

# Sample Chapter

## Development Through the Lifespan, 7/e

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# chapter 13



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## Physical and Cognitive Development in Early Adulthood

Early adulthood brings momentous changes—among them, choosing a vocation, starting full-time work, and attaining economic independence. This Dutch computer game designer and animator works in a field that combines an interest in gaming with artistic abilities.



# What's ahead in **chapter 13**

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The back seat and trunk piled high with belongings, 23-year-old Sharese hugged her mother and brother goodbye, jumped in the car, and headed toward the interstate with a sense of newfound freedom mixed with apprehension. Three months earlier, the family had watched proudly as Sharese received her bachelor's degree in chemistry from a small university 40 miles from her home. Her college years had been a time of gradual release from economic and psychological dependency on her family. She returned home periodically on weekends and lived there during the summer months. Her mother supplemented Sharese's loans with a monthly allowance. But this day marked a turning point. She was moving to her own apartment in a city 800 miles away, with plans to work on a master's degree. With a teaching assistantship and a student loan, Sharese felt more "on her own" than at any previous time in her life.

During her college years, Sharese made lifestyle changes and settled on a vocational direction. Overweight throughout high school, she lost 20 pounds in her sophomore year, revised her diet, and began an exercise regimen by joining the university's Ultimate Frisbee team, eventually becoming its captain. A summer spent as a counselor at a camp for chronically ill children helped convince Sharese to apply her background in science to a career in public health.

Still, two weeks before she was to leave, Sharese confided in her mother that she had doubts about her decision. "Sharese," her mother advised, "we never know if our life choices are going to suit us just right, and most times they aren't perfect. It's what we make of them—how we view and mold them—that turns them into successes." So Sharese embarked on her journey and found herself face-to-face with a multitude of exciting challenges and opportunities.

In this chapter, we take up the physical and cognitive sides of early adulthood, which extends from ages 18 to 40. As noted in Chapter 1, the adult years are difficult to divide into discrete periods because the timing of important milestones varies greatly among individuals—much more so than in childhood and adolescence. But for most people, early adulthood involves a common set of tasks: leaving home, completing education, beginning full-time work, attaining economic independence, establishing a long-term sexually and emotionally intimate relationship, and starting a family. These are energetic decades filled with momentous decisions that, more than any other time of life, offer the potential for living to the fullest. ●



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## PHYSICAL DEVELOPMENT

Throughout childhood and adolescence, the body grows larger and stronger, coordination improves, and sensory systems gather information more effectively. Once body structures reach maximum capacity and efficiency, **biological aging**, or **senescence**, begins—genetically influenced declines in the functioning of organs and systems that are universal in all members of our species. Like physical growth, however, biological aging varies widely across parts of the body, and individual differences are great—variation that the *lifespan perspective* helps us understand. A host of contextual factors—including each person’s genetic makeup, lifestyle, living environment, and historical period—can accelerate or slow age-related declines (Arking, 2006). As a result, the physical changes of the adult years are, indeed, *multidimensional* and *multidirectional* (see page 8 in Chapter 1).

In the following sections, we examine the process of biological aging. Then we turn to physical and motor changes already under way in early adulthood. As you will see, biological aging can be modified substantially through behavioral and environmental interventions. During the twentieth century, improved nutrition, medical treatment, sanitation, and safety added 25 to 30 years to *average life expectancy* in industrialized nations, a trend that is continuing (see Chapter 1, page 7). We will take up life expectancy in greater depth in Chapter 17.



### Biological Aging Is Under Way in Early Adulthood

**13.1** Describe current theories of biological aging, both at the level of DNA and body cells and at the level of tissues and organs.

At an intercollegiate tournament, Sharese dashed across the playing field, leaping high to catch Frisbees sailing her way. In her early twenties, she is at her peak in strength, endurance, sensory acuteness, and immune system responsiveness. Yet over the next two decades, she will age and, as she moves into middle and late adulthood, will show more noticeable declines. Biological aging is the combined result of many causes, some operating at the level of DNA, others at the level of cells, and still others at the level of tissues, organs, and the whole organism. Despite hundreds of theories and the efforts of many researchers, our understanding of the mechanisms of biological aging is incomplete.

### Aging at the Level of DNA and Body Cells

Current explanations of biological aging at the level of DNA and body cells are of two types: (1) those that emphasize the *programmed effects of specific genes* and (2) those that emphasize the *cumulative effects of random events* that damage genetic and cellular material. Support for both views exists, and a combination may eventually prove to be correct.



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This whitewater kayaker, in his early twenties, is at his peak in strength, endurance, and sensory acuteness.

Genetically programmed aging receives some support from kinship studies indicating that longevity is a family trait. People whose parents had long lives tend to live longer themselves. And greater similarity exists in the lifespans of identical than fraternal twins. But the heritability of longevity is low to moderate, ranging from .15 to .50 for age at death and from .15 to .55 for various measures of current biological age, such as hand-grip muscle strength, respiratory capacity, blood pressure, bone density, and overall physical health (Dutta et al., 2011; Finkel et al., 2014). Rather than inheriting longevity directly, people probably inherit risk and protective factors, which influence their chances of dying earlier or later.

One “genetic programming” theory proposes the existence of “aging genes” that control biological changes, such as menopause, efficiency of gross motor skills, and deterioration of body cells. The strongest evidence for this view comes from research showing that human cells allowed to divide in the laboratory have a lifespan of 50 divisions, plus or minus 10 (Hayflick, 1998). With each duplication, a special type of DNA called **telomeres**—located at the ends of chromosomes, serving as a



ALAMY

A young adult takes a selfie with her 85-year-old grandmother. Longevity tends to run in families, though people probably inherit risk and protective factors rather than length of life directly.



## Biology and Environment

### Telomere Length: A Marker of the Impact of Life Circumstances on Biological Aging

In the not-too-distant future, your annual physical exam may include an assessment of the length of your *telomeres*—DNA at the ends of chromosomes—which safeguard the stability of your cells. Telomeres shorten with each cell duplication; when they drop below a critical length, the cell can no longer divide and becomes senescent (see Figure 13.1). Although telomeres shorten with age, the rate at which they do so varies greatly. An enzyme called *telomerase* prevents shortening and can even reverse the trend, lengthening telomeres and protecting the aging cell.

Over the past decade, research examining the influence of life circumstances on telomere length has exploded. A well-established finding is that chronic illnesses, such as cardiovascular disease and cancer, hasten telomere shortening in white blood cells, which play a vital role in the immune response (see page 443) (Corbett & Alda, 2015). Telomere shortening, in turn, predicts more rapid disease progression and earlier death.

Accelerated telomere shortening has been linked to a variety of unhealthy behaviors, including cigarette smoking, excessive alcohol use, and the physical inactivity and overeating that lead to obesity and to insulin resistance, which often precedes type 2 diabetes (Epel et al., 2006; Ludlow, Ludlow, & Roth, 2013). Unfavorable health conditions may alter telomere length as early as the prenatal period, with possible long-term negative consequences for biological aging. In research on rats, poor maternal nutrition during pregnancy resulted in low birth weight and development of shorter telomeres in kidney and heart tissue (Tarry-Adkins et al., 2008). In related human investigations, children and adolescents who

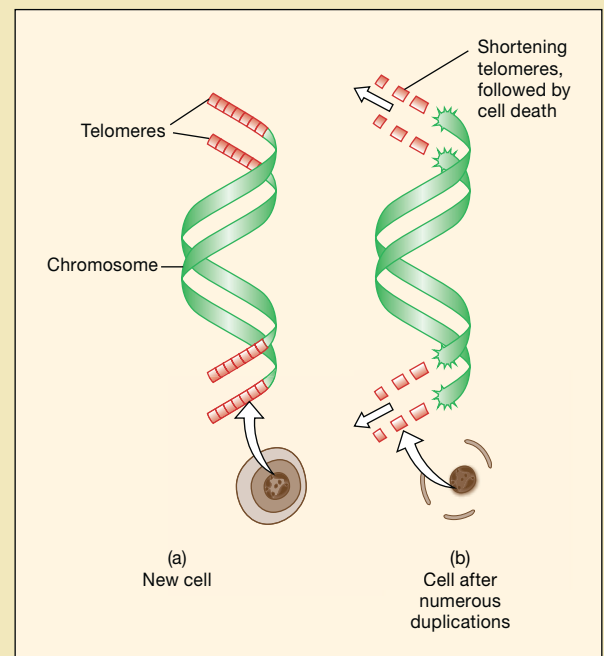
had been low-birth-weight had shorter telomeres in their white blood cells than did their normal-birth-weight agemates (Raqib et al., 2007; Strohmaier et al., 2015).

Persistent emotional stress—in childhood, abuse, bullying, or exposure to family violence; in adulthood, parenting a child with a chronic illness, caring for an older adult with dementia, or experiences of racial discrimination or violence—is linked to telomere shortness in white blood cells and swabbed cheek cells (Chae et al., 2014; Drury et al., 2014; Price et al., 2013; Shalev et al., 2013). In other research, maternal severe emotional stress during pregnancy predicted shortened telomere length in children’s white blood cells at birth and in follow-ups in early adulthood, even after other possible contributing factors (such as low birth weight and childhood and adult stress levels) were controlled (Entringer et al., 2011, 2012).

Fortunately, when adults make positive lifestyle changes, telomeres respond accordingly. Healthy eating behaviors; physical activity that increases fitness; reduced alcohol intake and cigarette smoking; and a decline in emotional stress are all associated with gains in telomerase activity and longer telomeres (Lin, Epel, & Blackburn, 2012; Shalev et al., 2013).

Currently, researchers are working on identifying sensitive

periods of telomere change—times when telomeres are most susceptible to modification. Early intervention—for example, enhanced prenatal care and treatments aimed at reducing childhood obesity and exposure to stressors—may be particularly powerful. But telomeres are changeable through intervention well into late adulthood (Epel et al., 2009; Price et al., 2013). As our understanding of predictors and consequences of telomere length expands, it may become an important index of health and aging throughout life.



**FIGURE 13.1** Telomeres at the ends of chromosomes.

(a) Telomeres in a newly created cell. (b) With each cell duplication, telomeres shorten; when too short, they expose DNA to damage, and the cell dies.

“cap” to protect the ends from destruction—shortens. Eventually, so little remains that the cells no longer duplicate at all. Telomere shortening acts as a brake against somatic mutations (such as those involved in cancer), which become more likely as cells duplicate. But an increase in the number of senescent cells (ones with short telomeres) also contributes to age-related disease, loss of function, and earlier mortality (Epel et al., 2009; Tchkonja et al., 2013). As the Biology and Environment box above reveals,

researchers have begun to identify health behaviors and psychological states that accelerate telomere shortening—powerful biological evidence that certain life circumstances compromise longevity.

According to an alternative, “random events” theory, DNA in body cells is gradually damaged through spontaneous or externally caused mutations. As these accumulate, cell repair and replacement become less efficient, and abnormal cancerous cells

are often produced. Animal studies confirm an increase in DNA breaks and deletions and damage to other cellular material with age. Similar evidence is accruing for humans (Freitas & Magalhães, 2011).

One hypothesized cause of age-related DNA and cellular abnormalities is the release of **free radicals**—naturally occurring, highly reactive chemicals that form in the presence of oxygen. When oxygen molecules break down within the cell, the reaction strips away an electron, creating a free radical. As it seeks a replacement from its surroundings, it destroys nearby cellular material, including DNA, proteins, and fats essential for cell functioning, thereby increasing the individual's vulnerability to wide-ranging disorders of aging, including cardiovascular disease, neurological impairments, cancer, cataracts, and arthritis (Stohs, 2011). Genes for longevity, some researchers have speculated, might work by defending against free radicals.

But mounting evidence indicates that free radicals are not a major contributor to DNA mutations, cellular damage, and reduced longevity. To the contrary, in some species, elevated free-radical activity—as long as it does not reach toxic levels—is associated with longer life, likely because it serves as a “stress signal” that activates DNA repair systems within cells (Shokolenko, Wilson, & Alexeyev, 2014). These findings may explain why antioxidant dietary supplements, such as vitamin A, beta-carotene, and vitamin E, have consistently failed to reduce the incidence of disease or extend length of life (Bjelakovic, Nikolova, & Gluud, 2013).

Furthermore, scientists have identified certain species with reduced genetic defenses against free-radical activity but with exceptional longevity (Liu, Long, & Liu, 2014). The naked mole rat, the longest-living rodent, has a lifespan of up to 31 years, despite displaying greater age-related DNA damage in some of its organs than seen in the ordinary mouse, which lives no more than 4 years.

In sum, although free-radical damage increases with age, no clear evidence indicates that it triggers biological aging. Rather, it may at times contribute to longevity.

## Aging at the Level of Tissues and Organs

What consequences might age-related DNA and cellular deterioration have for the overall structure and functioning of organs and tissues? There are many possibilities. Among those with clear support is the **cross-linkage theory of aging**. Over time, protein fibers that make up the body's connective tissue form bonds, or links, with one another. When these normally separate fibers cross-link, tissue becomes less elastic, leading to many negative outcomes, including loss of flexibility in the skin and other organs, clouding of the lens of the eye, clogging of arteries, and damage to the kidneys (Diggs, 2008; Kragstrup, Kjaer, & Mackey, 2011). Like other aspects of aging, cross-linking can be reduced by external factors, including regular exercise and a healthy diet.

