**ADOLESCENCE**

Adolescence (ages 11 to 21), the transition between childhood and adulthood, is one of the most dynamic periods of human development. Adolescence is characterized by dramatic physical, cognitive, social, and emotional changes. These changes, along with adolescents’ growing independence, search for identity, concern with appearance, need for peer acceptance, and active lifestyle, can significantly affect their physical activity behaviors.

Adolescents benefit from participating in physical activity. Physical activity can
- Give adolescents a feeling of accomplishment.
- Reduce the risk of certain diseases (e.g., coronary heart disease, hypertension, colon cancer, diabetes mellitus), if adolescents continue to be active during adulthood.
- Promote mental health.

The period of adolescence is divided into three stages. Early adolescence, ages 11 to 14, includes pubertal and cognitive changes. Middle adolescence, ages 15 to 17, is a time of increased independence and experimentation. Late adolescence, ages 18 to 21, adolescents make important personal and vocational decisions. These stages provide a useful context for understanding body-image issues and concerns of adolescents, as well as a framework for providing adolescents with the information they need to participate in physical activity.

**Growth and Physical Development**

The increased rate of growth that occurs during adolescence is second only to the rate of growth that occurs during the first year of life. During this period, adolescents achieve the final 15 to 20 percent of their adult height, gain 50 percent of their adult body weight, and accumulate up to 40 percent of their adult skeletal mass. The peak period of growth usually occurs at sexual maturity rating (SMR) 2 to 3 in females and 3 to 4 in males. The mean age of the initiation of the growth spurt is 9 1/2 years in females and 11 1/2 years in males. The mean age of peak height velocity are 11 1/2 years in females and 13 1/2 years in males. For females, most physical growth is completed by about 2 years after menarche. (The mean age of menarche is 12 1/2 years.) Males begin their pubertal growth spurt about 2 years later than females, and they typically experience their major growth spurt and increase in muscle mass during middle adolescence.

During adolescence, strength increases in both males and females, and strength can be increased further by participation in strength-training programs, especially from mid-puberty onward. On average, the percentage of body fat in males remains the same, whereas the percentage of body fat in females increases significantly.

Height and strength during and after puberty affect the ability of adolescents to compete in some
sports, such as football and basketball. However, in other sports, such as tennis and soccer, these attributes may be less important. The age at which the pubertal growth spurt occurs and the speed with which adolescents experience puberty vary greatly and may affect participation in physical activity and sports. For example, although early-maturing boys are often the most successful participants in Little League, they may not be the best athletes in high school.2,4,5

Physical activity and nutrition can affect adolescents’ energy levels and influence growth and body composition. Inadequate nutrition can delay sexual maturation, slow or stop linear growth, and compromise peak bone mass. Participating in regular physical activity and practicing healthy eating behaviors can help adolescents achieve normal body weight and body composition, thereby reducing their risk of obesity.

The changes associated with puberty can affect adolescents’ satisfaction with their appearance. For males, the increased size and muscular development that come with physical maturation can improve their body image. However, physical maturation among females—in particular, the normal increase in body fat—may lead to dissatisfaction with their bodies, which may result in weight concerns and dieting.

Anticipatory guidance can help prepare adolescents and their parents for changes associated with puberty. Because adolescents are usually interested in their growth and development, health supervision visits provide an opportunity for health professionals to discuss the importance of healthy eating behaviors, regular physical activity, and a positive body image.

Cognitive capacities increase dramatically during adolescence. During early adolescence, adolescents have a growing capacity for abstract thought, but their thinking still tends to be concrete and oriented toward the present. During middle adolescence, they become more capable of problem solving and abstract and future-oriented thinking. During late adolescence, they continue to refine their ability to reason logically and solve problems. These cognitive changes can help adolescents understand the importance of physical activity, because adolescents are beginning to reflect on their behavior and understand its consequences.

