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## Injury Prevention: The Application of CrossFit Kids

Many overuse injuries are preventable. Janet Kowalchick explains how CrossFit Kids can help keep young athletes healthy and on the field.

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If you were to take a straight pin and poke the pad of your finger lightly one or two times, it would have almost no effect. The thickness of the skin would prevent pain and tissue damage from just a few repetitions. If you were to poke your finger lightly 10,000 times at a high frequency, the dermis would begin to break down, nerve endings would then be affected, and pain and bleeding would ensue. The tissue is overloaded, and there is insufficient time for recovery between bouts of loading to the same area.

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This is one way to depict an overuse injury. Overuse injuries are preventable but on the rise in young athletes.

Overuse injury is defined as repetitive microtrauma to tissues—i.e., muscle, bone, ligaments, tendons—and can go unrecognized for an extended period of time. Just like the pad of the finger in the example above, the athlete is unaware the damage is occurring until a significant pain threshold is reached. The repetition leads to structural weakness and tissue failure finally occurs.

In today's highly competitive society, there is a trend to specialize youth in sport early, play year-round, and try to reach collegiate-scholarship potential as soon as possible instead of taking a methodical, progressive approach to training that matches the young athlete's physical and mental maturity. There are an estimated 3 million youth-sport injuries that occur each year in middle-school and high-school athletes (9). It is estimated that 50 percent of overuse injuries are preventable (1,5,6).

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### Overuse injuries preventable but are on the rise in young athletes.

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According to Dr. Joel S. Brenner and the Council on Sports Medicine and Fitness, overuse is one of the most common etiologic factors leading to injuries in youth athletes (2). There are multiple contributing factors to overuse, ranging from year-round, single-sport training; weekend tournament overload; and lack of multisport involvement, which increases the risk of "overuse abuse" from sport specialization.

Burnout is another key psychological factor wrapped up in this disease and should be recognized as a serious consequence of overuse training syndrome (2). Once the young athlete experiences multiple overuse injuries, what will be her desire to compete later in life? It is likely that she will relate this experience to an unpleasant time in her life. The goal of youth-sports participation is to create a lifestyle of enjoying exercise and fitness, not to allow overuse and injury.



*Above all, young athletes should have fun with their sport.*

### The Path to Overuse Injury

Fourteen-year-old Susie has always been a "natural." No matter what recreational sport she played from age 6 to 11 (prepubescent), she excelled. Now she is in high school and wants to run cross-country. At the preseason meeting, the coach invites her out to do summer training prior to the fall season. Although very active and fit, Susie's running background is that of her recreational league team sports: soccer and basketball. Intermittent multidirectional sprints have been the majority of her athletic movement, and she has never run consistently more than two to three miles.

The coach immediately sees her natural ability during the first four weeks of running 20 miles per week and asks her to come to the running camp at the end of the summer. The camp consists of two-a-day workouts comprising one linear activity: running. Even though this camp is only one week, the dose of repetitive pounding that running imposes on Susie's body is beginning to take its toll, but she does not feel it yet. Cross-country season comes, and Susie is moved up to varsity. She immediately starts setting records.



***Growth spurts can change the body mechanics of young athletes and leave them vulnerable to injury.***

Susie does not mention to her coach or parents that her hip is starting to ache every now and then. Susie is competitive and really enjoys her dominance in the sport. She takes ibuprofen for her hip pain, knowing that she will have a break soon, and finishes the season strong. Her hip pain decreases slightly with the time off, but the coach then asks her to come out for preseason track practice two weeks later.

Eager to please the coach, her peers, her parents and herself, Susie begins training again. Her hip pain soon returns. Susie finally tells her coach and her parents and sees the family physician, who orders rest for two weeks and non-steroidal anti-inflammatory drugs (NSAIDs). She follows this protocol and returns to track training.

Since Susie started running cross-country, her mileage went from 10 miles per week to 50 miles per week. This rapid increase in mileage goes beyond the recommended maximum 10 percent increase in mileage per week (9). Susie was also hitting a peak growth spurt

period in her maturation, and her inherent lateral hip strength was decreasing from running in one direction: forward. Susie's neuromuscular patterns compensated; her hip flexors became strong and tight, and her hip extensors and hamstrings were weak.

Susie's focus is centered on maintaining a dominant position on the team and in the sport, and, for the next six months, she pushes through the pain growing in her hip. Finally, after nearly a year of subtle, linear, repetitive stress on the same areas of her body, Susie ends up with a stress fracture of her femur. Her dominance in the sport is lost while rehabilitating, and her confidence is shaken.

This is a common scenario that plays out in many sports: youth baseball, softball, gymnastics, etc.