Gradual failure of the endocrine system, which produces and regulates hormones, is yet another route to aging. An obvious example is decreased estrogen production in women, which culminates in menopause. Because hormones affect many body functions, disruptions in the endocrine system can have widespread effects on health and survival. For example, a gradual drop in growth hormone (GH) is associated with loss of muscle and bone mass, addition of body fat, thinning of the skin, and decline in cardiovascular functioning. In adults with abnormally low levels of GH, hormone therapy can slow these symptoms, but it has serious side effects, including increased risk of fluid retention in tissues, muscle pain, and cancer (Ceda et al., 2010; Sattler, 2013). So far, diet and physical activity are safer ways to limit these aspects of biological aging.

Finally, declines in immune system functioning contribute to many conditions of aging, including increased susceptibility to infectious disease and cancer, changes in blood vessel walls associated with cardiovascular disease, and chronic inflammation of body tissues, which leads to tissue damage and plays a role in many diseases. Decreased vigor of the immune response seems to be genetically programmed, but other aging processes we have considered (such as weakening of the endocrine system) can intensify it (Alonso-Fernández & De la Fuente, 2011; Franceschi & Campisi, 2014). Indeed, combinations of theories—the ones just reviewed as well as others—are needed to explain the complexities of biological aging. With this in mind, let's turn to physical signs and other characteristics of aging.



## Physical Changes

**13.2** Describe the physical changes of aging, paying special attention to the cardiovascular and respiratory systems, motor performance, the immune system, and reproductive capacity.

During the twenties and thirties, changes in physical appearance and declines in body functioning are so gradual that most are hardly noticeable. Later, they will accelerate. The physical changes of aging are summarized in Table 13.1. We will examine several here and take up others in later chapters. Before we begin, let's note that these trends are derived largely from cross-sectional studies. Because younger cohorts have experienced better health care and nutrition, cross-sectional evidence can exaggerate impairments associated with aging. Fortunately, longitudinal evidence is expanding, helping to correct this picture.

## Cardiovascular and Respiratory Systems

During her first month in graduate school, Sharese pored over research articles on cardiovascular functioning. In her African-American extended family, her father, an uncle, and three aunts had died of heart attacks in their forties and fifties. These

**TABLE 13.1**  
**Physical Changes of Aging**

ORGAN OR SYSTEM	TIMING OF CHANGE	DESCRIPTION
Sensory		
Vision	From age 30	As the lens stiffens and thickens, ability to focus on close objects declines. Yellowing of the lens, weakening of muscles controlling the pupil, and clouding of the vitreous (gelatin-like substance that fills the eye) reduce light reaching the retina, impairing color discrimination and night vision. Visual acuity, or fineness of discrimination, decreases, with a sharp drop between ages 70 and 80.
Hearing	From age 30	Sensitivity to sound declines, especially at high frequencies but gradually extending to all frequencies. Change is more than twice as rapid for men as for women.
Taste	From age 60	Sensitivity to the four basic tastes—sweet, salty, sour, and bitter—is reduced as number and distribution of taste buds on the tongue decline.
Smell	From age 60	Loss of smell receptors reduces ability to detect and identify odors.
Touch	Gradual	Loss of touch receptors reduces sensitivity on the hands, particularly the fingertips.
Cardiovascular	Gradual	As the heart muscle becomes more rigid, maximum heart rate decreases, reducing the heart's ability to meet the body's oxygen requirements when stressed by exercise. As artery walls stiffen and accumulate plaque, blood flow to body cells is reduced.
Respiratory	Gradual	Under physical exertion, respiratory capacity decreases and breathing rate increases. Stiffening of connective tissue in the lungs and chest muscles makes it more difficult for the lungs to expand to full volume.
Immune	Gradual	Shrinking of the thymus limits maturation of T cells and disease-fighting capacity of B cells, impairing the immune response.
Muscular	Gradual	As nerves stimulating them die, fast-twitch muscle fibers (responsible for speed and explosive strength) decline in number and size to a greater extent than slow-twitch fibers (which support endurance). Tendons and ligaments (which transmit muscle action) stiffen, reducing speed and flexibility of movement.
Skeletal	Begins in the late thirties, accelerates in the fifties, slows in the seventies	Cartilage in the joints thins and cracks, leading bone ends beneath it to erode. New cells continue to be deposited on the outer layer of the bones, and mineral content of bone declines. The resulting broader but more porous bones weaken the skeleton and make it more vulnerable to fracture. Change is more rapid in women than in men.
Reproductive	In women, accelerates after age 35; in men, begins after age 40	Fertility problems (including difficulty conceiving and carrying a pregnancy to term) and risk of having a baby with a chromosomal disorder increase.
Nervous	From age 50	Brain weight declines as neurons lose water content and die, mostly in the cerebral cortex, and as ventricles (spaces) within the brain enlarge. Development of new synapses and limited generation of new neurons can, in part, compensate for these declines.
Skin	Gradual	Epidermis (outer layer) is held less tightly to the dermis (middle layer); fibers in the dermis and hypodermis (inner layer) thin; fat cells in the hypodermis decline. As a result, the skin becomes looser, less elastic, and wrinkled. Change is more rapid in women than in men.
Hair	From age 35	Grays and thins.
Height	From age 50	Loss of bone strength leads to collapse of disks in the spinal column, leading to a height loss of as much as 2 inches by the seventies and eighties.
Weight	Increases to age 50; declines from age 60	Weight change reflects a rise in fat and a decline in muscle and bone mineral. Since muscle and bone are heavier than fat, the resulting pattern is weight gain followed by loss. Body fat accumulates on the torso and decreases on the extremities.

Sources: Arking, 2006; Feng, Huang, & Wang, 2013; Lemaitre et al., 2012.

tragedies prompted Sharese to enter the field of public health in hopes of finding ways to relieve health problems among black Americans. The prevalence of *hypertension*, or high blood pressure, is 13 percent higher in the U.S. black than in the U.S. white population; the African-American rate of death from heart

disease (the number one cardiovascular cause) is 40 percent higher (Mozaffarian et al., 2015).

Sharese was surprised to learn that fewer age-related changes occur in the heart than we might expect, given that heart disease is a leading cause of death throughout adulthood,

responsible for as many as 10 percent of U.S. male and 5 percent of U.S. female deaths between ages 20 and 34—figures that more than double in the following decade and, thereafter, continue to rise steadily with age (Mozaffarian et al., 2015). In healthy individuals, the heart's ability to meet the body's oxygen requirements under typical conditions (as measured by heart rate in relation to volume of blood pumped) does not change during adulthood. Only during stressful exercise does heart performance decline with age—a change due to a decrease in maximum heart rate and greater rigidity of the heart muscle (Arking, 2006). Consequently, the heart has difficulty delivering enough oxygen to the body during high activity and bouncing back from strain.

One of the most serious diseases of the cardiovascular system is *atherosclerosis*, in which heavy deposits of plaque containing cholesterol and fats collect on the walls of the main arteries. If present, it usually begins early in life, progresses during middle adulthood, and culminates in serious illness. Atherosclerosis is multiply determined, making it hard to separate the contributions of biological aging from individual genetic and environmental influences. The complexity of causes is illustrated by research indicating that before puberty, a high-fat diet produces only fatty streaks on the artery walls (Oliveira, Patin, & Escrivao, 2010). In sexually mature adults, however, it leads to serious plaque deposits, suggesting that sex hormones may heighten the insults of a high-fat diet.

Cardiovascular disease has decreased considerably since the mid-twentieth century, with a larger drop during the past two decades due to a decline in cigarette smoking, improved diet and exercise among at-risk individuals, and better medical detection and treatment of high blood pressure and cholesterol (Mozaffarian et al., 2015). And as a longitudinal follow-up of an ethnically diverse sample of U.S. black and white 18- to 30-year-olds revealed, those at low risk—defined by not smoking, normal body weight, healthy diet, and regular physical activity—were far less likely to be diagnosed with symptoms of heart disease over the succeeding two decades (Liu et al., 2012). Later, when we consider health and fitness, we will see why heart attacks were so common in Sharese's family—and why they occur at especially high rates in the African-American population.

Like the heart, the lungs show few age-related changes in functioning at rest, but during physical exertion, respiratory volume decreases and breathing rate increases with age. Maximum vital capacity (amount of air that can be forced in and out of the lungs) declines by 10 percent per decade after age 25. Connective tissue in the lungs, chest muscles, and ribs stiffens with age, making it more difficult for the lungs to expand to full volume (Lowery et al., 2013; Wilkie et al., 2012). Fortunately, under normal conditions, we use less than half our vital capacity. Nevertheless, aging of the lungs contributes to older adults' difficulty in meeting the body's oxygen needs while exercising.

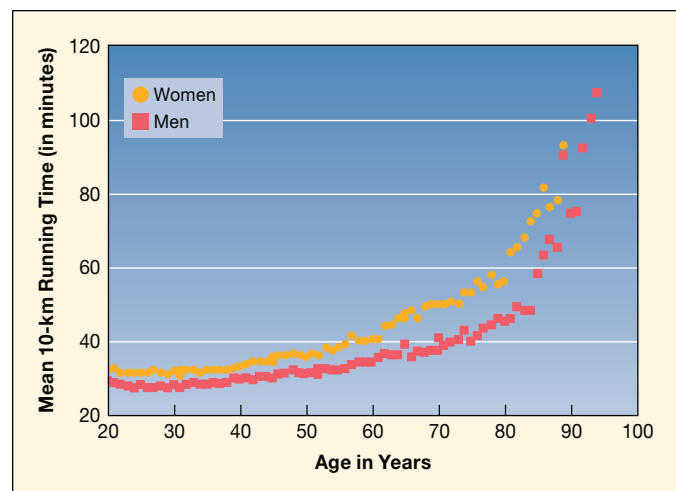
## Motor Performance

Declines in heart and lung functioning under conditions of exertion, combined with gradual muscle loss, lead to changes in

motor performance. In most people, the impact of biological aging on motor skills is difficult to separate from decreases in motivation and practice. Therefore, researchers study competitive athletes, who try to attain their very best performance in real life (Tanaka & Seals, 2008). As long as athletes continue intensive training, their attainments at each age approach the limits of what is biologically possible.

Many athletic skills peak between ages 20 and 35, then gradually decline. In several investigations, the mean ages for best performance of Olympic and professional athletes in a variety of sports were charted over time. Absolute performance in most events improved over the past century. Athletes continually set new world records, suggesting improved training methods. But ages of best performance remained relatively constant. Athletic tasks that require speed of limb movement, explosive strength, and gross-motor coordination—sprinting, jumping, and tennis—typically peak in the early twenties. Those that depend on endurance, arm-hand steadiness, and aiming—long-distance running, baseball, and golf—usually peak in the late twenties and early thirties (Morton, 2014; Schulz & Curnow, 1988). Because these skills require either stamina or precise motor control, they take longer to perfect.

Research on outstanding athletes tells us that the upper biological limit of motor capacity is reached in the first part of early adulthood. How quickly do athletic skills weaken in later years? Longitudinal research on master runners reveals that as long as practice continues, speed drops only slightly from the mid-thirties into the sixties, when performance falls off at an accelerating pace (see Figure 13.2) (Tanaka & Seals, 2003, 2008; Trappe, 2007). In the case of long-distance triathlon performance, which combines



**FIGURE 13.2** Ten-kilometer running times with advancing age, based on longitudinal performances of hundreds of master athletes.

Runners maintain their speed into the mid-thirties, followed by modest increases in running times into the sixties, with a progressively steeper increase thereafter. (From H. Tanaka & D. R. Seals, 2003, "Dynamic Exercise Performance in Masters Athletes: Insight into the Effects of Primary Human Aging on Physiological Functional Capacity," *Journal of Applied Physiology*, 5, p. 2153. © The American Physiological Society (APS). All rights reserved. Adapted with permission.)





MICHAEL KAPPELER/PICTURE-ALLIANCE/DPA/AP IMAGES

These professional athletes, ranging in age from 21 to 30 years, compete for the title of 2015 world champion in the men's 200-meter finals. Sprinting, which requires speed of limb movement and explosive strength, typically peaks in the early twenties.

running, swimming, and cycling, the decline in speed is even more gradual: The accelerating performance drop-off is delayed until the seventies, due to its non-weight-bearing swimming and cycling components (Lepers, Knechtle, & Stapley, 2013).

Indeed, sustained training leads to adaptations in body structures that minimize motor declines. For example, vital capacity is one-third greater in both younger and older active sports participants than in healthy, inactive age-mates (Zaccagni, Onisto, & Gualdi-Russo, 2009). Training also slows muscle loss, increases speed and force of muscle contraction, and leads fast-twitch muscle fibers to be converted into slow-twitch fibers, which support excellent long-distance running performance and other endurance skills (Faulkner et al., 2007). In a study of hundreds of thousands of amateur marathon competitors, 25 percent of the 65- to 69-year-old runners were faster than 50 percent of the 20- to 54-year-old runners (Leyk et al., 2010). And in exceptional instances, outstanding older athletes show startling performance gains with age. For example, in the Ironman Triathlon World Championship, the top male finisher in the 70- to 74-year-old age group in 2010 improved his 2012 performance by nearly an hour (Lepers, Knechtle, & Stapley, 2013). Modest gains have even been observed among 80-year-old competitors.

In sum, although athletic skills are at their best in early adulthood, biological aging accounts for only a small part of age-related declines until advanced old age. Lower levels of performance by healthy people into their sixties and seventies largely reflect reduced capacities resulting from adaptation to a less physically demanding lifestyle.

## Immune System

The immune response is the combined work of specialized cells that neutralize or destroy antigens (foreign substances) in the body. Two types of white blood cells play vital roles. *T cells*,

which originate in the bone marrow and mature in the thymus (a small gland located in the upper part of the chest), attack antigens directly. *B cells*, manufactured in the bone marrow, secrete antibodies into the bloodstream that multiply, capture antigens, and permit the blood system to destroy them. Because receptors on their surfaces recognize only a single antigen, T and B cells come in great variety. They join with additional cells to produce immunity.

