Major Topics

14.1 Adolescence
14.2 Puberty: The Biological Eruption
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14.4 Emerging Sexuality and the Risks of Sexually Transmitted Infections
14.5 Health in Adolescence
14.6 Eating Disorders: When Dieting Turns Deadly
14.7 Substance Abuse and Dependence: Where Does It Begin? Where Does It End?
Perhaps no other period of life is as exciting—and as bewildering—as adolescence. Except for infancy, more changes occur during adolescence than during any other time of life.

### Truth or Fiction?

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“*When will it happen?”*  
“*Why is my voice acting so funny?”*  
“*How tall will I be?”*  
“*Why do I get pimples?”*  
“*Why am I getting hairy?*”  
“*Why is mine not like his?”*  
“*What’s happening to me?”*
14.1 Adolescence

**QUESTION** » What is adolescence? In our society, adolescents are “neither fish nor fowl,” as the saying goes—neither children nor adults. Adolescents may be old enough to reproduce and may be as large as their parents, yet they are usually required to remain in school through age 18 (according to the Education Act in Ontario, for example), they may not be allowed to get driver’s licences until they are 16, and they cannot attend R-rated films unless accompanied by an adult. They can however sign up for social networking sites and work. Given the restrictions and new freedoms placed on adolescents, their yearning for independence, and a sex drive heightened by high levels of sex hormones, it is not surprising that adolescents occasionally are in conflict with their parents.

The capacity to think abstractly and hypothetically emerges during the teenage years. This ability gives rise to a stream of seemingly endless “Who am I?” questions, as adolescents search for a sense of identity and ponder the possible directions their adult lives may take.

Adolescence is a transitional period between childhood and adulthood, a coming of age. A century ago, most children in Canada assumed adult responsibilities early. Adolescence began to emerge as a distinct stage of development between childhood and adulthood when the demands of an increasingly complex society required a longer period of education and delayed entry into the labour force. It is no longer easy for Canadian adolescents to know when they have made the transition to adulthood. One legally becomes an adult at different ages, depending on whether one is enlisting in the armed services, buying a drink, driving a car, voting, or getting married.

The idea that adolescence is an important and separate developmental stage was proposed by G. Stanley Hall (1904), an early American psychologist. Hall believed that adolescence is marked by intense turmoil. He used the German phrase *Sturm und Drang* (“storm and stress”) to describe the conflicts and stresses of adolescence. According to Hall, adolescents swing back and forth between happiness and sadness, overconfidence and self-doubt, dependence and independence. Hall believed that adolescent mood swings and conflicts with parents are a necessary part of growing up. He thought that children have to rebel against their parents and their parents’ values to make the transition to adulthood.

Sigmund Freud (1964 [1933]) placed relatively little emphasis on adolescence because he believed that the first five years of life are the most critical. According to Freud, we enter the genital stage of psychosexual development at puberty. Sexual feelings are initially focused on the parent of the other gender, but they become transferred, or displaced, onto other adults or adolescents of the other gender. In an article titled “Adolescence as a Developmental Disturbance,” Anna Freud (1969), Freud’s daughter, portrayed adolescence as a turbulent period because of an increase in the sex drive. The adolescent tries to keep surging sexual impulses in check and redirects them from the parents to more acceptable outlets. The result is unpredictable behaviour, defiance of parents, confusion, and mood swings. Anna Freud, like G. Stanley Hall, believed that adolescent turmoil is a part of normal development. Although Hall’s view of adolescence is often adolescent storm and stress as universal and biological, he also acknowledged the importance of individual differences as well as the influence of culture on adolescents’ experience with this period (Arnett, 1999).

But adolescence need not be a time of “storm and stress.” Contemporary theorists no longer see adolescent storm and stress as inevitable (Smetana, 2011). Instead, they see adolescence as a period when biological, cognitive, social, and emotional functioning are reorganized.

Some theorists even argue that the concept of adolescence as a period of storm and stress marginalizes adolescents (Smetana, 2011). Seeing young

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**adolescence** A transitional period between childhood and adulthood, usually seen as being bounded by puberty at the lower end and by the assumption of adult responsibilities at the upper end.

**genital stage** In Freud’s psychoanalytic theory, the fifth and final stage of psychosexual development, in which gratification is attained through sexual intercourse with a person of the other gender.
people as “troubled” or “troubling” encourages adults to eye them warily and to not take their problems seriously. It is more useful to try to understand adolescents’ strengths and challenges and find ways of helping them cope. Furthermore, a year-long longitudinal study of students in Grade 6 and 7 found that adolescents who believe that adolescence is a time of storm and stress have a way of making adolescence become more stormy and stressful (Buchanan & Hughes, 2009). Perhaps our expectations of adolescents can be self-fulfilling prophecies.

Even if adolescence does not always involve storm and stress, adolescents face the challenge of adapting to numerous biological, cognitive, and social and emotional changes. These challenges, and the adolescent’s ability to cope with them, vary during the phases of adolescence. Most observers divide adolescence into three phases:

1. **Early adolescence** (11 or 12 to 14 years of age)—Early adolescence is characterized by rapid biological changes, relatively high levels of stress, and relatively low coping ability (Persike & Seiffge-Krenke, 2011; Sontag et al., 2011).

2. **Middle adolescence** (approximately 14 to 16 years)—Biological changes have largely run their course. Stress diminishes somewhat and coping ability increases.

3. **Late adolescence** (16 to 18 or 19 years)—The adolescent matures so that she or he looks more like an adult. Stress usually declines, and coping ability is usually higher than in early and middle adolescence (Persike & Seiffge-Krenke, 2011; Sontag et al., 2011).

Having noted these periods, we should add that some observers (e.g., Malekoff, 2004) extend the span of adolescence to the ages of 9 through the early twenties. The earlier age may reflect the “tween” phenomenon, which concerns youngsters of about ages 9–12, who can seem too old to be called children and too young to be called adolescents per se. **Tweens** is an adaptation of the word **between**, and “tweens” may undergo a budding psychological and social sexuality prior to the onset of the key biological changes of adolescence. Many movies and TV shows, such as *The Hunger Games* and *Pretty Little Liars* and the British *Tweenies*, are aimed at tweens. People in their early 20s are **emerging adults** who have reached biological maturity but have not experienced some of the social milestones considered representative of adulthood. As we see in Chapter 16, two of these milestones are financial independence and separation from parents. If adolescence is the transition between childhood and adulthood, then tweens and emerging adults represent transitions between transitions: the transition from childhood to adolescence (tweens) and the transition from adolescence to adulthood (emerging adulthood).

In this chapter, we focus on the biological and physical changes of adolescence. Let us begin—as adolescence begins—with puberty.

### 14.2 Puberty: The Biological Eruption

**QUESTIONS** » What is puberty? What happens during puberty? **Puberty** is a stage of development characterized by reaching sexual maturity and the ability to reproduce. The onset of adolescence coincides with the advent of puberty.
Puberty, however, is a biological concept, whereas adolescence is a psychosocial concept with biological correlates.

Puberty is controlled by a complex feedback loop involving the hypothalamus, pituitary gland, gonads (ovaries in females and testes in males), and hormones. The hypothalamus sends signals to the pituitary gland, which, in turn, releases hormones that control physical growth and the functioning of the gonads. The gonads respond to pituitary hormones by increasing their production of sex hormones (androgens and estrogens). The sex hormones further stimulate the hypothalamus, thus perpetuating the feedback loop.

The sex hormones also trigger the development of both the primary and the secondary sex characteristics. The primary sex characteristics are the structures that make reproduction possible. In girls, these structures are the ovaries, vagina, uterus, and fallopian tubes. In boys, they are the penis, testes, prostate gland, and seminal vesicles. The secondary sex characteristics are physical indicators of sexual maturation that do not involve the reproductive structures; these include breast development, deepening of the voice, and the appearance of facial, pubic, and underarm hair. Let us now explore the physical changes of puberty, starting with the growth spurt and then examining other pubertal changes in boys and girls that involve the primary and secondary sex characteristics.

The Adolescent Growth Spurt: Changed Forever

**QUESTION** » What happens during the adolescent growth spurt? The stable growth patterns in height and weight that characterize early and middle childhood come to an abrupt end with the adolescent growth spurt. Girls start to spurt in height sooner than boys, at an average age of about ten. Boys start to spurt about two years later, at an average age of about twelve. Girls and boys reach their periods of peak growth in height about two years after the growth spurt begins—at about 12 and 14 years, respectively (Hills & Byrne, 2011; see Figure 14.1 ■). The spurt in height for both girls and boys continues for about another two years at a gradually declining pace. Boys grow more than girls do during their spurt, averaging about 10 centimetres per year during the fastest year of the spurt, compared with about 7 or 8 centimetres per year for girls. Overall, boys add about 37 centimetres to their height during the spurt, and girls add about 33 centimetres.

Adolescents begin to spurt in weight about half a year after they begin to spurt in height. The period of peak growth in weight occurs about a year and a half after the onset of the spurt. Like the spurt in height, the growth spurt in weight continues for a little more than two years for both girls and boys (see Appendix B). Girls are taller and heavier than boys from about age 9 or 10 until about age 13 or 14 because their growth spurt occurs earlier. Once boys begin their growth spurt, they catch up with girls and eventually become taller and heavier.

Because the spurt in weight lags behind the spurt in height, many adolescents are relatively slender compared with their preadolescent and postadolescent stature. However, adolescents tend to eat enormous quantities of food to fuel their growth spurts.
Active 14- and 15-year-old boys may consume 3000–4000 calories a day without becoming obese. If they were to eat this much 20 years later, they might gain more than 45 kilograms per year. Little wonder that adults fighting the dismal battle of the bulge stare at adolescents in amazement as they inhale pizza for lunch and go out later for burgers and fries!

Girls’ and boys’ body shapes begin to differ in adolescence. For one thing, boys’ shoulders become broader than those of girls, whereas the hip dimensions of females and males do not differ much. Thus, girls have relatively broader hips compared with their shoulders, whereas the opposite is true for boys. A girl’s body shape is also more rounded than that of a boy. This is because, during puberty, girls gain almost twice as much fatty tissue as boys do, whereas boys gain twice as much muscle tissue as girls. Thus, a larger proportion of a male’s body weight is composed of his muscle mass, whereas a larger part of a female’s body weight is composed of fatty tissue.

**Individual Differences in the Growth Spurt**

Figure 14.1 and the growth chart in Appendix B show averages. Few of us begin or end our growth spurts right on the mark. Children who spurt earlier are likely to wind up with somewhat shorter legs and longer torsos, whereas children who spurt later have somewhat longer legs (Osuch et al., 2010; Peeters et al., 2005).

Regardless of the age at which the growth spurt begins, there is a moderate to high correlation between a child’s height at the onset of adolescence and her or his height at maturity (Sovio et al., 2009; Tanner, 1989). Are there exceptions? Of course. However, everything else being equal, a tall child has a reasonable expectation of becoming a tall adult, and a short child is likely to remain relatively short.

**Asynchronous Growth: On Being Gawky**

Adolescents are often referred to as awkward and gawky. A major reason for this is asynchronous growth—different parts of the body grow at different rates. In an exception to the principle of proximodistal growth, the hands and feet mature before the arms and legs (Xu et al., 2009). As a consequence, adolescent girls and boys may complain of big hands or feet. And, in an apparent reversal of the cephalocaudal growth trend, legs reach their peak growth before the shoulders and chest. This means that boys stop growing out of their pants about a year before they stop growing out of their jackets.

**The Secular Trend in Growth**

During the past century, children in the Western world have grown dramatically more rapidly and have wound up taller than children in earlier times (Ulijaszek, 2010). This historical trend toward increasing adult height, which also has been accompanied by an earlier onset of puberty, is known as the secular trend. Figure 14.2 shows that Swedish boys and girls grew more rapidly in 1938 and 1968 than they did in 1883 and ended up quite a bit taller. At the age of 15, the boys were about 15 centimetres taller and the girls were about 8 centimetres taller, on average, than their counterparts from the previous century (Tanner, 1989). The occurrence of a secular trend in height and also in weight has been documented in most European countries and in North America.

