



Chapter 3. Active Children and Adolescents



Childhood and adolescence are critical periods for developing movement skills, learning healthy habits, and establishing a firm foundation for lifelong health and well-being. Regular physical activity in children and adolescents promotes health and fitness. Compared to those who are inactive, physically active youth have higher levels of cardiorespiratory fitness and stronger muscles. They also typically have lower body fat and stronger bones. Physical activity also has brain health benefits for school-aged children, including improved cognition and reduced symptoms of depression. Evidence indicates that both acute bouts and regular moderate-to-vigorous physical activity improve the cognitive functions of memory, executive function, processing speed, attention, and academic performance for these children.



Youth who are regularly active also have a better chance of a healthy adulthood. Children and adolescents do not usually develop chronic diseases, such as heart disease, hypertension, type 2 diabetes, or osteoporosis. However, current evidence shows that obesity and other risk factors for these diseases, such as elevated insulin, blood lipids, and blood pressure, are increasingly appearing in children and adolescents. Exercise training in youth with overweight or obesity can improve body composition by reducing overall levels of body fat as well as abdominal fat. Regular physical activity also makes it less likely that these risk factors will develop and more likely that children remain healthy when they become adults.

This chapter provides physical activity guidance for children and adolescents 3 through 17 years old. The Advisory Committee did not review evidence for children younger than age 3 years.

Preschool-aged children (ages 3 through 5 years) should be encouraged to move and engage in active play as well as in structured activities, such as throwing games and bicycle or tricycle riding. To strengthen bones, young children should do activities that involve hopping, skipping, jumping, and tumbling. Although the specific amount of activity needed to improve bone health and avoid excess fat in young children is not well defined, a reasonable target may be 3 hours per day of activity of all intensities: light, moderate, or vigorous intensity. This is the average amount of activity observed among children of this age and is consistent with guidelines from Canada, the United Kingdom, and the Commonwealth of Australia.



Key Guidelines for Preschool-Aged Children

- ✓ Preschool-aged children (ages 3 through 5 years) should be physically active throughout the day to enhance growth and development.
- ✓ Adult caregivers of preschool-aged children should encourage active play that includes a variety of activity types.

School-aged youth (ages 6 through 17 years) can achieve substantial health benefits by doing moderate- and vigorous-intensity physical activity for periods of time that add up to 60 minutes or more each day. This activity should include aerobic activity as well as age-appropriate muscle- and bone-strengthening activities. It appears that, as in adults, the total amount of physical activity is more important for achieving health benefits than is any one component (frequency, intensity, or duration) or specific mix of activities (aerobic, muscle strengthening, bone strengthening). Even so, bone-strengthening activities remain especially important for children and young adolescents because the greatest gains in bone mass occur during the years just before and during puberty. In addition, the majority of peak bone mass is obtained by the end of adolescence.

Parents and other adults who work with or care for youth should be familiar with the key guidelines in this chapter. Adults play an important role in providing age-appropriate opportunities for physical activity. In doing so, they help lay an important foundation for lifelong, health-promoting physical activity. Adults need to encourage active play in children and encourage sustained and structured activity as children grow older. As children become adolescents, they typically reduce their physical activity, making it all the more important for adults to provide age-appropriate, enjoyable opportunities for physical activity and to encourage youth to participate.



Key Guidelines for School-Aged Children and Adolescents

- ✓ It is important to provide young people opportunities and encouragement to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.
- ✓ Children and adolescents ages 6 through 17 years should do 60 minutes (1 hour) or more of moderate-to-vigorous physical activity daily:
 - **Aerobic:** Most of the 60 minutes or more per day should be either moderate- or vigorous-intensity aerobic physical activity and should include vigorous-intensity physical activity on at least 3 days a week.
 - **Muscle-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days a week.
 - **Bone-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days a week.

Explaining the Guidelines

Types of Activity

The key guidelines for school-aged children and adolescents focus on three types of activity—aerobic, muscle strengthening, and bone strengthening. Each has important health benefits. Certain activities can be aerobic as well as muscle or bone strengthening. Illustrations of these activities can be found in the real-life examples at the end of this chapter.