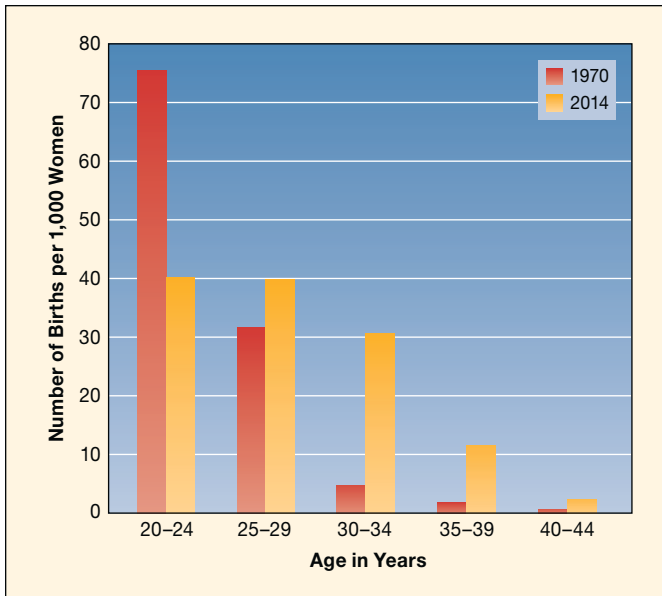
The capacity of the immune system to offer protection against disease increases through adolescence and declines after age 20. The trend is partly due to changes in the thymus, which is largest during the teenage years, then shrinks until it is barely detectable by age 50. As a result, production of thymic hormones is reduced, and the thymus is less able to promote full maturity and differentiation of T cells (Denkinger et al., 2015). Because B cells release far more antibodies when T cells are present, the immune response is compromised further.

Withering of the thymus is not the only reason that the body gradually becomes less effective in warding off illness. The immune system interacts with the nervous and endocrine systems. For example, psychological stress can weaken the immune response. During final exams, Sharese was less resistant to colds. And in the month after her father died, she had great difficulty recovering from the flu. Conflict-ridden relationships, caring for an ill aging parent, sleep deprivation, and chronic depression can also reduce immunity. And physical stress—from pollution, allergens, poor nutrition, and rundown housing—undermines immune functioning throughout adulthood (Cruces et al., 2014; Fenn, Corona, & Godbout, 2014). When physical and psychological stressors combine, the risk of illness is magnified.

## Reproductive Capacity

Sharese was born when her mother was in her early twenties. At the same age a generation later, Sharese was embarking on several years of graduate school, prioritizing education and career. Many people believe that pregnancy during the twenties is ideal, not only because of lower risk of miscarriage and chromosomal disorders (see Chapter 2) but also because younger parents have more energy to keep up with active children. Nevertheless, as Figure 13.3 on the following page reveals, first births to women in their thirties have increased greatly over the past three decades. Many people are delaying childbearing until their education is complete, their vocational lives are well-established, and they know they can support a child.

Nevertheless, reproductive capacity does decline with age. Between ages 15 and 29, 11 percent of U.S. married childless women report fertility problems, a figure that rises to 14 percent among 30- to 34-year-olds, 39 percent among 35- to 39-year-olds, and 47 percent among 40- to 44-year-olds. Recall, also, that after 35, the success of reproductive technologies drops sharply with age (see page 52 in Chapter 2) (Chandra, Copen, & Stephen, 2013). Because the uterus shows no consistent changes from the late thirties through the forties, the decline in female fertility is



**FIGURE 13.3** First births to American women of different ages in 1970 and 2014. The birthrate decreased for women 20 to 24 years of age, whereas it increased for women 25 years of age and older. For women in their thirties, the birthrate increased sixfold, and for those in their early forties, it doubled. Similar trends have occurred in other industrialized nations. (Based on Hamilton et al., 2015.)

largely due to reduced number and quality of ova. In many mammals, including humans, a certain level of reserve ova in the ovaries is necessary for conception (American College of Obstetricians and Gynecologists, 2014; Balasch, 2010). Some women have normal menstrual cycles but do not conceive because their reserve of ova is too low.

In males, semen volume and sperm motility decrease gradually after age 35, contributing to reduced fertility. In addition, the percentage of abnormal sperm rises, which elevates miscarriage rates and diminishes the success of reproductive technologies, irrespective of maternal age (Belloc et al., 2014). Although there is no best time in adulthood to begin parenthood, individuals who postpone childbearing until their late thirties or their forties risk having fewer children than they desired or none at all.

## Ask yourself

**CONNECT** How do heredity and environment jointly contribute to age-related changes in cardiovascular, respiratory, and immune system functioning?

**APPLY** Penny is a long-distance runner for her college track team. What factors will affect Penny's running performance 30 years from now?

**REFLECT** Before reading this chapter, had you thought of early adulthood as a period of aging? Why is it important for young adults to be aware of influences on biological aging?



## Health and Fitness

**13.3** Describe the influence of SES, nutrition, and exercise on health, and discuss obesity in adulthood.

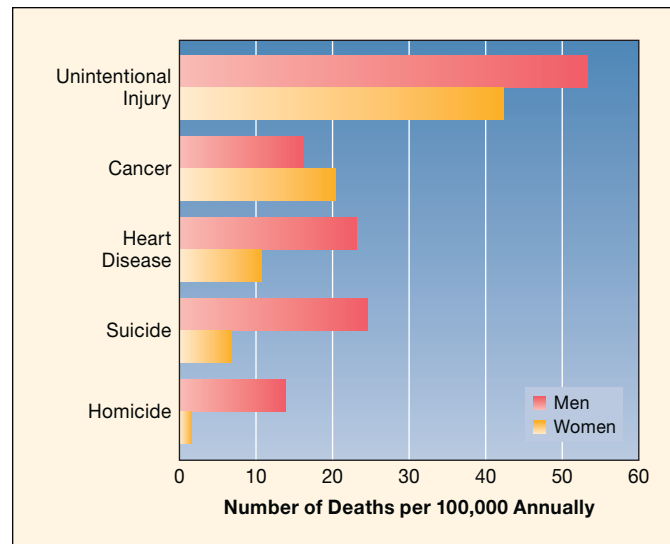
**13.4** What are the most commonly abused substances, and what health risks do they pose?

**13.5** Describe sexual attitudes and behavior of young adults, and discuss sexually transmitted infections and sexual coercion.

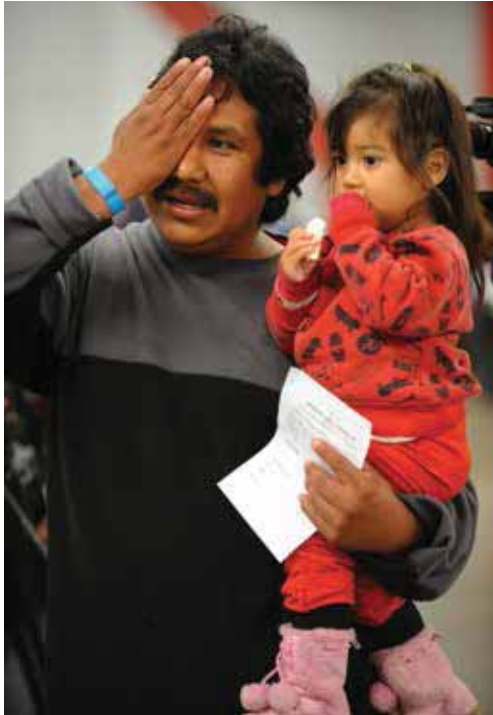
**13.6** How does psychological stress affect health?

Figure 13.4 displays leading causes of death in early adulthood in the United States. Death rates for all causes exceed those of many other industrialized nations (OECD, 2015b). A combination of factors, including higher rates of poverty and extreme obesity, more lenient gun-control policies, and historical lack of universal health insurance in the United States, is likely responsible. In later chapters, we will see that homicide rates decline with age, while disease and physical disability rates rise. Biological aging clearly contributes to this trend. But, as we have noted, wide individual and group differences in physical changes are linked to environmental risks and health-related behaviors.

SES variations in health over the lifespan reflect these influences. With the transition from childhood to adulthood, health inequalities associated with SES increase; income, education, and occupational status show strong, continuous relationships with almost every disease and health indicator (Agigoroaei, 2016). Furthermore, SES largely accounts for the sizable health



**FIGURE 13.4** Leading causes of death between 25 and 44 years of age in the United States. Nearly half of unintentional injuries are motor vehicle accidents. As later chapters will reveal, unintentional injuries remain a leading cause of death at older ages, rising sharply in late adulthood. Rates of cancer and cardiovascular disease rise steadily during middle and late adulthood. Except for cancer, men are more vulnerable than women to each leading cause. From what you learned in earlier chapters, can you explain these sex differences? (Based on Heron, 2015.)



ROBYN BECK/AFP/GETTY IMAGES

SES variations in health in the United States—larger than in other industrialized nations—are due to diverse health-related circumstances and habits plus insufficient access to high-quality, affordable health care. This Los Angeles free clinic helps address these problems by offering preventive services, including eye exams, to over 1,200 patients per day.

advantage of white over ethnic minority adults in the United States (Phuong, Frank, & Finch, 2012). Consequently, improving socioeconomic conditions is essential for closing ethnic gaps in health.

Health-related circumstances and habits—stressful life events, crowding, pollution, diet, exercise, overweight and obesity, substance abuse, jobs with numerous health risks, and availability of supportive social relationships—underlie SES health disparities (Smith & Infurna, 2011). Furthermore, poor health in childhood, which is linked to low SES, affects health in adulthood. The overall influence of childhood factors lessens if SES improves. But in most instances, child and adult SES remain fairly consistent, exerting a cumulative impact that amplifies SES differences in health with age (Matthews & Gallo, 2011; Wickrama et al., 2015).

Why are SES variations in health and mortality larger in the United States than in other industrialized nations? Besides lack of universal health insurance, low-income and poverty-stricken U.S. families are financially less well-off than families classified in these ways in other countries (Avendano & Kawachi, 2014). In addition, SES groups in the United States experience greater inequalities in environmental factors that affect health, such as housing, pollution, education, and community services.

These findings reveal, once again, that the living conditions that nations and communities provide combine with those that

people create for themselves to affect physical aging. Because the incidence of health problems is much lower during the twenties and thirties than later on, early adulthood is an excellent time to prevent later problems. In the following sections, we take up a variety of major health concerns—nutrition, exercise, substance abuse, sexuality, and psychological stress.

## Nutrition

Bombarded with advertising claims and an extraordinary variety of food choices, adults find it increasingly difficult to make wise dietary decisions. An abundance of food, combined with a heavily scheduled life, means that most Americans eat because they feel like it or because it is time to do so rather than to maintain the body's functions (Donatelle, 2015). As a result, many eat the wrong types and amounts of food. Overweight and obesity and diets high in sugar, fat, and processed foods are widespread nutritional problems with long-term consequences for adult health.

**Overweight and Obesity.** In Chapter 9, we noted that obesity (a greater than 20 percent increase over average body weight, based on age, sex, and physical build) has increased dramatically in many Western nations, and it is on the rise in the developing world as well. Among adults, a body mass index (BMI) of 25 to 29 constitutes overweight, a BMI of 30 or greater (amounting to 30 or more excess pounds) constitutes obesity. The U.S. adult obesity rate has continued to climb, recently reaching 38 percent. Obesity is especially prevalent among certain ethnic minorities, including Native Americans (41 percent), Hispanics (43 percent), and African Americans (48 percent) (Ogden et al., 2014). More African-American and Hispanic women than men are affected.

Overweight—a less extreme but nevertheless unhealthy condition—affects an additional 34 percent of Americans. Combine the rates of overweight and obesity and the total, 72 percent, makes Americans the heaviest people in the world (OECD, 2015a; Ogden et al., 2014). Notice that the U.S. obesity rate exceeds its rate of overweight—a blatant indicator of the epidemic scale of the problem.

Recall from Chapter 9 that overweight children and adolescents are very likely to become overweight adults. But a substantial number of people show large weight gains in adulthood, most often between ages 25 and 50. And young adults who were already overweight or obese typically get heavier, leading obesity rates to rise steadily between ages 20 and 60 (Ogden et al., 2014). Among immigrants, rates of overweight and obesity increase with length of time in the United States (Singh & Linn, 2013). First-generation adults (U.S. born with immigrant parents) have much higher odds of becoming obese than their foreign-born counterparts.

**Causes and Consequences.** As noted in Chapter 9, heredity makes some people more vulnerable to obesity than others. But environmental pressures underlie the rising rates of obesity in

industrialized nations: With the decline in need for physical labor in the home and workplace, our lives have become more sedentary. Meanwhile, the average number of calories and amount of sugar and fat consumed by Americans rose over most of the twentieth and early twenty-first century, with a sharp increase after 1970 (Cohen, 2014). Since then, low-cost, calorie-dense convenience foods and portion-supersizing have become widespread; eating out has escalated with women's increased participation in the labor force; and physical activity has declined as adults spend more time in sedentary transportation, jobs, and leisure activities—driving to and from work; sitting throughout the day, often behind a computer; and watching, on average, four hours of TV per day.

Adding some weight between ages 25 and 50 is a normal part of aging because **basal metabolic rate (BMR)**, the amount of energy the body uses at complete rest, gradually declines as the number of active muscle cells (which create the greatest energy demand) drops off. But excess weight is strongly associated with serious health problems—including type 2 diabetes, heart disease, and many forms of cancer—and with early death (see page 297 in Chapter 9).