**TRUTH OR FICTION REVISITED:** It turns out that children from middle- and upper-class families in industrialized countries have now stopped growing
Figure 14.2  
Are We Still Growing Taller than Our Parents?  
Twentieth-century children grew more rapidly and grew taller than children in preceding centuries.

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<thead>
<tr>
<th>Age in years</th>
<th>Boys' height</th>
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Nutrition apparently plays an important role (W. Johnson et al., 2012). Although each generation has stopped gaining on the last, children from middle- and upper-class families are taller and heavier than their age-mates from lower-class families. But these data in themselves are not very convincing. For example, it could be argued that genetic factors provide advantages that increase the chances for financial gain as well as for greater height and weight. But remember that children from the middle- and upper-class portion of the socioeconomic spectrum are no longer growing taller. Perhaps children who have had nutritional and medical advantages have simply reached their full genetic potential in height. Continued gains among families of lower socioeconomic status suggest that poorer children are still benefiting from improved nutrition.

We now examine some of the other changes that occur during puberty. You will notice that there are wide individual differences in the timing of the events of puberty. In a group of teenagers of the same age and gender, you may well find some who have completed puberty, others who have not even started, and others who are somewhere in between.

**Pubertal Changes in Boys**

At puberty, the pituitary gland stimulates the testes to increase their output of testosterone, leading to further development of the male genitals. The first visible sign of puberty is accelerated growth of the testes, which begins at an average age of about 11-and-a-half, although a range of ages of plus or minus two years is considered perfectly normal. Testicular growth further accelerates testosterone production and other pubertal changes. The penis begins a spurt of accelerated growth about a year later, and still later, pubic hair begins a growth spurt.
Underarm hair appears at about age 15. Facial hair is at first fuzz on the upper lip. An actual beard does not develop for another two or three years—only half of Canadian boys shave (of necessity) by age 17. The beard and chest hair continue to develop past the age of 20.

At 14 or 15, the voice deepens because of growth of the “voice box,” or larynx, and lengthening of the vocal cords. The developmental process is gradual, and adolescent boys sometimes exhibit an embarrassing cracking of the voice.

Testosterone also triggers the development of acne, which afflicts 75–90 percent of adolescents—females as well as males (Bauer et al., 2009; Taylor et al., 2011). Severe acne is manifested by multiple pimples and blackheads on the face, chest, and back. Although boys are more likely to have acne, we cannot say that girls suffer less from it. In our society, a smooth complexion has a higher value for girls than for boys, and girls with acne that boys would consider mild may suffer terribly.

Males are capable of producing erections in early infancy (and some male babies are born with erections), but the phenomenon is not frequent until age 13 or 14. Adolescent males may experience unwanted and unprovoked erections. Many boys worry that they will be caught with erections when walking between classes or when asked to stand in front of the class. The organs that produce semen grow rapidly, and boys typically ejaculate seminal fluid by age 13 or 14—about a year and a half after the penis begins its growth spurt—although here, too, there is much individual variation. About a year later, they begin to have nocturnal emissions, which are also called wet dreams because of the myth that emissions accompany erotic dreams. However, nocturnal emissions and erotic dreams need not coincide. Mature sperm are found in ejaculatory emissions by about the age of 15. And so ejaculation is not adequate evidence of reproductive capacity. Ejaculatory ability in boys usually precedes the presence of mature sperm by at least a year.

Nearly half of all boys experience enlargement of the breasts, or gynecomastia, which usually declines in a year or two. Gynecomastia stems from the small amount of female sex hormones secreted by the testes. When gynecomastia persists or becomes distressing, it can be treated with drugs, such as tamoxifen (Meyer, 2009). Some males have surgery (Laturi et al., 2010).

At age 20 or 21, men stop growing taller because testosterone causes epiphyseal closure, which prevents the long bones from making further gains in length. And so, puberty for males draws to a close. The changes of puberty in males are summarized in Concept Review 14.1.

**Pubertal Changes in Girls**

In girls, the pituitary gland signals the ovaries to vastly increase estrogen production at puberty. Estrogen may stimulate the growth of breast tissue (“breast buds”) as early as the age of eight or nine, but the breasts usually begin to enlarge during the tenth year. The development of fatty tissue and ducts elevates the areas of the breasts surrounding the nipples and causes the nipples themselves to protrude. The breasts typically reach full size in about three years, but the mammary glands do not mature fully until a woman has a baby.

Estrogen also promotes the growth of the fatty and supporting tissue in the hips and buttocks, which, along with the widening of the pelvis, causes the hips to become rounded. Growth of fatty deposits and connective tissue varies considerably. For this reason, development of breasts and hips differs.

Beginning at about the age of 11, girls’ adrenal glands produce small amounts of androgens, which, along with estrogen, stimulate the growth of larynx The part of the throat that contains the vocal cords.

semen The fluid that contains sperm and substances that nourish and help transport sperm.

nocturnal emission Emission of seminal fluid while asleep.

gynecomastia Enlargement of breast tissue in males.

epiphyseal closure The process by which the cartilage that separates the long end (epiphysis) of a bone from the main part of the bone turns to bone.

mammary glands Glands that secrete milk.
### Concept Review 14.1 Five Stages of Male Development during Puberty

Boys usually start to show the physical changes of puberty between the ages of 11 and 14, which is slightly older than when girls start puberty. The male sex hormone called testosterone and other hormones cause the physical changes.

Here are the five stages and what happens:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td><strong>Stage 1:</strong> May begin as early as age 9 and continue until 14.</td>
<td>No sign of physical development but hormone production is beginning.</td>
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</table>
| **Stage 2:** May begin anywhere from ages 11 to 13. | Height and weight increase rapidly.  
Testicles become larger and scrotum hangs lower.  
Scrotum becomes darker in colour.  
Fine hair growth begins at the base of the penis.  
Hair growth may begin on the legs and underarms. |
| **Stage 3:** May begin anywhere from ages 12 to 14. | The penis, scrotum, and testicles grow.  
Pubic hair becomes darker, thicker, and curlier.  
Muscles become larger and shoulders become broader.  
Sweat and oil glands become more active, which can result in acne.  
Sperm production may begin.  
Temporary swelling and tenderness may occur around nipples.  
Height and weight continue to increase.  
Hair growth on the legs and underarms continues. |
| **Stage 4:** May begin anywhere from ages 13 to 16. | Sperm production has usually begun.  
The larynx (Adam’s apple) increases in size. Vocal chords become longer and thicker, and the voice begins to break or crack, then becomes low.  
Height and weight continue to increase.  
Penis and testicles continue to grow.  
Pubic hair increases in amount and becomes darker, coarser, and curly. |
| **Stage 5:** May begin anywhere from ages 14 to 18. | Growth of facial hair begins.  
Chest hair growth may begin (not all males get much chest hair).  
Adult height is reached.  
Penis and testicles have reached full adult size.  
Pubic, underarm, and leg hair are adult colour, texture, and distribution.  
Overall look is that of a young adult man. |

pubic and underarm hair. Excessive androgen production can darken or increase the amount of facial hair. Androgens and estrogen have other functions as well.

Estrogen causes the labia, vagina, and uterus to develop during puberty, and androgens cause the clitoris to develop. The vaginal lining varies in thickness according to the amount of estrogen in the bloodstream.

Estrogen typically brakes the female growth spurt some years before testosterone brakes that of males. Girls deficient in estrogen during their late teens may grow quite tall, but most girls reach their heights because of normal, genetically determined variations.

Menarche

Menarche (first menstruation) commonly occurs between the ages of 11 and 14. But it is quite normal for menarche to occur as early as age nine or as late as age 16 (Capron et al., 2007; He et al., 2009). In the middle 1800s, European girls first menstruated at about the age of 16, as shown in Figure 14.3. During the past century and a half, however, the processes of puberty have occurred at progressively earlier ages in Western nations—an example of the secular trend in development. By the 1960s, the average age of menarche in North America had plummeted to its current figure of 12-and-a-half.

Figure 14.3 ■ The Decline in Age at Menarche

The age at menarche has been declining since the mid-1800s among girls in Western nations, apparently because of improved nutrition and health care. Menarche may be triggered by the accumulation of a critical percentage of body fat. Source: Tanner (1989).

labia The major and minor lips of the female genitalia.

clitoris A female sex organ that is highly sensitive to sexual stimulation but is not directly involved in reproduction.

menarche The onset of menstruation.
No single theory of the onset of puberty has found wide acceptance. In any event, the average age of the advent of puberty for girls and boys appears to have levelled off in recent years. The precipitous drop suggested in Figure 14.3 seems to have come to an end.

What accounts for the earlier age of puberty? One hypothesis is that girls must reach a certain body weight to trigger pubertal changes such as menarche (Terasawa et al., 2012; Wagner et al., 2012). Body fat could trigger the changes because fat cells secrete the protein leptin (Terasawa et al., 2012). Leptin would then signal the brain to secrete a cascade of hormones that raise estrogen levels in the body. Menarche comes later to girls who have a lower percentage of body fat, such as athletes and those with eating disorders (Schtscherbyna et al., 2009; Novotny et al., 2011).

The average body weight for triggering menarche depends on the girl's height (Novotny et al., 2011). Today's girls are larger than those of the early 20th century, probably because of improved nutrition and health care. It seems that the age threshold for reaching menarche may have been attained, because the average age has levelled off in recent years.

The age at menarche has been shown to be related to adverse health outcomes later in life. For example, earlier menarche has been associated with higher risk of breast cancer and possibly with a higher risk of endometrial cancer, adult obesity, and menstrual problems (Mishra et al., 2009).

**Hormonal Regulation of the Menstrual Cycle**

Testosterone levels remain fairly stable in boys, although they decline gradually in adulthood. However, estrogen and progesterone levels in girls vary markedly and regulate the menstrual cycle. Following menstruation—the sloughing off of the endometrium—estrogen levels increase, leading once more to the growth of endometrial tissue. **TRUTH OR FICTION REVISITED:** It is usually not true that girls can become pregnant right after they have their first menstrual period. Girls usually begin to ovulate only 12–18 months after menarche. A ripe ovum is released by the ovary when estrogen reaches peak blood levels. Then the inner lining of the uterus thickens in response to the secretion of progesterone. In this way, it gains the capacity to support an embryo if fertilization should occur. If the ovum is not fertilized, estrogen and progesterone levels drop suddenly, triggering menstruation once again.

The average menstrual cycle is 28 days, but variation among girls and in the same girl is common. Girls’ cycles are often irregular for a few years after menarche but later tend to assume patterns that are reasonably regular. Most menstrual cycles during the first two years or so after menarche occur without ovulation having taken place. But keep in mind that in any given individual cycle, an ovum may be produced, making pregnancy possible. So it is possible to become pregnant shortly after the onset of menarche.

**The Psychological Impact of Menarche**

In different times, in different places, menarche has had different meanings. The Manus of New Guinea greet menarche with an elaborate ceremony (Lohmann, 2004). The other girls of the village sleep in the menstruating girl’s hut. They feast and have parties. In the West, menstruation has historically received a mixed response. The menstrual flow itself has generally been seen, erroneously, as polluting, and the frequent discomforts of menstruation have led menstruating women to be stereotyped as irrational (Hubbard, 2009). Menarche itself has generally been perceived as the event in which a girl suddenly develops into a woman, but because of taboos and
prejudice against menstruating women, girls historically matured in ignorance of menarche.