Healthy Lifestyles

By participating in physical activity (e.g., biking, hiking, playing basketball) with their adolescents, parents can emphasize the importance of regular physical activity and show their adolescents that physical activity can be fun. Parents’ encouragement to be physically active may increase the adolescent’s activity level.

Teachers also play an important role in promoting physical activity in adolescents. Physical education should be provided at school every day, and enjoyable activities should be offered.

Adolescents spend a lot of time with their friends, and peer influence and group conformity are important. Because much of their physical activity occurs in group settings, adolescents’ participation in physical activity may be influenced by peers.

Some common chronic diseases of adulthood can be prevented or delayed if adolescents develop a physically active lifestyle and continue to be physically active as adults.6 Although adolescents may understand the importance of physical activity, most spend little time thinking about their future health, especially their health in older adulthood.2
Many types of physical activities provide health benefits. Although aerobic activities (e.g., running, biking), which increase maximum oxygen intake, were emphasized in the past, health professionals have learned that moderate physical activity also provides health benefits. Competitive sports appeal to some adolescents, but others enjoy non-competitive activities (e.g., walking, running, swimming, biking, dancing) that provide variety and opportunities for socialization and success. The best physical activities are those that adolescents enjoy.³

Only about two-thirds of males and one-half of females participate in the recommended amount of moderate physical activity (e.g., 15 minutes of running, 30 minutes of brisk walking, 45 minutes of playing volleyball)⁷ In addition, many adolescents become less active as they approach adulthood.⁷ More evidence-based research is needed on how to increase physical activity during adolescence or how to ensure that those who are physically active in adolescence remain so in adulthood.³⁴⁶ Ideally, adolescents will discover physical activities that they will continue to enjoy as adults.

Building Partnerships

Partnerships among health professionals, families, and communities are essential for ensuring that families receive guidance on physical activity. Health professionals need to give adolescents and parents the opportunity to discuss physical activity issues and concerns, and need to identify and contact community resources to help parents promote physical activity in their adolescents. Communities need to provide programs and safe places for adolescents to participate in physical activity.

Strengths, and Issues and Concerns

During health supervision visits, health professionals should emphasize the physical activity strengths of the adolescent, family, and community (Table 13) and address any physical activity issues and concerns (Table 14).
### Table 13. Physical Activity Strengths During Adolescence

<table>
<thead>
<tr>
<th>Adolescent</th>
<th>Family</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participates in physical activity</td>
<td>Encourages the adolescent to participate in physical activity</td>
<td>Promotes physical activity</td>
</tr>
<tr>
<td>Develops a positive attitude toward physical activity</td>
<td>Provides opportunities for the adolescent to participate in physical activity</td>
<td>Provides opportunities for adolescents to participate in physical activity</td>
</tr>
<tr>
<td>Enjoys physical activity</td>
<td>Ensures that the adolescent uses appropriate safety equipment (e.g., helmet, wrist guards, elbow and knee pads) during physical activity</td>
<td>Maintains policies (e.g., preservation of green space) and provides environmental support (e.g., well-maintained sidewalks, bicycle racks outside public facilities) that promote physical activity</td>
</tr>
<tr>
<td>Is aware of and has opportunities to participate in physical activity</td>
<td>Participates in physical activity with the adolescent</td>
<td>Provides safe environments for indoor and outdoor physical activity (e.g., walking and biking paths, playgrounds, parks, recreation centers)</td>
</tr>
<tr>
<td>Wants to improve motor skills</td>
<td>Provides a positive role model by participating in physical activity</td>
<td>Provides support for families of adolescents with special health care needs</td>
</tr>
<tr>
<td>Feels competent when participating in physical activity</td>
<td>Takes responsibility for own health</td>
<td></td>
</tr>
</tbody>
</table>
## Table 14. Physical Activity Issues and Concerns During Adolescence

