

Youth sport: positive and negative impact on young athletes

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Abstract: Organized youth sports are highly popular for youth and their families, with approximately 45 million children and adolescent participants in the US. Seventy five percent of American families with school-aged children have at least one child participating in organized sports. On the surface, it appears that US children are healthy and happy as they engage in this traditional pastime, and families report higher levels of satisfaction if their children participate. However, statistics demonstrate a childhood obesity epidemic, with one of three children now being overweight, with an increasingly sedentary lifestyle for most children and teenagers. Increasing sports-related injuries, with 2.6 million emergency room visits a year for those aged 5–24 years, a 70%–80% attrition rate by the time a child is 15 years of age, and programs overemphasizing winning are problems encountered in youth sport. The challenges faced by adults who are involved in youth sports, from parents, to coaches, to sports medicine providers, are multiple, complex, and varied across ethnic cultures, gender, communities, and socioeconomic levels. It appears that an emphasis on fun while establishing a balance between physical fitness, psychologic well-being, and lifelong lessons for a healthy and active lifestyle are paramount for success.

Keywords: youth sports, injuries, benefits, risks, prevention, specialization

Introduction

The popularity of youth sports continues to rise, with an estimated 45 million child and adolescent participants in the US.^{1,2} Seventy-five percent of US families with school-aged children have at least one child who participates in organized sports.^{3,4} Unfortunately, the framework which provides guidelines, rules, and regulations for youth sports has been established with very little scientific evidence.⁵ Even basic commonsense parameters for sports safety are not implemented or followed. Vague descriptions of age of participants, hours and structure of practice, and rules for competition vary between sports. Less than 20 percent of the 2–4 million “little league” coaches and less than 8% of high school coaches have received formal training.⁶ Each year approximately 35% of young athletes quit participation in sport, and whether an athlete returns to participation at a later date is unknown.^{7,8} Sports attrition rates are the highest during the transitional years of adolescence, when outside influences have the most impact. By the time children are 15 years of age, 70%–80% are no longer engaged in sport.^{1,8}

According to physical, psychological, and cognitive development, a child should be at least 6 years of age before participating in organized team sport, such as soccer and baseball.⁷ Further, an accurate assessment of each child’s individual sports readiness

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should be performed to assist in determining if a child is prepared to enroll and at which level of competition the child can successfully participate. A mismatch in sports readiness and skill development can lead to anxiety, stress, and ultimately attrition for the young athlete.^{7,8} For the very young “athlete”, the goals of participation are to be active, have fun, and to have a positive sport experience through learning and practice of fundamental skills.^{9,10} An introduction to a variety of activities has been shown to be both physically and psychologically beneficial for the youngster.⁷ Sports satisfaction surveys reveal that “having fun” is the main reason that most children like to participate in sports; however, the parents perception of why their children like to play sports is to “win”.^{5,6,10,11} The Institution for the Study of Youth Sports looked at the importance of winning from the child’s perspective, and found that it varied with gender and age, but for the majority of younger children, fairness, participation, and development of skills ranked above winning.¹² It appears that this disconnect amongst young athletes and adults may contribute to stress and unhappiness on the part of the child. Perhaps the adult interpretation of “little league” or “pee wee” sports as a mini-version of adult sports competition has led those who are involved in governing these activities down the wrong path, where winning overrides the fundamentals of youth sports, an outline of which is provided in Table 1. Implementation of some of the coaching tactics that were designed for college and professional athletes, such as hard physical practices for punishment, only the best get to play, running up the score, and overplaying celebratory wins has contributed to a negative atmosphere in youth sports.

