

Promoting Physical Activity

Participating in physical activity is an essential component of a healthy lifestyle and ideally begins in infancy and extends throughout adulthood. Regular physical activity increases lean body mass, muscle, and bone strength and promotes physical health. It fosters psychological well-being, can increase self-esteem and capacity for learning, and can help children and adolescents handle stress. Parents should emphasize physical activity, beginning early in a child's life.

The dramatic rise in pediatric overweight and obesity in recent years has increased attention to the importance of physical activity. Along with a balanced and nutritious diet, regular physical activity is essential to preventing pediatric overweight. Therefore, health care professionals are encouraged

to review this Bright Futures theme in concert with the *Promoting Healthy Nutrition and Promoting Healthy Weight* themes.

A number of groups have released physical activity guidelines. The *Physical Activity Guidelines for Americans*, which include guidance for children and adolescents aged 6 to 17 years, were released in 2008.¹ These guidelines recommend that children and adolescents engage in 60 minutes or more of physical activity daily. In 2009, the National Association for Sport and Physical Education released physical activity guidelines for infants and children younger than 6.² More recent reviews have found evidence to support physical activity interventions across a variety of settings important to children and youth, including early care and education, schools, and communities.³

Other health guidelines support these physical activity recommendations. For example, the US Department of Health and Human Services and US Department of Agriculture *2015–2020 Dietary Guidelines for Americans*⁴ emphasize adopting healthy eating habits and maintaining a healthy body weight by balancing calories from foods and beverages with calories expended (physical activity).