Furthermore, overweight adults suffer enormous social discrimination. Compared with their normal-weight agemates, they are less likely to find mates, be rented apartments, receive financial aid for college, or be offered jobs. And they report frequent mistreatment by family members, peers, co-workers, and health professionals (Ickes, 2011; Puhl, Heuer, & Brownell, 2010). Since the mid-1990s, discrimination experienced by overweight Americans has increased, with serious physical and mental health consequences. Weight stigma triggers anxiety, depression, and low self-esteem, which increase the likelihood that unhealthy eating behaviors will worsen. The more discrimination overweight people report, the greater their chances for becoming obese or—if already obese—remaining so (Sutin & Terracciano, 2013). The widespread but incorrect belief, perpetuated by the media, that obesity is a personal choice promotes negative stereotyping of obese persons.

**Treatment.** Because obesity climbs in early and middle adulthood, treatment for adults should begin as soon as possible—preferably in the early twenties. Even moderate weight loss reduces health problems substantially (Poobalan et al., 2010). But successful intervention is difficult. Most individuals who start a weight-loss program return to their original weight, and sometimes to a heavier weight, within two years (Wadden et al., 2012). The high rate of failure is partly due to limited evidence on just how obesity disrupts the complex neural, hormonal, and metabolic factors that maintain a normal body-weight set point. Until more information is available, researchers are examining the features of treatments and participants linked to greater success. The following elements promote lasting behavior change:

- *A lifestyle change to a nutritious diet lower in calories, plus regular exercise.* To lose weight and maintain the loss, Sharese sharply reduced calories in her diet and exercised regularly. The precise balance of dietary protein, carbohydrate,

and fats that best helps adults lose weight is a matter of heated debate. Although scores of diet books offer different recommendations, no clear-cut evidence exists for the long-term superiority of one approach over others (Wadden et al., 2012). Calorie reduction rather than dietary composition predicts weight loss, though restricting sugar and fat yields substantial health benefits.

A permanent lifestyle alteration that restricts calorie intake while increasing physical activity is essential for countering a genetic tendency toward overweight. The weight regain experienced by most dieters is sharply reduced when high levels of regular, sustained physical activity (such as an hour per day of brisk walking) become part of their lifestyle (Kushner, 2012). But most people mistakenly believe that only temporary lifestyle changes are needed (MacLean et al., 2011).

- *Training participants to keep an accurate record of food intake and body weight.* About 30 to 35 percent of obese people are convinced they eat less than they do. And although they have continued to gain weight, American adults generally report weight losses—suggesting that they are in denial about the seriousness of their weight condition (Wetmore & Mokdad, 2012). Furthermore, about 30 percent have problems with binge eating—a behavior associated with weight-loss failure (Pacanowski et al., 2014).

As Sharese recognized how often she ate when not actually hungry and regularly recorded her weight, she was better able to limit food intake. Following a diet that prescribes



AP PHOTO/THE DAILY RECORD, MAXIMILIAN FRANZ

A young adult has her weight checked by a nutrition counselor near the end of a 90-day weight-loss program. Keeping an accurate record of food intake and body weight is an important element in losing weight and keeping it off.

portion-controlled servings to help control intake is associated with considerably greater weight loss (Kushner, 2012).

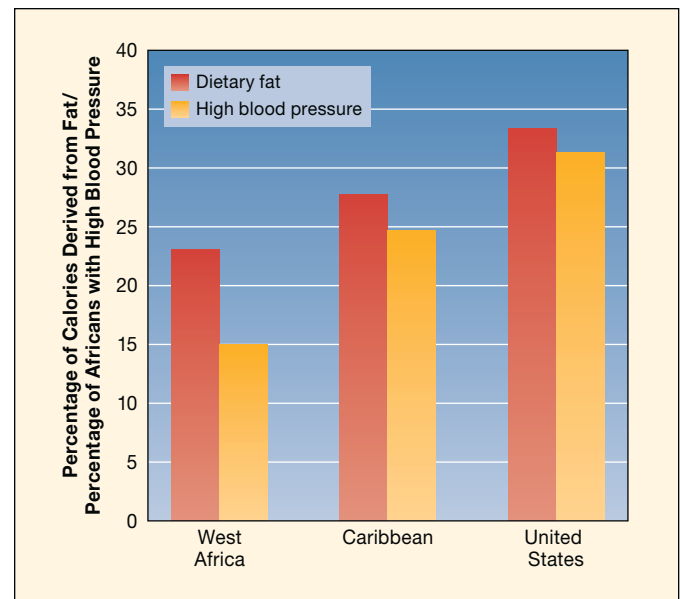
- **Social support.** Group or individual counseling and encouragement from friends and relatives help sustain weight-loss efforts by fostering self-esteem and self-efficacy (Poobalan et al., 2010). Once Sharese decided to act, with the support of her family and a weight-loss counselor, she felt better about herself even before the first pounds were shed.
- **Teaching problem-solving skills.** Most overweight adults do not realize that because their body has adapted to overweight, difficult periods requiring high self-control and patience are inevitable in successful weight loss (MacLean et al., 2011). Acquiring cognitive and behavioral strategies for coping with tempting situations and periods of slowed progress is associated with long-term change (Poelman et al., 2014). Weight-loss maintainers are more likely than individuals who relapse to be conscious of their behavior, to use social support, and to confront problems directly.
- **Extended intervention.** Longer treatments (from 25 to 40 weeks) that include the components listed here grant people time to develop new habits.

Although many Americans on weight-reduction diets are overweight, an estimated 25 to 65 percent of normal-weight adults view themselves as too heavy and are trying to lose weight (Nissen & Holm, 2015). Recall from Chapter 11 that the high value placed on thinness creates unrealistic expectations about desirable body weight and contributes to anorexia, bulimia, and binge eating disorder, which remain common in early adulthood (see pages 378–379). Throughout adulthood, both underweight and obesity are associated with increased mortality (Cao et al., 2014). A sensible body weight—neither too low nor too high—predicts physical and psychological health and longer life.

**Dietary Fat.** During college, Sharese altered the diet of her childhood and adolescent years, sharply limiting red meat, eggs, butter, and fried foods. The federal government’s Dietary Guidelines for Americans recommend that no more than 10 percent of total caloric intake be made up of saturated fat, which generally comes from meat and dairy products and is solid at room temperature (U.S. Department of Agriculture, 2016). No dietary limits are placed on healthy, unsaturated fats, found in most types of vegetable oil.

Research indicates that saturated fat, especially from meat, plays a role in the age-related rise in cardiovascular disease, breast cancer, and colon cancer (Ferguson, 2010; Sieri et al., 2014). In contrast, consuming unsaturated fat, especially in the form of linoleic acid—which is plentiful in corn, soybean, and safflower oils and in nuts and seeds—is linked to reduced cardiovascular disease mortality (Guasch-Ferré et al., 2015; Wu et al., 2014).

When we consume excessive saturated fat, some is converted to cholesterol, which accumulates as plaque on the arterial walls in atherosclerosis. Earlier in this chapter, we noted that atherosclerosis is determined by multiple biological and environmental factors. But saturated fat consumption (along with other



**FIGURE 13.5** Dietary fat and prevalence of high blood pressure among Africans in West Africa, the Caribbean, and the United States.

The three regions represent the historic path of the slave trade and, therefore, have genetically similar populations. As dietary fat increases, high blood pressure and heart disease rise. Both are particularly high among African Americans. (Based on Luke et al., 2001.)

societal conditions) is an important contributor to the high rate of heart disease in the U.S. black population. As Figure 13.5 shows, when researchers compared Africans in West Africa, the Caribbean, and the United States (the historic path of the slave trade), dietary fat increased, and so did high blood pressure and heart disease (Luke et al., 2001). In a survey of a large sample of inner-city African Americans experiencing financial and other stressors, those who consumed foods lower in fat said that neighborhood availability and affordability influenced their dietary choices (Eyler et al., 2004).

A vital goal of public health strategies aimed at improving nutrition and reducing the risk of chronic diseases is inducing people to replace saturated fat with unsaturated fat and with complex carbohydrates (whole grains, fruits, and vegetables), which are beneficial to cardiovascular health and protective against colon cancer (Kaczmarczyk, Miller, & Freund, 2012). Furthermore, regular exercise can reduce the harmful influence of saturated fat because it creates chemical byproducts that help eliminate cholesterol from the body.

## Exercise

Three times a week over the noon hour, Sharese delighted in running, making her way to a wooded trail that cut through a picturesque area of the city. Regular exercise kept her fit and slim, and she noticed that she caught fewer respiratory illnesses than in previous years, when she had been sedentary and overweight. As Sharese explained to a friend, “Exercise gives me a positive outlook and calms me down. Afterward, I feel a burst of energy that gets me through the day.”

Although most Americans are aware of the health benefits of exercise, only 50 percent of young adults engage in the nationally recommended 150 minutes per week of at least moderately intense leisure-time physical activity. And just 24 percent engage in the recommended two sessions per week of resistance exercises, which place a moderately stressful load on each of the major muscle groups. In early adulthood, about 40 percent of Americans are inactive, with no regular brief sessions of even light activity (U.S. Department of Health and Human Services, 2015). More women than men are inactive. And inactivity is greater among low-SES adults, who live in less safe neighborhoods, have more health problems, experience less social support for exercising regularly, and feel less personal control over their health. Overweight and obesity along with self-reported poor health are strong predictors of inactivity, irrespective of SES (Valle et al., 2015). Yet increasing physical activity is one of the most powerful means of enhancing general health.

### LOOK and LISTEN

Contact your local parks and recreation department to find out what community supports and services exist to increase adult physical activity. Are any special efforts made to reach low-SES adults?

Besides reducing body fat and building muscle, exercise fosters resistance to disease. Frequent bouts of moderate-intensity exercise enhance the immune response, lowering the risk of colds or flu and promoting faster recovery from these illnesses (Donatelle, 2015). Furthermore, physical activity is linked to reduced incidence of several types of cancer, with the strongest findings for breast and colon cancer (Fedewa et al., 2015). Physically active people are also less likely to develop diabetes and cardiovascular disease (Mehanna, Hamik, & Josephson, 2016). If they do, these illnesses typically occur later and are less severe than among their inactive agemates.

How does exercise help prevent these serious illnesses? First, it reduces the incidence of obesity—a risk factor for heart disease, diabetes, and cancer. In addition, people who exercise probably adopt other healthful behaviors, thereby lowering the risk of diseases associated with high-fat diets, alcohol consumption, and smoking. In animal studies, exercise directly inhibits growth of cancerous tumors—beyond the impact of diet, body fat, and the immune response (de Lima et al., 2008). Exercise also promotes cardiovascular functioning by strengthening the heart muscle, decreasing blood pressure, and producing a form of “good cholesterol” (high-density lipoproteins, or HDLs) that helps remove “bad cholesterol” (low-density lipoproteins, or LDLs) from the artery walls (Donatelle, 2015).

Yet another way that exercise guards against illness is through its mental health benefits. Physical activity reduces anxiety and depression and improves mood, alertness, and energy. Furthermore, EEG and fMRI evidence indicates that exercise enhances neural activity in the cerebral cortex, and it improves overall cognitive functioning (Etnier & Labban, 2012; Kim et al.,



Regular exercise of at least moderate intensity predicts a healthier, longer life. These young adults doing box jumps as part of a fitness program reap both physical and mental health benefits.

2012). The impact of exercise on a “positive outlook,” as Sharese expressed it, is most obvious just after a workout and can last for several hours (Acevedo, 2012). The stress-reducing properties of exercise undoubtedly strengthen immunity to disease. And as physical activity enhances cognitive functioning and psychological well-being, it promotes on-the-job productivity, self-esteem, ability to cope with stress, and life satisfaction.

When we consider the evidence as a whole, it is not surprising that physical activity is associated with substantially lower death rates from all causes. The contribution of exercise to longevity cannot be accounted for by preexisting illness in inactive people. In a Danish longitudinal study of a nationally representative sample of 7,000 healthy 20- to 79-year-olds followed over several decades, mortality was lower among those who increased their leisure-time physical activity from low to either moderate or high than among those who remained consistently inactive (Schnohr, Scharling, & Jensen, 2003).

## Substance Abuse

Alcohol and drug use peaks among U.S. 19- to 25-year-olds and then declines steadily with age. Eager to try a wide range of experiences before settling down to the responsibilities of adulthood, young people of this age are more likely than younger or older individuals to smoke cigarettes, chew tobacco, use marijuana, and take stimulants to enhance cognitive or physical performance (U.S. Department of Health and Human Services, 2015a). Binge drinking, driving under the influence, and experimentation with prescription drugs (such as OxyContin, a highly addictive painkiller) and “party drugs” (such as LSD and MDMA, or Ecstasy, and new substances produced to mimic their effects) also increase, at times with tragic consequences. Risks include brain damage, lasting impairments in cognitive and emotional functioning, and liver, kidney, and heart failure resulting in death (Karila et al., 2015; National Institute on Drug Abuse, 2016a).

Furthermore, when alcohol and drug taking become chronic, they intensify the psychological problems that underlie addiction. As many as 16 percent of 19- to 25-year-olds are substance abusers, with similar rates of men and women seeking treatment (U.S. Department of Health and Human Services, 2014, 2015). Return to Chapter 11, pages 386–387, to review factors that lead to alcohol and drug abuse in adolescence. The same personal and situational conditions are predictive in the adult years. Tobacco, marijuana, and alcohol are the most commonly abused substances.