Although the state of affairs of youth sports in the US may be alarming, the alternative of a sedentary lifestyle and childhood obesity is a price we cannot afford. Over the past three decades, the incidence of obesity in children has

tripled, with one of every three children being affected.^{13–15} Significantly higher rates are noted in the African-American and Hispanic communities.^{13–15} This current health problem in the US has long-term health consequences, including diabetes, heart disease, high blood pressure, cancer, asthma, musculoskeletal dysfunction, and pain.^{13–15} The evolutionary changes in our society over the last 30 years, ie, technology, increasing crime rates, two income households, the national financial crisis, isolated suburban neighborhoods, and fast food, has facilitated a sedentary lifestyle with the consumption of high caloric foods. This imbalance of calories consumed and energy expenditure has contributed to an increased body mass index and obesity in our society.¹⁶ The decline in physical activity has been attributed to increased use of car transport to and from school, an abundance of time spent in front of screens, and limited access to recess, physical education, and after-school programs.^{5,13,17} Time spent outdoors engaging in traditional pickup games of “kick the can”, “dodge ball”, “kick ball”, and “stick ball” are replaced with an average of 7.5 hours per day of screen time for children aged 8–18 years.^{5,13}

This paper examines the positive and negative aspects of youth sports in the US. Controversial topics, such as early specialization, identification of elite players, influence of trained and untrained coaches, increasing injury rates, and moral issues of character and sportsmanship are discussed. It is clearly apparent upon investigation of the strengths and weaknesses of youth sports that resolutions promoting a better, safer, and healthier future for all US children lies in partnership of involved adults, from parents, who lay the foundation of moral principles, to politicians, who support legislation and funding for positive sports initiatives.

Positive impact

The perceived and objective benefits of participation in sports for children and adolescents are numerous and span multiple domains, including physical, physiological, and social development. First and foremost, participation in sports fosters vigorous physical activity and energy expenditure. In 1999, the Centers for Disease Control reported that only 50% of youth engaged in regular exercise, illustrating the need for school and community organizations to promote and facilitate physical activity.¹⁴ In a more recent study by Troiano et al, only 42% of elementary school children undertook the recommended daily amount of physical activity, and only 8% of adolescents met this goal.¹⁸ Research has shown that childhood obesity is a good predictor of adult obesity,^{5,19} and it is estimated that one third of children born in the years 2000 and

Table 1 Fundamentals of youth sports

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- Fun
 - Decreases injury
 - Increases enthusiasm/eagerness
 - Prolongs involvement
 - Focus
 - Exercise
 - Friendship
 - Sportsmanship
 - Skill development
 - Fuel the basics
 - Keep it simple
 - Athlete-directed goals/motivation
 - Reward the effort rather than the outcome
-

beyond will encounter diabetes at some point in their lives.¹³ Organized sports have been shown to assist in breaking the vicious cycle of inactivity and unhealthy lifestyle by improving caloric expenditure, increasing time spent away from entertainment media, and minimizing unnecessary snacking. The chaotic lifestyles of working parents have facilitated an increase in consumption of “meals on the go”, which are often higher in calories, fats, and sugars. The average American now consumes 31% more calories, 56% more fat, and 14% more sugar than in previous years.¹³

Organized sports comply with Michelle Obama’s initiative “Let’s Move!” to combat childhood obesity by fulfilling the recommended physical activity requirements for children of 60 minutes a day, 5 days a week, for 6 of 8 weeks.^{13,14} In addition to promoting movement, youth sports provide a venue for learning, practicing, and developing gross motor skills.^{7,17} Successful acquisition of a motor skill at a young age improves the likelihood of future participation in that activity in adulthood.¹⁷ In 2010, the Centers for Disease Control reported a positive correlation between students who participated in high levels of physical activity and improved academic achievement, decreased risk of heart disease and diabetes, improved weight control, and less psychologic dysfunction.²⁰ Conversely, children who are obese often experience a diminished quality of life, learning difficulties, decreased self-confidence, and social discrimination.^{13,20,21} In a longitudinal study which looked at activity levels in the same children at 9 years of age and then again at 15 years of age, adolescent girls fell short of the recommended daily 60 minutes of activity at an earlier age than did boys.⁵ Both genders showed a decrease in physical activity as they transitioned into adolescence.⁵ Rates of participation in sports for suburban youth appear to be similar between boys and girls; however, urban and rural girls show significantly less activity than boys of similar residential status.^{21–23} Further, girls of color from a variety of ethnic backgrounds report lower levels of activity compared with Caucasian girls and boys of the same age.²³ Often the reality of living in lower socioeconomic neighborhoods contributes to inactivity, with more limited access to organized sport programs and facilities.^{21–23}