As a physical therapist, I see these types of injuries in my sports-medicine clinic on a daily basis. It is our responsibility as clinicians to recognize the patterns and environments from which these injured athletes evolve.

Peak growth spurts combined with inherent biomechanical issues are the recipe for injury. However, many times young athletes are put in a position to choose between rest and recovery or continued training with their team. The developmental neuroscience studies show that even though adolescents may demonstrate cognitive-like adult skills with decision making, they are still extremely vulnerable to the social implications of being dismissed from their sport due to injury (6). Therefore, their capacity to make decisions in their best interest dissolves during critical moments of assessment (6).

I have tried to reach out to various coaches, parents and physicians to convince them that overuse, musculoskeletal weakness and too much too soon are preventable. However, the social ramifications for athletes, the coaches' need to push for a win, and a potential scholarship for the parents present significant hurdles in an effort to have injured young athletes stay out of practice and competition to properly rehabilitate.

### **Finding Solutions: The CrossFit Kids Approach**

How can we effectively avoid overuse injuries and focus on prevention? There are physical, mental and social factors that need to be addressed when designing an effective injury-prevention program for children and teens.

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**My goal became to keep kids out of my sports-medicine clinic and work on the preventative side.**

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Enter Jeff and Mikki Lee Martin's CrossFit Kids. I discovered CrossFit Kids after attending the CrossFit Level 1 Trainer Course. I was amazed at the genuine research behind the CrossFit training method and its efficacy when employed properly and carefully. At the CrossFit Kids Trainer Course, I met the Martins, the founders of CrossFit Kids. Throughout the weekend of experts speaking on nutrition, education models, exercise physiology and neuroscience, I was 100 percent sold that this was exactly the platform I had been looking for to reach young athletes for injury prevention.



***The CrossFit Kids training method can help keep kids injury-free and playing the sports they love.***

My goal became to keep kids out of my sports-medicine clinic and work on the preventative side: keeping young athletes on the field and teaching them the proper techniques of functional movements for life.

While researching current literature, I found it remarkable that the exact message that the current position papers are calling for is what CrossFit Kids documents in its own position statement. How could that be?

The Martin's CrossFit journey started in 2004, just as the extent of this epidemic was being recognized in the literature. The Martins followed their intuition when applying the CrossFit methodology to children and teens. They were seeing the results, and their kids were becoming better athletes while reducing their risk of injury.

Jeff comes from a background of biochemistry and was always interested in the effects of exercise on the body. He was heavily involved in martial arts and was already running a program for kids at Brand X Martial Arts (which eventually became CrossFit Brand X). In searching for a different approach to his own fitness in 2003, Jeff discovered CrossFit and immediately caught on to the emphasis on biomechanics, the challenge of using more powerful energy systems and, most of all, the fun it was, even for an adult. He then introduced CrossFit into Brand X's martial-arts program. Jeff quickly saw how intrigued the kids were with this new type of training, and so he and Mikki Lee began developing a CrossFit-based program tailored for children and teens.

After years of working with kids, the Martins knew that the true value of introducing this type of training to children and adolescents was the importance of the movement patterns, not how much weight they were moving. Jeff respects the longevity of skills acquired during key years of maturation in youth. He dug into the pertinent literature and sought out the knowledge of professionals with backgrounds in science and education to help develop more specific programming for children. The Martins continued to go the extra mile and take this knowledge to a methodical, progressive coaching format so that, universally, CrossFit trainers could benefit from this type of teaching model and learn the specifics and inherent responsibilities of training children and teens (7).

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**“When fitness is defined as broad, inclusive and general, it means that participants will become well-rounded athletes who will be better at any and every sport.”**

**—CrossFit Kids**

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The description on the CrossFit Kids website reads as follows:

Since late 2004 CrossFit Kids has been forging the future of fitness and is currently in over 500 gyms in North America, Australia, Europe, Africa, India, Japan and Panama. CrossFit Kids is a strength and conditioning program that is specifically designed for kids and teenagers and helps them develop a lifelong love of fitness. In a supervised group setting, children and teens participate in fun and engaging workouts that deliver measurable results and prepare them to be well-rounded athletes. With a network of over 2,500 CrossFit Kids trainers, CrossFit Kids is being implemented in preschools to high schools with before- and after-school programs and integration into physical-education curriculum.

CrossFit Kids workouts consist of constantly varied, functional movements that deliver a fitness that is broad, inclusive and general and scalable for any participant at any level. Constantly varied means no two workouts are the same, so kids and teens never get bored and the novelty of each workout keeps them excited about participating. The functional movements involve exercises that are fundamental to all things that kids need to do when they play—pull, push, run, throw, climb, lift and jump. All of the movements are taught safely and effectively under the close supervision of thoroughly trained CrossFit Kids trainers.