**Tobacco and Marijuana.** Dissemination of information on the harmful effects of cigarette smoking has helped reduce its prevalence among U.S. adults from 40 percent 50 years ago to 17 percent today (Centers for Disease Control and Prevention, 2015d). Still, smoking has declined very slowly, and most of the drop is among college graduates, with far less change among those who did not finish high school. Furthermore, more men than women smoke, but the gender gap is much smaller today than in the past, reflecting a sharp increase in smoking among young women who did not finish high school.

Although college students' cigarette smoking has decreased over the past 15 years, their use of other forms of tobacco (e-cigarettes and cigars) and, especially, of marijuana has risen (Johnston et al., 2014). Young people seem to have absorbed messages about the health risks of cigarettes, though they minimize the dangers of alternative tobacco sources. And because of legalization of recreational marijuana use in some U.S. states, many young people view marijuana as safe. Yet 30 percent of users experience problematic withdrawal symptoms that result in dependency (National Institute on Drug Abuse, 2016b). And moderate to high marijuana use predicts becoming a chronic cigarette smoker in early adulthood (Brook, Lee, & Brook, 2015).

Compared to marijuana, tobacco use is much more addictive. Of young people who smoke cigarettes, the overwhelming majority started before age 21 (U.S. Department of Health and Human Services, 2015a). And the earlier they began smoking, the greater their daily cigarette use and likelihood of continuing, an important reason that preventive efforts with adolescents and young adults are vital.

The ingredients of cigarette smoke—nicotine, tar, carbon monoxide, and other chemicals—leave their damaging mark throughout the body. As smokers inhale, oxygen delivery to tissues is reduced, and heart rate and blood pressure rise. Over time, exposure to toxins and insufficient oxygen result in damage to the retina of the eye; constriction of blood vessels leading to painful vascular disease; skin abnormalities, including premature aging, poor wound healing, and hair loss; decline in bone mass; decrease in reserve ova, uterine abnormalities, and earlier menopause in women; and reduced sperm count and higher rate of sexual impotence in men (Carter et al., 2015; Dechanet et al., 2011). Other deadly outcomes include increased risk of heart attack, stroke, acute leukemia, melanoma, and cancer of the mouth, throat, larynx, esophagus, lungs, stomach, pancreas, kidneys, and bladder.

Cigarette smoking is the single most important preventable cause of death in industrialized nations. One out of every three young people who become regular smokers will die from a smoking-related disease, and the vast majority will suffer from at least one serious illness (Adhikari et al., 2009). The chances of premature death rise with earlier age of smoking initiation and number of cigarettes consumed. At the same time, the benefits of quitting in early adulthood include return of most disease risks to near-nonsmoker levels within 1 to 10 years. In a study of 1.2 million British women, those who had been regular smokers but stopped before they reached age 30 avoided 97 percent of the elevated risk of premature death from cigarettes. And those who quit before age 40 avoided 90 percent of the added risk (Pirie et al., 2013). Continuing to smoke throughout adulthood reduced life expectancy by 11 years.

Nearly 70 percent of U.S. smokers report having tried to quit during the past year, though just half who saw their doctors in the past year received advice to do so (Centers for Disease Control and Prevention, 2015; Danesh, Paskett, & Ferketich, 2014). Although millions have stopped without help, those who use cessation aids (for example, nicotine gum, nasal spray, or patches, designed to reduce dependency gradually) or enter treatment programs often fail: As many as 90 percent start smoking again within six months (Jackson et al., 2015). Unfortunately, too few treatments last long enough, effectively combine counseling with medications that reduce nicotine withdrawal symptoms, and teach skills for avoiding relapse.

**Alcohol.** National surveys reveal that about 9 percent of men and 5 percent of women in the United States are heavy drinkers, defined as weekly consumption of 15 drinks or more for men and 8 drinks or more for women (U.S. Department of Health and Human Services, 2015a). About one-third of heavy drinkers are *alcoholics*—people who cannot limit their alcohol use.

Alcohol consumption peaks in the late teens and early twenties and then declines steadily with age. Excessive use is particularly high among 18- to 22-year-old college students: 14 percent report heavy drinking and 39 percent binge drinking during the past month, compared with 9 and 33 percent for other people of the same age (National Institute on Alcohol Abuse and Alcoholism, 2015). Alcoholism usually begins during this age range and worsens over the following decade.

Rates of heavy drinking are similar for male and female college students, though women tend to “mature out” of harmful levels of use later than men (Hoepfner et al., 2013). Women also progress more quickly than men to alcohol dependence, in part because their bodies metabolize alcohol more slowly and, therefore, they experience alcohol-related problems at lower drinking levels. Also, whereas men more often drink to enhance positive emotions in social situations, women more often do so in response to stress and negative mood (Brady & Lawson, 2012). As we will see, consuming alcohol to dull awareness of life's problems is more strongly linked to sustained and increased use.

Twin and adoption studies support a moderate genetic contribution to alcoholism. Genes affecting alcohol metabolism and those promoting impulsivity and sensation seeking

(temperamental traits linked to alcohol and other addictions) are involved (Iyer-Eimerbrink & Nurnberger, 2014). But half of alcoholics have no family history of problem drinking.

Alcoholism crosses SES and ethnic lines but is higher in some groups than others. In cultures where alcohol is a traditional part of religious or ceremonial activities, people are less likely to abuse it. Where access to alcohol is carefully controlled and viewed as a sign of adulthood, dependency is more likely—factors that may, in part, explain why college students drink more heavily than young people not enrolled in college (Slutske et al., 2004). Poverty, hopelessness, and a history of physical or sexual abuse in childhood are among factors that sharply increase the risk of excessive drinking (Donatelle, 2015; U.S. Department of Health and Human Services, 2015a).

Alcohol acts as a depressant, impairing the brain's ability to control thought and action. In a problem drinker, it relieves anxiety at first but then induces it as the effects wear off, so the person drinks again, often at higher levels. Chronic alcohol use does widespread physical damage. Its best-known complication is liver disease, but it is also linked to cardiovascular disease, inflammation of the pancreas, irritation of the intestinal tract, bone marrow problems, disorders of the blood and joints, and some forms of cancer. Over time, alcohol causes brain damage, leading to confusion, apathy, inability to learn, and impaired memory (O'Connor, 2012). The costs to society are enormous. About one-third of fatal motor vehicle crashes in the United States involve drivers who have been drinking (U.S. Department of Transportation, 2014). Nearly half of convicted felons are alcoholics, and about half of police activities in large cities involve alcohol-related offenses (McKim & Hancock, 2013). Alcohol frequently plays a part in sexual coercion, including date rape, and in domestic violence.

The most successful treatments combine personal and family counseling, group support, and aversion therapy (use of medication that produces a physically unpleasant reaction to alcohol, such as nausea and vomiting). Alcoholics Anonymous, a

community support approach, helps many people exert greater control over their lives through the encouragement of others with similar problems. Nevertheless, breaking an addiction that has dominated a person's life is difficult; about 50 percent of alcoholics relapse within a few months (Kirshenbaum, Olsen, & Bickel, 2009).

## Sexuality

At the end of the teenage years, nearly 70 percent of U.S. young people have had sexual intercourse; by age 25, nearly all have done so, and the link between sexual activity and economic disadvantage apparent in adolescence (see page 381 in Chapter 11) has diminished (Copen, Chandra, & Febo-Vazquez, 2016). Compared with earlier generations, contemporary adults display a wider range of sexual choices and lifestyles, including non-marital experiences, cohabitation, marriage, and orientation toward a heterosexual or same-sex partner. In this chapter, we explore the attitudes, behaviors, and health concerns that arise as sexual activity becomes a regular event in young people's lives. In Chapter 14, we focus on the emotional side of close relationships.

**Heterosexual Attitudes and Behavior.** One Friday evening, Sharese accompanied her roommate Heather to a young singles bar, where two young men soon joined them. Faithful to her boyfriend, Ernie, whom she had met in college and who worked in another city, Sharese remained aloof for the next hour. In contrast, Heather was talkative and gave one of the men, Rich, her phone number. The next weekend, Heather went out with Rich. On the second date, they had intercourse, but the romance lasted only a few weeks. Aware of Heather's more adventurous sex life, Sharese wondered whether her own was normal. Only after several months of dating exclusively had she and Ernie slept together.

Since the 1950s, public displays of sexuality in movies and the media have steadily increased, fostering the impression that Americans are more sexually active than ever before. What are contemporary adults' sexual attitudes and behaviors really like? Answers were difficult to find until interviews addressing U.S. adults' sex lives first began to be conducted in the late 1980s with large, nationally representative samples. Today, the U.S. federal government regularly gathers such information from samples as large as 10,000 to 30,000 participants (Copen, Chandra, & Febo-Vazquez, 2016; Smith et al., 1972–2014). Additional, smaller-scale survey research has also enhanced our knowledge.

Recall from Chapter 11 that the sex lives of most teenagers do not dovetail with exciting media images. Similarly, although their sexual practices are diverse, adults are far less sexually active than we have come to believe. Monogamous, emotionally committed couples like Sharese and Ernie are more typical (and more satisfied) than couples like Heather and Rich.

Sexual partners, whether dating, cohabiting, or married, tend to be similar in age (within five years), education, ethnicity,



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College students gather for an impromptu spring party. Alcohol consumption peaks in the late teens and early twenties. Among heavy drinkers, women progress more quickly than men to alcohol dependence.





Although online dating sites have become increasingly popular, direct social interaction is vital for assessing one's compatibility with a potential partner.

and (to a lesser extent) religion. In addition, people who establish lasting relationships often meet in conventional ways—through friends or family members, or at school or social events where people similar to themselves congregate (Sprecher et al., 2015). The powerful influence of social networks on sexual choice is adaptive. Sustaining an intimate relationship is easier when adults share interests and values and people they know approve of the match.

Over the past decade, the Internet has become an increasingly popular way to initiate relationships. Among a sample of 2,200 Americans, 11 percent said they had used online dating sites or mobile dating apps. One-fourth of these had met their spouse or a long-term partner in this way, making the Internet the second most common route to meeting a partner, just behind meeting through friends. Furthermore, nearly 30 percent of participants knew someone who had formed an enduring relationship through Internet dating (Pew Research Center, 2013b). Knowing someone who has successfully met a partner online strongly predicts single adults' willingness to engage in Internet dating (Sprecher, 2011). Young people between 25 and 34 are the most avid users of dating sites and apps; 20 percent report having used them.

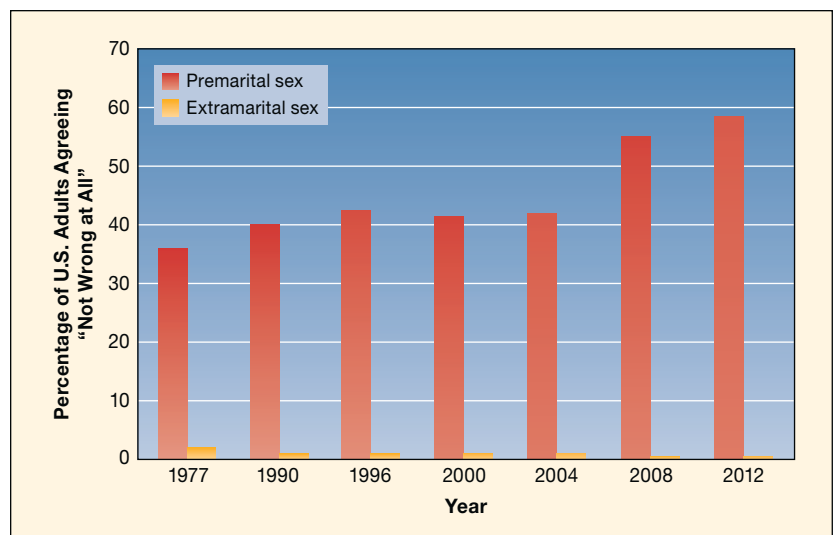
Nevertheless, online dating services sometimes undermine, rather than enhance, the chances of forming a successful relationship. Relying on Internet profiles and online communication omits aspects of direct social interaction that are vital for assessing one's compatibility with a potential partner. Especially when online communication persists for a long time (six weeks or more), people form idealized impressions that often lead to disappointment at face-to-face meetings (Finkel et al., 2012). Furthermore, having a large pool of potential partners from which to choose can promote a persistent "shopping mentality," which reduces online daters' willingness to make a commitment (Heino, Ellison, & Gibbs, 2010). Finally, the

techniques that matching sites claim to use to pair partners—sophisticated analyses of information daters provide—have not demonstrated any greater success than conventional off-line means of introducing people.

Consistent with popular belief, lifetime number of sexual partners (from age 18 on) reported by American adults has risen steadily over the past several decades, from an average of 7 in the late 1980s to 11 in the early 2010s, with men exceeding women by threefold—currently, 18 to 6. As Figure 13.6 shows, acceptance of premarital sex increased, with a sharp rise after the mid-2000s (Twenge, Sherman, & Wells, 2015). Nevertheless, when adults of any age are asked how many partners they have had in the past year, the usual reply—including from 18- to 25-year-olds—is one (Copen, Chandra, & Febo-Vazquez, 2016; Lefkowitz & Gillen, 2006).

What explains the trend toward more relationships in the context of sexual commitment? In the past, dating several partners was followed by marriage. Today, dating more often gives way to cohabitation, which typically leads either to marriage or to breakup. In addition, people are marrying later, and the divorce rate remains high. Together, these factors create more opportunities for new partners.