In addition to influencing physical health and warding off the negative consequences of obesity, youth participation in sports can also impact other high-risk health-related behaviors for boys and girls. A 2000 study reported by Pate et al investigated the relationship between participation in sports and health-related behaviors in US youth. Both male and female athletes were more likely to eat fruit and vegetables, and less likely to engage in smoking and illicit drug-taking.²²

The frequency of binge drinking remained consistent between athletes and nonathletes of both genders.²² Male athletes were also less likely than their nonathletic counterparts to sniff glue or carry a weapon.²² Not all risky behaviors performed by adolescents were curbed with participation in sports, however, the majority of teenagers who participated in sports appeared to be less interested in taking health risks than nonathletes. The amount and type of risky behaviors engaged in by adolescent athletes and nonathletes have been shown to vary according to gender, ethnicity, and socioeconomic status.²²

In 2009, The Woman’s Sports Foundation published an updated version of “Her Life Depends on It”, an evidence-based research project stressing the important role that physical activity and sports play in the lives of girls and women.²³ This report underscores the advantages in terms of health and well-being experienced by physically active girls. Promoting exercise in young females is crucial because the majority of girls do not undertake the recommended level of daily physical activity.²³ Positive health benefits for physically active young girls include a reduced risk for developing breast cancer, osteoporosis, heart disease, and obesity in the future.²³ Further, rates of teenage pregnancy, unprotected sexual intercourse, smoking, drug use, and suicide decrease with increasing physical activity and participation in sports.^{22,23} Girls who participate in sports are less likely to be depressed, more likely to reach higher academic goals, and more likely to demonstrate improved self-confidence and body image.^{21,23,24}

A reduction in suicidal thoughts and tendencies has been demonstrated for both teenage boys and girls who engage in sport.^{22–24} The Centers for Disease Control reports suicide as the third leading cause of death in adolescents, and advocates participation in sport for its positive psychologic benefits.²⁴ Data from the Centers for Disease Control 2005 Youth Risk Behavior Survey demonstrated that frequent vigorous activity reduces the risk of feelings of hopelessness and suicidal tendencies in both males and females.²⁴ In addition to the physical benefits of exercise, the social support and acceptance that being part of a team can provide contribute to the success of sport in reducing the risk of suicide.²⁴ Student athletes who report a strong social support system appear to be more resilient in terms of the negative processes that push teenagers toward suicide. The influence of friendship and peer interactions cannot be underestimated for the female athlete.²⁴ When the relationship between participation in sport, extracurricular activities, and social well-being was examined, students who engaged in sport demonstrated

more psychosocial benefits compared with those who were active in after-school programs not related to sport.^{24,25} Three different studies involving adolescents in 2003 found that those who participated in extracurricular activities, including sports, demonstrated improved skills in goal setting, time management, emotional control, leadership, wisdom, social intelligence, cooperation, and self-exploration.^{5,26,27} Teenagers who participate in team sports are happier, have increased self-esteem, and are less anxious, with a decreased risk of suicidal behavior.^{24,28}

Psychologic outcomes for community-based programs are successful if physical activity is combined with positive social constructs.^{5,20} When youth sports coaches were instructed in coach effectiveness training, an enhanced sporting experience was reported by most athletes.^{29–31} These coaches improved player satisfaction, motivation, self-esteem, compliance, and attrition rates through positive reinforcement and teaching.^{29,30}