<table>
<thead>
<tr>
<th>Adolescent</th>
<th>Family</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Has health problems</td>
<td>- Does not encourage the adolescent to participate in physical activity</td>
<td>- Lacks programs that promote physical activity in adolescents</td>
</tr>
<tr>
<td>- Experiences motor skill or developmental delays</td>
<td>- Does not advocate for physical education in schools</td>
<td>- Lacks safe environments for indoor and outdoor physical activity (e.g., walking and biking paths, playgrounds, parks, recreation centers)</td>
</tr>
<tr>
<td>- Lacks opportunities to participate in physical activity</td>
<td>- Does not provide positive role model by participating in physical activity</td>
<td>- Lacks policies (e.g., preservation of green space) and does not provide environmental support (e.g., well-maintained sidewalks, bicycle racks outside public facilities) that promote physical activity</td>
</tr>
<tr>
<td>- Lacks friends or siblings to be physically active with</td>
<td>- Does not participate in physical activity with the adolescent</td>
<td>- Does not provide support for families of adolescents with special health care needs</td>
</tr>
<tr>
<td>- Does not enjoy physical activity</td>
<td>- Has health problems that affect the amount of time spent with the adolescent</td>
<td></td>
</tr>
<tr>
<td>- Does not feel competent when participating in physical activity</td>
<td>- Has a work schedule or other commitments that reduce the amount of time spent with the adolescent</td>
<td></td>
</tr>
<tr>
<td>- Is embarrassed about appearance or lack of coordination</td>
<td>- Lacks space or equipment for physical activity</td>
<td></td>
</tr>
<tr>
<td>- Is shy or fearful of physical activity</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>- Has had unsuccessful or unpleasant experiences with physical activity</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>- Is more interested in sedentary behaviors (e.g., watching television and videotapes; playing computer games)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
An adolescent’s level of physical activity should be assessed as part of health supervision visits. (For more information on health supervision, see Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents, listed under Suggested Reading in this chapter.)

Health professionals can begin by gathering information about the adolescent’s level of physical activity. This can be accomplished by selectively asking key interview questions listed in this chapter, which provide a useful starting point for identifying physical activity issues and concerns.

Health professionals can then use this chapter’s screening and assessment guidelines, and counseling guidelines, to provide families with anticipatory guidance. Interview questions, screening and assessment, and counseling should be used as appropriate and will vary from visit to visit, adolescent to adolescent, and family to family.

Desired outcomes for the adolescent, and the role of the family, are identified to assist health professionals in promoting physical activity.

**Interview Questions**

The following questions are intended to be used selectively to gather information, to address the family’s issues and concerns, and to build partnerships.

**For the Adolescent**

Do you think physical activity is important? Why (or why not)?

Do you think you are getting enough physical activity? Why (or why not)?

Which physical activities do you participate in? How often? For how long each time?

Do you participate in physical activities at school? If so, which ones? How often?

Do you participate in physical activities in your neighborhood? If so, which ones? How often?
Do you participate in any physical activities with your parents (for example, walking, biking, hiking, skating, swimming, or running)?

Are there any physical activities you enjoy but don’t do? If so, which ones? Why?

Are there any physical activities you don’t enjoy? If so, which ones? Why?

Do you feel that you are good at physical activities? If so, which ones? If not, why?

Do you think you are in good shape? Can you keep up with your friends and other adolescents your age?

Do you always have something available to drink during and after physical activity?

Do you use appropriate safety equipment when you participate in physical activity? For example, do you use a helmet when you go skate-boarding, skating, or biking?

Have you been injured while participating in physical activity?

How much time each day do you spend watching television and videotapes or playing computer games?

For the Parent

Do you have questions or concerns about John’s participation in physical activity?

Does he participate in regular physical activity (for example, most, if not all, days of the week)?

Does Rebecca participate in physical education at school? If so, how often?

What does she do after school? Does she participate in physical activity?

Are there any physical activities John enjoys but does not do? If so, which ones? Why?

Are there any physical activities he doesn’t enjoy? If so, which ones? Why?