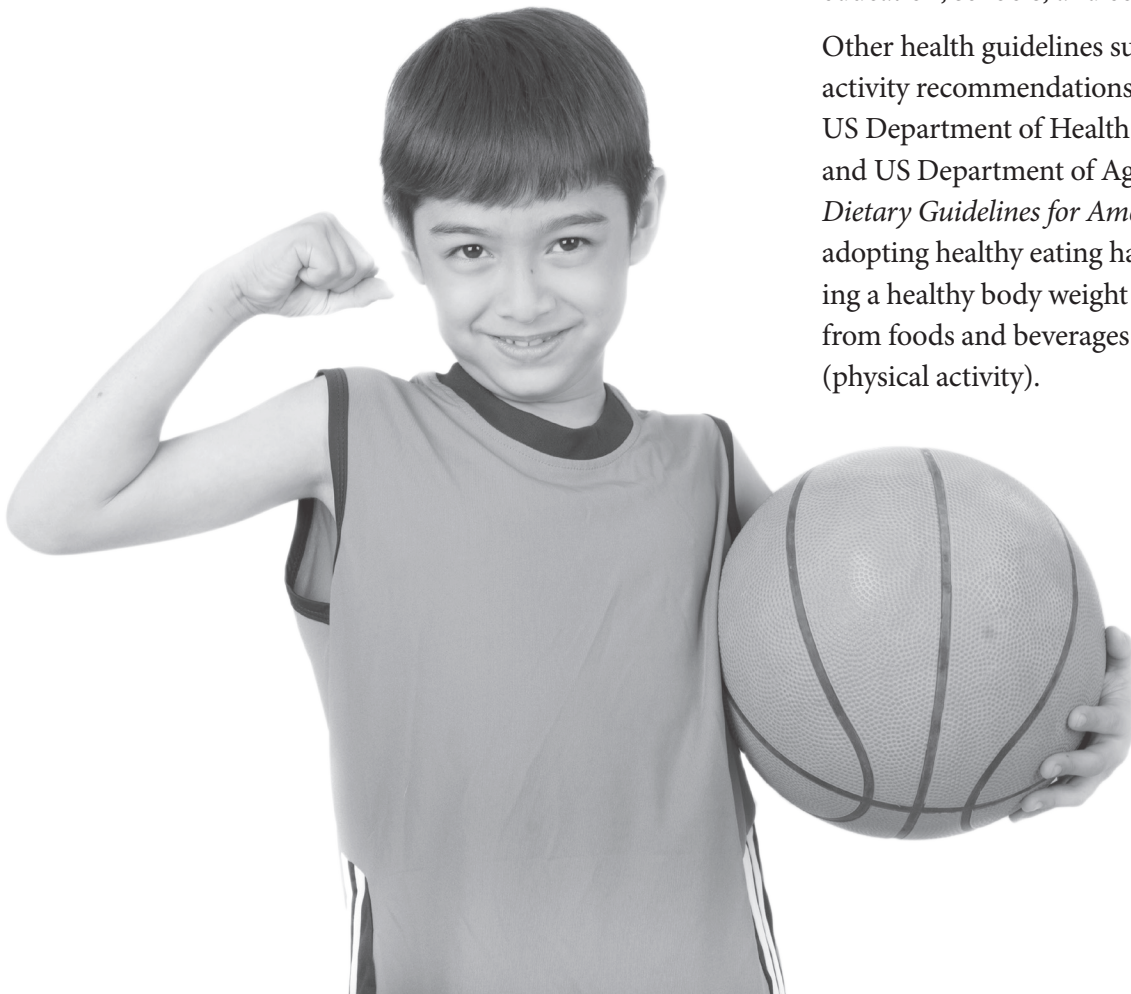




Table 1 summarizes the physical activity guidelines for infants, children, and adolescents from birth through age 21 years. It is important to note that children do not usually need formal muscle-strengthening programs, such as lifting

weights. Instead, children strengthen their muscles when they engage in activities such as running or biking, gymnastics, playing on a jungle gym, or climbing trees.

Table 1

Physical Activity Guidelines for Infants, Children, and Adolescents^{1,2}	
Infancy (birth–11 months)	<ul style="list-style-type: none"> • Infants should interact with caregivers in daily physical activities that are dedicated to exploring movement and the environment. • Caregivers should place infants in settings that encourage and stimulate movement experiences and active play for short periods of time several times a day. • Infants' physical activity should promote skill development in movement. • Infants should have supervised "tummy time" on a daily basis while awake. Tummy time should last as long as the infant shows enjoyment.⁵
Early childhood (1–4 years)	<ul style="list-style-type: none"> • Toddlers aged 1–3 years should engage in at least 60 minutes and up to several hours per day of unstructured^a physical activity. They should not be sedentary for >60 minutes at a time except when sleeping. • At least 30 minutes should be structured physical activity^b each day. • Toddlers should be given ample opportunities to develop movement skills that will serve as the building blocks for motor skill and bone development. • Young children aged 3–5 years should engage in at least 60 minutes and up to several hours of unstructured physical activity^a each day. They should not be sedentary for >60 minutes at a time except when sleeping. • Young children should accumulate at least 60 minutes of structured physical activity^b each day. • Young children should be encouraged to develop competence in fundamental motor skills that will serve as the building blocks for future motor skills and physical activity.
Middle childhood, adolescence, and young adulthood (5–21 years)	<ul style="list-style-type: none"> • Children, adolescents, and young adults should engage in ≥60 minutes of physical activity each day. • Most of the ≥60 minutes of physical activity each day should be either moderate^c- or vigorous^d-intensity aerobic physical activity. • As part of their daily activity, children and adolescents should engage in vigorous activity on at least 3 days per week. They also should engage in muscle-strengthening and bone-strengthening activity on at least 3 days per week. • It is important to encourage young people to participate in physical activities that are appropriate for their age, are enjoyable, and offer variety.

^a Unstructured physical activity is sometimes called "free time" or "self-selected free play." It is activity that children start by themselves. It happens when children explore the world around them.

^b Structured physical activity is planned and intentionally directed by an adult.

^c Moderate activity is activity that makes children's and adolescents' hearts beat faster than normal, makes them breathe harder than normal, and makes them sweat. They should be able to talk but not sing.

^d Vigorous activity is activity that makes children's and adolescents' hearts beat much faster than normal and makes them breathe much harder than normal. Children and adolescents should be able to speak only in short sentences.