Negative impact

There is an inherent risk of injury for athletes of all ages when participating in sport. During periods of increased growth velocity and closure of the growth plates in adolescence, young athletes are vulnerable to a variety of traumatic and overuse injuries.^{5,32–35} With increased youth participation in sports, an increase in sports-related injuries has been observed, with 2.6 million emergency room visits each year for those aged 5–24 years.^{1,36} Due to the rapid expansion of bones while growing and slowly elongating muscles, tension develops across the growth plates, the apophyses, and the joints.^{4,32} This increase in tensile forces can place the aforementioned structures at risk of injury. Depending on the stage of physical growth, children and adolescents often injure anatomic structures that are different from those injured in adults. Children's bones are weaker than their ligaments and tendons, therefore they are at an increased risk for fractures throughout the bone and growth plate.^{32–35}

During the adolescent years, some athletes may experience a decrease in flexibility, coordination, and balance, which not only increases the risk of injury, but also impacts sports performance, placing more stress, anxiety, and social pressure on the young athlete.^{5,32} Although children are generally more resilient and heal faster than adults (except in the case of concussion), special consideration of the immature skeleton is necessary for developing appropriate exercise volumes during practice, competition, and rehabilitation to avoid overuse injuries. A hasty return to sport with incomplete rehabilitation can result in chronic pain, dysfunction,

increased time away from sport, and repeated injury to the same or different body parts.

As participation in youth sports continues to rise, a direct impact on injury rates, medical costs, family burden, and time away from sport is observed. Accurate and comprehensive data on sporting injuries in the young athlete have been difficult to obtain because of inconsistent definitions of sports injury, under-reporting of injuries by parents and athletes, and lack of professional oversight in record-keeping. In addition to the physical consequences of injury, the psychosocial disturbances of mood swings, depression, and disconnection from the peer group are problematic and often require professional management.⁵ The National Center for Sports Safety reports that 3.5 million children aged 14 years and younger receive medical care for sports-related injuries each year, and of all the sports-related injuries that are cared for in the emergency room, two thirds involve injuries to children.³ It is estimated that two billion dollars are spent in the US health care system each year on the management of sports injuries.¹

Although not all injuries can be prevented, it appears that the youth sport culture is falling short in minimizing both traumatic and overuse injuries in children. Parents, coaches, sports medicine professionals, and organizers are all culpable. Despite the fact that 67% of injuries occur during practice session, many parents enforce fewer safety precautions during these times than during competition.⁵ At least half of all injuries sustained by young athletes result from overuse. As with adult injuries, overuse injuries in the young athlete are the result of both intrinsic and extrinsic factors. Intrinsic factors are those which are physiologic and often nonmodifiable, whereas extrinsic factors can be altered by outside influences. Adults involved in youth sports have an important role in influencing extrinsic factors, which can lead to injury reduction or exacerbation. Injury reduction strategies are shown in Table 2. For instance, current research on heat-related illnesses encountered by young athletes shows that prevention strategies and education can play an important role in the reduction of this serious injury.^{43,44} Recent scientific studies refute the earlier notion that young athletes are at an inherently increased risk of heat illness because of their immature physiologic systems. The current literature identifies a number of causes, which include general state of health, dehydration, and environmental temperature and humidity as reasons for heat-related illness in the young athlete.^{37,38} The National Athletic Trainer's Association reported 50 fatalities due to sports injuries in young athletes in 2010.³⁷ Despite multiple bills presented to

Table 2 Injury reduction strategies

Athlete	Parent/community	Coach
<ul style="list-style-type: none"> • Sports readiness • Aerobic and anaerobic fitness • Strength training • Flexibility • Proper rest • Proper hydration • Proper nutrition 	<ul style="list-style-type: none"> • Appropriate fit and use of equipment • Appropriate fit and use of footwear • Enforcement of safety rules • Adjustment for environmental conditions • Education of coaches (training, first aid, CPR/AED) 	<ul style="list-style-type: none"> • Preseason conditioning/activity • Appropriate training frequency, intensity, and duration • Limiting increases in training volume to 10% weekly • Insuring proper form/technique • Implementation of appropriate strengthening and conditioning program • Incorporation of warm-up and cool-down phases for practice and competition