During the past 6 months, has Rebecca been involved in physical activity programs? If so, which ones?

During the past 6 months, has she trained for any physical activities? If so, which ones?

Do you feel that John is too active? If so, why?

Do you feel that he is not active enough? If so, why?

Are there any physical activity programs in Rebecca’s school? In the community? If so, do you think she would participate if encouraged?

How can you help her become more active?

What barriers would make this difficult?

Do you and John participate in physical activities together? If so, which ones? How often?

How much time each day do you allow him to watch television and videotapes or play computer games?

Do you know where to take Rebecca in a medical emergency?

Is your neighborhood safe enough for her to participate in physical activity outside?
Screening and Assessment

If an adolescent wants to participate in a sports program, a preparticipation physical examination may be useful. In addition to the screening and assessment guidelines that follow, health professionals can refer to resources such as a preparticipation physical evaluation.8

- Obtain a complete medical history of the adolescent, including (1) history of previous injuries and hospitalizations, (2) family history of sudden cardiac death, and (3) history of dizziness or fainting during or after physical activity.8 You may want to inquire about conditions affecting sports participation.9

- Measure the adolescent’s height and weight, and plot these on a standard growth chart (see Tool H: CDC Growth Charts). Deviation from the expected growth pattern (e.g., a major change in growth percentiles on the chart) should be evaluated. This may be normal or may indicate a problem (e.g., difficulties with eating).

- Height and weight measurements provide reliable indicators of nutrition and health status. Changes in weight reflect an adolescent’s short-term nutrition intake and serve as general indicators of nutrition status and overall health. Low height-for-age may reflect long-term, cumulative nutrition or health problems.

- Body mass index (BMI) can be used as a screening tool to determine nutrition status and overall health. Calculate the adolescent’s BMI by dividing weight by the square of height (kg/m²) or by referring to a BMI chart. Compare the BMI to the norms listed for the adolescent’s sex and age on the chart. (See the Obesity chapter.)

- Some adolescents have a high BMI because of a large, lean body mass resulting from physical activity, high muscularity, or frame size. An elevated triceps skinfold (i.e., above the 95 percentile on CDC growth charts) can confirm excess body fat in adolescents.

- Assess the adolescent’s general health status, including medical conditions and recent illnesses. Assess the adolescent’s cardiovascular, pulmonary, and musculoskeletal systems. Obtain the adolescent’s blood pressure.

- Determine whether the adolescent is taking any medications.

- Assess the onset of menarche.

- Assess the adolescent’s physical maturity.
Assess the adolescent’s level of physical activity by

- Determining how much physical activity the adolescent participates in on a weekly basis.
- If possible, evaluating how the adolescent’s physical fitness compares to national standards (e.g., by reviewing the results of the adolescent’s President’s Council on Physical Fitness and Sports test).

Counseling

General

- Adolescents should be physically active every day or nearly every day, as part of play, games, physical education, planned physical activities, recreation, and sports, in the context of family, school, and community activities.
- Physical activity is recommended on most, if not all, days of the week. Explain that adolescents can achieve this level of activity through moderate physical activities (e.g., brisk walking for 30 minutes) or through shorter, more intense activities (e.g., jogging or playing basketball for 15 to 20 minutes).
- Moderate to vigorous physical activities (e.g., jogging, playing basketball or racquet sports, dancing, skating, biking) are those that require as much effort as brisk walking. The goal for adolescents is to engage in these activities at least three times a week for at least 20 minutes each time.
- Encourage adolescents to find physical activities they enjoy and can continue into adulthood.
- Discuss how adolescents can incorporate physical activity into their daily lives (e.g., by using the stairs instead of taking the elevator or escalator; by walking or riding a bike instead of driving or riding in a car).
- Encourage adolescents to participate in a variety of noncompetitive physical activities they enjoy (e.g., biking, in-line skating, jogging, swimming).
- Many adolescents enjoy participating in organized physical activity programs with friends and peers. Adolescents need to choose activities they enjoy and that make them feel competent.
- Encourage adolescents to take on new challenges that will increase their self-confidence (e.g., becoming physically active or learning a new sport). Teach them to set reasonable but challenging goals.
- Encourage parents to participate in physical activity with their adolescents and to be positive role models by participating in physical activity themselves.