Girls’ attitudes toward menarche reflect their level of education as well as certain physical realities. A Hong Kong study of 1573 Chinese high school students found a mixed response to the onset of menstruation (Tang et al., 2003). The average age of menarche was 11.67 years. Although most of the girls reported that menstruation was annoying (it involved some discomfort for them, along with the need to dispose of the menstrual flow), two in three reported feeling more “grown up,” and four in ten felt that they had become more feminine. Girls who felt positive about menarche were more likely to be educationally prepared to welcome it as a natural event, to have a positive body image, and to reject traditional negative attitudes. On the other hand, the circulating hormones connected with menarche may make the girl more vulnerable to stress (Allison & Hyde, 2011).

Most Canadian girls currently receive advance information about menstruation, not only from family and girlfriends but also from school health classes. The old horror stories are pretty much gone, at least in mainstream society (Gillooly, 2004). However, most girls experience at least some menstrual discomfort and need to discreetly dispose of the menstrual flow (Harel, 2008). Most girls can separate pride in “becoming women” from the realities of some discomfort and the fact that menarche usually means that the girl will not be growing much taller because of the braking effects of estrogen. The changes of puberty in females are summarized in Concept Review 14.2.

**Early versus Late Maturers: Does It Matter When You Arrive, as Long as You Do?**

**QUESTION** What are the effects of early or late maturation on adolescents?

Spencer recalls Al from his high school days. When Al entered Grade 9, he was all of 14, but he was also about 1.9 metres tall, with broad shoulders and arms thick with muscle. His face was cut from rock, and his beard was already dark. Al paraded down the hallways with an entourage of male and female admirers. When there were shrieks of anticipation, you could bet that Al was coming around the corner. Al was given a wide berth in the boys’ room. He would have to lean back when he combed his waxed hair up and back—otherwise, his head would be too high for the mirror. At that age, Spencer and his friends liked to tell themselves that Al was not all that bright. (This stereotype is unfounded, as we will see.) Nevertheless, they were envious of Al.

Al had arrived. Al had matured early, and he had experienced the positive aspects of maturing early. What causes some children to mature earlier or later than others? Genetic, dietary, and health factors all seem to influence the timing of puberty. And one controversial new theory suggests that childhood stress may trigger early puberty in girls.

**Early and Late Maturation in Boys**

Research findings about boys who mature early are mixed, but most of the evidence suggests that the effects of early maturation are generally positive (Teunissen et al., 2011). Late-maturing boys may feel conspicuous because they are among the last of their peers to lose their childhood appearance. The research literature is mixed as to whether the timing of maturation is related to adolescents’ eventual height, but it appears that early matures might wind up shorter and stockier than late matures (Baker et al., 2007; Biro, 2008).
Girls usually start to show the physical changes of puberty between the ages of 9 and 13, which is slightly sooner than boys. The female sex hormone called estrogen and other hormones cause the physical changes. Many girls are fully developed by the age of 16. Some girls will continue to develop through age 18. Here are the five stages and what happens:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1:</strong></td>
<td>Between ages 8 and 12</td>
</tr>
<tr>
<td></td>
<td>• No visible signs of physical development. But the ovaries are enlarging and hormone production is beginning.</td>
</tr>
<tr>
<td><strong>Stage 2:</strong></td>
<td>May begin anywhere from ages 8 and 14.</td>
</tr>
<tr>
<td></td>
<td>• Height and weight increase rapidly.</td>
</tr>
<tr>
<td></td>
<td>• Fine hair growth begins close to the pubic area and underarms.</td>
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<tr>
<td></td>
<td>• Breast buds appear; nipples become raised and this area may be tender.</td>
</tr>
<tr>
<td></td>
<td>• Sweat and oil glands become more active which can result in acne.</td>
</tr>
<tr>
<td><strong>Stage 3:</strong></td>
<td>May begin anywhere from ages 9 to 15.</td>
</tr>
<tr>
<td></td>
<td>• Breasts become rounder and fuller.</td>
</tr>
<tr>
<td></td>
<td>• Hips may start to widen in relation to waist.</td>
</tr>
<tr>
<td></td>
<td>• Vagina begins secreting a clear or whitish fluid.</td>
</tr>
<tr>
<td></td>
<td>• Pubic hair becomes darker, thicker, and curlier.</td>
</tr>
<tr>
<td></td>
<td>• Height and weight continue to increase.</td>
</tr>
<tr>
<td></td>
<td>• For some girls, ovulation and menstruation (periods) begin, but may be irregular.</td>
</tr>
<tr>
<td><strong>Stage 4:</strong></td>
<td>May begin anywhere from ages 10 to 16.</td>
</tr>
<tr>
<td></td>
<td>• Underarm hair becomes darker.</td>
</tr>
<tr>
<td></td>
<td>• Pubic hair starts to form a triangular patch in front and around sides of genital area.</td>
</tr>
<tr>
<td></td>
<td>• The nipple and the dark area around the breast (areola) may stick out from the rest of the breast.</td>
</tr>
<tr>
<td></td>
<td>• For many girls, ovulation and menstruation (periods) begin but may be irregular.</td>
</tr>
<tr>
<td><strong>Stage 5:</strong></td>
<td>May begin anywhere from ages 12 to 19.</td>
</tr>
<tr>
<td></td>
<td>• Adult height is probably reached.</td>
</tr>
<tr>
<td></td>
<td>• Breast development is complete.</td>
</tr>
<tr>
<td></td>
<td>• Pubic hair forms a thick, curly, triangular patch.</td>
</tr>
<tr>
<td></td>
<td>• Ovulation and menstruation (periods) usually occur regularly.</td>
</tr>
<tr>
<td></td>
<td>• Overall look is that of a young adult woman.</td>
</tr>
</tbody>
</table>

Early-maturing boys tend to be more popular than their late-maturing peers and are more likely to be leaders in school (Graber et al., 2004; Windle et al., 2008). Early-maturing boys in general are also more poised, relaxed, and good-natured. Their edge in sports and the admiration of their peers heighten their sense of self-worth. Some studies have suggested that the stereotype of the mature, tough-looking boy as dumb is just that—a stereotype.

On the negative side, early maturation is associated with greater risks of aggression and delinquency (Lynne et al., 2007), as well as abuse of alcohol and other drugs (Costello et al., 2007; Engels, 2009). Early maturation may also hit some boys before they are psychologically prepared to live up to the expectations of those who admire their new bodies. Coaches may expect too much of them in sports, and peers may want them to fight their battles (Biro, 2008). Sexual opportunities may create demands before the boy knows how to respond to them (Lam et al., 2002). Some early maturers may therefore worry about living up to the expectations of others.

Late maturers have the “advantage” of avoiding these early pressures. They are not rushed into maturity. On the other hand, late-maturing boys often feel dominated by early-maturing boys. They have been found to be more dependent and insecure. Although they are smaller and weaker than early maturers, they may be more likely to get involved in disruptive behaviour and substance abuse (Graber et al., 2004; Weichold et al., 2003).

But there are individual differences. Although some late maturers appear to fight their physical status and get into trouble, others adjust and find acceptance through academic achievement, music, clubs, and other activities. The benefits of early maturation appear to be greatest among lower-income adolescents because physical prowess is valued more highly among these youngsters. Middle- and upper-income adolescents also are likely to place more value on the types of achievements—academic and so on—available to late-maturing boys (Graber et al., 2004; Weichold et al., 2003).

**Early and Late Maturation in Girls**

The situation is somewhat reversed for girls. Whereas early maturation poses distinct advantages for boys, the picture is more mixed for girls. Adolescents tend to be concerned if they differ from their peers. **Truth or**

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*Image: Early and Late Maturation in Boys*

The effects of early maturation in boys are generally positive. Late-maturing boys may feel conspicuous because they are among the last of their peers to lose their childhood appearance.
FICTION REVISITED: Although boys who mature early usually have higher self-esteem than those who mature late, the same may not hold true for girls. Early-maturing girls may feel awkward because they are among the first of their peers to begin the physical changes of puberty (Allison & Hyde, 2011; Teunissen et al., 2011). They outgrow not only their late-maturing female counterparts but also their male age-mates. With their tallness and their developing breasts, they become conspicuous. Boys of their age may tease them about their breasts and their height. Tall girls of dating age frequently find that shorter boys are reluctant to approach them or be seen with them. Some tall girls walk with a slight hunch, as if trying to minimize their height. All in all, early-maturing girls are at greater risk for a host of psychological problems and substance abuse than girls who mature later (Blumenthal et al., 2011; Copeland et al., 2010).

Many girls who mature early have a poorer body image than those who mature later (Allison & Hyde, 2011). These negative feelings are more pronounced for girls who are in elementary school, where they are conspicuous, but are less pronounced in high school, where others are catching up. Christina recalls Amanda, a classmate who entered Grade 6 grade as a mature 11-year-old. Amanda stood out because she was taller than most of the girls and some of the boys in her grade and because she was one of the first girls to start developing breasts and wearing what was called a “training” bra. Unlike Al, Amanda did not walk around with her head held high. She tried to hide her maturational changes by wearing baggy tops. She received a great deal of unwarranted attention from the boys in her class and glares from some of the girls in her class.

Adolescent girls are quite concerned about their body shapes. Early maturers who are taller and heavier than other girls their age do not conform to the current cultural emphasis on thinness. Thus, they have more negative feelings about their bodies. Early maturation in girls is associated with a variety of other problems. Early-maturing girls obtain lower grades in school and have more conduct problems, a higher incidence of substance abuse, and a higher incidence of emotional disturbance, including depression (Blumenthal et al., 2011; Copeland et al., 2010). They are literally larger targets for deviant peer pressure. They initiate sexual activity earlier (Copeland et al., 2010). They become involved with older girls and boys. Their concern about their body shape also appears to heighten the risk of developing eating disorders (Allison & Hyde, 2011; Striegel-Moore et al., 2003).

The parents of early-maturing girls may increase their vigilance and restrictiveness. Increased restrictiveness can lead to new child–parent conflicts. A study of 302 African American adolescent–mother pairs found that mothers of early-maturing daughters had more heated discussions with them than with later-maturing daughters (Sagrestano et al., 1999). Girls who mature early are also at greater risk of sexual abuse (Romans et al., 2001; Vigil et al., 2005). The early-maturing girl can thus be a target of inappropriate parental attention and may develop severe conflicts about her body as a result.
Body Image in Adolescence

**QUESTION** How do adolescents feel about their bodies? Our body image includes how physically attractive we perceive ourselves to be and how we feel about our body. Adolescents are quite concerned about their physical appearance, particularly in early adolescence when the rapid physical changes of puberty are occurring (Jones & Crawford, 2006).

By the age of 18, girls and boys are more satisfied with their bodies than they were in the earlier teen years (Eisenberg et al., 2006). A five-year longitudinal study investigated the relationship between body image and depressed mood in 645 adolescents at ages 13, 15, and 18 (Holsen et al., 2001). On average, girls reported having a more negative body image and feeling more depressed about their bodies at all three ages. Dissatisfaction with body image led to feelings of depression among both genders (Wertheim et al., 2009). Adolescent females in our society tend to be more preoccupied with body weight and slimness than are adolescent males (Slater & Tiggeman, 2010). In contrast, many adolescent males want to put weight on and build their muscle mass (Jones & Crawford, 2006; Stanford & McCabe, 2005). Compared with adolescent boys, adolescent girls have a less positive body image and are more dissatisfied with their weight; the majority of girls are likely to be dieting or to have been on diets (Slater & Tiggeman, 2010). And girls are more likely to suffer from eating disorders, as we see later in the chapter.

Active Review

1. G. Stanley Hall proposed that adolescence is a period of storm and ____________.
2. Puberty is controlled by a ____________ loop involving hormones.
3. The gonads produce ____________ hormones (androgens and estrogens).
4. Girls begin their ____________ spurt in height at about ten, and boys spurt about two years later.
5. ____________ growth may produce gawkiness in adolescents.
6. Males stop growing taller because testosterone causes ____________ closure.
7. ____________ brakes the female growth spurt.
8. (Boys or Girls?) are more likely to benefit from early maturation.
9. (Boys or Girls?) are more likely to have a positive body image.

