

PHYSICAL CHANGES

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CHANGES IN THINKING
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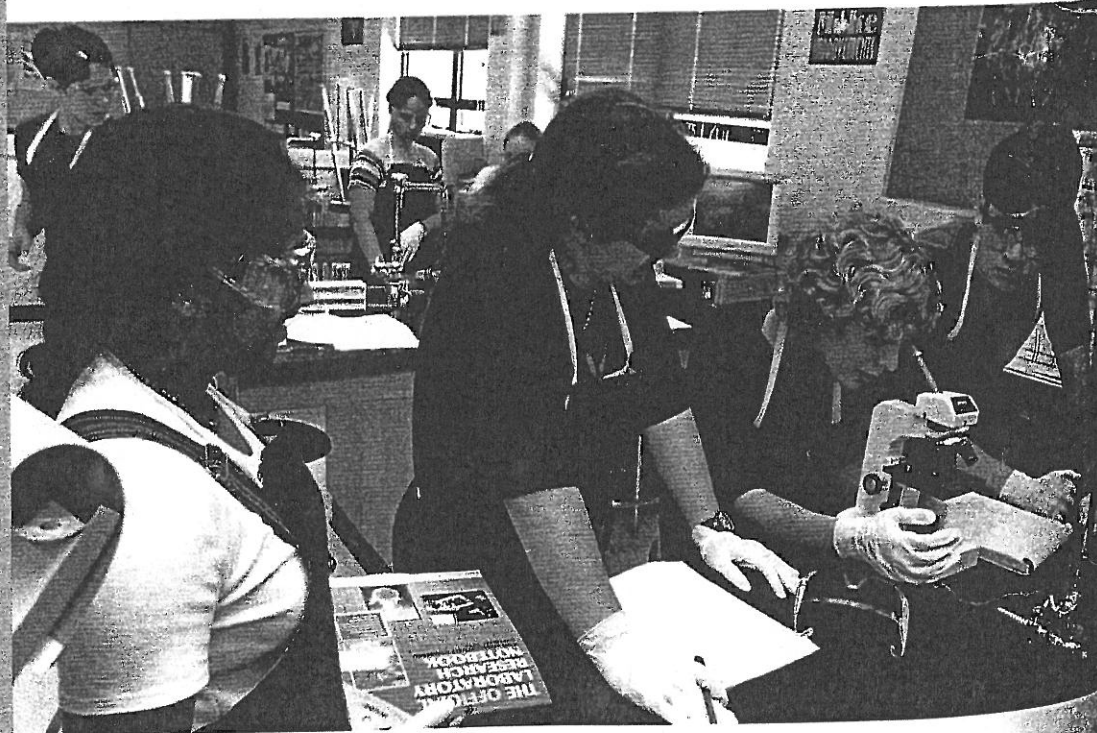
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Physical and Cognitive
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Eighth-graders Aisha and Michelle had been best friends since second grade. Now that they were on the verge of going to high school, the girls felt that they needed a lot more independence than their parents were willing to give them. Both had their own computers and cell phones that their parents allowed them to use as they pleased. But when their parents denied the girls' request to attend a concert, Aisha and Michelle concluded that their parents lacked respect for their emerging maturity. "They just don't want us to grow up," the girls agreed, and they made a mutual promise that each would beg, bargain, and nag until their parents finally agreed to let them go to the concert. "All our friends will be there," pleaded Aisha to her unyielding parents. "Even Sally is going," Michelle told her father, "and she's just a seventh-grader." But all their pleading was to no avail, and both concluded their failed negotiation sessions with the tragic adolescent refrain, "You never let me do anything!"



"Time for Plan B," Aisha told Michelle one night as the pair lamented the severe state of deprivation that their parents had imposed upon them. "I looked up the bus schedule online, and the 7:30 bus goes to the arena. We can sneak out and ride the bus to the concert." Michelle had her doubts, though. "How can we get out early enough without anyone knowing about it?" she asked. Aisha smiled, "That's the best part of my plan. You tell your parents that you're spending the night at my house, and I'll tell mine that I'm sleeping over at your house." Michelle grinned broadly, "What a great idea! But how do we get the tickets?" Aisha responded with the confidence of an accomplished petty larcenist, "I'll use my mom's credit card to buy the tickets online. I'll print out the receipt, and we can exchange it for the tickets when we get there." The girls could hardly contain their excitement as they contemplated what seemed to be a perfect plan. "Okay," said Michelle, moving on, "so, what are we gonna wear?"

On the night of the concert, Aisha and Michelle executed their plan flawlessly and were riding high on an exhilarating wave of self-congratulation. As it turned out, there was just one flaw in Aisha's and Michelle's plan: The bus route that they had planned to take from the arena back to their neighborhood stopped running at 10:00 p.m. As the girls stood at the bus stop in front of the arena, shivering in the cold night air and growing increasingly anxious as the street became utterly deserted, Aisha had to admit that she had forgotten to check the return route schedule. They finally reached the conclusion that they had no choice but to call their parents, who, as you might imagine, were furious. Aisha's and Michelle's parents confiscated the girls' computers, cell phones, and other possessions that they regarded as luxuries, and it was quite a long time before the girls were allowed to go anywhere but to school again.

Are Aisha and Michelle budding criminals? Not likely, but their actions arose from a new form of thinking that is characteristic of **adolescence**, the transitional period between childhood and adulthood. The powerful intellectual tools that emerge in the early teens allow adolescents to make plans and to mentally project themselves into those plans as a way of testing them. The process is somewhat akin to that of a scientist who formulates a hypothesis and devises an experiment to test it. Armed with this new way of thinking, young adolescents embark upon a period of development that is characterized by risks and opportunities that compete for their attention. Some of their choices are good ones, but others, like those made by Aisha and Michelle, reflect poor judgment. Most of teenagers' poor choices turn out to have little effect on the rest of their lives, but others can significantly alter the developmental trajectory of an adolescent's life. How these risks and opportunities are manifested in the physical and cognitive domains is the topic of this chapter.

adolescence the transitional period between childhood and adulthood

Physical Changes

When we think of the physical changes of adolescence, we usually give the greatest amount of attention to the reproductive system. Reproductive changes are important, as the text will point out. But momentous changes occur in other systems, and we will discuss those as well.

Learning Objective 11.1

How do the brains and other body systems of adolescents differ from those of younger children?

Brain Development and Physical Growth

Have you noticed that you are much better able to make realistic plans now than you could when you were 13 or 14? If so, then you have first-hand knowledge of the changes in the brain that facilitate planning and logic that occur during adolescence. Likewise, you were probably better coordinated and had more physical endurance at 18 than you did at 13, thanks to changes in the body's other organ systems that happen during the teen years.

The Brain There are two major brain growth spurts in the teenaged years. The first occurs between 13 and 15 (Spren et al., 1995). During this spurt, the cerebral cortex becomes thicker, and the neuronal pathways become more efficient. In addition, more energy is produced and consumed by the brain during this spurt than in the years that precede and follow it (Fischer & Rose, 1994). For the most part, these growth and energy spurts take place in parts of the brain that control spatial perception and motor functions. Consequently, by the mid-teens, adolescents' abilities in these areas far exceed those of school-aged children.

Neuropsychologists Kurt Fischer and Samuel Rose believe that a qualitatively different neural network emerges during the brain growth spurt that occurs between ages 13 and 15, which enables teens to think abstractly and to reflect on their cognitive processes (Fischer & Rose, 1994). As evidence, these researchers cite numerous neurological and psychological studies revealing that major changes in brain organization show up between ages 13 and 15 and that qualitative shifts in cognitive functioning appear after age 15. They claim that the consistency of these research findings is too compelling to ignore.