Injury Prevention

- Encourage adolescents to drink plenty of fluids when they are physically active. (See the Heat-Related Illness chapter.)
- Emphasize the use of appropriate safety equipment (e.g., helmets, wrist guards, elbow and knee pads) when the adolescent participates in physical activity. (See the Injury chapter.)
- Discuss the importance of an appropriate pace when beginning a new activity. Encourage adolescents to avoid doing too much too soon.
- Discuss the importance of using proper technique during weight or strength training, emphasizing sets of low resistance and high repetition.
Emphasize the importance of adolescents reducing their exposure to sunlight while participating in physical activity outdoors and thus their risk of developing skin cancer. Recommend preventive strategies such as (1) applying a broad-spectrum sunscreen with a sun protection factor (SPF) rating of 15 or greater to exposed skin 30 minutes before going outdoors, (2) reapplying sunscreen every 2 hours, and (3) wearing broad-spectrum sunglasses and brimmed hats and clothing that protect the skin as much as possible.

Determine whether adolescents who are involved in organized sports are being properly supervised. Make sure that adolescents enjoy participating in sports and are not being compelled to participate by an adult.

**Safety**

- If the safety of the environment or neighborhood is a concern, help parents and adolescents find other settings for physical activity (e.g., Boys and Girls Clubs of America, recreation centers, churches and other places of worship).
- Remind adolescents that they can do many activities indoors (e.g., calisthenics, aerobics, dancing, weight or strength training).

**Special Issues**

- Emphasize that achieving and maintaining a healthy weight is best accomplished through healthy eating behaviors and regular physical activity. (See the Nutrition chapter.)
- Encourage adolescents, especially those who are overweight, to limit sedentary behaviors (e.g., watching television and videotapes, playing computer games) to 1 to 2 hours per day. (See the Obesity chapter.)
- Encourage adolescents with special health care needs to participate in physical activity for cardiovascular fitness within the limits of their medical or physical conditions. Explain that adaptive physical education is often helpful and that a physical therapist can help identify appropriate activities. (See the Children and Adolescents with Special Health Care Needs chapter.)

**Substance Use**

- Warn adolescents about the risk of using alcohol, tobacco, and other drugs.
- Adolescents, particularly males, may be interested in using protein supplements or anabolic steroids to try to build muscle mass. Discourage the use of these products, and encourage healthy eating behaviors and participation in a supervised strength-training program. (See the Ergogenic Aids chapter.)
### Table 15. Desired Outcomes for the Adolescent, and the Role of the Family

#### Adolescent

<table>
<thead>
<tr>
<th>Educational/Attitudinal</th>
<th>Behavioral</th>
<th>Health/Physical Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Enjoys physical activity</td>
<td>- Participates in daily physical activity</td>
<td>- Grows and develops at an appropriate rate</td>
</tr>
<tr>
<td>- Understands the importance of physical activity</td>
<td>- Participates in physical activities that can be sustained throughout life</td>
<td>- Maintains good health</td>
</tr>
<tr>
<td>- Understands the role of physical activity in achieving and maintaining an appropriate body weight</td>
<td>- Uses appropriate safety equipment (e.g., helmet, wrist guards, elbow and knee pads) during physical activity</td>
<td></td>
</tr>
</tbody>
</table>

#### Family

<table>
<thead>
<tr>
<th>Educational/Attitudinal</th>
<th>Behavioral</th>
<th>Health/Physical Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Promotes physical activity</td>
<td>- Provides opportunities and safe places for the adolescent to participate in physical activity</td>
<td>- Maintains good health</td>
</tr>
<tr>
<td>- Understands the importance of developmentally appropriate physical activities</td>
<td>- Participates in physical activity with the adolescent</td>
<td></td>
</tr>
<tr>
<td>- Has resources that allow the adolescent to participate in physical activity</td>
<td>- Provides positive role model by participating in physical activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Advocates for physical education in schools</td>
<td></td>
</tr>
</tbody>
</table>
References


Suggested Reading


Does Jane Need to Be More Active?