**Reflect & Relate:** Was your adolescence a period of storm and stress? If so, what factors contributed to the turbulence?

14.3 Brain Development

**QUESTION** What brain developments take place during adolescence?

Unlike infants whose brain activity is completely determined by their parents and environment, [adolescents] may actually be able to control how their own brains are wired and sculpted …. This argues for doing a lot of things as a teenager …. You are hard-wiring your brain in adolescence. Do you want to hard-wire it for sports and playing music and doing mathematics or for lying on the couch in front of the television?

—Neuroscientist Jay Giedd of the National Institutes of Mental Health

What happens to the brains of adolescents who spend hours a day practising the piano or the violin? Their learning translates physically into increases in the thickness of the parts of the cerebral cortex that are being used
The gains in thickness of the cerebral cortex represent increases in gray matter, which consists of associative neurons that transmit messages back and forth in the brain when we are engaged in thought and sensorimotor activities. The neurons sprout new axon tips and dendrites, creating new synapses and increasing the flow of information.

Brain imaging studies reveal a general pattern of brain development into the teenage years related both to maturation and to the use of brain regions (Bramen et al., 2011, Paus, 2013). But even while parts of the brain gain in processing ability, there is also a pruning process that seems to follow the principle "Use it or lose it." Neural connections, or synapses, that are used are retained, while those that lie unused are lost.

Many adolescents show poor judgment, at least from time to time, and take risks that most adults would avoid (Schneider et al., 2012). It seems that brain development or immaturity may play a role. Deborah Yurgelun-Todd and her colleagues (Sava & Yurgelun-Todd, 2008) showed pictures of people with fearful expressions to adolescents ranging in age from 11 to 17 while the adolescents’ brains were scanned by functional magnetic resonance imaging (fMRI). Compared to adults, the adolescents’ frontal lobes (the seat of executive functioning) were less active, and their amygdalas (a part of the limbic system that is involved in discriminating emotions, including fear) were more active. The adolescents often misread the facial expressions, with those younger than 14 more often inferring sadness, anger, or confusion rather than fear. The older adolescents responded correctly more often and also showed the more adult pattern of less activity in the amygdala and more in the frontal lobes. The researchers suggest that one reason why many adolescents fail to show the judgment, insight, and reasoning ability of adults is immaturity of the frontal lobes (Yurgelun-Todd, 2007).

Genes (heritability) and the environment interact to shape early brain development. Researchers (Lenroot et al., 2009) used magnetic resonance imaging to analyze age-related differences in the heritability of cortical thickness with 600 twins, twin siblings, and singletons ranging in age from 5 to 19. Parts of the primary sensory and motor cortex, which develop earlier, respond to genetic influences earlier in childhood. Areas of the brain related...
to executive functioning (self-regulation) and language, the prefrontal cortex and the temporal lobes, show more prominent genetic influences in adolescence. It may therefore be that cognitive processes become more heritable as the brain matures. But again, there is an interaction between heredity and the environment. The experiences of adolescents also affect which parts of the cortex thicken and which are “pruned.”

Work by Tomáš Paus and colleagues (Paus et al., 2012; Paus et al., 2008) from the Rotman Research Institute at the University of Toronto highlights the importance of the bidirectional interplay between the brain and behaviour during adolescence—especially the significance of social environment, such as the quality of peer relations, and brain plasticity in how adolescent neural circuits are shaped. Future research using magnetic resonance imaging will likely provide some interesting information about how brain structures change during adolescence.

Active Review

10. The learning of adolescents who practise a musical instrument translates into increases in the thickness of the cerebral _____________.

11. The risk-taking shown by many adolescents has been related to immaturity of the ____________ lobes.

12. Areas of the brain related to executive functioning and language show (more or less?) prominent genetic influences in adolescence.

Reflect & Relate: Does “immaturity” of the prefrontal lobes excuse adolescents who engage in risky behaviour?

14.4 Emerging Sexuality and the Risks of Sexually Transmitted Infections

**QUESTION** » What kinds of sexually transmitted infections are there? In an episode of a recent TV series, an adolescent was referred to as a “hormone with feet.” Many or most adolescents are preoccupied with sex to some degree. These preoccupations are fuelled by a powerful sex drive. And many or most adolescents are not quite sure about what to do with these pressing urges. Should they masturbate? Should they pet? Should they engage in sexual intercourse? Parents and sex educators often say no, or wait. Yet it can seem that “Everyone’s doing it.” In Chapter 16, we discuss various sexual outlets and sexual orientation. Here, we focus on the risks of sexually transmitted infections.

Given a body that is suddenly sexually mature, a strong sex drive, vulnerability to peer pressure, and limited experience in handling temptation, teenagers are at particular risk for sexually transmitted infections (STIs). Sexually active adolescents have high rates of STIs, and in many cases have the highest rates of STIs (Public Health Agency of Canada, 2011). For example, Canadian females between the ages of 15 and 19 have the highest rates of gonorrhea in comparison to males and other age groups (Public Health Agency of Canada, 2013). Chlamydia (a bacterial infection of the vagina or urinary tract that can result in sterility) is the most commonly occurring STI in adolescents, followed by gonorrhea, genital warts, genital herpes, syphilis, and HIV/AIDS. Because it is lethal, HIV/AIDS tends to capture most of the headlines. However, other STIs are more widespread, and some of them can also be deadly.

**HIV/AIDS** HIV stands for human immunodeficiency virus, the virus that causes AIDS. AIDS stands for acquired immunodeficiency syndrome, a condition that cripples the body’s immune system, making the person vulnerable to diseases that would not otherwise be as threatening.
Chlamydia is the most commonly reported sexually transmitted infection in Canada (Public Health Agency of Canada, 2012). The incidence of chlamydia infections is especially high among those aged between 15 and 24 years of age. Chlamydia is a major cause of pelvic inflammatory disease (PID), which often leads to infertility.

The Canadian prevalence estimates for human papillomavirus (HPV) range from 10 to 30 percent (Public Health Agency of Canada, 2012). HPV is known to cause genital warts and is associated with cervical cancer. A vaccine is available that prevents most young women from being infected with HPV if it is administered before they become sexually active. The HPV immunization program is carried out across Canada in Grades 4 to 6 (depending on the province or territory) through a partnership between the health and education ministries. Genital warts may appear in visible areas of the skin, but most appear in areas that cannot be seen, such as on the cervix in women or in the urethra in men. Women who engage in sexual intercourse before the age of 18 and who have many sexual partners are particularly susceptible to infection. Fortunately, in most healthy young people, these infections clear up on their own.

**HIV/AIDS**

HIV/AIDS is the most devastating STI. If left untreated, it is lethal, and the long-term prospects of those who do receive treatment remain unknown. HIV—the virus that causes AIDS—has spread rapidly around the world. Some 33 million people are living with HIV/AIDS, of whom 2.5 million are children under the age of 15 (UNAIDS, 2010). The primary mode of HIV transmission worldwide is male–female sex. Anal intercourse is another mode of HIV transmission and is often practised by gay males. Injecting drugs is another way in which HIV is spread because sharing needles with infected individuals can transmit HIV. Other major risk factors include having sex with multiple partners, failing to use condoms, and abusing drugs and alcohol (Patrick et al., 2012).

Women account for a minority of cases of HIV/AIDS in Canada, but in many places around the world, they are more likely than men to be infected with HIV. A United Nations study in Europe, Africa, and Southeast Asia has found that sexually active teenage girls have higher rates of HIV infection than older women or young men in these regions (UNAIDS, 2010). A number of erroneous assumptions about HIV/AIDS have had a disproportionately negative effect on women. They include the false notions that HIV/AIDS is primarily a disease of gay men and people who inject drugs and that it is difficult to contract HIV/AIDS through male–female intercourse. The truth is that the primary mode of HIV transmission worldwide is male–female intercourse. Among Canadian women, male–female intercourse is the major source of infection by HIV.

**TRUTH OR FICTION REVISITED:** Studies regarding knowledge, attitudes, and beliefs about HIV/AIDS find that even children in the early school years are aware of HIV/AIDS. Nearly all high school students know how HIV/AIDS is transmitted, but adolescents often deny the threat of HIV/AIDS to them. As one high school girl said, “I can’t believe that anyone I would have sex with would be infected.” According to the Public Health Agency of Canada (2010), 26.5 percent of positive HIV cases are in young people aged 15 to 29.

**Risk Factors**

**QUESTION » What factors place adolescents at risk for contracting STIs?** Adolescents often take risks, with harmful consequences for their health and well-being. First, and most obvious, is sexual activity itself. As you can see in
Adolescence is marked by significant physical, emotional, and social changes. These changes are accompanied by important developmental tasks, including the transition to young adulthood and the development of personal identity and autonomy.

### Prevention of Sexually Transmitted Infections

**QUESTION** » Given the threat of HIV/AIDS and other STIs, what can be done to prevent them? Prevention and education are the primary weapons against STIs (Kirby et al., 2007). Adolescents need to learn about the transmission, symptoms, and consequences of STIs. They need to learn about “safer sex” techniques, including abstinence and, if they are sexually active, the use of condoms. Educating young people to use condoms is associated with lower levels of infection (Kirby et al., 2007).

But knowledge alone may not change behaviour. For example, many female adolescents lack power in their relationships. Males are likely to pressure them into unwanted or unprotected sexual relations (Wingood et al., 2006). Other goals of educational programs should include enhancing the adolescent’s sense of control over the prevention of AIDS and modifying behaviour associated with being infected with HIV. As with programs designed to prevent substance abuse, the development of effective decision-making and social skills may be critical in programs designed to prevent STIs (Martinez et al., 2011). Sexualityandu.ca is a wonderful Canadian site with information on sexual health, STIs, and well-being.

Public Health Agency of Canada’s (2008) *Canadian Guidelines for Sexual Health Education* use the information motivational and behavioural skills (IMB) model as a conceptual guide for promoting adolescent sexual health education. Plainly, sexual health education is about more than just providing young people with relevant sexual knowledge—it also requires motivating youth to use their knowledge and engage in healthy practices, and helping youth acquire behavioural skills that will promote sexual health.

### 14.5 Health in Adolescence

**QUESTION** » How healthy are Canadian adolescents? Adolescents are young and growing. Most seem sturdy. Injuries tend to heal quickly. The good news is that most Canadian adolescents are healthy. Few are chronically ill or miss school. However, they are more likely to suffer injuries, experience increasing rates of obesity, and have the highest rates of STIs in comparison to other age demographics (Public Health Agency of Canada, 2011). Canadian teenagers may be less healthy than their parents were at the same age.
Risk Taking in Adolescence
The reason why adolescents may be less healthy than their parents were at the same age is not an increase in the incidence of infectious diseases or other physical illnesses. Rather, the causes are external and rooted in lifestyle and risky behaviour: excessive drinking, substance abuse, reckless driving, violence, disordered eating behaviour, and, as we have seen, unprotected sexual activity (Schneider et al., 2012). We discussed the teen problem of sexually transmitted infections (STIs) in the preceding section. Now we will consider the causes of death in adolescence and then turn to other major health issues faced by teens: sleep, nutrition, eating disorders, and substance abuse.

Causes of Death

QUESTION » What are the causes of death among adolescents? Although adolescents are healthy as a group, a number of them die. Death rates are low in adolescence, although they are higher for older adolescents than for younger ones. For example, each year about twice as many 15- to 17-year-olds as 12- to 14-year-olds die (Miniño, 2010). Death rates are nearly twice as high for male adolescents as for female adolescents. A major reason for this is that males are more likely to take risks that end in death as a result of accidents, suicide, or homicide (Miniño et al., 2010). These three causes of death account for the great majority of all adolescent deaths.