Abbreviations: CPR, cardiopulmonary resuscitation; AED, automated external defibrillation.

state legislation in the last few years to prevent serious injuries, ie, cardiac arrest, heat illness, and concussion, less than 10% have been passed into law.³⁷ In an attempt to reduce the rising incidence of concussion in young athletes, 33 states require education for coaches, parents, athletes, and school personnel in the recognition, management, and prevention of concussion in youth sports.^{4,39} In 2012, the National Association for Sport and Physical Education published its “Shape of the Nation Report”, illustrating the role of both federal and state government in developing regulations regarding recess and physical education for grades K through 12.⁴⁰ Currently, there are no federal regulations regarding implementation of recess and physical education in the US school system. Seventy-five percent of the States mandate schools provide physical education in the elementary, middle, and high school curricula; however, only 12% of states include frequency and duration requirements throughout all grade levels.⁴⁰ More than 80% of states require physical education at some time during grades K through 12. The report identifies differences in specific regulations on implementation of physical education between individual states.³¹

Over the last two decades, a notable rise in specialization has occurred in youth sports. More young athletes are choosing a single sport to participate in all year round at younger ages, with infrequent breaks and rest. This continued participation concentrated on one sport is believed to increase the risk of sport-related injuries, peer isolation, burnout, psychosocial problems, and attrition.^{5,41,42} Further, some antisocial behaviors involving negative peer interaction and lack of cooperation skills may lead to social isolation caused by early sports specialization.^{41,42} Despite numerous studies showing that athletic performance at an early age is unreliable in predicting future ability to perform successfully in a chosen sport, many parents encourage their children to specialize.^{41,42} Pressure for early specialization to maximize athletic skills for future social, financial, and educational rewards is generated by parents, coaches, neighbors, society,

and colleges. Unfortunately, the reality is that 98% of young athletes will never reach the highest level in sport.^{42,43} Trying to identify young athletes who are genuinely talented is very difficult and unrealistic, given the degree to which children change in their physical, psychological, emotional, and cognitive domains from childhood to young adulthood.^{41,42} The earlier a young athlete is identified as having talent, the more uncertain is the prediction of future success.^{41,42} Ericsson’s studies of deliberate practice emphasize that at least 10,000 hours of dedicated practice is necessary to achieve excellence in a skill.⁴⁴ He further believes that an individual is not born an expert, but expertise is developed over time.⁴⁴ In the literature on identification of talent, a key component in achieving long-term success is an athlete’s internal development regarding love of the sport which provides sustainability for the endless hours of practice, instruction, and competition necessary to become an elite player.⁴² Motivation to participate and endure the highs and lows is more indicative of a promising future than skill or sport readiness at an early age.⁴² Studies that have looked at organized sports programs in the Soviet Union show athletic advantages stemming from diversification not specialization.⁴⁵ Because of concerns about the health and well-being of young athletes, the American Academy of Pediatrics does not recommend specialization in sports before the age of 12–13 years,^{39,41} and encourages 1–2 days off a week, two months of recovery each year, participation in only one team per season, and limiting changes in training volume to 10% per week.^{39,41}

In addition to sports specialization impacting the young athlete, the financial burden impacting parents and the family is also significant. Some families sacrifice vacations, savings, and normal family structure to support the athlete’s sporting endeavors. Many parents feel excellence in sports will pay for future college expenses; however, the majority of athletes will not receive enough money to cover the cost of today’s tuition.⁴⁶ Less than 4% of high school athletes who participate in

boys' soccer, girls' soccer, football, and basketball play for a division I or division II school.^{6,47} Only one of 100 high school athletes will receive a division I athletic scholarship.⁴⁷ The average scholarship awarded in 2003–2004 for a division I or II school was \$10,409, which covered about half the cost of a state school and 20% of the cost of private school attendance.⁴⁶ Most often, the financial investment in private lessons or coaches, sports camps, participation in elite teams, showcase tournaments, and travel expenses over the middle and high school years exceeds the value of the college scholarship.⁴⁶ Even more unrealistic is anticipating that a young athlete who demonstrates elite skill potential will achieve professional or Olympic status. It is estimated that one in 6000 high school football players will play in the National Football League, and that only 2–3 in 10,000 high school basketball players will play for the National Basketball Association.⁴⁷ In addition, less than 20% of junior elite athletes and 0.2% of high school athletes will achieve elite status in adulthood.⁴¹

