unstable bone and cartilage lesions. Most commonly on the weight-bearing sur-



Figure 1 – PubMed search February 2022 results for “Osteochondritis Dissecans Knee” since ~1950. N=1178.



Figure 2 – PubMed search February 2022 results for “Osteochondritis Dissecans Elbow” since ~1950. N=525.

faces of the medial femoral condyle, lesions have been found on the lateral femoral condyle and less often on the articular surface of the patella and femoral trochlea. Understanding of the condition of osteochondritis dissecans has evolved in the past decade, with many questions still unanswered. The Scottish Rite for Children sports medicine group is involved in a national, multicenter organization called Research in Osteochondritis dissecans of the Knee (ROCK). This collaboration of pediatric orthopedic specialists aggregates data across large numbers of patients to study etiology of these lesions, correlate healing outcomes and identify effective strategies for treatment.

These lesions are often recalcitrant and present challenging scenarios for treatment. Efforts from this multicenter group hold promise for improving treatment of these osteochondral conditions in our young athletes. Despite this work advancing our understanding of natural history and treatment strategies even in our youngest patients, these lesions may often fail attempts at primary healing and require salvage or reconstructive procedures of the joint surface. In a study published this month, results following osteochondral grafting for bulk replacement of these defects performed within the Scottish Rite Sports Center were compared between patients with open physes and those in an older group. This salvage strategy has proven, in early outcomes, to be a good option for even these youngest patients.

OCD lesions certainly represent a unique and challenging subset of overuse-related conditions in this population, but there are many others for which treatment and research is ongoing.

## Repetitive Stress on Growing Structures

Musculoskeletal structures in a skeletally immature and growing athlete are sensitive to repetitive compressive and traction forces.

### Traction Forces

Though sprains and strains become more common in adolescents, apophyseal inflammation or fractures may present as medial elbow pain (Little Leaguer's elbow) or shoulder pain (Little Leaguer's shoulder) from repetitive throwing. At the knee, a running and jumping athlete may present with pain caused by patellar apophysitis (Sinding Larsen-Johansson syndrome) or tibial tubercle apophysitis (Osgood Schlatter syndrome).

### Compressive Forces

Much like OCD's, the repetitive compression inside the joint or through the bone can lead to a stress reaction or stress fracture in the bone. This is common in the lower leg and foot of runners and distal femur in soccer players.

Prospective study is ongoing currently at the Scottish Rite Sports Medicine Center musculoskeletal ultrasound to evaluate physes of both symptomatic and asymptomatic youth athletes. This data may lead to injury prevention strategies for these growth plate injuries. A second, grant-funded study is

currently being launched utilizing the Sports Movement Science Lab within the Scottish Rite Sports Medicine Center evaluating movement displayed by dancers with and without an injury history to evaluate correlates of motion and loading with known dance injuries.

## Anterior Cruciate Ligament Injuries

Even an injury such as the anterior cruciate ligament (ACL) tear – which has been noted more frequently during the past decade in our youth athletes and is commonly thought of as a single traumatic event during play – may have a correlation to overuse and over-exposure. Pediatric and adolescent athletes may commonly have relatively underdeveloped neuromuscular control and/or play through times of fatigue. As a result, muscular forces around the knee required to slow and stabilize the knee may be insufficient to protect the ACL during high-speed pivoting that often occurs during the level of training and play common with increasing sport specialization. While studies have shown increasing neuromuscular control and improving landing strategies may reduce some ACL injuries, they continue to be diagnosed at an alarming rate within our youth athletes. Work from the Scottish Rite Sports Medicine Center has resulted in surgical techniques to add stabilization to traditional ACL reconstruction with demonstrated reduction in reinjury risk, and ongoing work within the physical therapy department to improve sport readiness prior to return to play is ongoing.

## Injury Prevention and Education

Injury surveillance, injury prevention and education are keys to making progress in protecting young athletes. Further research is ongoing regarding correlates and risk factors for the development of these conditions in sport-specific populations. Much of the research is very promising but just hitting the tip of the iceberg. As we know is most often the case, strategies to promote prevention will be the most powerful medicine and will remain a focus for pediatric sports medicine research in future decades.

Partnership throughout the care team for kids and families involved in youth sports, as well as effective parental education, will remain a key factor in keeping our kids active in a happy and healthy way. [DMJ](#)

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