Aerobic activities are those in which young people rhythmically move their large muscles for a sustained period of time. Running, hopping, skipping, jumping rope, swimming, dancing, and bicycling are all examples of aerobic activities. Aerobic activities increase cardiorespiratory fitness. Children often do activities in short bursts, which may not technically be aerobic. However, the Guidelines uses the term aerobic to refer to these types of activities, even if they are done only briefly.

Muscle-strengthening activities make muscles do more work than usual during activities of daily life. This is called *overload*, and strengthens the muscles. Muscle-strengthening activities can be unstructured and part of play, such as playing on playground equipment, climbing trees, and playing tug-of-war. Or they can be structured, such as lifting weights or working with resistance bands.

Bone-strengthening activities produce a force on the bones of the body that promotes bone growth and strength. This force is commonly produced by impact with the ground. Running, jumping rope, basketball, tennis, and hopscotch are all examples of bone-strengthening activities. As these examples illustrate, bone-strengthening activities can also be aerobic and muscle strengthening.

How Age Influences Physical Activity in Children and Adolescents

Children and adolescents should meet the key guidelines by doing activity that is appropriate for their age. Their natural patterns of movement differ from those of adults. For example, children are naturally active in an intermittent way, particularly when they do unstructured active play. During recess and in their free play and games, children use basic aerobic and bone-strengthening activities, such as running, hopping, skipping, and jumping, to develop movement patterns and skills. They alternate brief periods of moderate- and vigorous-intensity activity with periods of light-intensity physical activity or rest. Any episode of moderate- or vigorous-intensity physical activity, however brief, counts toward the key guidelines for children and adolescents ages 6 through 17 years. For preschool-aged children, activity of any intensity counts, including light intensity.

Children also commonly increase muscle strength through unstructured activities that involve lifting or moving their body weight or working against resistance. Children do not usually do or need formal muscle-strengthening programs, such as lifting weights. However, these programs are safe for children if they are properly prescribed and supervised.

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See [Chapter 2. Physical Activity and Health](#) for more on overload and related concepts.

As children grow into adolescents, their patterns of physical activity change. They are able to play organized games and sports and are able to sustain longer periods of activity. But they still commonly do intermittent activity, and any period of moderate- or vigorous-intensity activity can count toward the key guidelines.

During the transition to adolescence, sex differences in physical activity behavior appear. The amount of physical activity done by girls tends to decrease dramatically compared to that of boys, and the disparity persists into adulthood ([Figures 1-1](#) and [1-2](#)). Therefore, adolescent girls may need additional support and encouragement to maintain health-enhancing physical activity.

Adolescents may meet the key guidelines by doing free play, sports, or structured programs. Structured exercise programs can include muscle-strengthening activities, such as lifting weights, working with resistance bands, or using body weight for resistance (such as push-ups, pull-ups, and planks). Muscle-strengthening activities count if they involve a moderate or greater level of effort and work the major muscle groups of the body—legs, hips, back, abdomen, chest, shoulders, and arms.

Levels of Intensity for Aerobic Activity

Children and adolescents ages 6 and older can meet the key guidelines by doing a combination of moderate- and vigorous-intensity aerobic physical activities or by doing only vigorous-intensity aerobic physical activities. Youth should not do only moderate-intensity activity. It is important to include vigorous-intensity activities because they lead to greater improvement in cardiorespiratory fitness.

The intensity of aerobic physical activity can be defined on either an absolute or a relative scale. Either scale can be used to monitor the intensity of aerobic physical activity:

Absolute intensity is the amount of energy expended during the activity, without considering a person's cardiorespiratory fitness.

Relative intensity uses a person's level of cardiorespiratory fitness to assess level of effort.

Relative intensity describes a person's level of effort relative to his or her fitness. As a rule of thumb, on a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10, moderate-intensity activity is a 5 or 6. Young people doing moderate-intensity activity will notice that their hearts are beating faster than normal and they are breathing harder than normal. Vigorous-intensity activity begins at a level of 7 or 8. Youth doing vigorous-intensity activity will feel their heart beating much faster than normal, and they will breathe much harder than normal.