TRUTH OR FICTION REVISITED: Seventy percent of adolescent deaths are due to injuries and poisonings, both intentional and unintentional (Public Health Agency of Canada, 2012), and nearly three in four of these involve motor vehicles (Miniño et al., 2010). Alcohol often is involved in accidental deaths. Alcohol-related motor vehicle accidents are the leading cause of death for 15- to 24-year-olds. Alcohol frequently is implicated in other causes of accidental death or injury, including drowning and falling (Miniño et al., 2010).

Sleep

QUESTION » How much sleep do adolescents need? It might seem that adolescents sleep around the clock, especially on weekends, but adolescents need about 8.5–9.25 hours of sleep per night (National Sleep Foundation, 2012). On weekends, therefore, many adolescents are trying to catch up on their sleep.

Research shows that many, if not most, North American adolescents experience sleep deprivation—defined as under six hours of sleep per night (Hagenauer et al., 2009; Roberts et al., 2009). Getting enough sleep is a biological need, important for coping with the rapid biological changes of puberty, but surveys show that most teenagers average less than seven hours of sleep per school night and report feeling tired at school and during extracurricular activities (National Sleep Foundation, 2012). Teenagers find it difficult to get enough sleep due to hectic schedules with after-school jobs and extra-curricular activities, homework, family obligations, and evening (or
late night!) emailing, texting, and chatting with friends. Changes in the brain also tend to push back the clock for adolescents—a change called a phase delay—so that they prefer to go to bed later than they did as children. However, school usually begins early in the morning, so parents may push the adolescent to get to bed early. Ironically, the typical adolescent’s natural time to go to sleep might be 11 p.m. or even later. Teenagers may thus feel wide awake at an imposed bedtime, even if they are exhausted. Moreover, they are compelled to wake up when their bodies are arguing that it is the middle of the night and they have not had enough sleep to feel rested and alert. As a result, many adolescents have trouble paying attention in school, solving problems, retaining information, and coping with stress. Sleep deprivation also poses a heightened risk for automobile accidents, irritability, depression, and poor impulse control.

Nutrition

**QUESTIONS** What are the nutritional needs of adolescents? What do adolescents actually eat?

Physical growth occurs more rapidly in the adolescent years than at any other time after birth, with the exception of the first year of life. To fuel the adolescent growth spurt, the average girl, depending on her activity level, needs to consume 1800–2400 calories per day and the average boy needs 2200–3200 (Nutrition Facts, 2012). Canada’s Food Guide’s recommended serving portions for people aged 9–13 and 14–18 differ from those for younger children. The nutritional needs of adolescents vary according to their stage of pubertal development. For example, at the peak of their growth spurt, adolescents use twice as much calcium, iron, zinc, magnesium, and nitrogen as they do during the other years of adolescence (Nutrition Facts, 2012). Calcium intake is particularly important for females to build up their bone density and help prevent osteoporosis, a progressive loss of bone, later in life. Osteoporosis affects millions of women, particularly after menopause. But most teenagers—both girls and boys—do not consume enough calcium.

Adolescents also are likely to obtain less vitamin A, thiamine, and iron but more fat, sugar, protein, and sodium than recommended (USDA, 2005). One problem is that potatoes dominate the vegetable intake of adolescents (Kimmons et al., 2009). If these were sweet potatoes or baked potatoes, the problem would not be so severe. However, adolescents—like many adults—are likely to eat French fries, which are fried in oil. Most adolescents eat few other vegetables, especially dark green and orange vegetables and legumes.

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### A CLOSER LOOK REAL LIFE

**Schools and Adolescent Nutrition**

The Centers for Disease Control and Prevention notes the following:

- Schools are in a unique position to promote healthy eating and help ensure appropriate food and nutrient intake among students. Schools provide students with opportunities to consume an array of foods and beverages throughout the school day and enable students to learn about and practise healthy eating behaviours.

- Schools should ensure that only nutritious and appealing foods and beverages are provided in school cafeterias, vending machines, snack bars, school stores, and other venues that offer food and beverages to students. In addition, nutrition education should be part of a comprehensive school health education curriculum.


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**osteoporosis** A condition involving the progressive loss of bone tissue.

**menopause** The cessation of menstruation, typically occurring between ages 48 and 52.
While society’s nutritional awareness is increasing, adolescents’ intake of fruit is often limited to fruit juice, most often orange juice, which does have vitamin C but which is also high in calories.

Adolescents often skip breakfast, especially girls who are watching their weight (Niemeier et al., 2006). Teenagers are more likely to miss meals or eat away from home than they were in childhood. With busy, more irregular schedules and less supervision they may consume large amounts of fast food and junk food, which are high in fat and calories but not very nutritious (Niemeier et al., 2006). About 8 percent of adolescents are overweight, and another 17 percent are severely overweight (obese) (Ogden et al., 2012). Canadian statistics estimate that about a quarter of children between the ages of 2 to 17 are overweight or obese (Active Healthy Kids Canada, 2009), followed by a recent report indicating that this number is up to 32% in children aged 5 to 17 (Active Healthy Kids Canada, 2013). Junk food is connected with being overweight, and being overweight in adolescence can lead to chronic illness and earlier death in adulthood, even for teens who later lose weight (Alamian & Paradis, 2012). Overweight adolescents are more likely than adolescents of normal weight to experience heart disease, strokes, and cancer as adults (Alamian & Paradis, 2012).

14.6 Eating Disorders: When Dieting Turns Deadly

QUESTION » What are eating disorders? The North American ideal has slimmed down to where most North American females of “average” weight (we are not talking here about those who are overweight!) are dissatisfied with the size and shape of their bodies (Miyake et al., 2010; Slater & Tiggeman, 2010). The wealthier your family, the more unhappy you are likely to be with your body (Polivy et al., 2005). Perhaps, then, it is no surprise that dieting has become the normal way of eating for most adolescent females (Polivy et al., 2005). Plumpness has been valued in many preliterate societies, and Western paintings from earlier centuries suggest that there was a time when physically well-rounded women were the ideal. But in contemporary Western culture, slim is in (Polivy et al., 2005); although acceptance and promotion of different body types and healthy eating is recommended, adolescents are bombarded with mixed messages.

Adolescents are highly concerned about their bodies. Puberty brings rapid changes, and adolescents wonder what they will look like once the flood of hormones has ebbed. In Chapter 15, we mention that adolescents tend to think that others are paying a great deal of attention to their appearance. Because of the cultural emphasis on slimness and the psychology of the adolescent, adolescents—especially girls—are highly vulnerable to eating disorders.

The eating disorders anorexia nervosa and bulimia nervosa are characterized by gross disturbances in patterns of eating.

Anorexia Nervosa

There’s a saying “You can never be too rich or too thin.” TRUTH OR FICTION REVISITED: Most teens are not worried about a fat bank account, but one can certainly be too skinny, like Rachel (Ballweg, 2001).

I wanted to be a runner. Runners were thin and I attributed this to dieting, not training. So I began restricting my diet: No butter, red meat, pork, dessert, candy, or snacking. If I ate any of the forbidden items, I obsessed about it and felt guilty for days.

As a high school freshman, I wanted to run with the fastest girls so I trained hard, really hard, and ate less. Lunch was lettuce sand-
wiches, carrots, and an apple. By my senior year, I was number three on the team and lunch was a bagel and an orange.

I maintained a rigid schedule—running cross country and track, having a seat on student council, volunteering, and maintaining a 3.9 GPA throughout high school—while starving myself (1000 calories per day), trying to attain the impossible perfection I thought couldn’t be far away if I only slimmed down a little bit more.

Several teammates were concerned, but I shrugged them off saying family members were tall and slender; I was a health nut; I didn’t like fatty foods; I was a vegetarian; I didn’t like sweets; I wasn’t hungry; I wasn’t starving.

A psychiatrist didn’t help at all. I went in, sat on the couch, and told her what she wanted to hear: I would eat more, run less, stop restricting myself, and quit obsessing about being thin. I was very good at knowing exactly what to tell others.

I dropped 10 pounds [4.5 kilograms] my first year of university—from 125 to 115 pounds [57 to 52 kilograms]. I was 5 feet, 8 inches [1.73 metres] tall and wore a size 5. I hated my body, so I starved myself and ran like a mad woman.

In quiet moments, I was sad and worried about what might be going on inside me.

I was already taking birth control to regain my menstrual cycle; my weight was 15% below what was recommended for my height; I was always cold; I had chest pains and an irregular heartbeat; my hair was limp and broke off; my skin was colorless.

It wasn’t until I came to the University of Iowa and joined the varsity women’s cross-country team that I began to see what I was doing to myself. A teammate had an eating problem. Every time I saw her, I felt sick to my stomach. She had sunken cheeks, eyes so big they swallowed her face. She was an excellent student and a college-level varsity athlete. Many people wondered at her determination, but I understood. She used the same excuses I did.

For one sick instant, I wondered if I would be happier if I were that thin. That is when I started to realize I was slowly killing myself.

At the urging of my coach, I saw the team nutritionist, who recommended a psychiatrist who felt no pity for me and made me take a brutally honest look at who I was and why I was starving myself. She didn’t accept any of my excuses. She helped me realize that there are other things to think about besides food and body image. About this time, I decided to quit the cross-country team. The pressure I felt to be thin and competition at the college level were too much when I needed to focus on getting well.

After two months of therapy, my weight had dropped again. I’m not sure how far because I refused to step on a scale, but my size-5 pants were falling off. My psychiatrist required weekly weigh-ins.

I wasn’t putting into practice any of the things my nutritionist and counsellor suggested. They told me that if I wanted to have children someday, I needed to eat. They warned me of osteoporosis at age

An Adolescent with Anorexia Nervosa

Anorexia nervosa is a life-threatening eating disorder in which an individual—most often an adolescent or young adult female—has a distorted body image and consequently refuses to eat. She may lose 25 percent of her body weight in a year and impair the health of nearly all her bodily systems.
30. Then my psychiatrist scared me to death. She told me I needed to start eating more or I would be checked into the hospital and hooked up to an IV. That would put me on the same level as my Iowa teammate. I had looked at her with such horror and never realized that I was in the same position.

My psychiatrist asked how my family would feel if they had to visit me in the hospital because I refused to eat. It was enough to make me think hard the next time I went through the food service lines.

Of course, I didn’t get better the next day. But it was a step in the right direction. It’s taken me three years to get where I am now. At 5 foot, 8¼ inches [1.73 metres] (I even grew as I got healthier), and 145 pounds [66 kilograms], I look and feel healthier, have better eating and exercise habits, and don’t obsess about food as much as I used to. On rare occasions, I think about controlling my food intake. My eating disorder will haunt me for the rest of my life. If I’m not careful, it could creep back.*

Rachel was diagnosed with anorexia nervosa, a life-threatening eating disorder characterized by extreme fear of being too heavy, dramatic weight loss, a distorted body image, and resistance to eating enough to reach or maintain a healthful weight. Rachel, like other people with anorexia nervosa, weighed less than 85 percent of her desirable body weight, and “desirable” body weights are already too slender for many individuals. Anorexia nervosa afflicts males as well as females, but females with eating disorders outnumber males. Most studies put the female-to-male ratio at ten-to-one or higher, but some find a smaller gender difference (Kjelsås et al., 2004). By and large, anorexia nervosa afflicts women during adolescence and young adulthood (Wertheim et al., 2009). The typical person with anorexia is a young white female of higher socioeconomic status (Striegel-Moore et al., 2003). Affluent females have greater access to fitness centres and health clubs and are more likely to read the magazines that idealize slender bodies and to shop in the boutiques that cater to females with svelte figures. All in all, they are regularly confronted with unrealistically high standards of slimness that make them extremely unhappy with their own physiques (Forbush et al., 2007). We know that the incidences of anorexia nervosa and bulimia nervosa have increased markedly in recent years.