From US Department of Health and Human Services. Active children and adolescents. In: 2008 *Physical Activity Guidelines for Americans*. Washington, DC: US Dept of Health and Human Services; 2008:15-21. ODPHP publication U0036. <http://health.gov/paguidelines/guidelines>. Accessed September 16, 2016; and adapted with permission from National Association for Sport and Physical Education. *Active Start: A Statement of Physical Activity Guidelines for Children Birth to Five Years*. Reston, VA: National Association for Sport and Physical Education; 2009.



Physical Inactivity: A Growing Problem for Children and Adolescents

For children and adolescents today, spending time in sedentary activities is increasingly common. Many ride in a car or bus to school rather than walk or bike, many schools are reducing or eliminating physical education classes and time for recess, many parents are afraid to let their children play outside, and labor-saving devices abound. Screens—televisions (TVs), computers, and handheld devices—are everywhere and screen time is an important component of daily life.

Screen time takes up a remarkable portion of children's and adolescent's lives, and new types of media are becoming increasingly popular. Parental awareness and assessment of screen time should encourage a balance that includes adequate time for physical activity. The American Academy of Pediatrics (AAP) recommends that infants and children younger than 18 months have no screen time and that children aged 18 months through 4 years limit screen time to no more than 1 hour per day.⁶ For school-aged children and adolescents, parents can consider making a family media use plan, which can help them balance the child's needs for physical activity, sleep, school activities, and unplugged time against time available for media (www.HealthyChildren.org/MediaUsePlan).⁷

In an environment that encourages inactivity, being physically active must be a lifelong, conscious decision. Health care professionals can do much to support children, adolescents, and families in this daily commitment by explaining why physical activity is important to overall health, providing information about community physical activity resources, and being physically active themselves.

Promoting Physical Activity in Children and Adolescents With Special Health Care Needs

Children and adolescents with special health care needs should be encouraged to participate in physical activity, according to their ability and health status, as appropriate. Participating in physical activity can make their activities of daily living easier, can improve their health status, and ultimately can reduce morbidity from secondary conditions during adulthood. Health care professionals should help parents, children, and adolescents select appropriate activities and duration by considering the child's or adolescent's needs and concerns, cognitive abilities, and social skills, as well as implement adaptations that will enable the child or adolescent to have a positive experience. (*For more information on this topic, see the Promoting Health for Children and Youth With Special Health Care Needs theme.*)

Opportunities for physical activity for children and adolescents with special health care needs are mandated by the Individuals with Disabilities Act.⁸ Physical activity is an essential component in the child's or adolescent's Individualized Education Program at school. It also is an essential component in the care plan for home services for children older than 3 years and in the Individualized Family Service Plan for infants and children birth to age 3.⁷ Many organizations (eg, American Physical Therapy Association, Disabled Sports USA, and National Sports Center for the Disabled) provide information on appropriate physical activities and potential adaptations for specific conditions and disabilities. State and federal laws often require programs to address these issues and include children with special needs. Programs such as Special Olympics also can encourage children and adolescents with



special health care needs to become involved with physical activity.⁹ Infants and young children who have significant physical or cognitive impairments are usually enrolled in early intervention programs in which physical activity takes place as part of the daily routine. Alternatively, they are in preschool or child care settings in which physical movement activities are adapted to their particular needs, if necessary.

Physical Activity and Sports

Preventing Heat-Related Illness and Sickling

Adequate fluid intake and preventing dehydration are critical for children's and adolescents' health. The risk of dehydration becomes greater with increased heat, humidity, intensity or duration of physical activity, body surface area, and sweating.¹⁰ It is no longer believed that children are at greater risk of dehydration and heat-related illness than adults.¹¹

Heat-related illness can be critical and sometimes life-threatening. It is important for health care professionals, coaches, parents, and adolescents to be able to recognize the signs and symptoms of heat-related illness and to know the recommendations for treating it.