The college years are marked by an increase in uncommitted sexual encounters, including "hookups" (emotionally uninvolved, casual sex) and "friends with benefits" (casual sex as an add-on to an existing friendship). Estimates indicate that two-thirds or more of contemporary U.S. college students have experienced at least 1 hookup, and as many as one-fourth 10 or more (Halpern & Kaestle, 2014). Although some young people report positive reactions, these encounters often have negative emotional consequences (more so for women), including lower self-esteem, regret, and depressed mood (Lewis et al., 2012). The



**FIGURE 13.6** Percentage of U.S. adults agreeing that premarital sex and extramarital sex are “not wrong at all.” In surveys of nationally representative samples of many thousands of Americans age 18 and older over the past four decades, acceptance of premarital sex increased, rising sharply after the mid-2000s. In contrast, approval of extramarital sex remained consistently low, even showing a recent decline. (Based on Smith et al., 1972–2014.)

prevalence of casual sex on college campuses suggests that young people often use it to gratify sexual needs during a time in which they are not yet ready to invest in an intimate bond.

Still, the majority of U.S. 18- to 29-year-olds say they eventually want to settle down with a mutually exclusive lifetime sexual partner (Halpern & Kaestle, 2015). In line with this goal, most people spend the majority of their lives with one partner. And as Figure 13.6 reveals, approval of extramarital sex remains low among U.S. adults of all ages, even showing a slight recent decline.

How frequently do Americans have sex? Not nearly as often as the media would suggest. One-third of 18- to 59-year-olds have intercourse as often as twice a week, another third have it a few times a month, and the remaining third have it a few times a year or not at all. Three factors affect frequency of sexual activity: age, whether people are cohabiting or married, and how long the couple has been together. Single people have more partners, but this does not translate into more sex! Sexual activity increases through the twenties and (for men) the thirties as people either cohabit or marry. Then it declines, even though hormone levels have not changed much (Herbenick et al., 2010; Langer, 2004). The demands of daily life—working, commuting, taking care of home and children—are probably responsible. Despite the common assumption that sexual practices vary greatly across social groups, the patterns just described are unaffected by education, SES, or ethnicity.

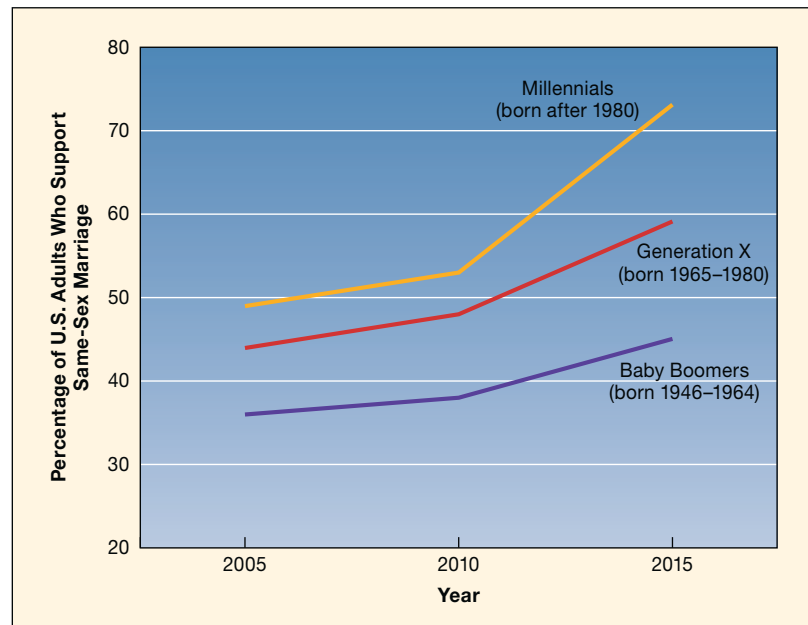
Furthermore, sexual frequency predicts life satisfaction only in the context of a satisfying relationship. But beyond once a week, more frequent sex does not add to happiness (Muise, Schimmack, & Impett, 2015). Among adults in committed relationships, who range considerably in quantity of sexual activity, more than 80 percent report feeling “extremely physically and emotionally satisfied” with their sex lives, a figure that rises to 88 percent for married couples. In contrast, as number of sex partners increases, sexual satisfaction declines sharply (Paik, 2010). These findings challenge two stereotypes—that marriage is sexually dull and that people who engage in casual dating have the “hottest” sex.

A minority of U.S. adults—women more often than men—report persistent sexual problems. For women, the two most frequent difficulties are lack of interest in sex and inability to achieve orgasm. Most often mentioned by men are climaxing too early and anxiety about performance. Sexual difficulties are linked to an array of biological factors, including chronic illnesses such as atherosclerosis and diabetes and use of various drugs. They are also associated with low SES and psychological stress and are more common among people who are not married, have had many partners, and have experienced sexual abuse during childhood or sexual coercion in adulthood (Wincze & Weisberg, 2015). As these findings suggest, a history of unfavorable relationships and sexual experiences increases the risk of sexual dysfunction.

But overall, a completely untroubled physical experience is not essential for sexual happiness. Satisfying sex involves more than technique; it is attained in the context of love and fidelity. In sum, happiness with partnered sex is linked to an emotionally fulfilling relationship, good mental health, and overall contentment with life.

**Sexual Minority Attitudes and Behavior.** The majority of Americans support civil liberties and equal employment opportunities for lesbians, gay men, and bisexuals. And attitudes toward sex and romantic relationships between adults of the same sex have gradually become more accepting: Overall, more than half of U.S. adults favor allowing same-sex couples to marry legally—society’s official recognition of a sexual relationship (Pew Research Center, 2015d). As Figure 13.7 shows, members of the Millennial generation, born after 1980, are the most accepting of same-sex marriage, though acceptance has risen dramatically among all generations.

Sexual minorities’ political activism and greater openness about their sexual orientation have contributed to gains in acceptance. Exposure and interpersonal contact reduce negative attitudes; those who know many lesbian and gay people are highly accepting. Other than Millennials, who show no gender difference in acceptance, heterosexual men judge sexual minorities (especially gay men) more negatively than do heterosexual women, likely because of men’s greater concern with gender-role conformity (Clarke, Marks, & Lykins, 2015; Pew Research Center, 2015b). Acceptance is greatest among highly educated people who are low in religiosity.



**FIGURE 13.7** Percentage of U.S. adults who support same-sex marriage, by generation. In surveys of nationally representative samples of several thousand Americans age 18 and older, support for allowing same-sex couples to marry legally increased from 2005 to 2015 among all generations. Younger cohorts are the most accepting; nearly three-fourths of Millennials approve of legalized same-sex marriage. (Based on Pew Research Center, 2010b, 2015d.)



THINKSTOCK/COMSTOCK IMAGES/GETTY IMAGES

Gay and lesbian romantic partners, like heterosexual partners, tend to be similar in education and background. With greater openness and political activism, attitudes toward same-sex relationships have become more accepting.

An estimated 3.8 percent of U.S. men and women—more than 8 million adults—identify as lesbian, gay, bisexual, or transgender, with women substantially more likely than men to report a bisexual orientation (Gallup, 2015). But many sexual minority adults do not reveal their sexual orientation in survey research. This unwillingness to answer questions, engendered by a climate of discrimination, has limited researchers' access to information about the sex lives of gay men and lesbians.

The little evidence available indicates that relationships between same-sex partners follow the same patterns as other-sex relationships: People tend to seek out partners similar in education and background to themselves; partners in committed relationships have sex more often and are more satisfied; and the overall frequency of sex is generally moderate, though higher for gay than lesbian couples in early adulthood (Joyner, Manning, & Prince, 2015; Laumann et al., 1994). And in a survey of over 20,000 ethnically diverse men whose most recent sexual event involved a male partner, those who reported feeling love or affection rated sex as more pleasurable. Furthermore, expressions of love or affection for a partner, especially one's regular partner, were common among gay men of all ethnicities—African American, Asian, European American, and Hispanic (Calabrese et al., 2015). These findings challenge negative stereotypes of gay relationships, especially those of black men, as focused on sexual gratification without warmth and tenderness.

Sexual minorities tend to live in or near large cities, where many others share their sexual orientation, or in college towns, where attitudes are more accepting (Hubbard, Gorman-Murray, & Nash, 2015). Living in small communities where prejudice is intense and no social network exists through which to find compatible same-sex partners is isolating, lonely, and predictive of mental health problems (Swank, Frost, & Fahs, 2012). People who identify themselves as gay, lesbian, or bisexual also tend to

be well-educated (McGarrity, 2014). This probably reflects greater social and sexual liberalism among the more highly educated and therefore greater willingness to disclose a minority sexual orientation.

**Sexually Transmitted Infections.** In the United States, one in every four individuals is likely to contract a sexually transmitted infection (STI) at some point in life. Although the incidence is highest between ages 15 and 24 (see page 383 in Chapter 11), STIs continue to be prevalent throughout the twenties, when people accumulate most of their sexual partners yet often do not take appropriate measures to prevent disease transmission (Centers for Disease Control and Prevention, 2015b). Although both men and women are seriously affected, women are at greater risk for long-term health consequences. They are less likely to experience symptoms of the most common infections, which—left untreated—cause infertility and pregnancy complications.

HIV/AIDS remains a serious risk, with gay men bearing the greatest burden for this disease. Many have responded by changing their sexual practices—limiting number of sexual partners, choosing partners more carefully, and using condoms consistently and correctly. Heterosexuals at elevated risk due to a history of many partners have done the same, resulting in declines in HIV diagnoses in some subgroups. Still, the annual number of U.S. new HIV infections—about 50,000—has remained stable since the late 1990s (Centers for Disease Control and Prevention, 2015g). And the incidence of HIV-positive adults is higher in the United States than in any other industrialized nation (OECD, 2015b).

HIV largely spreads through men having sex with men and through heterosexual contact in poverty-stricken minority groups, among whom high rates of intravenous drug abuse coexist with poor health, inadequate education, high life stress, and hopelessness. People overwhelmed by these problems are least likely to take preventive measures. Among low-income African Americans and Hispanics, HIV diagnoses have risen by over 20 percent in the past decade (Centers for Disease Control and Prevention, 2016).

Yet HIV/AIDS can be contained and reduced—through sex education extending from childhood into adulthood and through access to health services, condoms, and clean needles and syringes for high-risk individuals. In view of susceptibility among women, who account for one-fourth of cases in North America and Western Europe and more than half in developing countries, a special need exists for female-controlled preventive measures (Wiringa, Gondwe, & Haggerty, 2015). Drug-based vaginal gels and rings that kill or inactivate the virus have shown promising results and are undergoing further testing.

**Sexual Coercion.** To celebrate the end of final exams, Kelsey, a sophomore at a large university, went to a party at a friend's off-campus apartment, consumed alcohol, and lapsed into a stupor, fading in and out of consciousness. When she awoke, she found herself in a bedroom with another partyer—a male student—on top of her. Though she shouted “no” and tried to push him off, he used force. Then several more men

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Cultural forces, including gender stereotyping and societal acceptance of violence, contribute to the high incidence of sexual coercion. Organizations like Take Back the Night aim to make communities safer by increasing awareness about sexual violence.

joined in (Krakauer, 2015). Hours later, Kelsey reported the attack, but the police suggested that because she was partially conscious, the sex might have been consensual.

An estimated 19 percent of U.S. women, sometime in their lives, have endured *rape*, legally defined as vaginal, anal, or oral penetration with a body part or object by force, by threat of harm, or when the victim is incapable of giving consent (because of alcohol consumption, mental illness, or intellectual disability). About 45 percent of women have experienced other forms of sexual coercion. The majority of victims (nearly 8 out of 10) were first victimized before age 25. The incidence is especially high on college campuses (Centers for Disease Control and Prevention, 2014c; Fedina, Holmes, & Backes, 2016). Like Kelsey, women are vulnerable to acquaintances and strangers, although in most instances their abusers are men they know well. Sexual coercion crosses SES and ethnic lines; people of all walks of life are offenders and victims.

Personal characteristics of perpetrators are far more dependable predictors of sexual coercion than those of victims. Men who commit these acts tend to be manipulative of others, lack empathy and remorse, pursue casual sexual relationships rather than emotional intimacy, approve of violence against women, and accept rape myths (such as “Women really want to be raped”). Perpetrators also interpret women’s social behaviors inaccurately, viewing friendliness as seductiveness, assertiveness as hostility, and resistance as desire (Abbey & Jacques-Tiura, 2011). Furthermore, sexual abuse in childhood, promiscuity in adolescence, and alcohol abuse in adulthood are associated with sexual coercion. Approximately half of all sexual assaults take place while people are intoxicated (Black, 2011).

### LOOK and LISTEN

Obtain from your campus student services or police department the number of sexual assaults reported during the most recent year. What percentage involved alcohol? What prevention and intervention services does your college offer?

Cultural forces also contribute. When men are taught from an early age to be dominant, competitive, and aggressive and women to be submissive and cooperative, the themes of rape are reinforced. Societal acceptance of violence also sets the stage for rape, which typically occurs in relationships in which other forms of aggression are commonplace. Exposure to sexually aggressive pornography and other media images, which portray women desiring and enjoying the assault, also promote sexual coercion by dulling sensitivity to its harmful consequences.

About 2 percent of U.S. men have been victims of rape, and 23 percent victims of other forms of sexual coercion. As with women, men under age 25 are at highest risk (Centers for Disease Control and Prevention, 2014c). Although rape victims report mostly male perpetrators, women are largely responsible for other forms of sexual coercion against men. Victimized men often say that women who committed these acts used threats of physical force or actual force, encouraged them to get drunk, or threatened to end the relationship unless they complied (French, Tilghman, & Malebranche, 2015). Social attitudes toward male victims are especially unsympathetic and blaming. Not surprisingly, few report these crimes.