Jane Jones, who is 15 years old, is seeing Dr. Munoz for an annual physical examination. Jane and her mother first fill out a questionnaire about Jane’s physical activity participation and other aspects of Jane’s health. The responses indicate that Jane is not physically active.

Dr. Munoz discusses the benefits of physical activity, including improving Jane’s overall health status and sense of well-being. He then recommends that Jane incorporate physical activity into her daily routine (e.g., by walking or biking rather than riding in or driving a car; by taking the stairs rather than using the elevator or escalator; by doing chores that require effort, such as vacuuming and mowing the lawn).

Dr. Munoz also recommends that Jane start participating in a specific physical activity. He suggests brisk walking, biking, skating, or dancing on most, if not all, days of the week. Dr. Munoz suggests that Jane do these activities with a friend to make them more fun. He also encourages her to try other activities. Jane agrees to give Dr. Munoz’s suggestions a try, and her mother promises to support her efforts.
FREQUENTLY ASKED QUESTIONS ABOUT PHYSICAL ACTIVITY IN ADOLESCENCE

■ Will vigorous physical activity affect my son’s growth and physical development?

Encourage your son to eat a variety of healthy foods for growth, physical development, and his level of physical activity. Growth and physical development in teenagers who are training and competing in vigorous physical activities, especially activities that emphasize low body weight (for example, distance running, gymnastics, and ballet), may be compromised if their caloric expenditure exceeds their food intake.

■ Can my daughter participate in physical activity during her menstrual period?

Yes. In fact, there are benefits associated with being physically active during the menstrual period (for example, less cramping and lighter menstrual flow). Girls and female adolescents who experience symptoms such as severe cramping, nausea, vomiting, headache, lightheadedness, and heavy menstrual flow tend to avoid physical activity during their period. If your daughter has any of these symptoms, which usually can be managed, take her to a health professional for evaluation.

■ Our teenager is growing fast. Does he have a higher risk of injury?

During the growth spurt, injuries such as muscle strains, sprains, and overuse are possible. The fact that they occasionally occur does not mean that your son should avoid physical activity.

■ When can my teenager lift weights?

With proper training and supervision, most teenagers can safely lift weights. Teenagers should not try to lift maximal amounts of weight until they are physically mature (on average, age 16 for males and 2 years after menarche for females). (The mean age of menarche is 12 1/2 years.) In addition, teenagers should not try to lift weights beyond their capabilities, and excessive repetitions and power lifting are not recommended.

■ Should I sign my daughter up for an after-school sports program?

After-school sports programs are a good idea if your daughter is interested in them. She may need encouragement but should not be compelled to participate.

■ My neighborhood isn’t very safe. How can my teenager participate in physical activity?

Encourage your teenager’s school to provide after-school and weekend physical activity programs. Also, community organizations, recreation centers, and churches and other places of worship provide opportunities for teenagers to participate in physical activity. Work with community leaders to ensure that your teenager has safe places for participating in physical activity (for example, walking and biking paths, playgrounds, parks, and recreation centers). Also,
your teenager can do many activities at home with soft equipment that can be used in tight spaces. Examples include modified versions of bowling, basketball, darts, and golf. Additional activities your teenager can do at home include stretching, calisthenics, aerobics, dancing, and weight or strength training.

**Resources for Families**

See Tool F: Physical Activity Resources for contact information on national organizations that can provide information on physical activity. State and local departments of public health and education, as well as local libraries, are additional sources of information.


