



## **Overtraining in Young Athletes**

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Millions of school-age youth in the United States participate in some type of organized or recreational sport program. In addition to interscholastic sports which are offered at 77% of middle schools and 91% of high schools, a growing number of boys and girls participate on highly organized travel teams and “elite” sport clubs that cater to a variety of athletes including dancers, gymnasts, figure skaters, and swimmers. Moreover, the number of private fitness centers that offer specialized training programs for children and adolescents is also increasing. This type of intense training and competition can result in injuries, illness, or burnout which may have a detrimental effect on the young athlete’s ability or desire to participate in sports as an ongoing lifestyle choice. Since youth programs should help boys and girls develop a lifelong interest in physical activity, program design considerations for maximizing enjoyment and minimizing the risk of overuse injury will be the focus of this article.

### Over-reaching vs. Overtraining

Regular participation in a sports program has the potential to positively influence many physical and psychosocial measures. In addition to favorable changes in aerobic fitness, muscle strength and selected motor performance skills, sports training provides young athletes with an opportunity to make friends, learn something new and feel good about their performances. However, sport training for young athletes must be based on the fundamental principles of

pediatric exercise science and consistent with the needs, goals and abilities of each participant. Since young athletes are physically and psychologically less mature than adults, training programs designed for college or professional athletes are potentially injurious to children and adolescents.

If training programs are appropriately designed and sensibly progressed, the acute and chronic adaptations that take place will likely result in meaningful changes in performance. However, if the intensity, volume or frequency of training exceeds the capacity of an athlete, extreme fatigue, injury or illness can result. On a short term basis, excessive training is called over-reaching. For example, if a high school swimmer participates in several days of intense and voluminous training (without adequate rest and recovery between workouts), it is likely that performance will begin to wane. The rationale behind this type of training is to overwork an athlete to build up tolerance and then taper to allow time for recovery and rejuvenation. Recovery from a brief period of overreaching is typically achieved with a few days of less intense training and rest. Short-term overreaching followed by a tapering period can result in “overcompensation” and an improvement in performance provided that training stimulus and recovery period are consistent with the needs of each athlete.

While overreaching is sometimes a planned phase of youth sport programs, overreaching can become overtraining syndrome if intense training is continued for a prolonged period of time without an adequate taper. Overtraining syndrome (also called “burnout”) is the condition resulting from overtraining and is typically characterized by a decrease in performance, chronic muscle or joint pain, lack of enthusiasm about practice, and personality changes. Unlike

overreaching which typically resolves within a few days, overtraining can last for several months and in some cases ruin an athletic career. Doing too much too soon or simply participating in the same sport or activity for a prolonged period of time may result in overtraining and potentially an overuse injury such as a stress fracture.

Typically, overtraining arises when mistakes are made in the design and progression of the training program which may include both sport specific (e.g., sport practices and competitions) and non-sport specific modalities (e.g., strength and conditioning activities). From a real world perspective, highly motivated young athletes who are pressured by their parents and coaches to outdo predecessors, outshine contemporaries, and outperform competitors may be considered “at risk” for overtraining syndrome. These young athletes need to be mentored and monitored carefully to avoid over-participation and overtraining.

### Overuse Injuries

Overtraining syndrome can result in an overuse injury which is defined as microtraumatic damage to bone, muscle or tendon due to repetitive stress without adequate time for recovery and reparation. Professionals who work with young athletes need to identify youth at risk of overuse injuries so that correctable risk factors can be identified and treated. While intrinsic risk factors (e.g., previous injury, poor physical conditioning, and muscle imbalances) and extrinsic risk factors (e.g., improper footwear and training errors) often explain why some young athletes sustain overuse injuries and others remain injury-free throughout the season, a common theme in most overuse injuries is training errors. That is to say, unfit athletes who try to play themselves into shape are an absolute set-up for injury because their unfit bodies are not prepared for the

repetitive stress of sports practice and competition. While the causative factors for overuse injuries in young athletes are multi-dimensional, some sports medicine professionals believe that both acute and overuse injuries can be reduced by 15% to 50% by addressing risk factors such as poor physical conditioning that are typically associated with sports injuries.

Nowadays, it appears that the focus of most youth sport programs is on the development of sport-specific skills rather than on the development of fundamental fitness abilities such as strength, power, endurance, agility, balance and coordination. Although some parents and coaches argue that sports specialization is the key to athletic success, broad based participation in a variety of sports and activities is related more to later sports success than early sports specialization. Indeed, the American Academy of Pediatrics suggests that sport specialization should be discouraged before adolescence. Participation in physical activity should not revolve around one sport, but rather evolve out of varied physical activities which include FUNDamental movement skills (e.g., running, jumping, twisting, hopping, and skipping) and preparatory conditioning which enhance both health-and skill-related components of physical fitness.

Since overuse injuries such as tendinitis and stress fractures typically result from too much training or an inappropriate increase in training volume, an important question to consider is “How much training is too much for young athletes?” Although there are no scientific guidelines that answer this question, some sport medicine professionals have suggested limiting one sporting activity to a maximum of 5 days per week with at least one day off from any organized activity. However, the intensity of each workout as well as subtle changes in the training program must also be considered. For example, high school cross country runners who switch

from running on grass during the summer to running on the road during the fall have increased the intensity of their training even if the weekly mileage remains the same. Others suggest that careful medical monitoring is needed for young athletes who train more than 18 hours per week.

Since recovery is an integral part of the training cycle, it is also important to balance high intensity and/or high volume workouts with less intense training or L.I.T. sessions that facilitate recovery, enhance joint stability, improve range of motion, and reinforce learning of specific movement patterns. L.I.T. sessions are valued by our young athletes as an important component of our multi-faceted approach to enhancing performance and optimizing recovery. Since the greatest adaptations take place when the muscles have recovered from a previous training session, L.I.T. training enables our young athletes to train as hard as possible when they are as strong as possible.

In summary, developing fitness and sport programs for young athletes can be a challenging process which involves balancing the demands of training with the need for recovery. As fitness professionals, we have a shared responsibility to provide children and adolescents with enjoyable experiences that increase their confidence in their abilities to be physically active while enhancing both health- and skill-related components of physical fitness. Since training errors are a common theme in most overuse injuries in young athletes, we should ensure that boys and girls are prepared for the demands of sports training by participating regularly in a variety of fitness activities. Nowadays, qualified fitness professionals have a unique opportunity to design and implement age-appropriate physical activity programs for children and adolescents.

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