**Consequences.** Women’s and men’s psychological reactions to rape resemble those of survivors of extreme trauma. Responses include shock, confusion, and symptoms of post-traumatic stress disorder (PTSD)—flashbacks, nightmares, irritability, psychological numbing, and difficulty concentrating—along with chronic fatigue, depression, substance abuse, social anxiety, difficulties with sexuality and intimacy, and suicidal thoughts (Gavey & Senn, 2014; Judson, Johnson, & Perez, 2013). Victims of ongoing sexual coercion may fall into a pattern of extreme passivity and fear of taking any action.

One-third to one-half of female rape victims are physically injured. From 4 to 30 percent contract STIs, and pregnancy results in about 5 percent of cases. Furthermore, victims of rape (and other sexual crimes) report more symptoms of illness across almost all body systems. And they are more likely to engage in negative health behaviors, including smoking and alcohol use (Black, 2011; Schewe, 2007).

**Prevention and Treatment.** Many female rape victims do not get help because fear over provoking another attack keeps them from confiding even in trusted family members and friends. A variety of community services, including safe houses, crisis hotlines, support groups, and legal assistance, exist to help women take refuge from abusive partners, but most are underfunded and cannot reach out to everyone in need. Practically no services are available for victimized men, who are often too embarrassed to come forward.

The trauma induced by rape is severe enough that therapy is vital—both individual treatment to reduce anxiety and depression and group sessions where contact with other survivors helps



## Applying what we Know

### Preventing Sexual Coercion

SUGGESTION	DESCRIPTION
Reduce gender stereotyping and gender inequalities.	The roots of men's sexual coercion of women lie in the historically subordinate status of women, which keeps women economically dependent on men and therefore poorly equipped to avoid partner violence. At the same time, increased public awareness that women commit sexually aggressive acts is needed.
Mandate treatment for both male and female perpetrators.	Ingredients of effective intervention include combating rape myths that victims "wanted it" and are to blame; inducing personal responsibility for coercive behavior; teaching social awareness, social skills, and anger management; and developing a support system to prevent future attacks.
Expand interventions for children and adolescents who have witnessed violence between their parents.	Although most child witnesses to parental violence do not become involved in abusive relationships as adults, they are at increased risk.
Teach both men and women to take precautions that lower the risk of sexual assault.	Risk of sexual assault can be reduced by communicating sexual limits clearly to a date; developing supportive ties to neighbors; increasing the safety of the immediate environment (for example, installing deadbolt locks, checking the back seat of the car before entering); avoiding deserted areas; not walking alone after dark; and leaving parties where alcohol use is high.
Broaden definitions of rape to be gender-neutral.	In a few U.S. states, where the definition of rape is limited to vaginal or anal penetration with a body part, a woman legally cannot rape a man. A universally applied definition that encompasses women as both victims and perpetrators is needed.

counter isolation and self-blame (Street, Bell, & Ready, 2011). Other critical features that foster recovery include

- *Routine screening for victimization* during health-care visits to ensure referral to community services and protection from future harm
- *Validation of the experience*, by acknowledging that many others have been similarly physically and sexually assaulted; that such assaults lead to a wide range of persisting symptoms, are illegal and inappropriate, and should not be tolerated; and that the trauma can be overcome
- *Safety planning*, even when the abuser is no longer present, to prevent recontact and reassault. This includes information about how to obtain police protection, legal intervention, a safe shelter, and other aid should a rape survivor be at risk again.

Finally, many steps can be taken at the level of the individual, the community, and society to prevent sexual coercion. Some are listed in Applying What We Know above.

## Psychological Stress

A final health concern, threaded throughout previous sections, has such a broad impact that it merits a comment of its own. Psychological stress, measured in terms of adverse social conditions, traumatic experiences, negative life events, or daily hassles, is related to a wide variety of unfavorable health outcomes—both unhealthy behaviors and clear physical consequences. Recall from earlier chapters that intense, persistent stress, from the prenatal period on, disrupts the brain's inherent ability to manage

stress, with long-term consequences. For individuals with childhood histories of stress, continuing stressful experiences combine with an impaired capacity to cope with stress, heightening the risk of adult health impairments.

As SES decreases, exposure to diverse stressors rises—an association that plays an important role in the strong connection between low SES and poor health (see pages 444–445). Chronic stress is linked to overweight and obesity, diabetes, hypertension, and atherosclerosis. And in susceptible individuals, acute stress can trigger cardiac events, including heartbeat rhythm abnormalities and heart attacks (Bekkouche et al., 2011; Kelly & Ismail, 2015). These relationships contribute to the high incidence of heart disease in low-income groups, especially African Americans. Compared with higher-SES individuals, low-SES adults show a stronger cardiovascular response to stress, perhaps because they more often perceive stressors as unsolvable (Carroll et al., 2007). Earlier we mentioned that stress interferes with immune system functioning, a link that may underlie its relationship to several forms of cancer. And by reducing digestive activity as blood flows to the brain, heart, and extremities, stress can cause gastrointestinal difficulties, including constipation, diarrhea, colitis, and ulcers (Donatelle, 2015).

The many challenging tasks of early adulthood make it a particularly stressful time of life. Young adults more often report depressive symptoms than middle-aged people, many of whom have attained vocational success and financial security and are enjoying more free time as parenting responsibilities decline (Nolen-Hoeksema & Aldao, 2011). Also, as we will see in Chapters 15 and 16, because of their longer life experience, middle-aged and older adults are better than young adults at coping with stress.

In previous chapters, we repeatedly noted the stress-buffering effect of social support, which continues throughout life. Helping young adults establish and maintain satisfying, caring social ties is as important a health intervention as any we have mentioned.

## Ask yourself

**CONNECT** Describe history-graded influences that have contributed to the obesity epidemic. (To review this aspect of the lifespan perspective, refer to pages 9–10 in Chapter 1.)

**APPLY** Tom had been going to a health club three days a week after work, but job pressures convinced him that he no longer had time for regular exercise. Explain to Tom why he should keep up his exercise regimen, and suggest ways to fit it into his busy life.

**REFLECT** Have you used online dating sites or dating apps? Do you know others who have used them? In your view, what are the strengths and limitations of Internet dating as a way to find a compatible romantic partner?

## COGNITIVE DEVELOPMENT

The cognitive changes of early adulthood are supported by further development of the cerebral cortex, especially the prefrontal cortex and its connections with other brain regions. Pruning of synapses along with growth and myelination of stimulated neural fibers continue, though at a slower pace than in adolescence. These changes result in continued fine-tuning of the *prefrontal cognitive-control network*, which achieves a better balance with the brain's *emotional/social network* as sensation seeking gradually diminishes (see pages 373–374 in Chapter 11). Consequently, planning, reasoning, and decision making improve, supported by major life events of this period—including attaining higher education, entering a career, and grappling with the demands of marriage and child rearing (Taber-Thomas & Perez-Edgar, 2016). Furthermore, fMRI evidence reveals that as young adults become increasingly proficient in a chosen field of endeavor, regions of the cerebral cortex specialized for those activities undergo further *experience-dependent brain growth* (see page 124 in Chapter 4). Besides more efficient functioning, structural changes occur as greater knowledge and refinement of skills result in more cortical tissue devoted to the task and, at times, reorganization of brain areas governing the activity (Lenroot & Giedd, 2006).

How does cognition change in early adulthood? Lifespan theorists have examined this question from three familiar vantage points. First, they have proposed transformations in the structure of thought—new, qualitatively distinct ways of thinking that extend the cognitive-developmental changes of adolescence. Second, adulthood is a time of acquiring advanced knowledge in a particular area, an accomplishment that has important implications for information processing and creativity. Finally, researchers are interested in the extent to which the diverse mental abilities assessed by intelligence tests remain stable or change during the adult years—a topic addressed in Chapter 15.



## Changes in the Structure of Thought

**13.7** Explain how thinking changes in early adulthood.

Sharese described her first year in graduate school as a “cognitive turning point.” As part of her internship in a public health clinic, she observed firsthand the many factors that affect human health-related behaviors. For a time, the realization that everyday dilemmas did not have clear-cut solutions made her intensely uncomfortable. “Working in this messy reality is so different from the problem solving I did in my undergraduate classes,” she told her mother over the phone one day.

Piaget (1967) recognized that important advances in thinking follow the attainment of formal operations. He observed that adolescents prefer an idealistic, internally consistent perspective on the world to one that is vague, contradictory, and adapted to particular circumstances (see Chapter 11, page 393). Sharese’s reflections fit the observations of researchers who have studied **postformal thought**—cognitive development beyond Piaget’s formal operational stage. To clarify how thinking is restructured in adulthood, let’s look at some influential theories, along with supportive research. Together, they show how personal effort and social experiences combine to spark increasingly rational, flexible, and practical ways of thinking that accept uncertainties and vary across situations.

## Epistemic Cognition

The work of William Perry (1981, 1970/1998) provided the starting point for an expanding research literature on the development of *epistemic cognition*. *Epistemic* means “of or about knowledge,” and **epistemic cognition** refers to our reflections on how we arrived at facts, beliefs, and ideas. When mature, rational thinkers reach conclusions that differ from those of others, they consider the justifiability of their conclusions. When they cannot justify their approach, they revise it, seeking a more balanced, adequate route to acquiring knowledge.

**Development of Epistemic Cognition.** Perry wondered why young adults respond in dramatically different ways to the diversity of ideas they encounter in college. To find out, he interviewed Harvard University undergraduates at the end of each of their four years, asking “what stood out” during the previous year. Responses indicated that students’ reflections on knowing changed as they experienced the complexities of university life and moved closer to adult roles—findings confirmed in many subsequent studies (King & Kitchener, 2002; Magolda, Abes, & Torres, 2009; Magolda et al., 2012).

Younger students regarded knowledge as made up of separate units (beliefs and propositions), whose truth could be determined by comparing them to objective standards—standards that exist apart from the thinking person and his or her situation. As a result, they engaged in **dualistic thinking**, dividing information, values, and authority into right and wrong, good and bad,

we and they. As one first-year college student put it, “When I went to my first lecture, what the man said was just like God’s word. I believe everything he said because he is a professor ... and this is a respected position” (Perry, 1981, p. 81). When asked, “If two people disagree on the interpretation of a poem, how would you decide which one is right?” a sophomore replied, “You’d have to ask the poet. It’s his poem” (Clinchy, 2002, p. 67). Dualistic thinkers approach learning by accepting what they are given.

Older students, in contrast, had moved toward **relativistic thinking**, viewing all knowledge as embedded in a framework of thought. Aware of a diversity of opinions on many topics, they gave up the possibility of absolute truth in favor of multiple truths, each relative to its context. As a result, their thinking became more flexible and tolerant. As one college senior put it, “Just seeing how [famous philosophers] fell short of an all-encompassing answer, [you realize] that ideas are really individualized. And you begin to have respect for how great their thought could be, without its being absolute” (Perry, 1970/1998, p. 90). Relativistic thinking leads to the realization that one’s own beliefs are often subjective because several frameworks may satisfy the criterion of internal logical consistency (Sinnott, 2003). Thus, the relativistic thinker is acutely aware that each person, in arriving at a position, creates her own “truth.”

Eventually, the most mature individuals progress to **commitment within relativistic thinking**. Instead of choosing between opposing views, they try to formulate a more personally satisfying perspective that synthesizes contradictions. When considering which of two theories studied in a college course is better or which of several movies most deserves an Oscar, the individual moves beyond the stance that everything is a matter of opinion and generates rational criteria against which options can be evaluated (Moshman, 2013). At the same time, mature thinkers willingly revise their internal belief system when presented with relevant evidence.

By the end of the college years, some students reach this extension of relativism. Adults who attain it generally display a more sophisticated approach to learning, in which they actively seek differing perspectives to deepen their knowledge and understanding and to clarify the basis for their own perspective. Notice how commitment within relativistic thinking involves the information-gathering cognitive style (see page 410 in Chapter 12) and pursuit of personally meaningful beliefs, values, and goals essential to healthy identity development. Mature epistemic cognition also contributes greatly to effective decision making and problem solving.

### Importance of Peer Interaction and Reflection.

Advances in epistemic cognition depend on further gains in metacognition, which are likely to occur in situations that challenge young people’s perspectives and induce them to consider the rationality of their thought processes (Barzilai & Zohar, 2015). In a study of the college learning experiences of seniors scoring low and high in epistemic cognition, high-scoring students frequently reported activities that encouraged them to struggle with realistic but ambiguous problems in a support-



WILL KIRK/HOMEWOODPHOTO/JHU.EDU

A team of university students participates in a global competition to design a more protective, lightweight, and comfortable suit for Ebola workers. Collaboratively tackling challenging, real-world problems leads to gains in epistemic cognition.

ive environment, in which faculty were committed to helping them understand how knowledge is constructed and why it must be subject to revision. For example, an engineering major, in describing an airplane-design project that required advanced epistemic cognition, mentioned his discovery that “you can design 30 different airplanes and each one’s going to have its benefits and there’s going to be problems with each one” (Marra & Palmer, 2004, p. 116). Low-scoring students rarely mentioned such experiences.

In tackling challenging, ill-structured problems, interaction among individuals who are roughly equal in knowledge and authority is beneficial because it prevents acceptance of another’s reasoning simply because of greater power or expertise. When college students were asked to devise the most effective solution to a difficult logical problem, only 3 out of 32 students (9 percent) in a “work-alone” condition succeeded. But in an “interactive” condition, 15 out of 20 small groups (75 percent) arrived at the best answer following extensive discussion (Moshman & Geil, 1998). Whereas few students working alone reflected on their solution strategies, most groups engaged in a process of “collective rationality” in which members challenged one another to justify their reasoning and collaborated in working out the most effective strategy.

Of course, reflection on one’s own thinking can also occur individually. But peer interaction fosters the necessary type of individual reflection: arguing with oneself over competing ideas and strategies and coordinating opposing perspectives into a new, more effective structure. As at earlier ages, peer collaboration remains a highly effective basis for education in early adulthood.