The AAP councils on sports medicine and fitness and on school health recommend that sufficient and appropriate fluid be readily available and consumed at regular intervals before, during, and after physical activity. Assuming normal hydration at the beginning of sports activity, children aged 9 to 12 years require 100 to 250 mL (3–8 oz) *every 20 minutes*. Both adolescent girls and boys require up to 1.0 to 1.5 L (34–50 oz) *per hour* to minimize sweating-induced body-water deficits.¹¹

Sickle cell trait (SCT) also can pose a grave risk for some children and adolescents. During intense bouts of physical activity participation, sickle cells can accumulate and block blood vessels, causing

explosive rhabdomyolysis that can lead to death. Sickling can begin after 2 to 5 minutes of extreme exertion and can reach life-threatening levels soon thereafter if the child or adolescent struggles on or is urged on by coaches despite warning signs. Sickling collapse is an intensity syndrome that differs from other common causes of collapse. Tailored precautions can prevent sickling collapse and can enable children or adolescents with SCT to thrive (Box 1).¹² In addition to SCT, other risk factors to heat illness include obesity, diabetes mellitus, cardiovascular disease, and recent or concomitant illness.

Table 2 reviews the 3 types of heat-related illness as well as exertional sickling.

Ensuring Adequate Nutrition

To perform optimally in sports, children and adolescents need to consume adequate protein and a diet high in carbohydrates: whole grains, pasta, vegetables, fruits, and low-fat milk products. Moderate amounts of sugar also may help to meet carbohydrate needs. Inadequate carbohydrate intake may be associated with fatigue, weight loss or inability to gain weight, and decreased performance.

Box 1

Managing Sickle Cell Trait in Athletic Settings¹³

- Any child or adolescent with SCT who develops symptoms of cramping, pain, weakness, fatigue, or shortness of breath should stop exercising immediately.
- Any child or adolescent with SCT should avoid timed serial sprints and sustained exertions for >2–3 minutes without a break.
- Preventive measures are encouraged, including decreasing exercise intensity, slower buildup of conditioning by allowing for frequent rest and recovery periods, and increasing opportunities for hydration.

Abbreviation: SCT, sickle cell trait.

**Table 2**

Heat-Related Illness: Signs, Symptoms, and Treatment^{12,14}		
Condition	Signs and Symptoms	Treatment
Heat cramps	<ul style="list-style-type: none"> Disabling muscle cramps Thirst Rapid heart rate Normal body temperature Alertness Normal blood pressure 	<ul style="list-style-type: none"> Give child or adolescent 4–8 oz of cold water every 10–15 minutes. Make sure child or adolescent avoids caffeine. Move child or adolescent to a cool place. Remove as much clothing and equipment as possible. Provide passive stretching. Apply ice massage to cramping muscles.
Heat exhaustion	<ul style="list-style-type: none"> Sweating Dizziness Headache Light-headedness Clammy skin Flushed face Shallow breathing Nausea Body temperature of 100.4°F–104°F Normal mental activity 	<ul style="list-style-type: none"> Give child or adolescent 16 oz of cold water for each pound of weight lost. Move child or adolescent to a cool place. Remove as much clothing and equipment as possible. Cool child or adolescent (eg, with ice packs, ice bags, immersion in ice water).
Heat stroke	<ul style="list-style-type: none"> Shock Collapse Body temperature >104°F Delirium Hallucinations Loss of consciousness Seizures Inability to walk 	<ul style="list-style-type: none"> Call 911 for emergency medical treatment. Cool child or adolescent (eg, with ice packs, ice bags, immersion in ice water). Administer intravenous fluids.
Exertional sickling (with SCT)	<ul style="list-style-type: none"> Muscle weakness exceeds pain. May slump to ground because of weakness. Rapid tachypnea. Rectal temperature <103°F. May occur quickly and without warning. Muscles appear normal. Quicker recovery compared to heat cramps. 	<ul style="list-style-type: none"> Call 911 for emergency medical treatment. Provide supplemental oxygen by face mask. Cool child or adolescent if necessary. Prepare for CPR. Tell hospital to expect “exertional rhabdomyolysis.”