The above examples are the extreme costs of youth sports; however, even participation at a basic level for physical activity and fun can be a financial hardship for some families. Basic costs include uniforms, equipment, league fees, travel expenses, and footwear.⁴⁶ Urban youth have additional expenses, with neighborhood fields and recreational centers being absent or not maintained, and both sport and safety equipment being outdated or damaged. A decrease in governmental funding for youth after-school programs has limited accessibility and feasibility for sports participation in lower socioeconomic areas.⁴⁶ Dwindling financial resources also contribute to attrition in sports.^{5,46} Fortunately, a few nonprofit organizations are emerging in inner cities to provide positive opportunities for at-risk youth.

For children who do have access to organized sport, the majority of them being Caucasian from suburban neighborhoods, the influential role of the youth sports coach cannot be overestimated.^{5,46} At times, the athlete spends more hours a week in the presence of a coach than interacting with the family so, by default, the coach becomes a model for behavior. In one study, both parents and athletes rated the majority of youth coaches as only good, with 25% reported as less than good.⁶ Regulations regarding the requirements for coaching a youth sports team are almost nonexistent and vary widely across states, municipalities, and type of sport. The level of experience among youth coaches ranges from a volunteer parent, who perhaps has no experience with the sport, to paid coaches of elite teams. Most coaches are untrained in the strengthening and conditioning principles necessary for the young athlete, emergency management of sports injuries, or in basic first aid, cardiopulmonary resuscitation,

and automated external defibrillation, which results in an increase in the rate and severity of injuries for participants. The concept of educational requirements for coaches was met with resistance because the materials proposed were viewed as unreliable, ineffective, and lacking in comprehensiveness.⁵ Thirty percent of youth report negative actions of coaches and parents as their reason for quitting sport.⁸ Athletes have even reported being called names, insulted, and shouted at by coaches.⁶ Other negative coaching behaviors observed by athletes included cheating and fighting with parents, referees, and other coaches. Some athletes also felt pressured to play while injured.⁶

Other reasons cited for sports attrition linked to coaching behavior included favoritism, poor teaching skills, and increased pressure to win, all of which created a negative atmosphere and decreased the fun of playing sport.⁵ A direct correlation is noted between a positive or negative sporting experience and attrition rate. Participation in sport is widely believed to improve moral character, sportsmanship, and ability to collaborate towards a common goal. However, these secondary gains in sports participation cannot be assumed and must be facilitated by positive role modeling on the part of parents and coaches. Accordingly, facilitation of a negative sports environment by adults who are directly or indirectly involved in supervision of youth programs results in negative social behavior.

Parents, in addition to coaches, can create high levels of stress and anxiety for the young athlete.^{48–50} A parent can inadvertently set a child up for failure by establishing unrealistic goals for performance and winning by forcing a young athlete to participate in sports beyond their readiness and interest.^{5,7} A child who is unable to perform as expected by parents and coaches may lose confidence and seek alternative avenues for fun. Problem parents who behave inappropriately by putting too much emphasis on winning, having impractical expectations, and criticizing or pampering their children are encountered frequently by high school coaches.¹¹ These parental pressures may contribute to a negative sports experience for the maturing athlete.¹¹ Unfortunately, conflict between parents and coaches is observed all too often in sports culture.

With less than 20% of high school students involved in sport, reducing attrition rates for those engaged in youth sport is important. Combating sports-related injuries, high-pressure environments, and negative behavior on the part of both parents and coaches appears to be an initial viable intervention to mitigate problems in youth sport. Table 3 compares the positive and negative aspects of youth sports for young athletes and their families.

