By Michele Wojciechowski

NOT 'SMALL ADULTS'

Here’s what PTs need to know about pediatric overuse injuries.

At Cincinnati Children's Hospital Medical Center, Chris Kovacs, PT, DPT, evaluates a young patient who plays golf competitively. Kovacs, the facility’s coordinator of sports and orthopedic physical therapy and a board-certified orthopaedic clinical specialist, looks at the player’s strength, flexibility, and range of motion. He’s also analyzing the way the teen swings a golf club—recording the swing on video to show the young golfer what’s going wrong and how it can be fixed.

In this case, he may tell the teen that he’s thrusting his hips toward the ball too early in his downswing—forcing him to hyperflex his neck and causing his neck pain. The teen won’t understand, Kovacs explains, why the PT wants to treat the hip muscles and glutes when it’s the neck that hurts—until he watches the video footage.

“You can get buy-in with kids if you can speak their language and know about their sport,” Kovacs adds. PTs treating pediatric and adolescent overuse injuries need to get their patients to agree to treatment or to rest and let their bodies recover, he notes. Often, showing them what’s happening helps them understand and become willing participants.

Different Biomechanics

Julie Granger, PT, DPT, says PTs must remember that children's injuries are unlike adults’ because their biomechanics are different. Kids are still growing physically, cognitively, and emotionally. Granger owns PRISM (Performance Rehabilitation & Integrative Sports Medicine) Wellness Center in Atlanta.

“Kids are not small adults,” she says. “They need to be treated in their own special, unique way—taking into account their age, continuing physical development, and general spirit.”

Granger continues: “They have more difficulty being consistent with the way they move from day-to-day because, for example, they may move one way on Monday, then something grows overnight. On Tuesday, their brains and emotions have to recalibrate along with the physical growth. The body grows really fast, but the brain has less time to recalibrate everything else. You see kids start to lose coordination, and there are more injuries. I equate them with puppies—they’ve got big feet and awkward bodies.”

PTs also should explain these changes to the children’s parents and coaches. “Say they have an 8-year-old with pretty good biomechanics,” Granger says. “When the child reaches 11, the coach or parents ask, ‘What happened? Who is this child? They aren’t moving the same way.’ We need to describe what’s going on with that child’s body, to inform the coach or parents and help them help the kid avoid injury.”

Injuries on the Rise

An estimated 60 million youth aged 6-18 are involved in some form of organized sports. Of those, 44 million are active in more than 1 sport. Of those 60 million, 27 million participate in
team sports. While the prevalence of overuse injuries varies depending on the particular sport—for example, 37% in skiing, compared with 68% in running—overall estimates range from 45% to 54%.

More children also are specializing in 1 particular sport early in life, as opposed to sampling—playing various sports during different seasons throughout the year. "They're performing that certain skillset over and over and over again, and as a result they develop overuse injuries," says Granger.

But not only focused athletes are at risk. She says that more sedentary children—whose schools may offer less physical education because of funding cuts—become injured because they haven't learned to train properly. Nutrition is another factor: Injuries may occur if kids aren't eating enough or aren't getting the best type of nutrition to either prevent injuries or heal from them.

"Youth need to diversify. High school athletes used to play 3 or 4 different sports throughout the year," observes Teresa Schuemann, PT, DPT, ATC, who focuses on injury prevention in younger players. "When athletes use different techniques, they use different parts of the body."

"Today," Schuemann continues, "the sports industry wants kids to get hooked on a certain sport early." Schuemann is director and owner of private practice TPT Inc in Loveland, Colorado. She's also program director of a sports physical therapy residency program for postgraduate and continuing education provider Evidence in Motion. "This includes coaches. They see talent and want to develop it." Schuemann is a board-certified clinical specialist in sports physical therapy.

While it's often recommended that, at most, children's sports participation match their age—for example, that 12-year-old girls play no more than 12 hours of sports per week—Corey Kunzer, PT, DPT, notes that, unfortunately, the best athletes tend not to stop there. "They'll play a lot more minutes than other athletes," he says. "They also may play in multiple leagues, and typically are starting and playing the whole game." "It's increased intensity, volume, and exposure for injury." Kunzer, a board-certified specialist in sports physical therapy, is the supervisor and coordinator of sports residency physical therapy at the Mayo Clinic in Minnesota.

That's not to say that youth shouldn't be active. "There are great benefits
to participation in youth sports, including development of self-esteem, socialization, and overall general fitness," Kovacs says. But what's needed is balance.