The second brain growth spurt begins around age 17 and continues into early adulthood (van der Molen & Molenaar, 1994). This time, the frontal lobes of the cerebral cortex are the focus of development (Davies & Rose, 1999). You may recall that this area of the brain controls logic and planning. Thus, it is not surprising that older teens differ from younger teens in terms of how they deal with problems that require these cognitive functions.

Other Body Systems An adolescent may grow 3 to 6 inches a year for several years. After the growth spurt, teenagers add height and weight slowly until they reach their adult size. Girls attain most of their height by age 16, while boys continue to grow until they are 18–20 years old (Tanner, 1990).

The shape and proportions of the adolescent's body also go through a series of changes. During the growth spurt, the normal cephalocaudal and proximodistal patterns are reversed.

Thus, a teenager's hands and feet are the first body parts to grow to full adult size, followed by the arms and legs; the trunk is usually the slowest-growing part. In fact, a good signal for a parent that a child is entering puberty is a rapid increase in the child's shoe size. Because of this asymmetry in the body parts, adolescents are often stereotyped as awkward or uncoordinated. However, adolescents may look awkward, but they are better coordinated than school-aged children (Malina, 1990).

Joint development enables adolescents to achieve levels of coordination that are close to those of adults. As they do at younger ages, boys continue to lag behind girls. You may remember from earlier chapters that boys' fine-motor skills are poorer than girls' be-

cause their wrists develop more slowly. In early adolescence, this sex difference is very large; girls achieve complete development of the wrist by their mid-teens (Tanner, 1990). A similar pattern of sex differences is evident in other joints as well, enabling early-adolescent girls to outperform boys of the same age on a variety of athletic skills that require coordination, such as pitching a softball. However, by the late teens, at age 17 or 18, boys finally catch up with girls in joint development and, on average, gain superiority over them in coordinated movement.

Muscle fibers become thicker and denser, and adolescents become quite a lot stronger in just a few years. Both boys and girls show this increase in strength, but it is much greater in boys (Buchanan & Vardaxis, 2003). This difference in strength reflects the underlying sex difference in muscle tissue that is accentuated at adolescence: Among adult men, about 40% of total body mass is muscle, compared to only about 24% in adult women. This sex difference in muscle mass (and accompanying strength) seems to be largely a result of hormone differences. But sex differences in exercise patterns or activities may also be involved.

During the teenaged years, the heart and lungs increase considerably in size, and the heart rate drops. Both of these changes are more marked in boys than in girls—another of the factors that make boys' capacity for sustained physical effort greater than that of girls. Before about age 12, boys and girls have similar endurance limits, although even at these earlier ages, when there is a difference, it is usually boys who have greater endurance, because of their lower levels of body fat. After puberty, boys have a clear advantage in endurance, as well as in size, strength, and speed (Klomsten, Skaalvik, & Espnes, 2004).

Milestones of Puberty

The growth and development of teenagers' brains and bodies is remarkable. However, the physical change that most people associate with adolescence is the attainment of sexual maturity. **Puberty** is a collective term that encompasses all of the changes, both seen and unseen, that are needed for reproductive maturity. It begins when the **pituitary gland**, the gland that controls all of the body's other glands, signals a child's adrenal gland to step up its production of androgen (See Table 11.1). This milestone is called *adrenarche* and occurs around age 7 or 8. Next, the pituitary begins secreting hormones that stimulate the growth of the ovaries in girls and the testes in boys. As they grow, these glands secrete hormones that cause the sex organs to develop, testosterone in boys and a form of estrogen called *estradiol* in girls.

The pituitary also secretes two other hormones, *thyroid stimulating hormone* and *general growth hormone*; these, along with adrenal androgen, interact with the specific sex hormones

Learning Objective 11.2

What are the major milestones of puberty?

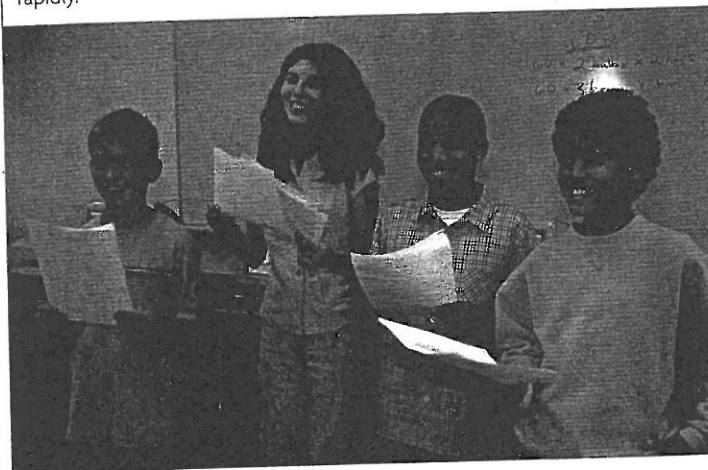
puberty collective term for the physical changes which culminate in sexual maturity

pituitary gland gland that triggers other glands to release hormones

Table 11.1 Major Hormones That Contribute to Physical Growth and Development

Gland	Hormone(s)	Aspects of Growth Influenced
Thyroid gland	Thyroxine	Normal brain development and overall rate of growth
Adrenal gland	Adrenal androgen	Some changes at puberty, particularly the development of secondary sex characteristics in girls
Testes (boys)	Testosterone	Crucial in the formation of male genitals prenatally; also triggers the sequence of changes in primary and secondary sex characteristics at puberty in the male
Ovaries (girls)	Estrogen (estradiol)	Development of the menstrual cycle and breasts in girls; has less to do with other secondary sex characteristics than testosterone does for boys
Pituitary gland	General growth hormone, thyroid stimulating hormone, and other activating hormones	Rate of physical maturation; signals other glands to secrete

Adolescent girls reach adult height sooner than boys do because their bones grow and their joints develop more rapidly.



and affect growth. Adrenal androgen, which is chemically very similar to testosterone, plays a particularly important role for girls, triggering the growth spurt and affecting development of pubic hair. For boys, adrenal androgen is less significant, presumably because boys already have so much male hormone in the form of testosterone in their bloodstreams. These hormonal changes trigger two sets of body changes: development of the sex organs and a much broader set of changes in the brain, bones, muscles, and other body organs.

The most obvious changes of puberty are those associated with sexual maturity. Changes in **primary sex characteristics** include growth of the testes and penis in the male and of the ovaries, uterus, and vagina in the female. Changes in **secondary sex characteristics** include breast development in girls, changing voice pitch and beard growth in boys, and the growth of body hair in both sexes. These physical developments occur in a defined sequence that is customarily divided into five stages, following a system originally suggested by J. M. Tanner (Tanner, 1990), examples from which are shown in Table 11.2.

Sexual Development in Girls Studies of preteens and teens in both Europe and North America show that the various sequential changes are interlocked in a particular pattern in girls. The first steps are the early changes in breasts and pubic hair, closely followed by the peak of the growth spurt and by the development of breasts and pubic hair. First menstruation, an event called **menarche** (pronounced men-ARE-kee), typically occurs 2 years after the beginning of other visible changes and is succeeded only by the final stages of breast and pubic hair development. Among girls in industrialized countries today, menarche occurs, on average, between 12 and 13; 99% of all girls experience this event between the ages of 9 and 12 (Adelman & Ellen, 2002).