Table 3 Impact of youth sports

Positive	Negative
<ul style="list-style-type: none"> • Physical <ul style="list-style-type: none"> ○ Increased physical activity ○ Enhanced fitness ○ Lifelong physical, emotional, and health benefits ○ Decreased risk of obesity ○ Minimizes development of chronic disease ○ Improves health ○ Improves motor skills • Psychological <ul style="list-style-type: none"> ○ Decrease depression ○ Decrease suicidal thoughts ○ Decrease high risk health behaviors ○ Increases positive behavior in teens ○ Develops fundamental motor skills ○ Improves self-concept/self-worth • Social <ul style="list-style-type: none"> ○ Enhances social skills ○ Provides life lessons ○ Improves positive social behaviors ○ Enhances time management skills ○ Improves academic achievement ○ Helps to develop passion and goal setting ○ Improves character 	<ul style="list-style-type: none"> • Physical <ul style="list-style-type: none"> ○ Injuries ○ Untrained coaches ○ Inconsistent safety precautions ○ Lack of sports science influencing policy and practices • Psychological <ul style="list-style-type: none"> ○ Increase stress to be an elite player ○ High rates of attrition ○ Too competitive ○ Inappropriate expectations to achieving scholarships/professional career • Social <ul style="list-style-type: none"> ○ Inconsistent funding to insure proper safety equipment, venues, and equal participation ○ Expense ○ Inequality across groups (socioeconomic, ethnic, geographic, gender)

Future prospects

Changing the future of youth sports for the better needs a collaborative effort between parents, coaches, teachers, health professionals, community leaders, and politicians. As a society, we need to change the philosophy of youth sport from a negative environment to a positive one in which most children can thrive, benefit from, and sustain their participation in sport. Organized sports participation needs to be available to all youth, regardless of gender, neighborhood, or socio-economic status. Youth sports should emphasize fun, and maximize physical, psychological, and social development for its participants. Policies and guidelines which establish

the framework for youth sports should be implemented based on scientific knowledge.⁵ Because the role of federal, state, and local government in establishing safe and inclusive activity programs is minimal, establishing some formal type of education regarding positive coaching skills, general physical training, injury reduction, and first aid should be encouraged. State and federal legislation can assist in improving safety in sport for young athletes by providing an appropriate framework for participation in youth sports.⁴ Programs that teach and model improved moral character while providing physical activity are necessary. Proposed changes to improve youth sports are suggested in Table 4. Fostering programs

Table 4 Future of youth sports: proposed changes for positive results

Society	Parents	Coaches
<ul style="list-style-type: none"> • Training of coaches • Enforce sports safety • Increase funding <ul style="list-style-type: none"> ○ Safety education for coaches ○ Improved policies and procedures ○ Increased participation by underserved groups <ul style="list-style-type: none"> – Greater availability of facilities and fields – Proper safety equipment • Rules and regulations guided by science • Pre-participation physicals 	<ul style="list-style-type: none"> • Positive parenting through appropriate praise and emphasis on fun more than winning • Focus on goals of skill acquisition • Positive reinforcement before, during and after games and practices • Promote desired behaviors <ul style="list-style-type: none"> ○ Sportsmanship ○ Punctuality ○ Preparedness (eg, proper clothing, equipment, hydration) 	<ul style="list-style-type: none"> • Emphasize fun • De-emphasize winning • Positive praise of team and individuals • Greater emphasis on physical activity than skill mastery • Obtain education on youth athlete coaching • Provide age appropriate instruction • Gain knowledge of sport and rules • Gain basic knowledge of strength, conditioning, nutrition and sports safety principles • Injury recognition/first aid, including heat illness and concussion

