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IMPROVING THE PHYSICAL FITNESS OF YOUNG PLAYERS THROUGH ACTION GAMES

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Annotation
Youth training requires a specific and different approach to design and implementation of physical preparation. As famously stated by Bompa, young people cannot merely be considered “mini adults”. The physiological makeup of children and adolescents is markedly different from that of mature adults (38); it follows that the parameters applied to training design should reflect these differences. Neural, hormonal, and cardiovascular systems develop with advances in biologic age, leading to corresponding changes in neuromuscular performance.

Keywords: youth sports; strength training; metabolic conditioning; neuromuscular training; injury prevention

Rates of development of a number of physiological and physical performance parameters measured in young team-sports athletes are shown to peak at approximately the same time as they attain peak height velocity (41). The age at which this occurs is highly individual; typical ages are approximately 11.5 years for girls (3) and 13.8 to 14.2 years for boys (41). However, this age varies considerably; levels of biologic and physiological maturation can be markedly different between young athletes of the same chronologic age (5,27). What constitutes appropriate strength training and metabolic conditioning for a young player is therefore determined by, and is specific to, the individual players stage of physical development. The stage of physical maturity also influences the mechanism of training effects, such as whether improvements are predominantly mediated by neural factors or whether morphologic and physiological adaptation plays the greater role (43). The emotional and psychological maturity of the individual is another important factor to be considered when designing and implementing strength training for a youth sports player (27,43). Another area of training for young athletes that has received less attention is neuromuscular training, including specific instruction and practice of fundamental movement mechanics.

Neuromuscular and postural control and movement biomechanics for jumping, landing, running, and changing direction all can be developed in the young team-sports player as a means to improve athleticism. Such development of fundamental movement skills may also help reduce injury risk by equipping the young player to be better at reacting to challenges in the game environment.

NEED FOR PHYSICAL PREPARATION WITH YOUNG TEAM-SPORTS PLAYERS

A major public health concern is the sedentary behaviors and decreasing levels of physical inactivity of youth worldwide (23). Regular physical activity and proper nutrition exert a major influence on growth and development in children and adolescents. From this perspective, appropriate physical preparation assumes increased importance to a young players athletic development given the apparent lack of habitual physical activity elsewhere in his or her lifestyle. The absence of such a program of physical preparation to help achieve a threshold level of physical activity may otherwise hinder young players. development during critical periods in their growth and maturation to the extent that they may not fulfill their genetic potential (23). As a result of modern sedentary lifestyles, young people are also often not physically prepared for the rigors of youth sports (12,27). Accordingly, the increase in participation in organized youth sports in North America has been accompanied by a dramatic increase in sports-related injuries (17,27). It has not been documented whether the increase in the number of injuries has been proportional to the increased numbers of participants or whether there has been a relative increase in the rate of injury among these young players. Whatever the case, approximately onethird of young athletes participating in organized sports in the United States sustain injuries requiring medical attention (2). Incidence of medical treatment for sports injuries peaks between the ages of 5 and 14 years and progressively decreases thereafter (1). The ankle and knee are the most common sites of injury reported in these young athletes (1,2). Youth sports players also appear to be at greater risk of low back pain and acute lumbar spine injury, particularly during adolescence (28). Inadequate physical preparation is believed to play a role in most sportsrelated injuries in young athletes (27). Conditions of muscle fatigue place athletes at greater risk of injury; tired players in the latter stages of a game are more likely to sustain injury than when they are fresh. Likewise, players are more likely to be injured early in the season when their fitness levels are not up to standard (45). Physical preparation, which includes strength training and training to develop cardiorespiratory fitness, is therefore an established part of strategy for prevention of sports injuries, including those in children and youth sports (32). Inadequate motor skills are another factor

identified as increasing the risk of youth sports injury (1). Again, these abilities may be developed through appropriate athletic preparation. Injuries incurred during youth sports are a frequently cited reason for ceasing to participate in sports as an adult (32). This cessation has negative health implications given the established links among physical inactivity, obesity, and chronic disease in adulthood. From this perspective, prevention of injury in youth sports assumes increased importance, beyond enhancing youth sports performance (32). OVERUSE INJURY INCIDENCE IN YOUTH SPORTS When organizing participation of adolescents in physical training and organized sports, it is important to recognize that young people are still growing (5,27). Coaches must consider that the bones, muscles, and connective tissues of the young athlete are not yet fully developed. As such, high volumes of repetitive practice may make the young player susceptible to overuse injury. This dictates not only that there is a need for age-appropriate practice and competition schedules, but also that young players physical preparation is designed specifically to reflect their stage of growth and maturation. Biomechanical factors seem to play a role in the incidence of overuse injuries with youth sports participation. The rapid changes in the size and length of limbs during growth spurts alter the mechanics of athletic movements (20). As young athletes grow, these changes actually increase the forces and mechanical stresses involved in sports movements. When the young player is undergoing a growth spurt, particular care should be taken, in view of the combined strain associated with rapid growth and physical stresses during competition and practices (38). During this time, the immature skeleton may be more susceptible to injury than at later stages in the athletes development; lumbar spine injuries particularly appear to increase in adolescent athletes (28). Growing cartilage is similarly more prone to injury in comparison to when the player reaches physical maturity, which can also be a factor in some overuse injuries (1). Given time, muscles and connective tissues respond to accommodate these growth-related changes; however, there is a time lag before this adaptation takes place (20). Under normal circumstances, connective tissues remain within their failure limits during this lag phase. However, during puberty in boys particularly, there is a rapid increase in body mass and strength; tendon and ligament strengths respond relatively more slowly than muscle, meaning these structures are closer to their failure limits in young players during this phase of maturation (20). Repeatedly performing a given sports movement during this sensitive period in the young players development can then lead to overuse injury. The point of attachment of tendon to bone (i.e., apophysis) is an area particularly prone to overuse injury in the growing player (1). Microtrauma injury, or

apophysitis, commonly occurs at the heel (Sever's disease) and the elbow ("little league elbow") in younger children (i.e., 7–10 years). A similar condition, Osgood–Schlatter disease, occurs at the insertion of the patella tendon and is often seen between the ages of 11 and 15 years (1). In certain youth sports, there is a risk of overuse injuries simply because of the strains involved in repetitive performance of a particular sports skill movement during practices and games, such as in throwing sports. In the United States, it has been estimated that these overuse injuries make up approximately one-half of all sports-related injuries requiring medical treatment (20). To combat this problem, some governing bodies suggest limits for the number of repetitions of movements (e.g., number of throws) that can be performed by a young player during a practice session.

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