Abbreviations: CPR, cardiopulmonary resuscitation; SCT, sickle cell trait.

For children and adolescents who train intensively (eg, for those competing at the national or international level), the recommended carbohydrate intake is 60% to 70% of total calories consumed; those who train moderately do not need more than the acceptable macronutrient distribution range

of 45% to 65% of calories from carbohydrates, as recommended by the Institute of Medicine.¹⁵ The amount of carbohydrates required depends on the child’s or adolescent’s sex, weight, energy expenditure, level of physical activity, and type of sport performed, as well as on environmental factors.¹⁶



Meals Before and After Physical Activity or Competitions

Consuming a light meal high in complex carbohydrates (eg, rice, pasta, bread) and ample caffeine-free beverages (eg, fruit juice, water) is recommended 2 to 4 hours before an event to prevent hunger, provide energy, ensure gastric emptying, and prevent respiratory and cardiac stress. During physical activities involving several events, energy can be obtained by consuming sports drinks or unsweetened fruit juice diluted to a half strength with water up to 1 hour before physical activity. If events are 1 to 3 hours apart, carbohydrate snacks (eg, cereal bars, sports bars, crackers, fruit, whole-wheat bread, bagels) or liquid meals are recommended. After intense physical activity, it is important to replace muscle and liver glycogen stores by consuming carbohydrates within 2 hours. Drinking beverages containing carbohydrates should be encouraged if foods are not well tolerated or not available within 2 hours after physical activity. Drinking low-fat chocolate milk after prolonged vigorous activity helps with muscle recovery and has many of the nutrients of most commercial recovery drinks, including high-quality protein and key electrolytes, such as

calcium, potassium, sodium, and magnesium. It is readily available and affordable and accepted by children and adolescents. It has been shown to improve muscle recovery comparable to other commercial carbohydrate drinks.¹⁷

Preventing Injury

Preventing injury in children and adolescents during physical activity is a responsibility shared by parents, physical education teachers, coaches, recreation program staff, and children and adolescents themselves. The practices listed in Box 2 have been shown to help prevent physical activity injury.

Conducting Pre-participation Physical Evaluation

A pre-participation physical evaluation as part of the yearly Bright Futures Health Supervision Visit is recommended to promote the health and safety of the athlete in training and competition. Annual or preseason evaluation of the athlete provides the medical background for athletes and parents to make physical activity decisions with the athlete's physician or the team physician. Pre-participation physical evaluation components and technique have been developed by a collaboration of sports physicians caring for children and adolescents.¹⁸

Box 2

Preventing Physical Activity Injury

- Stretch before participating in physical activity, and cool down afterward with a period of walking or stretching.
- Use appropriate safety equipment in low-, moderate-, and high-risk sports, as required by the sport. This equipment includes mouth guards, helmets, shin guards, elbow pads and knee pads, and eye protection. The use of sports eye safety goggles should be emphasized for children with impaired vision or blindness in one eye. *(For more information on this topic, see the Promoting Safety and Injury Prevention theme.)*
- Limit duration of specific, repetitive physical activities that require repeated use of the same muscles (eg, pitching, running).
- Set an appropriate pace when beginning an activity, and be aware of early symptoms of injury (eg, increase in muscle soreness, bone or joint pain, excessive fatigue, decrease in performance). Children and adolescents who experience any of these symptoms should decrease participation in physical activity until symptoms diminish or, if the injury is severe, cease participation temporarily.



Promoting Physical Activity: Infancy— Birth Through 11 Months

The first year of life is marked by dramatic changes in the amount and type of physical activity the infant displays. Motor skill development begins with involuntary reflexes. These reflexes recede as the infant gains voluntary control over her body. Infants usually acquire motor skills in a similar order, but the rate at which they acquire the skills varies.