When fitness is defined as broad, inclusive and general, it means that participants will become well-rounded athletes who will be better at any and every sport that they play because CrossFit Kids specializes in not specializing. Our workouts will increase physical competence in 10 fitness domains: cardiovascular and respiratory endurance, stamina, strength, flexibility, power, speed, coordination, agility, balance, and accuracy.

With workouts that are scalable, CrossFit Kids can equally benefit a person who is less active or an accomplished athlete by tailoring workouts so that each participant is challenged just enough to deliver measurable results and personal athletic progress (3).

If you are a CrossFitter, the information above is not new. It is most likely the reason you are hooked on going to your local affiliate and addicted to the whiteboard. But perhaps you have not thought about the positive application to children and adolescents.

### **Guidelines for Injury Prevention**

It is well documented that proper strength training results in a positive physiological change in cardiovascular health, muscle strength and bone density for all ages. If we examine the current research and key sports-medicine position papers, it becomes increasingly apparent that CrossFit Kids programming abides by these guidelines. In fact, it is as though the Martins had a crystal ball in 2004 and created CrossFit Kids to combat the pandemic of overuse injuries.

For example, the National Strength and Conditioning Association position paper *Youth Resistance Training* (5) summarizes its current research purporting the very ideals that CrossFit Kids and physical therapy embody. A properly designed and supervised resistance program will provide the following:

- A. A relatively safe environment for youth ages ranging from children (6-12) and adolescents (13-18).
- B. Enhanced muscular strength and power for youth.
- C. Improved cardiovascular risk profile for youth.
- D. Improved motor skill performance and enhanced sports performance for youth.
- E. Improved psychosocial well-being for youth.
- F. Development of exercise habits during childhood and adolescence.

Every guideline published by this paper is addressed in the description in CrossFit Kids.

Best-practice recommendations from the National Athletic Trainers Association coincide with the aforementioned and also speak to the concept of “delayed specialization.” The danger lies in the repetitive microtrauma and submaximal loading that is subtle and goes unnoticed in the youth athlete until the damage is pronounced. The innately talented athletes are at particular risk in that they are recognized early on for their natural talents. These athletes are then selected in prepuberty to specialize in their supposed ideal sport. Regardless of the lack of skeletal maturation, growth spurts and growing muscle imbalances, they are either willing or pushed to pursue that sport year round. Delaying sports specialization encourages the athlete to continue sampling sports to allow for a balance in musculoskeletal development and enhanced comprehensive neuromuscular growth (10).



*If young athletes delay specialization, they can balance their muscular development, which helps prevent injury and improves performance.*



***The constant variety of CrossFit Kids ensures children don't stress the same body parts every day.***

Let's briefly consider our case-example athlete, Susie. By following these guidelines, we might predict that her risk for injury would be lower. It would be interesting to see how Susie could have fared had her cross-country mileage progression been kept to a lower volume (equal to or less than the recommended 10 percent increase per week) and had she attended CrossFit Kids classes two to three times per week in the summer and preseason and then maintained two times per week in season.

### **What Keeps Them Compliant?**

CrossFit Kids programming solves other clinical issues surrounding injury prevention and rehabilitation. It is challenging to capture the interest of a young patient-athlete pulled from the playing field into a sterile clinical environment to "get stronger." The drive is almost entirely

extrinsic and comes from a desire to please the therapist, parent and coach by going through the motions of rehabilitation. Doing exercises tailored to her specific injury coupled with general strengthening therapy during clinic can be quite mundane to a teenager who is solo with only a clock and a physical therapist eagle-eyeing her technique.

Consider these two scenarios:

### **Scenario One**

Maddi returns to the doctor for shoulder pain. It has been six months since her last visit, and she just completed a month of playing travel softball. She looks fatigued, and her strength, especially in her throwing arm, has declined. Maddi tells the doctor that her arm has been painful during the last month. The doctor takes X-rays, prescribes NSAIDS, orders no softball practice for six weeks and sends the patient back to physical therapy.

She returns to PT, does specific rotator-cuff exercises and core and balance training two times per week. At home, she is unable to perform her exercises properly due to lack of supervision and lack of interest and is semi-compliant following through with all that is prescribed. Despite the therapist's comprehensive treatment plan, Maddi is socially isolated from her team and depressed that her shoulder continues to interrupt her year-round training.