It is possible to become pregnant shortly after menarche, but irregular menstrual cycles are the norm for some time. In as many as three-quarters of the cycles in the first year and half of the cycles in the second and third years after menarche, the girl's body produces no ovum (Adelman & Ellen, 2002). Full adult fertility thus develops over a period of years. Such irregularity no doubt contributes to the widespread (but false) assumption among younger teenaged girls that they cannot get pregnant.

The Secular Trend Interestingly, the timing of menarche changed rather dramatically between the mid-19th and the mid-20th centuries. In 1840, the average age of menarche in Western industrialized countries was roughly 17; the average dropped steadily from that time

until the 1950s at a rate of about 4 months per decade among European populations, an example of what psychologists call a **secular trend** (Roche, 1979). The change was most likely caused by significant changes in lifestyle and diet, particularly increases in protein and fat intake, that resulted in an increase in the proportion of body fat in females.

Data collected over much shorter periods of time in developing countries support the nutritional explanation of the secular trend. In one study, researchers found that the average age of menarche was 16 among North Korean girls who lived in squalid refugee camps (Ku et al., 2006). By contrast, studies involving impoverished groups in which food supplies suddenly increase reveal that the age of menarche can plummet from 16 to 13 within just a few years after improvements in nutrition are experienced (Khanna & Kapoor, 2004). Consequently, any change in eating patterns that affects girls' body fat, which must reach a critical value of 17% before menarche can occur, is likely to lead to a change in the age of menarche (Adelman & Ellen, 2002). But is there a lower limit on how early menarche can occur?

Exaggerated media accounts of the secular trend would have us believe that girls may some day attain sexual maturity during infancy (Viner, 2002). However, there is strong evidence for a genetic limit on the age range within which menarche may occur. For one thing, studies involving thousands of girls indicate that the average age of menarche for White girls in the United States is currently about 12.8 years and that it has not changed since the mid 1940s (Kaplowitz & Oberfield, 1999; Viner, 2002). Moreover, the average age at menarche stands at 12.1 among African American girls and 12.2 among Hispanic American girls, both of which represent a drop of about 2 months since the mid-1960s (Kaplowitz & Oberfield, 1999; Wu, Mendola, & Buck, 2002). Thus, the average age at menarche for the whole population of girls in the United States was stable from 1945 to 1965 and declined about 2.5 months between 1965 and 1995 (Kaplowitz & Oberfield, 1999).

In contrast to the stability of menarche, the average ages at which girls show secondary sex characteristics, such as the appearance of breast buds and pubic hair, have dropped significantly in recent decades (Anderson, Dallal, & Must, 2003). On average, girls nowadays show these signs 1 to 2 years earlier than their mothers and grandmothers did, resulting in a lengthening of the average time between the appearance of secondary sex characteristics and menarche (Parent et al., 2003). Researchers have found that this trend is attributable to the increased prevalence of overweight among children that you read about in Chapter 9 (Wang, 2002).

Overweight is both a cause and a consequence of early secondary sex characteristic development, because the hormonal changes that trigger the appearance of these characteristics also signal the body's weight regulation mechanisms to increase fat stores (Pierce & Leon, 2005; Remsberg et al., 2004). Little is known about how these early hormonal shifts affect girls' later health. Several studies are underway to determine whether overweight girls who exhibit early secondary sex characteristic development are at increased risk for breast cancer, adult obesity, and heart disease (National Cancer Institute, 2006; Pierce & Leon, 2005). Interestingly, too, researchers are also investigating why overweight delays pubertal development in boys and whether such delays affect boys' health later in life (Wang, 2002).

Sexual Development in Boys In boys, as in girls, the peak of the growth spurt typically comes fairly late in the sequence of physical development. Studies suggest that, on average, a boy completes stages 2, 3, and 4 of genital development and stages 2 and 3 of pubic hair development before reaching the peak of the growth spurt (Adelman & Ellen, 2002). His first ejaculation, or *spermarche*, occurs between 13 and 14 years of age, but the production of viable sperm production does not happen until a few months after the first ejaculation. Most boys do not attain adult levels of sperm production until stage 5 of genital development. The development of a beard and the lowering of the voice occur near the end of the sequence. Precisely when in this sequence the boy begins to produce viable sperm is very difficult to determine, although current evidence places this event some time between ages 12 and 14, usually before the boy has reached the peak of the growth spurt (Adelman & Ellen, 2002).

secular trend a change that occurs in developing nations when nutrition and health improve—for example, the decline in average age of menarche and the increase in average height for both children and adults that happened between the mid-18th and mid-19th centuries in Western countries

primary sex characteristics

the sex organs: ovaries, uterus, and vagina in the female; testes and penis in the male

secondary sex characteristics

body parts such as breasts in females and pubic hair in both sexes

menarche the beginning of menstrual cycles

Table 11.2 Examples of Tanner's Stages of Pubertal Development

Stage	Female Breast Development	Male Genital Development
1	No change except for some elevation of the nipple.	Testes, scrotum, and penis are all about the same size and shape as in early childhood.
2	Breast bud stage: elevation of breast and the nipple as a small mound. Areolar diameter increases compared to stage 1.	Scrotum and testes are slightly enlarged. Skin of the scrotum reddens and changes texture, but little or no enlargement of the penis.
3	Breast and areola both enlarged and elevated more than in stage 2, but no separation of their contours.	Penis slightly enlarged, at first mainly in length. Testes and scrotum are further enlarged. First ejaculation.
4	Areola and nipple form a secondary mound projecting above the contour of the breast.	Penis further enlarged, with growth in breadth and development of glans. Testes and scrotum further enlarged, and scrotum skin still darker.
5	Mature stage. Only the nipple projects, with the areola recessed to the general contour of the breast.	Genitalia achieve adult size and shape.

(Source: Petersen & Taylor, 1980, p. 127)

Learning Objective 11.3

What are the consequences of early, "on time," and late puberty for boys and girls?

Timing of Puberty

Although the order of physical developments in adolescence seems to be highly consistent, there is quite a lot of individual variability. In any random sample of 12- and 13-year-olds, you will find some who are already at stage 5 and others still at stage 1 in the steps of sexual maturation. We have already discussed the contribution of diet, exercise, and body fat to the timing of puberty. Researchers think that hereditary and behavioral factors also contribute to hormonal secretions in the bodies of individual teenagers, thereby controlling the timing of puberty (Dorn et al., 2003). Discrepancies between an adolescent's expectation and what actually happens determine the psychological effect of puberty. Those whose development occurs outside the desired or expected range are likely to think less well of themselves, to be less happy with their bodies and with the process of puberty. They may also display other signs of psychological distress.

Research in the United States indicates that girls who are early developers (who experience major body changes before age 10 or 11) show consistently more negative body images, such as thinking of themselves as too fat (Sweeting & West, 2002). Such girls are also more likely to get into trouble in school and at home, more likely to become sexually active and to be depressed than are girls who are average or late developers (Kaltiala-Heino, Kosunen, Rimpela, 2003). Among boys, both very early and very late puberty are associated with depression (Kaltiala-Heino, Kosunen, Rimpela, 2003). However, researchers have also consistently found that boys who are slightly ahead of their peers in pubertal development often occupy leadership roles and are more academically and economically successful in adulthood (Taga, Markey, & Friedman, 2006). In addition, substance use is associated with early puberty

Girls who develop early report much less positive adolescent experiences and more depression than girls who develop "on time" or later.



in both girls and boys, because, based on their appearance, early maturers are often invited to join groups of older teens among whom substance use is an important social activity (Costello, Sun, Worthman, & Angold, 2007).