She explains that when kids play on various types of teams—school, league, travel, club—it eventually catches up with them, as they're also attending school and doing homework. Overuse injuries can come, too, from time spent traveling for these teams. Youth aren't getting enough sleep, and they're exhausted. Research suggests that youth are well-advised to play any single sport only 8 months of the year, as opposed to year-round.²

Young athletes sometimes play so much, says Kovacs, because of the "professionalization" of sports—meaning that their parents believe they can become good enough to receive college scholarships or go pro. The reality, though, is that only about 2% of high school athletes receive college scholarships, according to the National Collegiate Athletic Association.³

Granger notes that in addition to kids being pressured by their parents in some cases, they also may be pushed by peers, coaches, school systems, and even other parents who want to see the teams win. And sometimes athletes put pressure on themselves to keep playing—even when hurt.

**Early Specialization**

While most research stresses the importance of not specializing in a particular sport too early, there are exceptions to this rule. Casey Unverzagt, PT, DPT, DSc, says, "If you want to excel in gymnastics, figure skating, or diving, you really do have to specialize early—as in before the age of 8." He is an assistant clinical professor and director of admissions for the doctor of physical therapy program at Baylor University in Texas. He also is a fellow of the American Academy of Orthopaedic Manual Therapists.

Research supports this: "Although there are many examples of early specialised sports training, it appears that such training may be necessary in those technical sports that require elite-level competitions prior to full maturation, such as gymnastics or rhythm gymnastics, figure skating and swimming/diving. This type of early specialised training typically occurs before the age of 12, and frequently as young as 5 or 6 years of age."²

While this technically puts children more at risk of developing overuse injuries, there is an effective way to modify their training to try to prevent them. "Include integrative neuromuscular training into their practices," says Unverzagt.

Integrative neuromuscular training (INT) is a conceptual training model that is operationally defined as a supplemental training program that incorporates general (eg, fundamental movements) and specific (eg, exercises targeted to motor control deficits) strength and conditioning activities—such as resistance, dynamic stability, core focused strength, plyometric and agility—that are designed to enhance health and skill-related components of physical fitness.⁵

According to one study, "INT programs that integrate a variety of fundamental movements designed to enhance both health and skill-related fitness may be most beneficial if initiated during pre-adolescence. Moreover, INT is more likely to have long-lasting effects if qualified professionals focus on the process of developing fundamental motor skills rather than producing enhanced sports performance. INT maintained throughout childhood and adolescence will likely improve movement biomechanics, minimize the risk of sports-related injury, and promote positive health outcomes during adulthood."⁶

**Types**

The most common overuse injuries Granger sees are stress fractures—brought on by under-fueling and over-training—and injuries of the growth plates, both apophysis and epiphysis. "It's important to know the difference between an adult injury and a pediatric injury that affects the growth plate, because they require different kinds of care," Granger explains.

For example, what might at first appear to be an ankle sprain in an 11-year-old girl may well not be that at all. Given the patient's age and the status of her growth plates, it's more likely, Granger says, that the issue is not a sprain but, rather, a fractured growth plate. In that case, the youth would not be allowed to put weight on that ankle. The ankle instead would be immobilized in a cast.

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— JULIE GRANGER

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or a boot for a period of time. “Physical therapists need to err on the side of assuming it’s a growth-plate injury until proven otherwise,” she asserts.

Granger gives another example: throwing injuries. Suppose a 13-year-old boy reports shoulder pain while throwing a baseball. Were he an adult, a PT might first suspect a rotator cuff injury. In the teen, however, it could be a fracture of the proximal humeral growth plate. “The latter requires immobilization in a sling rather than physical therapy,” Granger notes.

When in doubt, she advises her peers to refer the patient to a PT who specializes in treating pediatric and adolescent athletes—or to an orthopedic physician if an X-ray is needed to determine if the injury has affected the growth plate.

In rare instances, high-risk defects can occur. Unverzagt says, “When we start to see stress fractures along the femoral neck, or patellar stress fractures or even anterior tibial stress fractures, those are the ones that send up a red flag.”

“We’ve even seen a handful of effort-driven or exertional thromboses—it’s essentially like a deep vein thrombosis, but in the upper quarter,” Unverzagt continues. “While there are many risks for this, pretending you’re not fatigued and pitching through dysfunction certainly doesn’t help. It’s super rare, but it’s out there.”

According to the International Olympic Committee consensus statement on youth athletic development, “… unsuspected cardiovascular disease represents the most common cause of sudden death in competitive youth athletes.”