### **Scenario Two**

Maddi returns to CrossFit from a month hiatus while she was playing travel softball. She looks fatigued and her strength, especially in her throwing arm, has declined. Maddi mentions to the coach that her arm has been a little sore from pitching so much. The CrossFit Kids trainer modifies the WOD (workout of the day) to include more shoulder-stabilization, rhomboid and mid-to-low-trapezius exercises, such as ring rows and handstand holds.

After the WOD, her trainer reviews band stretching (e.g., 8) to the group, using Maddi as the example. Maddi, luckily, is on a break from travel ball where she can now focus on resting her pitching arm and improving her core strength in addition to overall trunk and shoulder stability. Over the next four weeks, Maddi comes to CrossFit two times per week and regains her shoulder strength while improving her core strength. She enjoys the camaraderie of her peer group and is motivated to work hard for the supervising coach to finish the WOD and improve her times.

## Beyond Scenario Two

The situation changes when that teenage patient is placed in a CrossFit Kids class with peers. A teaching methodology centered on pairing fitness with fun and a workout environment vibrant with blaring music, laughter and eagerness encourage the development of intrinsic motivation to exercise. The internal desire to complete the WOD efficiently and competitively requires that the teens focus on how they are performing the movements. They learn how to move well, how to exercise and how to live. Perfect movement or gaining strength is no longer “I have to do this”; it becomes “I want to do this.” I would argue that such intrinsically motivated purpose in the realm of general physical fitness lends itself to injury prevention and rehabilitation.

The CrossFit Kids program can be effective in delivering strength and flexibility while preventing burnout from the athlete’s primary sport. At CrossFit Ridgecrest, we see athletes in and out of their primary season. We re-evaluate their return to CrossFit and start at square one if necessary. While young athletes may not always enjoy the trip back to the PVC, they soon refocus their attention to technique and their motivation to return to the feeling of being overall fit ... CrossFit!

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**CrossFit Kid trainers learn to recognize muscular imbalances, growth spurts, changes in neuromuscular patterns and burnout when they see these athletes on a week-to-week basis.**

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This addresses the psychological issue as well. Out of the realm of their single-sport environment, they are allowed to think about the competition with their CrossFitting peers instead of their teammates or opposing teams. They can stimulate their neuromotor systems with new and proper movement patterns or techniques designed to enhance overall power from core to extremity. CrossFit



***At CrossFit Kids, young athletes find themselves doing things they would never do in their primary sport, which increases their overall athleticism.***

Kids is dynamic and constantly varied, in addition to being closely supervised with an emphasis on technique. The programming is perfect for this population of youth athletes.

In the CrossFit setting, CrossFit Kid trainers learn to recognize muscular imbalances, growth spurts, changes in neuromuscular patterns and burnout when they see these athletes on a week-to-week basis. The opportunity to recognize and correct the subtleties of what leads to overuse injuries in prepubescent and adolescent youth in the CrossFit setting is an incredible boost for injury prevention.

### Maximizing Returns

Sports Trauma and Overuse Prevention or [STOPinjuries.org](http://STOPinjuries.org) is the brainchild of renowned orthopedic surgeon Dr. James Andrews, who became concerned with the number of “Tommy John” surgeries being performed on youth baseball players (age 16 and under). He enlisted the support of the American Association of Orthopedic Surgeons among other founding organizations (the American Academy of Pediatrics, the National Athletic Trainers’ Association, the American Medical Society for Sports Medicine and SAFE Kids USA) to organize information on sport trauma and overuse injuries and how to prevent them.



This massive education campaign is now easily accessed on the Internet at [STOPinjuries.org](http://STOPinjuries.org). We can partner with organizations like this to help promote the fact that CrossFit Kids can be a viable solution on all fronts. The ideals of the founders Jeff and Mikki Lee Martin are the exact elements that can promote injury prevention and safe return to sports.

A well-developed injury-prevention program needs to meet the criteria of sound medical research and established guidelines as outlined here. Constantly varied, high-intensity, functional movement that promotes universal motor-recruitment patterns (4) can be an effective model for this design. CrossFit Kids provides a wonderful platform to promote injury prevention and can be embraced by the physical-therapy and medical community as evidence-based practice. The program's proven ability to foster a passion for fitness within kids encourages young athletes to be their own advocates in the fight against overuse injuries.

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Courtesy of Janet Kowalchick

### About the Author

Janet Kowalchick holds a master's in exercise physiology and a master's in physical therapy. She is a CrossFit Level 1 trainer/ CrossFit Kids trainer and strength-and-conditioning coach for the Indian Wells Valley Swim Team and the Burroughs High School Baseball Team. She and her husband, Grant, who holds similar credentials in CrossFit, own *CrossFit Ridgecrest/ Kowalchick Physical Therapy*.