Research also indicates that pubertal timing interacts with a number of other variables to produce both positive and negative effects on adolescents' development. For instance, personality traits contribute to the effects of pubertal timing (Markey, Markey, & Tinsley, 2003). It appears that girls who experience early puberty and who are high in the Big Five trait of openness to experience are more likely to be sexually active at an early age than are girls who are early but who do not possess this trait.

Moreover, parenting moderates the effects of pubertal timing such that both early-maturing boys and girls who are more likely to become involved in sexual activity and substance abuse if their parents are permissive (Costello, Sun, Worthman, & Angold, 2007).

Perhaps the most important variable that moderates the effects of pubertal timing, however, is the social context in which an adolescent experiences the physical changes associated with puberty. Consider the case of girls who are involved in activities that, by their nature, inhibit development of the proportion of body fat required to initiate puberty, such as ballet and gymnastics. In these contexts, girls who are late by general cultural standards are on time for the reference group with which they spend most of their time. Thus, early puberty may cause them to believe they can no longer be successful in their chosen pursuit and may devastate their self-esteem, whereas late puberty may enhance their self-confidence and self-esteem (Brooks-Gunn, 1987; Brooks-Gunn & Warren, 1985).

Critical Thinking

1. Suppose you were asked to give a talk to parents about young teenagers' need for sex education and for adult guidance with regard to romantic relationships. How would you integrate the information on brain development with the discussion of the stages of puberty in your presentation?

Adolescent Sexuality

Puberty brings with it the hormonal changes that underlie both sexual attraction and sexual behavior. Still, these important domains of experience are not entirely controlled by hormones. Each has psychological and social components, as you will see.

Sexual Behavior

Do you remember your first sexual experience? Nowadays, most people have their first sexual encounter in the mid- to late teens (Fryar et al., 2007). However, teens vary widely in how often they have sex and in how many partners they have.

Prevalence of Sexual Behavior Figure 11.1 graphs findings from a 2005 national survey of high school students in the United States (CDC, 2006). As you can see, boys were found to be more sexually active than girls. Furthermore, the proportion of sexually experienced teens increased across grades 9 to 12.

Consistent with earlier surveys, sexual experience was found to vary across racial and ethnic groups. About 67% of African American high school students reported having had sexual intercourse at least once in their lives. The rates among Hispanic American and White students were 51% and 44%, respectively. African American students were also more likely than Hispanic American and White teens to have had their first sexual encounter before age 13 (17% versus 7% and 4%, respectively).

There were also age and ethnic differences among students who were currently sexually active—defined as having had sex at least once within 3 months of responding to the survey. For example, roughly 41% of eleventh-grade females reported recent sexual activity, while only 20% of ninth-grade females did so. Researchers also found ethnic differences: 49% of African American students reported being currently sexually active, compared to 35% of Hispanic Americans and 32% of Whites.

Although sexual activity among boys is somewhat correlated with the amount of testosterone in the blood, social factors are much better predictors than hormones

Learning Objective 11.4

What are the patterns of adolescent sexual behavior in the United States?

Television programs aimed at adolescent audiences often portray teens in sexual situations, such as these two from the popular show *Hannah Montana*.

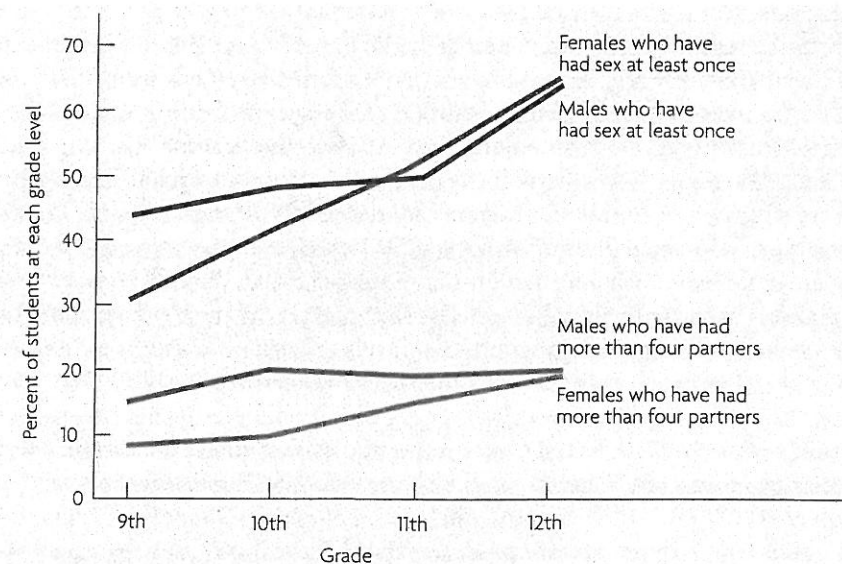
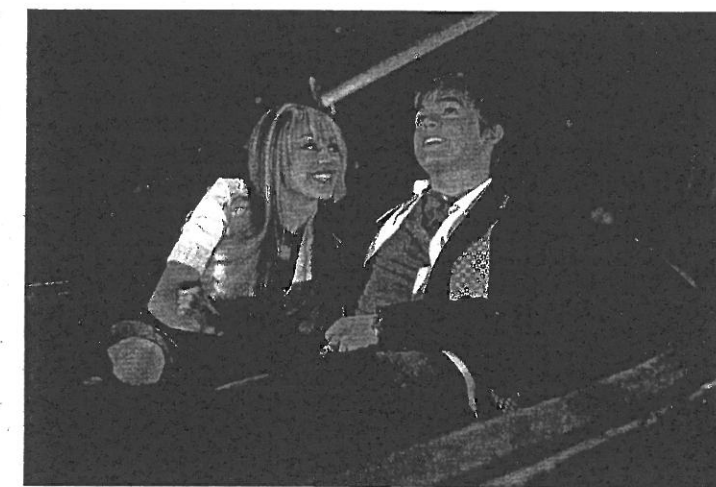
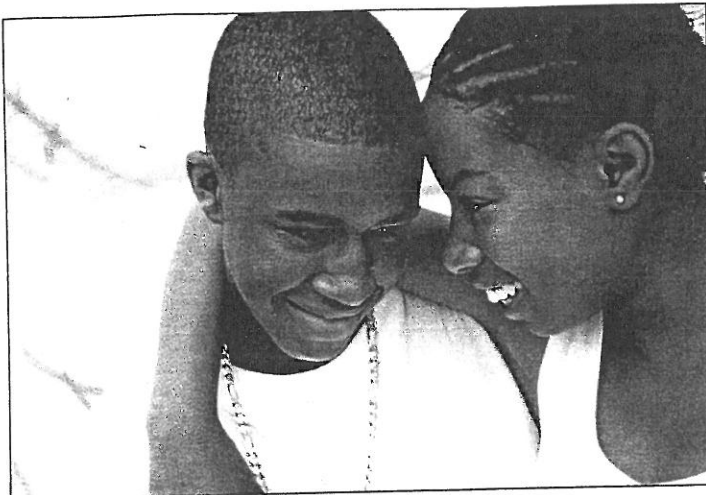


Figure 11.1
Sexual Activity among High School Students

The graph illustrates the data from a representative sample of more than 15,000 high school students interviewed in 2005.

(Source: CDC, 2006.)



Teens who date in early adolescence, as these middle-schoolers may be doing, are more likely to become sexually active while still in school than peers who begin dating later.

of teenagers' sexual activity (Halpern, Udry, Campbell, & Suchindran, 1993; Udry & Campbell, 1994). In fact, cross-cultural evidence suggests that the same factors are related to sexual behavior even in societies with very low rates of teenaged sexual activity, such as Taiwan (Wang & Chou, 1999). Those who begin sexual activity early are more likely to live in poor neighborhoods in which young people are not well monitored by adults. They come from poorer families or from families in which sexual activity is condoned and dating rules are lax. They are more likely to use alcohol. Many were abused and/or neglected in early childhood (Herrenkohl, Herrenkohl, Egolf, & Russo, 1998).