Table 5 Organizations promoting a positive youth sports environment

- STOP sports injuries: <http://www.stopsportsinjuries.org/>
- Let's move!: <http://www.letsmove.gov/>
- Institute for the Study of Youth Sports, Michigan State University: <http://edwp.educ.msu.edu/isys/>
- Women's Sports Foundation: <http://www.womenssportsfoundation.org/>
- Heads up: concussion in youth sports: <http://www.cdc.gov/concussion/HeadsUp/youth.html>
- Character Counts: <http://charactercounts.org/>
- Girls on the Run: <http://www.girlsontherun.org/>
- America SCORES: <http://www.americaSCORES.org/>
- Squash busters: <http://www.squashbusters.org/>
- Row New York: <http://www.rownewyork.org/>
- Up 2 Us: <http://www.up2us.org/>
- GoGirlGo!: <http://www.womenssportsfoundation.org/en/home/programs/gogirlgo/about-gogirlgo>

that help to establish positive and healthy values for youth sports, such as the Institute for the Study of Youth Sports and Character Counts, is important.⁵¹ The six pillars of character, ie, trustworthiness, respect, responsibility, fairness, caring, and citizenship can be modeled by all adults who interact with children in sports.⁵¹ These pillars can be the building blocks for establishing sportsmanship and cooperation in the youth sports community. A reference list of organizations promoting a positive youth sports environment is provided in Table 5.

Implementation of a pre-participation physical evaluation (PPE) to assist in reducing injuries, athlete education, and identification of more serious health problems may be beneficial in keeping athletes safer while participating in sports.⁵² The governing bodies of the American Academy of Family Practice, American Academy of Pediatrics, American College of Sports Medicine, American Medical Society of Sports Medicine, American Orthopedic Society of Sports Medicine, and the American Osteopathic Academy of Sports Medicine have collaborated, produced, and endorsed new PPE guidelines for the promotion of health and safety in school sports programs.⁵² The PPE is a screening tool that identifies potentially serious health conditions in the young athlete requiring further investigation prior to participation in sport. Currently, every state uses some type of PPE for school-based sports programs, but specific evaluation components are not standardized.⁵² Differences exist between the level of professionals performing the tests, types of heart screenings, and content of the examination.⁵² In general, the PPE should be sensitive, accurate, and affordable to administer. The National Federation of State High School Associations considers the PPE to be a prerequisite for participation in sport, but does not have the authority to mandate its implementation.⁵² Requirements for a PPE in youth sport are inconsistent and almost nonexistent. Despite participation

in vigorous sporting and recreational activities, the young athlete undergoes little if any physical examination except for wellness visits. Medical societies endorsing the PPE guidelines acknowledge its limitations, but do agree that, when performed consistently by a qualified health practitioner, it is a valuable tool for identifying athletes at risk.⁵² The benefits of the PPE include introducing the athlete to the health care system, early identification and treatment of health-related problems, and education regarding injury prevention, nutrition, hydration, and unhealthy teenage behavior. Facilitation and encouragement of safe participation in sport is the goal of the PPE.⁵²

Conclusion

Sports and recreation should be a fundamental part of children's lives, despite troubling signs in the youth sports culture. Sport provides a medium for physical activity, developing friendships, and learning developmental skills across all domains. In the current environment of childhood obesity, fostering activity is vital to children's health and well-being. The multiple health benefits for children of all ages who participate in vigorous physical activity are well documented. Organized youth sports, when focused on fundamentals, facilitate physical activity while providing enjoyment for the young athlete. Fostering a positive youth sports experience is the accumulation of multiple factors, ie, matching the child's readiness with the demands of the sport, positive behavior from coaches and parents, realistic goal setting, and appropriate methods in place for injury reduction and management. Reducing sports attrition is necessary for sustaining sports participation and facilitating physical activity into adulthood. The challenges faced by US adults who recognize the need to facilitate change in the youth sport culture are significant, complex, and varied across ethnic cultures, gender, communities, and socioeconomic levels. It

appears that an emphasis on having fun while establishing a balance between physical fitness, psychologic well-being, and lifelong lessons for a healthy and active lifestyle are paramount for success.

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