Females with anorexia nervosa can drop 25 percent or more of their weight within a year. Severe weight loss triggers abnormalities in the endocrine system (i.e., with hormones) that prevent ovulation (Andersen & Ryan, 2009). Their general health declines. Problems arise in the respiratory system (Gardini et al., 2009) and the cardiovascular system (Papadopoulos et al., 2009). Females with anorexia are at risk for premature development of osteoporosis (Andersen & Ryan, 2009). The mortality rate for anorexic females is about 4–5 percent.

In one common pattern, the girl sees that she has gained some weight after menarche, and she resolves that she must lose it. But even after the weight is gone, she maintains her pattern of dieting and, in many cases, exercises at a fever pitch (Shroff et al., 2006). The patterns continue as she plunges toward her desirable weight—according to weight charts—and even after those who care about her tell her she is becoming all skin and bones. Denial is a huge part of anorexia nervosa. Anorexic girls deny that they are losing too much weight. They deny any health problems, pointing to their feverish exercise routines as evidence. Distortion of the body image is a major feature of the disorder. Others see anorexic females as skin and bones, whereas anorexic women fix their gaze in the mirror and believe they are looking at a body that is too heavy.

* Source: Excerpt from Ballweg, Rachel (2001). Can you be too rich or too thin? Well and Good 3. Copyright © The University of Iowa. Used with permission.
Bulimia Nervosa

Nicole awakens in her cold dark room and already wishes it was time to go back to bed. She dreads the thought of going through this day, which will be like so many others in her recent past. She asks herself the question every morning, “Will I be able to make it through the day without being totally obsessed by thoughts of food, or will I blow it again and spend the day [binge eating]?” She tells herself that today she will begin a new life, today she will start to live like a normal human being. However, she is not at all convinced that the choice is hers.

—Boskind-White & White (1983, p. 29)

So, does Nicole begin a new life today? No. Despite her pledge to herself, Nicole begins the day with eggs and toast—butter included. Then she downs cookies; bagels smothered with cream cheese, butter, and jelly; doughnuts; candy bars; bowlsfuls of cereal and milk—all in less than an hour. When her body cries “No more!” she turns to the next step: purging. Purging also is a routine. In the bathroom, she ties back her hair. She runs the shower to mask noise, drinks some water, and makes herself throw everything up. Afterward she makes another pledge to herself: “Starting tomorrow, I’m going to change.” Will she change? In truth, she doubts it.

Bulimia nervosa, Nicole’s eating disorder, is characterized by recurrent cycles of binge eating and purging. Binge eating often follows on the heels of dieting. There are various methods of purging. Vomiting is common. Other avenues include strict dieting or fasting, laxatives, and demanding exercise regimes. Individuals with eating disorders will not settle for less than their idealized body shape and weight (Watson et al., 2011). Bulimia, like anorexia, is connected with irregular menstrual cycles (Mendelsohn & Warren, 2010) and tends to afflict women during adolescence and young adulthood (Bravender et al., 2010). Eating disorders are upsetting and dangerous in themselves, and they are also connected with depression (Kim et al., 2012).

Bulimia nervosa, like anorexia nervosa, tends to afflict women during adolescence and young adulthood (Nolen-Hoeksema et al., 2007). TRUTH OR FICTION REVISITED: It is true that some university women—and other young women—control their weight by going on cycles of binge eating followed by self-induced vomiting.

Perspectives on Eating Disorders

QUESTION » What are the origins of eating disorders? According to some psychoanalysts, anorexia nervosa may reflect a young woman’s efforts to cope with sexual fears, especially the possibility of becoming pregnant. They interpret the female’s behaviour as an attempt to regress to prepubescence. Anorexia nervosa prevents some adolescents from separating from their families and assuming adult responsibilities. Their breasts and hips flatten once more because of the loss of fatty tissue. In the adolescent’s fantasies, perhaps, she remains a sexually undifferentiated child.

Many parents are obsessed with encouraging their children—especially their infants—to eat adequately. Thus, some observers suggest that children may refuse to eat as a way of battling with their parents. (“You have to eat something!” “I’m not hungry!”) It often seems that warfare does occur in the families of adolescents with eating disorders. Parents in such families are often unhappy and have their own issues with eating and dieting. They also “act out” against their daughters—letting them know that they consider them unattractive and, before the development of the eating

bulimia nervosa An eating disorder characterized by cycles of binge eating and vomiting as a means of controlling weight gain.
disorder, letting them know that they think they should lose weight (Hanna & Bond, 2006).

A particularly disturbing risk factor for eating disorders in adolescent females is a history of child abuse, particularly sexual abuse (Leung et al., 2010). One study found a history of childhood sexual abuse in about half of women with bulimia nervosa, compared to a rate of about 7 percent among women who do not have the disorder (Deep et al., 1999). Another study compared 45 pairs of sisters, one of whom was diagnosed with anorexia nervosa (Karwautz et al., 2001). Those with anorexia were significantly more likely to be exposed to high parental expectations and to sexual abuse.

Certainly, young women have a very slender social ideal set before them in women such as pop star Taylor Swift and many fashion models. The World Health Organization (WHO) labels people as malnourished when their BMIs are lower than 18.5. However, recent Miss America contestants come in at a BMI near 17 (Rubinstein & Caballero, 2000). So beauty queens add to the woes of “normal” young women and even to those of young women who hover near the WHO “malnourished” borderline. As the cultural ideal slenderizes, women with desirable body weights, according to the health charts, feel overweight, and overweight women feel gargantuan (Wertheim et al., 2009).

Many individuals with eating disorders, such as Rachel, are involved in activities that demand weight limits, such as dancing, acting, and modelling (Ravaldi et al., 2003). Gym enthusiasts and male wrestlers also feel the pressure to stay within an “acceptable” weight range (Ravaldi et al., 2003). Men, like women, experience pressure to create an ideal body, one with power in the upper torso and a trim abdomen.

Eating disorders tend to run in families, which raises the possibility of genetic involvement (Peterson et al., 2009; Raevuori et al., 2009). Genetic factors do not directly cause eating disorders, but they appear to involve obsessive and perfectionistic personality traits (Welch et al., 2009). In a society in which so much attention is focused on the ideal of the slender body, these personality traits encourage dieting. Anorexia also often co-occurs with depression (Green et al., 2009). Individuals with perfectionistic tendencies are likely to be disappointed in themselves, giving rise to feelings of depression. But it may also be that both anorexia and depression share genetic factors. Genetically inspired perfectionism, cultural emphasis on slimness, self-absorption, and family conflict may create a perfect recipe for the development of eating disorders (Kaye et al., 2004).

Treatment and Prevention

Treatment of eating disorders—particularly anorexia nervosa—is a great challenge. The disorders are connected with serious health problems, and the low weight of individuals with anorexia is often life-threatening. Some adolescent girls are admitted to the hospital for treatment against their will (Brunner et al., 2005). Denial is a feature of anorexia nervosa, and many girls do not recognize—or do not admit—that they have a problem. When the individual with anorexia does not—or cannot—eat adequately through the mouth, measures such as nasogastric (tube) feeding may be used.

Antidepressants are frequently used in the treatment of eating disorders (Crow et al., 2009; Powers & Bruty, 2009). Eating disorders are often accompanied by depression, and it may be that the common culprit in eating disorders and depression is a lower-than-normal level of the neurotransmitter

\[^1\text{You can calculate your body mass index as follows: Write down your weight in kilograms, and then divide it by your height in metres squared. For example, if you weigh 70 kilograms and are 1.7 metres tall, your BMI is 70/(1.7 \times 1.7), or 24.22. A BMI greater than 25 is defined as overweight.}\]
serotonin. Antidepressants such as Prozac and Zoloft enhance the activity of serotonin in the brain, often increasing food intake in anorexic individuals and decreasing binge eating in bulimic people. In one study, 10 of 11 anorexic females showed significant weight gain after 14 weeks of treatment with an antidepressant, and they maintained the gain at a 64-week follow-up (Santonastaso et al., 2001). They were also evaluated as being significantly less depressed and perfectionistic.

Because family problems are commonly connected with eating disorders, family therapy is often used to treat these disorders (Fishman, 2006; Lock et al., 2006). Family therapy has positive outcomes in many cases, but it is not an appropriate setting for dealing with childhood sexual abuse.

Cognitive-behavioural therapy has been used to help anorexic and bulimic individuals challenge their perfectionism and distorted body images. It has also been used to systematically reinforce appropriate eating behaviour. But let’s remember that all of this is connected with cultural attitudes that idealize excessive thinness. “Prevention” will have to address cultural values as well as potential problems in individual adolescents.

14.7 Substance Abuse and Dependence: Where Does It Begin? Where Does It End?

QUESTIONS » What is substance abuse? What is substance dependence? Think of our society as a cafeteria with brightly coloured drugs glimmering on the shelves and in the trays. In almost any high school, adolescents will tell you that drugs are available. In fact, so will many middle schoolers. And so will some elementary school children. Give credit to those adolescents who do not use drugs. They generally refuse them as a matter of choice, not because of lack of supply. The drugs are there, and some of the most harmful drugs are perfectly legal, at least for adults.

Children and adolescents use drugs not only to cope with medical problems but also to deal with daily tensions, run-of-the-mill depression, even boredom. Many adolescents use drugs for the same reasons that adults do, but they also use them because they are imitating peers or rebelling against parents who beg them not to (Costello, 2007). They use drugs to experience pleasure, to deaden pain, and to earn prestige among peers.

Adolescents frequently get involved with drugs that cripple their ability to attend school or to pay attention when they do. Alcohol and other drugs are also linked with reckless, sometimes deadly, behaviour (Schneider et al., 2012). Alcohol is the BDOC—that is, the Big Drug on Campus. It is the most widely used substance in high schools and on college and university campuses (Johnston et al., 2011). Marijuana is no slacker either. Nearly one third of Canadian youth aged 15–19 have used marijuana (Public Health Agency of Canada, 2011).

Where does the use of a drug or substance end and substance abuse begin? According to the American Psychiatric Association (2013), substance use disorders are the ongoing use of a substance despite the social, occupational, psychological, or physical problems it causes. When adolescents miss school or fail to complete assignments because they are intoxicated or “sleeping it off,” they are abusing alcohol. The amount they drink is not the issue; the problem is the role that the substance plays in their lives.

Substance dependence is more serious than substance abuse. An adolescent who is dependent on a substance loses control over using it and may

substance use disorder A persistent pattern of use of a substance characterized by frequent intoxication and impairment of physical, social, and/or emotional well-being.

substance dependence A persistent pattern of use of a substance that is accompanied by physiological addiction.
organize his or her life around getting the substance and using it. Substance dependence also changes the body. Having it in one's body becomes the norm, so that the adolescent may experience tolerance, withdrawal symptoms, or both. Tolerance develops as the body becomes habituated to the substance; as a result, the adolescent has to use progressively higher doses to achieve the same effects. A number of substances are physically addictive, so when the addicted adolescent stops using them or lowers the dosage, characteristic withdrawal symptoms occur; this is also known as abstinence syndrome. When addicted individuals lower their intake of alcohol, they may experience symptoms such as tremors (shakes), high blood pressure, rapid heart and pulse rate, anxiety, restlessness, and weakness. Many adolescents who begin to use substances such as alcohol for pleasure wind up using them to escape the abstinence syndrome.

Why, you might wonder, are psychologists and educators so concerned about substance abuse? It is not just a moral issue. Drugs are not “bad” simply because they are illegal. Children and adolescents are not advised to avoid them simply because they are under age. Drugs can have serious harmful effects on health. Let’s consider the effects of some depressants, stimulants, and hallucinogens.

**Depressants**

**QUESTION » What are the effects of depressants?** All depressants slow the activity of the nervous system. Beyond that, they have different cognitive and biological effects. Depressants include alcohol, narcotics derived from the opium poppy (heroin, morphine, and the like), and sedatives (such as barbiturates and methaqualone).