Health care professionals may offer parents valuable guidance at each visit for the infant's next developmental steps to help parents plan safe, educational, and appropriate physical activities (see Table 1). Infants need consistent, lively, and developmentally appropriate physical activities. Without adequate physical stimulation, infants adopt more sedentary behaviors and tend to roll over, crawl, and walk later than those who enjoy physical activity with a parent or other caregiver.

Part of the infant's day should be spent with a parent who provides both systematic and spontaneous opportunities for active play and physical activity. Parents or caregivers can help the infant be active through floor play, “tummy time,” and all daily routines, such as diapering, dressing and bathing, gently pulling to a sitting position, rolling over, lifting arms over head, pulling to a standing position, and helping lift a foot for a sock. Games such as pat-a-cake, peekaboo, and “How big is the baby?” all encourage the infant's active movement.

Giving infants freedom of movement encourages them to explore their environments and learn about their surroundings. Playpens, swings, and infant seats may be appropriate at certain times, but parents should be encouraged to let the infant move around freely with close supervision. Health care professionals can counsel parents to avoid using infant walkers, jumpers, or a car safety seat as positioning devices in the home. It is important

to be aware that some parents—such as those who live in shelters or substandard housing—feel it is unsafe for their infant to explore. Health care professionals can help parents living in these environments identify appropriate activities so their infant can meet daily physical activity recommendations.

Health care professionals should caution parents not to use TV or other media to entertain or educate fussy or bored infants during the first years of life. At this stage of development, TVs, computers, and digital devices are not appropriate tools for these purposes. The AAP recommends that children at this age have no screen time.⁶

Promoting Physical Activity: Early Childhood—1 Through 4 Years

A primary reason for promoting physical activity during early childhood is to help young children master basic motor skills.¹⁹ Most children develop gross motor skills in a typical sequence: walking, marching, galloping, hopping, running, traveling around obstacles, and skipping.¹⁹ As a child progresses through infancy into early childhood, the child's strength and flexibility increases, and he is better able to control his head and neck. In addition, all gross motor skills improve. Most children master fine motor skills (manipulation) and spatial relationships during early childhood. Eye-hand and eye-foot coordination, balance, and depth perception typically develop during this period as well. Physical activity can promote mastery of these skills, all of which are important developmental milestones. In addition, physical activity can improve physical and mental health and is fun for children.

Component activities that build on each other include gross motor activity (large movement skills), stability activity, manipulative (small movement or fine motor skills) activity, and rhythm activity.¹⁹ Some activities, such as dancing,



combine several of these components. Movement concepts include learning about where and how the body moves, the effort it takes to move the body (eg, time, force), and the relationship of the body to what is around it. Structured play contributes to stability, flexibility, and stamina.

Engaging young children in structured and unstructured play promotes joy of movement, a sense of control, and the ability to navigate the body through space. The most prevalent form of physical activity in early childhood is unstructured play. Simply playing outside—walking, running, climbing, and exploring the environment—is an important opportunity for physical activity. Structured play, which includes developmentally appropriate forms of physical activity, such as dancing or simple games, allows parents to help children master specific motor skills in a safe and supervised manner.

Physical activity in early childhood also has other benefits. An Iowa study of young children showed that physical activity contributes to optimal bone development.²⁰ Other research has shown that adolescents who had the highest levels of activity in early childhood had lower accretion of body fat compared with those who had lower levels of physical activity during early childhood. Unstructured play and structured play during early childhood can help prevent pediatric overweight²¹ and also appear to increase self-esteem and reduce symptoms of depression and anxiety during early childhood.²¹

Promoting Physical Activity: Middle Childhood—5 Through 10 Years

As children grow and develop, their motor skills increase, giving them an opportunity to participate in a wider variety of physical activities. Children may try many different physical activities and choose one or more in which they are particularly

interested. When children have multiple options for physical activity available in the community, they can be encouraged to express their preferences, develop competencies, and find activities that fit their skills and interests and promote fitness throughout life.

During middle childhood, parents strongly influence a child's physical activity level. Parents should encourage their child to be physically active. Parents who participate in physical activity with their child (eg, walking, dancing, biking, hiking, playing outside, participating in sports such as basketball or baseball) demonstrate the importance of regular physical activity and show their child that physical activity can be fun. Other family members, peers, teachers, and media figures also can encourage children to be physically active.