Among girls, those who are sexually active are also more likely to have experienced early menarche, to have problems in school, to have had their first date at a relatively early age, and to have a history of sexual abuse (Buzi, Roberts, Ross, Addy, & Markham, 2003; Ompad et al., 2006). The greater the number of risk factors present in the life of an individual teenager, the greater the likelihood that he or she will be sexually active. However, adolescents' moral beliefs and the activities in which they participate also predict their sexual activity. For example, teenagers who believe that premarital sex is morally wrong and who attend religious services frequently are less likely than their peers to become sexually active before reaching adulthood (Miller et al., 1998). Rates of sexual activity are also lower among teens who are involved in sports or other after-school pursuits than among their peers who do not participate in such activities (Savage & Holcomb, 1999). Moreover, alcohol use is associated with 25–30% of adolescent sexual encounters; thus, teens who do not use alcohol are less likely to be sexually active than are their peers who drink (CDC, 2000c).

Contraceptive Use Despite their high levels of sexual activity, teenagers know remarkably little about physiology and reproduction (Carrera et al., 2000). At best, only about half of teenagers can identify the time of greatest fertility in the menstrual cycle (Freeman & Rickels, 1993). Many teens are also woefully ignorant of sexually transmitted diseases and their potential consequences, although about 90% of high school students report having learned about sexually transmitted diseases in school (CDC, 2000c; Rosenthal, Lewis, Succop, & Burklow, 1997; Sharma & Sharma, 1997). Even when they are knowledgeable about STDs, many teens lack the assertiveness necessary to resist sexual pressure from a romantic partner or to discuss condom use.

Among students who reported recent sexual activity, only 63% said they had used a condom in their most recent sexual encounter. African Americans were more likely than students in other groups to report having used condoms (69% versus 57% of Hispanic Americans and 63% of Whites). Birth control pills were used even less frequently. Only 21% of sexually active females reported being on the pill. In addition, pill usage was far more common among White high school girls (27%) than among their African American or Hispanic American peers (9% and 11%, respectively). Thus, many developmentalists and public health advocates say that more effective sex education programs are needed. Most suggest that programs that include training in social and decision-making skills, as well as information about STDs and pregnancy, are more likely than information-only approaches to reduce the prevalence of sexual activity and to increase the number of teens who protect themselves against disease and pregnancy when they do have sex. Programs that involve parents also appear to be more successful than those that target only teenagers themselves (Lederman & Mian, 2003; Wilson & Donenberg, 2004). However, no clear consensus about the effectiveness of various approaches to sex education has emerged, and some studies show that even carefully designed sex education programs have little or no long-term effect on adolescents' sexual behavior (Henderson et al., 2007).

Many adults object to sex education because they believe it will cause teenagers who are not sexually active to become so. Research suggests that such fears are unfounded (Berne &

Huberman, 1996). There are also debates over the degree to which sex education programs should emphasize abstaining from sex or using contraceptives (Santelli et al., 2006). Studies examining several types of programs indicate that abstinence-based sex education is most likely to result in delay of first sexual intercourse when it is initiated with younger students—seventh- or eighth-graders—who are not yet sexually active (Borawski et al., 2005). Moreover, students who participate in multi-session programs are more likely to remain abstinent than those who are exposed to single-session presentations about abstinence (Postrado & Nicholson, 1992).

Sex education advocates suggest that abstinence and contraceptive education should not be thought of in either/or terms (Borawski et al., 2005). They point to research suggesting that programs that both encourage abstinence *and* provide basic information about reproduction and contraception appear to influence teen participants both to delay sexual intercourse and to use contraception when they do decide to become sexually active (St. Pierre, Mark, Kaltreider, & Aiken, 1995). Indeed, finding a way to encourage teens to avoid becoming sexually active too early may be critical to influencing contraceptive use. The older teenagers are when they become sexually active, the more likely it is that they will be cognitively capable of weighing the various options and consequences associated with intercourse.

Adolescent Pregnancy

Learning Objective 11.5

Which teenaged girls are most likely to get pregnant?

The rate of pregnancy among adolescents is higher in the United States than many other industrialized countries (Ambuel, 1995; Singh & Darroch, 2000). For example, the overall annual rate is about 40 pregnancies per 1,000 teens in the United States; it is only 17 pregnancies per 1,000 in Israel and 4 per 1,000 in Japan (Martin et al., 2006; Merrick & Morad, 2002). Ethnic differences exist within the United States as well (U.S. Bureau of the Census, 1998). Births to teenagers represent about a quarter of all births to African American women. Among Whites, only 11% of births involve teenaged mothers; among Hispanic women, about 17% of all births are to teenagers.

However, teen pregnancy statistics can be confusing, because they usually refer to all pregnancies among women under age 20. To clarify the extent of the teen pregnancy problem, it is useful to break down the statistics by adolescent subgroups. For example, in the United States, the annual pregnancy rate is less than 1 pregnancy per 1,000 for girls younger than 15; 22 per 1,000 among girls aged 15 to 17; and 70 per 1,000 among 18- to 19-year-olds (Martin et al., 2006). Looking at the numbers this way shows that teen pregnancy is far more frequent among older adolescents and, in fact, is most likely to happen after a girl leaves high school.

The age at which an adolescent becomes a parent is only one aspect of the teen pregnancy issue. Birth rates among teenagers have actually dropped in the entire U.S. population since the 1960s, including among 15- to 19-year-olds. What has increased is the rate of births to unmarried teens. During the 1960s, more than 80% of teens who gave birth were married. By contrast, in 2003, only 20% of teenaged mothers were married (CDC, 2004).

The proportion of teenaged mothers who eventually marry the baby's father has also declined in recent years, and, again, there are ethnic differences. Less than 5% of African American teen mothers marry the baby's father, compared to 26% of Hispanics and 41% of whites (Population Resource Center, 2004). Moreover, across ethnic groups, only 17% of teen mothers maintain romantic relationships with their babies' fathers beyond the first few months after birth (Gee & Rhodes, 1999, 2003).

Whether a girl becomes pregnant during her teenaged years depends on many of the same factors that predict sexual activity in general (Miller, Benson, & Galbraith, 2001). The younger a girl is when she becomes sexually active, the more likely she is to become pregnant. Among teenaged girls from poor families, from single-parent families, or from families with relatively uneducated parents, pregnancy rates are higher (Vikat, Rimpela, Kosunen, & Rimpela, 2002). Likewise, girls whose mothers became sexually active at an early age and bore their first child early are likely to follow a similar path.

In contrast, the likelihood of pregnancy is lower among teenaged girls who do well in school and have strong educational aspirations. Such girls are both less likely to be sexually

active at an early age and more likely to use contraception if they are sexually active. Girls who have good communication about sex and contraception with their mothers are also less likely to get pregnant.

When teenaged girls become pregnant, in most cases, they face the most momentous set of decisions they have encountered in their young lives (see the Real World). About one-third of teen pregnancies across all ethnic groups end in abortion, and about 14% result in miscarriages (Alan Guttmacher Institute, 2004). Among Whites, 7% of teens carry the baby to term and place it for adoption, but only 1% of African American teens relinquish their babies to adoptive families.