Alcohol lessens inhibitions, so drinkers may do things when drinking that they would otherwise resist (Collins et al., 2010; Donohue et al., 2007). Ingesting five or more drinks in a row—that is, binge drinking—is connected with bad grades and risky behaviour, including risky (unprotected, promiscuous) sex, acts of aggression, and accidents (McCauley et al., 2010). Small amounts of alcohol can be stimulating because alcohol dilates blood vessels, but high doses have a sedative effect, which is why alcohol is labelled a depressant. Alcohol is also an intoxicant: It distorts perceptions, impairs concentration, hinders coordination, and slurs the speech. The media pay more attention to deaths resulting from heroin and cocaine overdoses, but hundreds of college students die each year from drinking-related causes, including accidents and overdoses (Miniño et al., 2010; Naimi et al., 2010). (Yes, a person can die from drinking too much at one time.)

Adolescent drinking often leads to drinking as an adult, and chronic drinking can lead to serious physical disorders such as cirrhosis or cancer of the liver. Chronic heavy drinking has been linked to cardiovascular disorders. Heavy drinking increases the risk of breast cancer among women and may harm the embryo if she is pregnant (Rathus et al., 2014).

Heroin is a depressant that is derived from the opium poppy. Like morphine and other opioids, its major medical use is as a pain reliever. But it also can provide a euphoric “rush,” which is why many experimenters are tempted to use it again. Heroin is addictive, and regular users develop tolerance.

Barbiturates are depressants with various legitimate medical uses, such as relief from pain, anxiety, and tension and treatment of insomnia, high blood pressure, and epilepsy, but people can become rapidly dependent on them. These drugs are used illegally by adolescents because of their relaxing effects and their ability to produce a mild euphoria. Depressants have additive effects; therefore, mixing barbiturates and other depressants is risky.
**Stimulants**

**QUESTION » What are the effects of stimulants?** Using stimulants is like stepping on the body’s accelerator. Stimulants speed up the heartbeat and other bodily functions. They can also keep people awake and alert, but at the expense of some wear and tear. Nicotine, cocaine, and amphetamines are the most commonly used stimulants.

Nicotine is found in cigars, cigarettes, and chewing tobacco. Nicotine causes the release of the hormone adrenaline, which ramps up the heart, disrupts its rhythm, and causes the liver to pour sugar into the blood. Nicotine, like other stimulants, also increases the rate at which the body burns calories and lowers the appetite, so some adolescents smoke as a means of controlling their weight (Anzengruber et al., 2006; Copeland et al., 2006). About 13 percent of Canadian youth aged 15 to 19 smoke (Statistics Canada, 2009). Nicotine is also the chemical that addicts people to tobacco (Small et al., 2010). The abstinence syndrome from nicotine includes symptoms such as drowsiness and loss of energy (the stimulant is gone, after all), palpitations of the heart (irregular heartbeat), sweating, tremors, lightheadedness and dizziness, insomnia, headaches, and digestive problems (irregular bowel movements and cramps). Cigarette smoke contains carbon monoxide, which causes shortness of breath, and hydrocarbons (“tars”), which are responsible for most respiratory diseases and cases of lung cancer (American Lung Association, 2010). Pregnant smokers increase the risk of miscarriage, stillbirths, preterm births, and low-birth-weight babies (American Lung Association, 2010).

The stimulant cocaine produces feelings of euphoria, relieves pain, boosts self-confidence, and reduces appetite. Cocaine has biological as well as psychological effects: It accelerates the heart rate, spikes the blood pressure, constricts the arteries of the heart, and thickens the blood—a combination that can cause cardiovascular and respiratory collapse (Lange & Hillis, 2010). Cocaine has caused the deaths of several young athletes who used it to boost their performance and confidence. Because cocaine is a stimulant, overdoses can cause restlessness, insomnia, and tremors.

Amphetamines are widely known to students as enablers of all-night cram sessions. Many dieters rely on them to reduce their appetites. Tolerance for amphetamines develops rapidly, and adolescents can become dependent on them, especially when they use these drugs to self-medicate for depression. Regular use of the powerful amphetamine called methamphetamine may be physically addictive (Embry et al, 2009), but the extent to which amphetamines cause physical addiction has been a subject of controversy. High doses of amphetamines, like high doses of cocaine, can cause restlessness and insomnia, irritability, and loss of appetite.

**Hallucinogenics**

**QUESTION » What are the effects of hallucinogenics?** Hallucinogenics give rise to perceptual distortions called hallucinations. A user may believe that the hallucination cannot be real, and yet it assaults the senses so strongly that it is confused with reality. Marijuana, Ecstasy, LSD, and PCP are examples of hallucinogenic drugs.

Marijuana is derived from the Cannabis sativa plant. It is typically smoked, although it can be eaten. Many adolescents report that marijuana helps them relax and elevates their mood. Adolescents who use marijuana report greater sensory awareness, self-insight, creativity, and empathy for other people’s feelings. Smokers become highly attuned to bodily sensations, especially their heartbeat, which tends to
accelerate. They experience hallucinations, as in time seeming to slow down so much that a song seems to go on indefinitely. But strong intoxication can disorient and frighten some smokers.

Marijuana carries a number of health risks. For example, it impairs the perceptual–motor coordination used in driving. It impairs short-term memory and slows learning (Egerton et al., 2006; Lamers et al., 2006). Although it causes positive mood changes in many people, some experience anxiety and confusion (Bonn-Miller et al., 2007). Users can become psychologically dependent on marijuana, and research also suggests that regular users can experience withdrawal, which is a sign of physical addiction (Budney et al., 2007).

Ecstasy—also known as MDMA (an abbreviation for its chemical formula)—is a popular “party drug” or “club drug.” Its chemical formula has similarities both to amphetamines, the stimulants, and to mescaline, the hallucinogenic drug (Lamers et al., 2006). As a result, Ecstasy gives users the boost of a stimulant—making them somewhat more alert and suffusing them with feelings of elation and self-confidence. As a mild hallucinogenic, it also removes users a bit from reality. The combination appears to free them to some degree from inhibitions and cognitive awareness of the possible consequences of risky behaviour, such as unprotected sex. Ecstasy can also impair working memory (not helpful in studying), increase anxiety, and lead to depression (Lamers et al., 2006).

LSD stands for lysergic acid diethylamide, another hallucinogenic drug. Regular use of hallucinogenics can cause psychological dependence and tolerance, but people are not known to become physically addicted to them. High doses can impair coordination and judgment (driving while taking hallucinogenic drugs poses grave risks), can change one's mood, and can cause hallucinations and paranoid delusions (a belief that one is in danger or is being observed or followed).

Prevalence of Substance Abuse

**QUESTION** How widespread is substance abuse among adolescents? Alcohol, tobacco, and cannabis use are the most frequently used substances by Canadian youth (Public Health Agency of Canada, 2011). According to one Canadian report, approximately one-third of Canadian youth report heavy alcohol consumption (i.e., more than five drinks per month) (Public Health Agency of Canada, 2011). Certain groups are at greater risk for substance abuse. For example, males are more likely to report substance abuse issues than their female counterparts; however, there are recent increases in female youth substance use. As well, youth who have experienced sexual abuse as children, street-involved or homeless youth, as well as sexual minority youth, may be at increased risk for substance abuse. Finally, First Nation, Inuit, and Métis youth are also at greater risk of substance abuse. While these risk factors exist, it is important to identify ways to support youth and promote resiliency. See Table 14.1 for ways to help promote resiliency and healthy choices.

Factors in Substance Abuse and Dependence

**QUESTION** What factors are associated with substance abuse and dependence? Adolescents often become involved with substance abuse and dependence through experimental use (Marlatt, 2010). Some are conforming to peer pressure; acceptance by peers means doing what the peers do. Some are rebelling against moral or social constraints. Others are in it for the experience. Of these, some are simply curious; they want to see what effects the drugs will have. Others are trying to escape from boredom or from the pressures of school or the neighbourhood. Some, of course, are looking for pleasure or excitement. Some youngsters are imitating what they see their own parents doing.
**TABLE 14.1**

**Help Prevent Drug Use by Your Teen**

**Tips on Developing Their Resiliency**

Have you ever wondered why some young people overcome great adversity, such as poverty, neglect, abuse and violence, to develop into healthy adults?

Resiliency is about how we manage and adapt to obstacles in our lives. Everyone enjoys learning about interesting stories of how people overcome adversity and go on to succeed in life.

Resiliency is not a trait or characteristic that you are born with. Some teens develop resilience naturally, but others will need help.

Parenting plays an important role in developing resiliency. However, parenting must also be combined with a supportive school and community setting as well as good physical and mental health.

There are factors that can promote resiliency, such as:
- Self-confidence
- Hope
- Safe neighbourhoods
- Community support
- Intelligence
- Optimism
- Involvement in extracurricular activities

**Fostering resiliency rests on relationships.**

- A caring and supportive relationship with at least one adult is extremely important in helping teens develop into strong and happy adults.
- Your family is the most important factor affecting your teen’s life.
- Positive relationships with parents, peers, grandparents, neighbours, teachers, coaches, etc, can help teens develop competence and well-being.
- Children who have two or more adults whom they feel are “important” to them in school are happier, more motivated at school, are more self-confident and concerned about others.

**School plays an important role in promoting resiliency**

By ensuring that your teen has a positive school experience, you can help your teen cope with the stress of the many physical, intellectual, and emotional changes, and changes in friendships and family relationships.

**Transitions are important.**

- During the short and intense teen years, more changes take place than any other time in one’s life except during infancy.
- During these years, teens go through many changes (for example, how they relate to parents and other family members, and a growing interest in friends and social groups).
- When your child moves from elementary or middle school to high school, it is a major change that can affect their decision to use or not use drugs.

**Tips to help prevent drug use with your teen**

- Be aware of the many changes that your teen is going through. These changes may make teens feel extremely stressed, less confident, vulnerable and depressed.
- Be sympathetic to what it must be like for your teen to be experiencing such feelings. Remember a time when you went through many changes and how that felt.
- Although they may want to be more independent, your teen needs structure and support. Your support matters.
- Always communicate a reason for your decisions. When you have to say no, make sure you explain why. Share your standards of conduct and achievement.
- Establish regular household events, set limits, monitor homework, attend parent–teacher conferences and more.
- Show ongoing interest in your teen’s life and respect them. Take the time to listen to your teen. Although it may often seem that having a conversation with you is at the bottom of their “to do” list—find the “teachable moments” where you can talk openly together. Teachable moments can happen while driving in the car, at the dinner table, or while discussing a situation at school or a current event in the news.

Remember that parenting plays an important role in developing resilience. You are their most important role model and their best defence against drug use.

Source: © All rights reserved. Questions and Answers: Gender Identity in Schools. Public Health Agency of Canada. Reproduced with permission from the Minister of Health, 2014.
Social cognitive theorists suggest that children and adolescents usually try drugs because someone has recommended them or because they have observed someone else using them. But whether or not they continue to use the drug depends on factors such as whether use is reinforced by peer approval. The drug can also be reinforcing by enhancing the user’s mood or by reducing unpleasant emotions such as anxiety and tension. For individuals who are addicted, prevention of the abstinence syndrome is reinforcing. Carrying the substance and obtaining a “rainy day” supply are reinforcing because the child or adolescent does not have to worry about being caught short.

Why, you may wonder, do children and adolescents use drugs when their health education courses inform them that drugs are harmful? Don’t they believe their teachers? Some do; some don’t. But the reinforcement value of the substances occurs now, today. The harmful effects are frequently long-term, or theoretical.

Associating with peers who use drugs and who tolerate drug use is one of the strongest predictors of adolescent drug use and abuse (Costello, 2007; Jones et al., 2008). Children are highly vulnerable to peer pressure in the early teen years. If they are closely involved with a drug-abusing group, they may feel pressured to join in. Adolescents who are extensively involved with peers, especially to the exclusion of their families, are at greater risk for drug use.