When adults supervise children, they generally cannot ascertain a child's heart or breathing rate. However, they can observe whether a child is doing an activity which, based upon absolute energy expenditure, is considered to be either moderate or vigorous intensity. For example, a child walking to school is doing

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See [Appendix 1. Physical Activity Behavior: Intensity, Bouts, and Steps](#) for a more detailed discussion of intensity and how to measure it.

moderate-intensity activity. A child running on the playground is doing vigorous-intensity activity. However, children with low fitness may experience activities that are moderate intensity on the absolute scale as being vigorous intensity. [Table 3-1](#) includes examples of activities classified by absolute intensity. It shows that some activities, such as bicycling, can be moderate or vigorous intensity, depending upon level of effort.

Table 3-1. Examples of Aerobic, Muscle-, and Bone-Strengthening Physical Activities for Children and Adolescents

Type of Physical Activity	Preschool-Aged Children	School-Aged Children	Adolescents
Moderate-intensity aerobic	<ul style="list-style-type: none"> ■ Games such as tag or follow the leader ■ Playing on a playground ■ Tricycle or bicycle riding ■ Walking, running, skipping, jumping, dancing ■ Swimming ■ Playing games that require catching, throwing, and kicking ■ Gymnastics or tumbling 	<ul style="list-style-type: none"> ■ Brisk walking ■ Bicycle riding ■ Active recreation, such as hiking, riding a scooter without a motor, swimming ■ Playing games that require catching and throwing, such as baseball and softball 	<ul style="list-style-type: none"> ■ Brisk walking ■ Bicycle riding ■ Active recreation, such as kayaking, hiking, swimming ■ Playing games that require catching and throwing, such as baseball and softball ■ House and yard work, such as sweeping or pushing a lawn mower ■ Some video games that include continuous movement
Vigorous-intensity aerobic	<ul style="list-style-type: none"> ■ Games such as tag or follow the leader ■ Playing on a playground ■ Tricycle or bicycle riding ■ Walking, running, skipping, jumping, dancing ■ Swimming ■ Playing games that require catching, throwing, and kicking ■ Gymnastics or tumbling 	<ul style="list-style-type: none"> ■ Running ■ Bicycle riding ■ Active games involving running and chasing, such as tag or flag football ■ Jumping rope ■ Cross-country skiing ■ Sports such as soccer, basketball, swimming, tennis ■ Martial arts ■ Vigorous dancing 	<ul style="list-style-type: none"> ■ Running ■ Bicycle riding ■ Active games involving running and chasing, such as flag football ■ Jumping rope ■ Cross-country skiing ■ Sports such as soccer, basketball, swimming, tennis ■ Martial arts ■ Vigorous dancing

Type of Physical Activity	Preschool-Aged Children	School-Aged Children	Adolescents
Muscle strengthening	<ul style="list-style-type: none"> Games such as tug of war Climbing on playground equipment Gymnastics 	<ul style="list-style-type: none"> Games such as tug of war Resistance exercises using body weight or resistance bands Rope or tree climbing Climbing on playground equipment Some forms of yoga 	<ul style="list-style-type: none"> Games such as tug of war Resistance exercises using body weight, resistance bands, weight machines, hand-held weights Some forms of yoga
Bone strengthening	<ul style="list-style-type: none"> Hopping, skipping, jumping Jumping rope Running Gymnastics 	<ul style="list-style-type: none"> Hopping, skipping, jumping Jumping rope Running Sports that involve jumping or rapid change in direction 	<ul style="list-style-type: none"> Jumping rope Running Sports that involve jumping or rapid change in direction

Note: Some activities, such as bicycling or swimming, can be moderate or vigorous intensity, depending upon level of effort. For preschool-aged children, aerobic activities listed can be either moderate or vigorous intensity.

Meeting the Key Guidelines

American youth vary in their physical activity participation. Some do not participate at all, others participate in enough activity to meet the key guidelines, and some exceed the key guidelines.

One practical strategy to promote activity in youth is to replace sedentary behavior with activity whenever possible. For example, where appropriate and safe, young people should walk or bicycle to school or the bus stop instead of riding in a car. Rather than only watching sporting events on television, young people should participate in age-appropriate sports or games.

- Children and adolescents who do not meet the key guidelines** should slowly increase their moderate-to-vigorous physical activity in small steps and in ways that they enjoy. A gradual increase in the number of days and the time spent being active will help reduce the risk of injury.
- Children and adolescents who meet the key guidelines** should continue doing moderate-to-vigorous physical activity every day and, if appropriate, become even more active. Evidence suggests that even more than 60 minutes of activity daily may provide additional health benefits for school-aged youth.
- Children and adolescents who exceed the key guidelines** should maintain their activity level and vary the kinds of activities they do to reduce the risk of overtraining or injury.