Children are motivated to participate in physical activity by having fun, by feeling competent, and through variety. Feelings of failure, embarrassment, and boredom, as well as rigid structure, discourage participation. Table 3 shows age-appropriate activities in which children should be engaged and skills to be developed during middle childhood. There should be less emphasis on competition and more on skill development and learning rules and strategy.



**Table 3**

Age-Appropriate Physical Activities		
Age, years	Motor Skills Being Developed	Appropriate Physical Activities
5–6	Fundamental (eg, running, galloping, jumping, hopping, skipping, throwing, catching, striking, or kicking)	<ul style="list-style-type: none"> • Activities that focus on having fun and developing motor skills rather than on competition • Simple activities that require little instruction • Repetitive activities that do not require complex motor and cognitive skills
7–9	Fundamental transitional (eg, throwing for distance or throwing for accuracy)	<ul style="list-style-type: none"> • Activities that focus on having fun and developing motor skills rather than on competition • Activities with flexible rules • Activities that require little instruction • Activities that do not require complex motor and cognitive skills
10–11	Transitional complex (eg, playing basketball, soccer)	<ul style="list-style-type: none"> • Activities that continue to focus on having fun and developing motor skills • Activities that require entry-level complex motor and cognitive skills • Activities that continue to emphasize motor skill development but begin to incorporate instruction on strategy and teamwork

Parents should be cautioned against relying exclusively on schools to provide adequate physical activity for their child. Pressures on school budgets have had the consequence of reducing or eliminating physical education curricula and thus students' opportunities for physical activity.²² Additionally, indoor and outdoor recesses have been curtailed in many school systems. However, recess can serve as an important break from the rigors of concentrated academic challenge and can improve cognitive, social, emotional, and physical health.²³ Recess is a complement to a physical education program.

Promoting Physical Activity: Adolescence — 11 Through 21 Years

Participating in regular physical activity helps adolescents develop skills and pastimes they can enjoy throughout their lives. Adolescents who participate in physical activity increase muscle and bone strength and lean muscle mass. In addition, they

may have less body fat and may be better able to maintain a healthy body weight. Physical activity also can reduce symptoms of depression and anxiety and improve overall mood.^{1,21} Weight-bearing physical activity contributes to building greater bone density in adolescence and helps maintain peak bone density in adulthood.²⁴

Some adolescents are aware of diseases that affect their family or community (eg, overweight, diabetes, cardiovascular disease). This awareness may make them receptive to actions that may reduce risks of these diseases. Health care professionals can consider explaining to adolescents the link between participating in physical activity and reduced risk of diseases that negatively affect their families and perhaps many people within their communities.

Adolescents have numerous options for regular physical activity. Competitive sports appeal to some; others enjoy noncompetitive activities that



provide variety and opportunities for socialization. Meeting the recommended 60 minutes or more per day can be done through sustained periods of physical activity or multiple short periods (eg, at least 10 minutes) at various times during the day. Even adolescents who are heavily scheduled with school, extracurricular activities, and part-time jobs can be physically active through short periods of moderate-intensity activity. The accumulated total is the important variable for overall health and calorie burning.

Social and peer influences can positively or negatively affect participation in physical activity. The best physical activities are those that adolescents enjoy. In some communities, the lack of safe places for recreation necessitates creative alternatives for participating in physical activity (eg, using the steps at school or in apartment complexes).

During early adolescence, girls and boys can participate in competitive sports together. However, with the onset of puberty, weight and strength differences between girls and boys rapidly become great enough to pose a safety concern. Coed activities should be limited to non-collision sports.

Adolescents participating in competitive sports and other physical activities can be vulnerable to misinformation and unsafe practices that promise enhanced performance. Pressure to compete can lead them to experiment with ergogenic aids or performance-enhancing substances. These enhancements all lack efficacy and many are dangerous.



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