Parenting styles play a role. Having open lines of communication with a parent helps inhibit drug use. The authoritative pattern of child rearing appears to protect children from substance abuse (Newman et al., 2008; Suldo et al., 2008). Heavy drug use is most likely to occur in families that have parents with permissive or neglecting–rejecting parenting styles.

Adolescent drug users often experience school problems. They do poorly in school, and their academic motivation is low (Dunn & Mezzich, 2007). Certain psychological characteristics are associated with drug use, including anxiety and depression, antisocial behavior, and low self-esteem (Donohue et al., 2006; Gau et al., 2007).

### A CLOSER LOOK [DIVERSITY]

**Gender, College Plans, Ethnicity, and Substance Abuse**

There is a lot of variation in the prevalence of substance abuse among adolescents. The Institute for Social Research at the University of Michigan has regularly asked high school seniors (Grade 12 students) whether they have used various substances within the past year (the annual prevalence), as well as a variety of questions about alcohol and cigarettes. For every substance assessed, adolescent males are more likely than adolescent females to have used or abused the substance (Johnston et al., 2011). This finding holds for both widely abused substances, such as alcohol and marijuana, and more rarely used substances, such as heroin and crack. Plans to complete four years of college appear to have a restraining effect on substance abuse. Seniors who anticipate at least four more years of schooling are less likely to engage in substance abuse than seniors who plan no further schooling or less than four years of further schooling. The difference in cigarette smoking is most salient.

Now consider the ethnic groups studied by the researchers. Substance abuse is highest among European American Grade 12 students. African American teenagers are least likely to report substance abuse.

### Reflect

- Why do you think that adolescent males are more likely than adolescent females to report engaging in substance abuse?
- Why do you think that plans to attend college for four years might have a restraining effect on substance abuse among students?
- Are you surprised by the relationship between substance abuse and ethnicity? Why or why not?
- Is it possible that the worst adolescent substance abusers were not in the group sampled by the Institute for Social Research? Explain.
- Can you think of any reasons why adolescents in the sample might have been motivated to misrepresent their behaviour? Explain.
Biological factors are apparently involved in determining which experimenters will continue to use a drug and which will not. Children may inherit genetic predispositions toward abuse of specific substances, including depressants, stimulants, and hallucinogens (Agrawal et al., 2010; Dick et al., 2009; Farrer et al., 2009; Kuo et al., 2010). For example, the biological children of alcoholics who are reared by adoptive parents are more likely to abuse alcohol than are the biological children of the adoptive parents.

Treatment and Prevention

**QUESTION » How can we treat and prevent substance abuse?** Health professionals, educators, police departments, and laypeople have devised many approaches to the prevention and treatment of substance abuse and dependence among adolescents. However, treatment has been a frustrating endeavor; and it is not clear which approaches are most effective. In many cases, adolescents with drug dependence really do not want to discontinue the substances they are abusing. Many are referred to treatment by parents or school systems, but they deny the negative impact of drugs on their lives. They may belong to a peer group that frowns on prevention or treatment programs (Lochman et al., 2007). When addicted adolescents come for treatment, helping them through a withdrawal syndrome may be straightforward enough. But once their bodies no longer require the substance to feel “normal,” they may return to the social milieu that fosters substance abuse and be unable to find strong reasons for living a life without drugs (Lochman et al., 2007). The problem of returning to abuse and dependence following treatment—that is, the problem of relapse—can thus be more troublesome than the problems involved in initial treatment.

Many adolescents with substance abuse problems also have psychological disorders or serious family problems. When treatment programs focus only on substance abuse and do little to treat the psychological disorder or relationships in the family, the outcome of treatment tends to suffer (Sussman et al., 2006).

The ability of teenagers to deal with the physical changes of adolescence and to engage in health-promoting behaviours depends in part on their growing cognitive abilities. We examine development in that area in Chapter 15.

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**Active Review**

13. Death rates are higher for (male or female?) adolescents.

14. Most adolescent deaths are due to _____________.

15. ____________ is a life-threatening eating disorder characterized by intense fear of being overweight, a distorted body image, and refusal to eat.

16. Bulimia nervosa is characterized by recurrent cycles of binge eating followed by _____________.

17. Anorexia nervosa and bulimia nervosa (do or do not?) tend to run in families.

18. Eating disorders are related to traits such as _____________.

19. Substance ____________ disorder is the repeated use of a substance despite the fact that it is causing or compounding social, occupational, psychological, or physical problems.

20. Substance dependence is characterized by loss of control over use of the substance, tolerance, and a(n) ____________ syndrome.

21. ____________ is the substance most commonly used by adolescents.

22. ____________ is the agent that creates physiological dependence on tobacco.

**Reflect & Relate:** How widespread were eating disorders and substance abuse in your own high school? Did you notice gender differences in the rates of these two problems? How did these problems begin? What are some ways in which parents and educators might help adolescents avoid them?
14.1 Adolescence

What is adolescence?
Adolescence is a transitional period between childhood and adulthood. G. Stanley Hall believed that adolescence is marked by “storm and stress.” Current views challenge the idea that storm and stress are normal or beneficial.

14.2 Puberty: The Biological Eruption

What is puberty? What happens during puberty?
Puberty is a stage of physical development that is characterized by reaching sexual maturity. Puberty is controlled by a feedback loop involving glands. Sex hormones trigger the development of primary and secondary sex characteristics.

What happens during the adolescent growth spurt?
Girls spurt sooner than boys. Boys tend to spurt about 10 centimetres per year, and girls about 7 or 8 centimetres per year. During their growth spurts, boys catch up with girls and grow taller and heavier. Boys' shoulders become broader, and girls develop broader and rounder hips. More of a male's body weight is made of muscle. Adolescents may look gawky because of asynchronous growth. Boys typically ejaculate by age 13 or 14. Female sex hormones regulate the menstrual cycle.

What are the effects of early or late maturation on adolescents?
The effects of early maturation are generally positive for boys and are often negative for girls. Early-maturing boys tend to be more popular. Early-maturing girls become conspicuous, often leading them to make sexual approaches, engage in deviant behaviour, and have a poor body image.

How do adolescents feel about their bodies?
Girls are generally more dissatisfied with their bodies than boys are. By age 18, dissatisfaction tends to decline.

14.3 Brain Development

What brain developments take place during adolescence?
Brain developments reflect genetic and environmental influences. There is general thickening of the cortex and some pruning. Cortical thickening also occurs in areas “exercised” by experience, such as practising a musical instrument. The amygdala seems to lose “influence” as the prefrontal cortex (and executive function) increases in prominence.

14.4 Emerging Sexuality and the Risks of Sexually Transmitted Infections

What kinds of sexually transmitted infections are there?
Sexually transmitted infections (STIs) include bacterial infections such as chlamydia, gonorrhea, and syphilis; viral infections such as HIV/AIDS, HPV, and genital herpes; and some others.

What factors place adolescents at risk for contracting STIs?
The risk factors include sexual activity with multiple partners, and sexual activity without condoms, and substance abuse. Sharing hypodermic needles with an infected person can also transmit HIV.

Given the threat of HIV/AIDS and other STIs, what can be done to prevent them?
Prevention involves education about STIs, along with advice concerning abstinence or “safer sex.”

14.5 Health in Adolescence

How healthy are Canadian adolescents?
Most Canadian adolescents are healthy; however, their long-term prognosis may be deteriorating due to increased obesity rates and high STIs rates. Most adolescents’ health problems stem from their lifestyles.

What are the causes of death among adolescents?
Death rates are higher for older adolescents and for male adolescents. Accidents, suicides, and homicides account for about three in four deaths among adolescents.

How much sleep do adolescents need?
Adolescents require 8.5–9.25 hours of sleep per night, but because of a phase delay in sleep and the need to rise early for school, many adolescents are sleep deprived.

What are the nutritional needs of adolescents? What do adolescents actually eat?
The average girl needs between 1800 and 2400 calories per day, and the average boy needs about 2200–3200 calories per day. Adolescents need large amounts of elements such as calcium, iron, zinc, magnesium, and nitrogen. Adolescents usually need more vitamins than they take in but less sugar, fat, protein, and sodium.

14.6 Eating Disorders: When Dieting Turns Deadly

What are eating disorders?
The eating disorders include anorexia nervosa and bulimia nervosa. Anorexia nervosa is characterized by fear of being overweight, a distorted body image, and refusal to eat. Bulimia nervosa is characterized by recurrent cycles of binge eating followed by purging. Eating disorders mainly affect females.

What are the origins of eating disorders?
Some psychoanalysts suggest that anorexia is an effort to remain prepubescent. One risk factor for eating disorders in adolescent females is a history of child abuse. Eating disorders may develop because of fear of gaining weight
resulting from cultural idealization of the slim female. Genetic factors may connect eating disorders with perfectionistic personality styles.

14.7 Substance Abuse and Dependence: Where Does It Begin? Where Does It End?

What is substance abuse? What is substance dependence?
Substance abuse is the use of a substance despite the related social, occupational, psychological, or physical problems. Substance dependence is characterized by loss of control over use of the substance and is typified by tolerance and withdrawal symptoms.

What are the effects of depressants?
Depressants are addictive substances that slow the activity of the nervous system. Alcohol lowers inhibitions, relaxes, and intoxicates. Heroin can provide a strong euphoric “rush.” Barbiturates relieve anxiety and tension.

What are the effects of stimulants?
Stimulants accelerate the heartbeat and other bodily functions and depress the appetite. Nicotine is the stimulant in tobacco. The stimulant cocaine produces euphoria and bolsters self-confidence, but it occasionally causes respiratory and cardiovascular collapse. Adolescents use amphetamines to remain awake for cram sessions.

What are the effects of hallucinogenics?
Hallucinogenics give rise to perceptual distortions called hallucinations. Marijuana helps some adolescents relax and elevates the mood, but it impairs perceptual–motor coordination and short-term memory. LSD ("acid") produces vivid hallucinations.

How widespread is substance abuse among adolescents?
Approximately one third of Canadian youth reportedly heavily consume alcohol. As well, about one third of Canadian youth have tried cannabis. Most students have tried alcohol, and many use it regularly.

What factors are associated with substance abuse and dependence?
Substance abuse and dependence usually begin with experimental use in adolescence. Adolescents may experiment because of curiosity, conformity to peer pressure, parental use, rebelliousness, or a desire to escape from boredom or pressure and to seek excitement or pleasure. Some individuals may also have a genetic predisposition toward dependence on certain substances.

How can we treat and prevent substance abuse?
It may be relatively simple to help an adolescent through an abstinence syndrome (the process is called detoxification); it is more difficult to prevent relapse.

Key Terms

- adolescence W14-4
- genital stage W14-4
- puberty W14-5
- feedback loop W14-6
- hypothalamus W14-6
- pituitary gland W14-6
- primary sex characteristics W14-6
- secondary sex characteristics W14-6
- asynchronous growth W14-7
- secular trend W14-7
- larynx W14-9
- semen W14-9
- nocturnal emission W14-9
- gynecomastia W14-9
- epiphyseal closure W14-9
- mammary glands W14-9
- labia W14-11
- clitoris W14-11
- menarche W14-11
- gray matter W14-18
- HIV/AIDS W14-19
- osteoporosis W14-23
- menopause W14-23
- anorexia nervosa W14-26
- bulimia nervosa W14-27
- substance use disorder W14-29
- substance dependence W14-29
- tolerance W14-30
- abstinence syndrome W14-30
- sedatives W14-30
- hallucinogenics W14-31
Active Learning Resources

Go to Voyages in Development’s CourseMate at www.nelsonbrain.com, where you will find an interactive eBook, flashcards, Pre-Lecture Quizzes, Section Quizzes, Exam Practice, videos, and more.