The children of teenaged mothers are more likely than children born to older mothers to grow up in poverty, with all the accompanying negative consequences for the child's optimum development (Burgess, 2005). For instance, they tend to achieve developmental milestones more slowly than infants of older mothers (Pomerleau, Scuccimarri, & Malcuit, 2003). However, the children of teenaged mothers whose own parents help with child care, finances, and parenting skills are less likely to suffer such negative effects (Birch, 1998; Uno, Florsheim, & Uchino, 1998). Moreover, social programs that provide teenaged mothers with child care and the support they need to remain in school positively affect both these mothers and their babies. Such programs also improve outcomes for teenaged fathers (Kost, 1997).

THE REAL WORLD

Crisis Intervention for the Pregnant Teen

Brianna is a high school junior who has recently become sexually active. She fears that she is pregnant, but she doesn't know where to turn for help. Finally, after a great deal of agonizing over her situation, Brianna visited the clinic at her school, pretending to be suffering from a stomach ache. In her conversation with the nurse, Brianna casually asked about whether a girl who thought she was pregnant could talk to the school nurse about it without fearing that the nurse would tell her parents. The nurse recognized that Brianna was actually talking about herself. After some initial awkwardness, the nurse succeeded in establishing a trusting relationship with the girl through which she was able to use her crisis intervention skills to help Brianna deal with her situation.

A crisis intervention model proposed more than four decades ago continues to be helpful to health professionals, teachers, and parents in understanding and helping teens in crisis (Caplan, 1964). The first stage in a crisis, called the *initial phase*, is characterized by anxiety and confusion. Thus, the first step in crisis intervention in many teenaged pregnancies often happens when a significant adult in the teenager's life recognizes a change in behavior and questions the girl about it. However, mental health professionals recommend gentle confrontation during this phase (Blau, 1996). For example, a

pregnant teenager might be reminded that it isn't possible to keep a pregnancy secret for very long, but this is clearly not the time to bombard them with questions such as "How are you going to support a baby? What about school? Are you going to go to college?"

The second stage of a crisis, the *escalation phase*, happens as the teenager begins to try to confront the crisis. In many cases, adolescents in this phase feel too overwhelmed to maintain daily functions such as getting to school and keeping track of homework. Teens in this phase may be responsive to helpers who simplify their decision-making by directly telling them what to do. For example, a pregnant teen's mother may make a doctor's appointment for her and see that she keeps it instead of nagging her to do it herself.

The third stage of a crisis is called the *redefinition phase*. Those who are providing emotional support for the pregnant teen in this stage can help by guiding her through the process of breaking the problem down into small pieces. For the teen who wants to raise her baby, counselors or parents can divide the decisions to be made into financial and educational categories. They can help the teen identify short-term and long-term goals in each category and assist her in finding the answers to important questions. For example, in the finan-

cial category, the girl must find out how much financial support she can expect to receive from the baby's father. With respect to continuing her education, she must determine the available day-care options.

Teens who leave the redefinition phase with a realistic plan of action are typically no longer in a crisis mode. However, teens who fail to re-define their problem appropriately enter the fourth crisis stage, the *dysfunctional phase*. In this stage, either the pregnant adolescent gives up hope or she goes into denial. The goal of crisis intervention is to prevent either of the stage-four outcomes. Yet the entire process probably depends on whether a pregnant teen has a sensitive adult in her life who will recognize the signs of the initial phase—just one more reason why teenagers, who may seem very grown up, still need warm, authoritative parenting.

Questions for Reflection

1. In which crisis phase was Brianna when she visited the school clinic?
2. Think about how the crisis phases might be manifested in a different kind of crisis. For instance, what phase-related behaviors might be shown by a teenager who has been arrested for under-age drinking?

Sexual Minority Youth

Learning Objective 11.6

What are some of the causes that have been proposed to explain homosexuality?

The emergence of a physical attraction to members of the opposite sex, or *heterosexuality*, is one of the defining features of adolescence for the great majority of teenagers. For some, though, adolescence is the time when they discover, or confirm a long-standing suspicion, that they are attracted to people of the same sex (*homosexuality*) or to both sexes (*bisexuality*). Still others become increasingly convinced that their psychological gender is inconsistent with their biological sex (*transgenderism*).

Gay, Lesbian, and Bisexual Adolescents Surveys involving thousands of teens have found that about 92% identify themselves as exclusively heterosexual in *sexual orientation*, a person's preference for same- or opposite-sex partners (Austin et al., 2004; Remafedi, Resnick, Blum, & Harris, 1998). About 7% of teens report that they are still unsure of their sexual orientation, and 1% say that they classify themselves as exclusively gay, exclusively lesbian, or bisexual. By adulthood, 94% report being exclusively heterosexual, and just over 5% describe themselves as gay, lesbian, or bisexual, leaving only a very small proportion who are still undecided as to their sexual orientation (Langer, Arnedt, & Sussman, 2004).

Lay people and researchers alike have wondered what causes some people to develop a gay, lesbian, or bisexual orientation. Several twin studies show that when one identical twin is homosexual, the probability that the other twin will also be homosexual is 50–60%, whereas the concordance rate is only about 20% for fraternal twins and only about 11% for pairs of biologically unrelated boys adopted into the same family (Dawood et al., 2000; Kendler et al., 2000). Family studies also suggest that male homosexuality runs in families—that is, the families of most gay men have a higher proportion of homosexual males than do the families of heterosexual men (Bailey et al., 1999). Such findings strengthen the hypothesis that homosexuality has a biological basis (Dawood et al., 2000). Such evidence does not mean that environment plays no role in homosexuality. For example, when one of a pair of identical twins is homosexual, the other twin does *not* share that sexual orientation 40–50% of the time. Something beyond biology must be at work, although developmentalists do not yet know what environmental factors may be involved.

Prenatal hormone patterns may be one factor in homosexuality (Rahman & Wilson, 2003). For example, women whose mothers took the drug diethylstilbestrol (DES, a synthetic estrogen) during pregnancy are more likely to be homosexual as adults than are women who were not exposed to DES in the womb (Meyer-Bahlburg et al., 1995). These studies are consistent with the hypothesis that homosexuality is programmed in at birth.

Whatever the cause of variations in sexual orientation, the process through which an individual comes to realize that he or she is homosexual appears to be a gradual one. Some researchers think that the process begins in middle childhood as a feeling of doubt about one's heterosexuality (Carver, Egan, & Perry, 2004). Retrospective studies have found that many gay men and lesbians recall having had homosexual fantasies during their teen years, but few fully accepted their homosexuality while still in adolescence (Wong & Tang, 2004). Instead, the final steps toward full self-awareness and acceptance of one's homosexuality appear to take place in early adulthood.

As homosexual teens grapple with questions about their sexual orientation, many report feeling isolated from and unaccepted by their peers (Martin & D'Augelli, 2003). This may help explain why a higher proportion of homosexual than heterosexual teens suffer from depression and attempt suicide (Cato & Canetto, 2003; Remafedi, French, Story, Resnick, & Blum, 1998; Safren & Heimberg, 1999; Savin-Williams & Ream, 2003). Many mental health professionals suggest that, to respond to these adolescents' needs, school officials provide emotional and social support for homosexual teens (Rostosky, Owens, Zimmerman, & Riggle, 2003; van Wormer & McKinney, 2003).