**Treatment**

The role of the PT in treating young athletes begins as it would with any other injury: “We need to reduce pain and restore range of motion and strength,” says Granger. “But it’s essential that the treatment be age-appropriate,” she adds. “If they are athletes, their care needs to be sport-specific. Finally, because they’re growing and changing, both physically and emotionally, the way we teach them needs to be simple, so that they can fully understand what we want them to do.”

She says that videotaping youth and breaking down their movements by showing them what’s going on—as Kovacs does with his patients—is key. “When their pain has decreased, you need to look at the sport-specific movement that the child is doing and find out what’s going on. With the treatment, you’re not only developing their motor skills but also engaging the young person. They’re like, ‘Sweet! You care about my sport!’ You get quick buy-in.”

When patients are motivated and the PT understands the movement needed for a given sport, Granger adds, “You can design sport-specific exercises that address the issue. For example, if the sport is baseball, you may be able to attach a bat to an elastic band to help strengthen the player’s core while he’s in a lunge position. That will help to ready him for batting.”

“We need to engage kids,” Granger continues. “If we sit them on a table and have them do repetition after repetition of a single muscle type exercise, they’re going to get bored. They’re not going to want to do it for their home exercise program. But if we make exercise specific to their sport, it increases their motivation and improves both motor control and coordination. We’re setting them up for long-term success.”

PTs should have a parent present, Granger says—not only so they know what’s going on, but also for safety during hands-on treatment. The parent can leave the room during the actual treatment, Granger adds, “but it’s important to wrap up the session by educating parents on what happened, what the child learned, and what needs to happen for accountability at home.”

Kunzer says that the strongest predictor of an overuse injury is a prior injury. “Many athletes will have a prior injury such as an ankle sprain. But they initially didn’t spend enough time to rehab it correctly—that puts them at significant risk,” he notes. “So, we have to emphasize the need for the body to recover.” Athletes need to know about proper nutrition and sleep, and be apprised whether any kind of imbalance or weakness puts them at particular risk of injury, Kunzer adds.

**Prevention**

“Overuse or repetitive trauma injuries represent approximately 50% of all pediatric sport-related injuries,” one
Unverzagt agrees. “We’ve got this information in academia, but it’s not being disseminated out into the public. As PTs, we need to step in and intervene.” As part of this education, she says that PTs should provide resources on nutrition, rest, and injury-prevention exercises, such as stretches, that can ease the strain on the young athletes’ bodies.

Schuemann says it’s important to talk with parents about making sure their children are developing good all-around sporting skills. “They need to be able to run, jump, skip, hop, swing, and have some eye-hand coordination,” she says.

Emphasize to parents, kids, and coaches that early specialization is risky, Unverzagt advises. Encourage youth to sample sports and leave time for free play. “Fifty years ago, kids were outside climbing trees and playing stickball in the street. Now they’re on their phones and in front of their computers,” he notes. “Individuals who don’t get unstructured free playtime are the ones who tend to develop overuse injuries.”

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"Go out and educate your communities. When they understand what to do or not do, there will be fewer injuries."
— COREY KUNZER

injuries—as do those who play too much of 1 sport in a year.” He cites an article from the Orthopaedic Journal of Sports Medicine: “Youth who specialize in a single sport should plan periods of isolated and focused INT to enhance diverse motor skill development and reduce injury risk factors.”

Since coaches are the ones spending the most time with young athletes, they need to know if there are any physical problems with their team members. Schuemann does everything from prevention screenings (to see if their physical form is correct) to movement screenings (to guard against harmful compensatory patterns). She also screens entire teams and tells them if she detects certain patterns. “For example, I might see that 80% of the players are too tight in their hamstrings,” she says. “I then educate coaches and players by telling them they should do some hamstring stretches at the end of practices.”

Schuemann also works with coaches to design appropriate warmups. Likewise, she’ll step in to tell a coach the importance of having all athletes function well. “Their hearts are in the right places, and they’re doing it for the kids,” says Unverzagt. “But we need to make sure that they’re training the kids right. FIFA [the Federation Internationale de Football Association] has done a great job creating injury-prevention programs and education for coaches—but most of them don’t even know it exists. They can get all this information online [http://grassroots.fifa.com/en/for-kids.html] for free.”

Finally, Schuemann says injury-prevention clinics are valuable because they help athletes identify small injuries and learn how to prevent them from getting larger. In the clinic, Unverzagt likewise conducts prevention screenings of teams—making sure athletes don’t have any neurodevelopment patterns that predispose them to injury. ■

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REFERENCES