Special Considerations

Children and Adolescents With Disabilities

Children and adolescents with disabilities are more likely to be inactive than those without disabilities. Youth with disabilities should work with a health care professional or physical activity specialist to understand the types and amounts of physical activity appropriate for them. When possible, children and adolescents with disabilities should meet the key guidelines. When young people are not able to participate in the appropriate types or amounts of physical activities needed to meet the key guidelines, they should be as active as possible and avoid being inactive.

Getting and Staying Active: Real-Life Examples

Children and adolescents can meet the key guidelines and become regularly physically active in many ways. The first example is for a preschool-aged child showing how light-, moderate-, and vigorous-intensity physical activity can be incorporated throughout the day. The next examples are for a child and for an adolescent who are meeting the 60 minutes-a-day key guideline.



Jake: A 4-Year-Old Child

At childcare, Jake goes outside twice a day and plays games like hide-and-seek or hopscotch, chases his friends, and enjoys climbing up and going down the slide. At home, Jake is always on the move, whether he is building a fort in the living room, running around with his older sister, or seeing how high he can jump. On the weekends, Jake takes swimming lessons at the community pool or does gymnastics at the local recreation center. His family also likes to go to the city park, where Jake enjoys riding his tricycle. At home, Jake's parents limit his screen time. All these activities ensure that Jake does at least 3 hours of movement a day.

Ebony: An 11-Year-Old Child

Ebony has a physical disability and uses a wheelchair to get around. Ebony does 60 or more minutes of daily physical activity that is at least moderate intensity, and she also includes vigorous-intensity, bone-strengthening, and muscle-strengthening activities. Here are the daily activities she participates in during a sample week:

- **Monday and Friday:** Wheels to and from school (20 minutes); races a friend during recess (10 minutes); plays basketball during an afterschool program (30 minutes)
- **Tuesday and Thursday:** Wheels to and from school (20 minutes); actively participates during physical education class (50 minutes); plays four square in her afterschool program (15 minutes)



- **Wednesday:** Wheels to and from school (20 minutes); plays tag during recess (20 minutes); participates in an adaptive swim program (45 minutes)
- **Saturday:** Participates in an adaptive swim program (45 minutes); wheels with her mom to and from the grocery store (25 minutes)
- **Sunday:** Goes on a family bike ride using her adaptive bike (60 minutes); plays catch with her sister (10 minutes)

Ebony meets the key guidelines by doing vigorous-intensity aerobic activities, bone-strengthening, and muscle-strengthening activities on at least 3 days a week:

- **Vigorous-intensity** activities on 5 days: basketball, tag or racing at recess, bicycling, and swimming
- **Bone-strengthening** activities on 2 days: physical education class
- **Muscle-strengthening** activities on 2 days: physical education class

Darius: A 16-Year-Old Adolescent

Darius does 60 or more minutes of daily physical activity that is at least moderate intensity. Here are the daily activities he participates in during a sample week when school is not in session:

- **Monday and Wednesday:** Walks dog (10 minutes); plays basketball at a nearby school gym that has a shared-use agreement for community physical activity during the summer (50 minutes)
- **Tuesday and Thursday:** Walks dog (10 minutes); plays doubles tennis (30 minutes); does planks and push-ups (5 minutes) with his dad in the evening; rides his bicycle to a friend's home (15 minutes)
- **Friday:** Plays Frisbee in the park with friends (60 minutes)
- **Saturday:** Vacuums his family's home and cleans the bathrooms (30 minutes); rides his bike on a local trail (30 minutes)
- **Sunday:** Plays an active video game with his family that involves continuous movement at a moderate intensity (30 minutes); does body-weight exercises in his room (30 minutes)



Darius meets the key guidelines by doing vigorous-intensity aerobic activities, bone-strengthening, and muscle-strengthening activities on at least 3 days a week:

- **Vigorous-intensity** activities on 4 days: basketball and bicycling
- **Bone-strengthening** activities on 4 days: basketball, tennis
- **Muscle-strengthening** activities on 3 days: body-weight exercises, including planks and push-ups