Transgendered Teens Transgendered teens and adults are those whose psychological gender is the opposite of their biological sex. Some studies suggest that transgendered

transgendered a person whose psychological gender is the opposite of his or her biological sex

individuals may have been exposed to atypical amounts of androgens in the womb (Lippa, 2005). However, most do not have such histories, so the cause of transgenderism remains a mystery. Nevertheless, transgendered adolescents usually report that, since early childhood, they have been more interested in activities that are associated with the opposite sex than in those that are typical for their own (Lippa, 2005). However, most children who are attracted to cross-gender activities, and even those who express a desire to be the opposite gender, do not exhibit transgenderism after puberty (Cohen-Kettenis & van Goozen, 1997). Thus, such behaviors on the part of children are not considered to be predictive of the development of transgenderism in adolescence.

Out of fear of being stigmatized, most teens who suspect that they are transgendered keep their feelings to themselves. The denial and anger that is often expressed by family members when transgendered adolescents do venture to “come out” amplifies these teens’ distress (Zamboni, 2006). As a result, like gay, lesbian, and bisexual teens, transgendered teens are more likely to suffer from depression and are at higher risk of suicide than heterosexual adolescents are (Rosenberg, 2003).

Once individuals accept their transgendered status, some choose to live as the opposite gender on a full-time basis, a pattern called *transsexualism*. Most transsexuals are content with their lives, but others are so anguished by the conflict between their sex and their psychological gender that they seek *sex reassignment*—a process involving hormonal treatment, reconstructive surgery, and psychological counseling—in order to achieve a match between the two. Typically, sex reassignment is reserved for adults, but some sex reassignment specialists accept teenaged patients (Smith et al., 2005). Regardless of the age at which sex reassignment is sought, at least half of those who explore this option, with the help of skilled counselors, ultimately reject it in favor of less drastic ways of coping with their dilemma. Among those who do actually go through the procedure, most are happy with the results and experience relief from their preoperative emotional distress.

Critical Thinking

1. Look back at Bronfenbrenner’s ecological model of development in Chapter 2 (pages 43–44). Think of sexually developing adolescents as being in the innermost circle, or the biological context, and explain how the microsystem, exosystem, and macrosystem affect sexually active teens, pregnant adolescents, and sexual minority youth.

Adolescent Health

For most individuals, adolescence is one of the healthiest periods of life. However, as adolescents gain independence, they encounter numerous health risks.

Learning Objective 11.7

How does sensation-seeking affect risky behavior in adolescents?

Sensation-Seeking

Teenagers appear to have what many developmentalists describe as a heightened level of *sensation-seeking*, or a desire to experience increased levels of arousal such as those that accompany fast driving or the “highs” associated with drugs. Sensation-seeking leads to recklessness, which, in turn, leads to markedly increased rates of accidents and injuries in this age range. For example, adolescents drive faster and use seat belts less often than adults do (Centers for Disease Control [CDC], 2000c). To reduce the number of accidents among teenaged drivers, many states in the United States have enacted laws establishing “graduated” driver’s licenses (Cobb, 2000). Sixteen-year-olds can drive in most such states, but they must remain accident- and ticket-free for a certain period of time before they can have privileges such as driving at night.

Risky behaviors may be more common in adolescence than other periods because they help teenagers gain peer acceptance and establish autonomy with respect to parents and other authority figures (Donnenberg, Emerson, Bryant & King, 2006; Letkato, 2006). Permissive parenting contributes as well, as does alcohol use (Donnenberg, Emerson, Bryant, & King, 2006). In addition, adolescents who are not involved in extracurricular activities at school or to whom popularity is important are more likely than their peers who value popularity less to engage in risky behavior (Carpenter, 2001; Stein, Roeser, & Markus, 1998).

The messages conveyed in the popular media about sex, violence, and drug and alcohol use may influence teens’ risky behavior. In the United States, 13- to 17-year-olds spend more time watching television, listening to music, and playing video games than they do in school (Collins et al., 2004). Surprisingly, most teenagers report that their parents have few, if any, rules regarding media use (Mediascope Press, 2000). However, research indicates that media messages interact with individual differences in sensation-seeking (Greene, Krcmar, Rubin, Walters, & Hale, 2002). Thus, teens who are highest in sensation-seeking are those who are most strongly influenced by media portrayals of risky behavior.

Prime-time television programs contain about five sexual incidents per hour, and only 4% of these impart information about the potential consequences of sex (Henry J. Kaiser Family Foundation, 2005). Drugs and alcohol are even more prevalent than sex in the popular media. One survey found that 98% of 200 movies surveyed portrayed characters using some kind of substance, and in most cases characters used more than one substance (Mediascope Press, 1999c). Another group of researchers found that 51% of films they surveyed depicted teenagers smoking (Mediascope Press, 1999c). In another 46%, teenagers were shown consuming alcohol, and 3% contained images of teens using illegal drugs. Again, references to the consequences of drug or alcohol use were rare; they occurred in only 13% of films surveyed.

Drugs, Alcohol, and Tobacco

The story about Aisha and Michelle at the beginning of the chapter may have reminded you of some of the poor decisions that you made when you were younger. As we noted, most such decisions turn out to have little impact on teens’ later lives. However, the choices that teenagers make about substance use can have life-long consequences.

As you can see in Figure 11.2, illicit drug use is far less common among recent than in past cohorts of teenagers (Johnston, O’Malley, Bachman, & Schulenberg, 2007). Researchers attribute this trend to declining approval of drug use among adolescents and to contemporary teens’ better understanding of the negative consequences of taking drugs. Still, experts agree that drug use among teens continues to be a significant problem because of the risks to which teens expose themselves, such as drunk driving and the possibility of life-long addiction, when they use these substances.

Table 11.3 on page 320 lists the percentages of 8th-, 10th-, and 12th-grade students who reported using each drug listed in the 12 months preceding the survey. Clearly, as was true in earlier cohorts, marijuana is the illicit substance that teens use most often, but a surprising number of teenagers are using prescription drugs such as Ritalin, OxyContin, and Vicodin. Similar percentages of teens use over-the-counter drugs such as cough medicines.

Learning Objective 11.8

What patterns of drug, alcohol, and tobacco use have been found among adolescents in the United States?

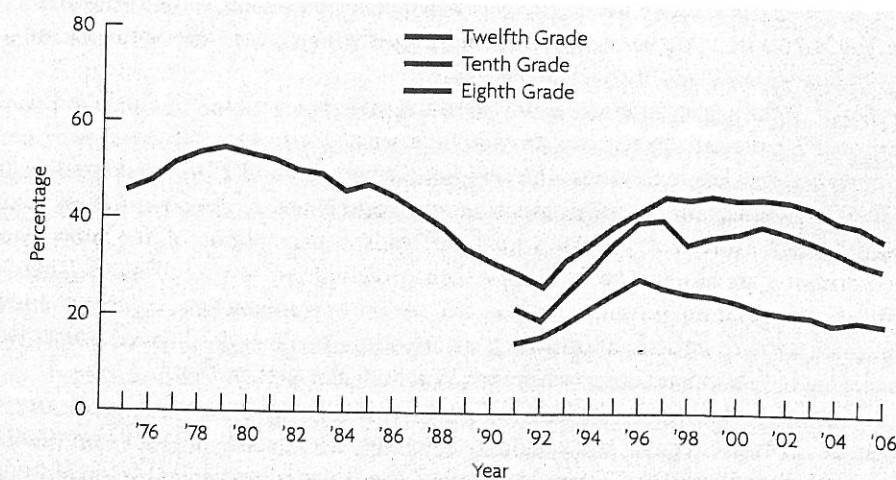


Figure 11.2
Illicit Drug Use Trends
among Teenagers

This figure shows the percentage of teens who admitted to using illicit drugs in the previous 12 months. As you can see, drug use rates have declined since the 1970s.

Table 11.3 Percentages of Teens Who Have Used Illicit Drugs in the Past 12 Months

Drug	8th-graders	10th-graders	12th-graders
Alcohol	34%	56%	67%
Marijuana	12%	25%	32%
Vicodin*	3%	7%	10%
Diet pills*	5%	8%	8%
Tranquilizers*	3%	5%	7%
Over-the-counter cold medicines*	4%	5%	7%
Cocaine	2%	3%	5%
OxyContin*	3%	4%	4%
MDMA (Ecstasy)	1%	3%	4%
Crack cocaine	1%	1%	2%
Ritalin*	3%	4%	4%
Methamphetamine	2%	2%	3%
LSD	<1%	2%	2%
Heroin	1%	1%	1%

*Recreational usage outside the scope of the purpose for which drug is medically approved.

Source: Johnston et al., 2007.

(Note: Inclusion of such drugs in this discussion refers only to their use for purposes other than those for which they have been medically approved.) Nevertheless, illicit drug use is far less prevalent than alcohol use among teenagers. Moreover, nearly one-third of 12th-graders reported having been drunk in the month prior to the survey.

What makes a teenager want to use alcohol or drugs? Those who express the most interest in sensation-seeking are those who are most likely to use drugs and consume alcohol (Donohew et al., 1999). Indeed, researchers have found that individual levels of sensation-seeking predict peer associations—that is, teens who are high sensation-seekers choose friends who are similar. Once such groups are formed, sensation-seeking becomes a central feature of their activities. So, for example, if one member tries marijuana or alcohol, others do so as well. However, teens who spend a lot of time alone may also be vulnerable to substance abuse. Researchers have found that shy adolescents, particularly those who are high in neuroticism, are more likely to use alcohol and drugs than are peers who are more outgoing (Kirkcaldy, Siefen, Surall, & Bischoff, 2004).

Sensation-seeking also interacts with parenting style to increase the likelihood of drug use. Authoritative parenting seems to provide high sensation-seeking teenagers with protection against their reckless tendencies (Pilgrim, Luo, Urberg, & Fang, 1999). In fact, for African American adolescents, authoritative parenting may entirely negate the potential influence of drug-using peers. Moreover, parents who have realistic perceptions of the prevalence of teenaged drinking are also less likely to have teenaged children who are drinkers. These parents, who are aware of the prevalence of alcohol use among adolescents, try to prevent their children from getting into situations, such as attending unsupervised social events, where drinking is likely to happen (Bogenschneider, Wu, Raffaelli, & Tsay, 1998).

Sensation-seeking seems to be less important in tobacco use. Surveys suggest that 12% of U.S. adolescents are regular smokers, and 30% have tried smoking (Johnston, O'Malley, Bachman, & Schulenberg, 2007). Smoking rates have dropped considerably since the mid-

1970s when about 30% of older teenagers were regular smokers. Researchers argue that, thanks to public education campaigns and the inclusion of anti-smoking information in school curricula, more teenagers are aware of the health consequences of smoking than earlier cohorts. Moreover, many teens report that they oppose smoking because of its potential effect on their attractiveness to potential romantic partners.

Peer influence plays an important role in teen smoking. A non-smoking teenager who begins associating with a cohesive group of adolescents among whom smoking is a prominent behavior and a sign of group membership is likely to take up the habit, too. In fact, some developmentalists advise parents that if their teenaged child's friends smoke, especially close friends with whom the child spends a lot of time, parents should probably assume that their child smokes as well (Urberg, Degirmencioglu, & Pilgrim, 1997). Moreover, the period between ages 15 and 17 seems to be the time during which a teenager is most susceptible to peer influences with regard to smoking (West et al., 1999). Clearly, then, by monitoring the friends of their 15- to 17-year-olds and discouraging them from associating with smokers, parents may help prevent their teens from smoking (Mott, Crowe, Richardson, & Flay, 1999).

Eating Disorders

Have you ever tried to lose weight? Surveys show that, at any given time, about half of women and a third of men in the United States are on some kind of weight-loss diet (Bish et al., 2005). Thus, it isn't surprising that 40% of teenagers diet regularly, and 20% of them use extreme measures such as taking diet pills (CDC, 2006; Neumark-Sztainer et al., 2006). However, dieting is quite different from an *eating disorder*, which is a category of mental disorders in which eating behaviors go far beyond most people's everyday experience with trying to lose weight (American Psychiatric Association, 2000). Most importantly, individuals with an eating disorder have a distorted body image that, in extreme cases, causes them to believe that they are overweight when they are actually on the verge of starvation. These disorders, which can be fatal, tend to make their first appearance in individuals' lives during the mid- to late teens. They are more common among girls than boys, but gay and lesbian youth, as well as teens who are unsure about their sexual orientation are also at higher risk than their heterosexual peers of developing eating disorders (Austin et al., 2004).

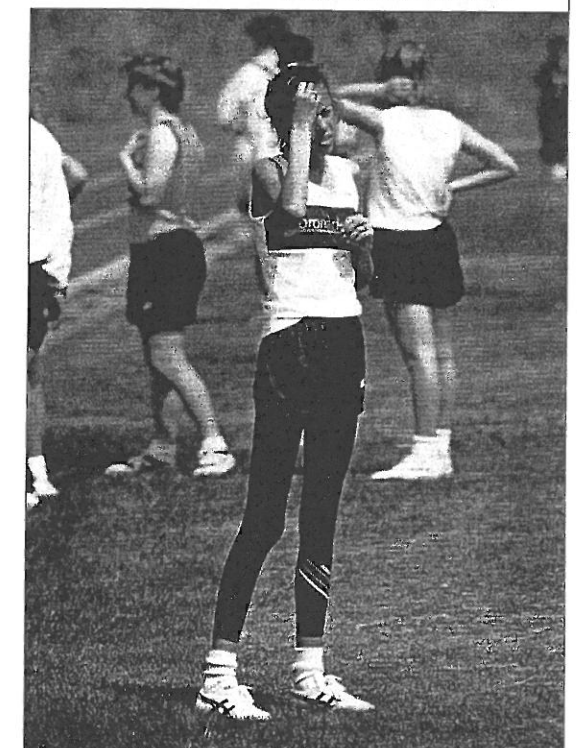
Anorexia Nervosa Teenagers who suffer from **anorexia nervosa** usually have a more distorted body image than those who have bulimia. This eating disorder is characterized by extreme dieting, intense fear of gaining weight, and obsessive exercising. In girls or women (who are by far the most common sufferers), the weight loss eventually produces a variety of physical symptoms associated with starvation: sleep disturbance, cessation of menstruation, insensitivity to pain, loss of hair on the head, low blood pressure, a variety of cardiovascular problems, and reduced body temperature. Between 10% and 15% of those with anorexia literally starve themselves to death; others die because of some type of cardiovascular dysfunction (Deter & Herzog, 1994).

Bulimia Nervosa **Bulimia nervosa** involves an intense concern about weight combined with twice-weekly or more frequent cycles of binge eating followed by purging, through self-induced vomiting, excessive use of laxatives, or excessive exercising (Attie, Brooks-Gunn, & Petersen, 1990). Teens with bulimia are ordinarily not exceptionally thin, but they are obsessed with their weight, feel intense shame about their abnormal behavior, and often experience significant depression. The physical consequences of bulimia include marked tooth

Learning Objective 11.9

What are the characteristics and causes of eating disorders?

When this 15-year-old with anorexia looks at herself in the mirror, chances are she sees herself as "too fat," despite being obviously emaciated.



anorexia nervosa an eating disorder characterized by self-starvation

bulimia nervosa an eating disorder characterized by binge eating and purging