### LOOK and LISTEN

Describe learning experiences in one of your college courses that advanced your epistemic cognition. How did your thinking change?

Perry's theory and the research it stimulated are based on samples of highly educated young adults. These investigators acknowledge that progress in epistemic cognition is probably limited to people confronting the multiplicity of viewpoints typically encountered during a college education and that the most advanced attainment—commitment within relativism—often requires advanced graduate study (Greene, Torney-Purta, & Azevedo, 2010; King & Kitchener, 2002). But the underlying theme—thought less constrained by the need to find one answer to a question and more responsive to its context—is also evident in another theory of adult cognition.

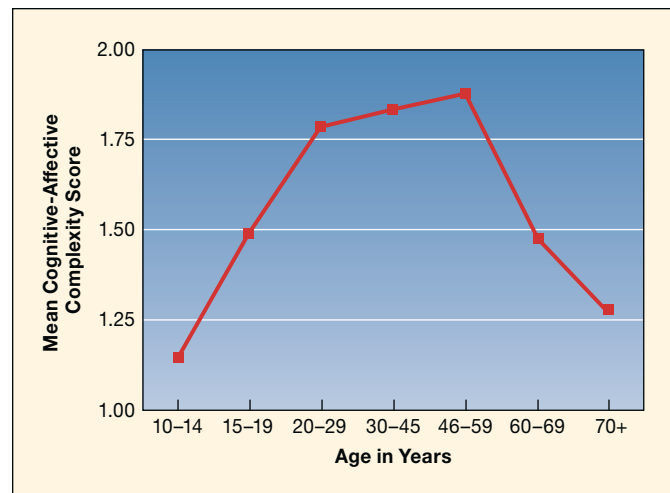
## Pragmatic Thought and Cognitive-Affective Complexity

Gisella Labouvie-Vief's (1980, 1985) portrait of adult cognition echoes features of Perry's theory. Adolescents, she points out, operate within a world of possibility. Adulthood involves movement from hypothetical to **pragmatic thought**, a structural advance in which logic becomes a tool for solving real-world problems.

The need to specialize motivates this change. As adults select one path out of many alternatives, they become more aware of the constraints of everyday life. And in the course of balancing various roles, they accept contradictions as part of existence and develop ways of thinking that thrive on imperfection and compromise. Sharese's friend Christy, a married graduate student and parent of her first child at age 26, illustrates:

I've always been a feminist, and I wanted to remain true to my beliefs in family and career. But this is Gary's first year of teaching high school, and he's saddled with four preparations and coaching the school's basketball team. At least for now, I've had to settle for "give-and-take feminism"—going to school part-time and shouldering most of the child-care responsibilities while he gets used to his new job. Otherwise, we'd never make it financially.

Labouvie-Vief (2003, 2005, 2015) also points out that young adults' enhanced reflective capacities alter the dynamics of their emotional lives: They become more adept at integrating cognition with emotion and, in doing so, again make sense of discrepancies. Examining the self-descriptions of 10- to 80-year-olds diverse in SES, Labouvie-Vief found that from adolescence through middle adulthood, people gained in **cognitive-affective complexity**—awareness of conflicting positive and negative feelings and coordination of them into a complex, organized structure that recognizes the uniqueness of individual experiences (see Figure 13.8) (Labouvie-Vief, 2008; Labouvie-Vief et al., 2007). For example, one 34-year-old combined roles, traits, and diverse emotions into this coherent self-description: "With the recent birth of our first child, I find myself more fulfilled than ever, yet struggling in some ways. My elation is tempered by my gnawing concern over meeting all my responsibilities in a satisfying way while remaining an individualized person with needs and desires."



**FIGURE 13.8** Changes in cognitive-affective complexity from adolescence to late adulthood. Performance, based on responses of several hundred 10- to 80-year-olds' descriptions of their roles, traits, and emotions, increased steadily from adolescence through early adulthood, peaked in middle age, and fell off in late adulthood when (as we will see in later chapters) basic information-processing skills decline. (From G. Labouvie-Vief, 2003, "Dynamic Integration: Affect, Cognition, and the Self in Adulthood," *Current Directions in Psychological Science*, 12, p. 203, copyright © 2003, Sage Publications. Reprinted by permission of SAGE Publications.)

Cognitive-affective complexity promotes greater awareness of one's own and others' perspectives and motivations. As Labouvie-Vief notes, it is a vital aspect of adult *emotional intelligence* (see page 317 in Chapter 9) and is valuable in solving many pragmatic problems. Individuals high in cognitive-affective complexity view events and people in a tolerant, open-minded fashion. And because cognitive-affective complexity involves accepting and making sense of both positive and negative feelings, it helps people regulate intense emotion and, therefore, think rationally about real-world dilemmas, even those that are laden with negative information (Labouvie-Vief, Grünh, & Studer, 2010).

Awareness of multiple truths, integration of logic with reality, and cognitive-affective complexity sum up qualitative transformations in thinking under way in early adulthood. As we will see next, adults' increasingly specialized and context-bound thought, although it closes off certain options, opens new doors to higher levels of competence.



## Expertise and Creativity

### 13.8 What roles do expertise and creativity play in adult thought?

In Chapter 9, we noted that children's expanding knowledge improves their ability to remember new information related to what they already know. For young adults, **expertise**—acquisition of extensive knowledge in a field or endeavor—is supported



by the specialization that begins with selecting a college major or an occupation, since it takes many years to master any complex domain. Experts' curiosity, even passion, for their field fuels this sustained learning. As expertise is attained, it has a profound impact on information processing.

Compared with novices, experts remember and reason more quickly and effectively. The expert knows more domain-specific concepts and represents them in richer ways—at a deeper and more abstract level and as having more features that can be linked to other concepts. As a result, unlike novices, whose understanding is superficial, experts approach problems with underlying principles in mind. For example, a highly trained physicist notices when several problems deal with conservation of energy and can therefore be solved similarly. In contrast, a beginning physics student focuses only on surface features—whether the problem contains a disk, a pulley, or a coiled spring (Chi, 2006; Mayer, 2013). Experts can use what they know to arrive at many solutions automatically—through quick and easy remembering. And when a problem is challenging, they tend to plan ahead, systematically analyzing and categorizing elements and selecting the best from many possibilities, while the novice proceeds more by trial and error.

In addition to effective problem solving, expertise is necessary for creativity (Weissberg, 2006). The creative products of adulthood differ from those of childhood in that they are not just original but also directed at a social or aesthetic need. Mature creativity requires a unique cognitive capacity—the ability to formulate new, culturally meaningful problems and to ask significant questions that have not been posed before (Rostan, 1994). Movement from *problem solving* to *problem finding* is a core feature of postformal thought evident in highly creative artists and scientists.

Case studies support the 10-year rule in development of master-level creativity—a decade between initial exposure to a field and sufficient expertise to produce a creative work. Furthermore, a century of research reveals that creative productivity typically rises in early adulthood, peaks in the late thirties or early forties, and gradually declines, though creative individuals near the end of their careers are usually more productive than those just starting their careers (Simonton, 2012). But exceptions exist. Those who get an early start in creativity tend to peak and drop off sooner, whereas “late bloomers” reach their full stride at older ages. This suggests that creativity is more a function of “career age” than of chronological age.

The course of creativity also varies across disciplines and individuals (Simonton, 2012; Simonton & Damian, 2013). For example, poets, visual artists, and musicians typically show an early rise in creativity, perhaps because they do not need extensive formal education before they begin to produce. Academic scholars and scientists, who must earn higher academic degrees and spend years doing research to make worthwhile contributions, tend to display their achievements later and over a longer time. And whereas some creators are highly productive, others make only a single lifetime contribution.

Though creativity is rooted in expertise, not all experts are creative. Creativity also requires other qualities. A vital ingredient is the capacity to “think intuitively” with a reduced filter—to avoid dismissing information that, at first glance, appears irrelevant. Although this lessened inhibition is a liability in other forms of cognition, it contributes to creators' capacity to think “outside the box”—to come up with numerous, unusual associations that they can capitalize on during the creative process (Carson, Peterson, & Higgins, 2003; Dane et al., 2011).

In personality, creative individuals are tolerant of ambiguity, open to new experiences, persistent and driven to succeed, capable of deep task involvement, and willing to try again after failure (Zhang & Sternberg, 2011). Finally, creativity demands time and energy. For women especially, it may be postponed or disrupted by child rearing, divorce, or an unsupportive partner.

In sum, creativity is multiply determined. When personal and situational factors jointly promote it, creativity can continue for many decades, well into old age.

## Ask yourself

**CONNECT** Why is expertise necessary for creativity? What additional ingredients are essential for creative thought?

**APPLY** For her lifespan development course, Marcia wrote a paper discussing the differing implications of Piaget's and Vygotsky's theories for education. Next, she reasoned that combining the two perspectives is more effective than relying on either position by itself. Explain how Marcia's reasoning illustrates advanced epistemic cognition.

**REFLECT** Describe a classroom experience or assignment in one of your college courses that promoted relativistic thinking.



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Visual artists as well as poets and musicians typically show an early rise in creativity, though they may need a decade or more to produce master-level creative works.



## The College Experience

**13.9** Describe the impact of a college education on young people's lives, and discuss the problem of dropping out.

Looking back at the trajectory of their lives, many people view the college years as formative—more influential than any other period of adulthood. This is not surprising. College serves as a “developmental testing ground,” a time for devoting full attention to exploring alternative values, roles, and behaviors. To facilitate this exploration, college exposes students to a form of “culture shock”—encounters with new ideas and beliefs, new freedoms and opportunities, and new academic and social demands.

Nearly 70 percent of U.S. recent high school graduates enrolled in an institution of higher education. Among college students, 60 percent followed this traditional route of starting college shortly after finishing high school, earning their undergraduate degree by age 24. The remaining 40 percent, who range widely in age, delayed college entry because of financial constraints, family responsibilities, or other life circumstances (U.S. Department of Education, 2015). Most research on the transforming impact of attending college focuses on traditional students between ages 18 and 24. We will consider nontraditional students in Chapter 15.

### Psychological Impact of Attending College

Thousands of studies reveal broad psychological changes from the freshman to the senior year of college (Montgomery & Côté, 2003; Pascarella & Terenzini, 1991, 2005). As research on episodic cognition revealed, students become better at reasoning about problems that have no clear solution, identifying the strengths and weaknesses of opposing sides of complex issues, and reflecting on the quality of their thinking. Their attitudes and values also broaden. They show increased interest in literature, the performing arts, and philosophical and historical issues and greater tolerance for racial and ethnic diversity. Also, as noted in Chapter 12, college leaves its mark on moral reasoning by fostering concern with individual rights and human welfare, sometimes expressed in political activism. Finally, exposure to multiple worldviews encourages young people to look more closely at themselves. During the college years, students develop greater self-understanding, enhanced self-esteem, and a firmer sense of identity.

How do these interrelated changes come about? The impact of college is jointly influenced by the richness of campus academic and out-of-class offerings and students' engagement in those experiences. The more students study and interact with both faculty and diverse peers in academic and extracurricular settings, the more they benefit cognitively—in grasping the complex causes of events, thinking critically, and generating effective problem solutions (Bowman, 2011a). Also, interacting with racially and ethnically mixed peers—both in courses exploring



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Community college students join in a Peace Week activity, keeping pace with the beat of a drum circle. The more students interact with diverse peers in academic and extracurricular settings, the more they benefit cognitively from attending college.

diversity issues and in out-of-class settings—predicts gains in civic engagement. And students who connect their community service experiences with their classroom learning show large cognitive gains (Bowman, 2011b; Parker & Pascarella, 2013). These findings underscore the importance of programs that integrate commuting students into extracurricular campus life.

To what extent are U.S. college students sufficiently engaged in educationally meaningful experiences to transition successfully to the labor market? For research that bears on this question, refer to the Social Issues: Education box on the following page.

### Dropping Out

In the 1970s, the United States ranked first in the world in percentage of young adults with college degrees; today it is twelfth, with just 44 percent of 25- to 34-year-olds having graduated. It lags far behind such countries as Canada, Japan, and South Korea, the global leader—where the rate is 66 percent (OECD, 2014). Major contributing factors are the high U.S. child poverty rate; poor-quality schools in low-income neighborhoods; and high rates of high school dropout among economically disadvantaged, ethnic minority teenagers (see page 402 in Chapter 11). College leaving is also influential: Six years after enrolling at a four-year institution, 42 percent of U.S. students have not earned their degrees. Most dropouts leave within the first year and many within the first six weeks. Dropout rates are higher in colleges with less selective admission requirements (U.S. Department of Education, 2015). And ethnic minority students from low-SES families are, once again, at increased risk of dropping out.

Both personal and institutional factors contribute to college leaving. Most entering freshmen have high hopes for college life but find the transition difficult. Those who have trouble adapting—because of lack of motivation, poor study skills, financial pressures, or emotional dependence on parents—quickly develop negative attitudes toward the college environment. Often these exit-prone students do not meet with their



## Social Issues: Education

### How Important Is Academic Engagement in College for Successful Transition to the Labor Market?

**D**o critical thinking, complex reasoning, and written communication—skills designated by educators and employers as crucial for success in the twenty-first century economy—really matter in college graduates' efforts to secure a satisfying, well-paid job? To find out, researchers gave 1,600 students at 25 U.S. four-year colleges and universities a test of general collegiate learning in the fall of their first year and, again, around the time they graduated (Arum & Roksa, 2014). The students also responded to surveys and in-depth interviews about the meaningfulness of their college experiences. Two years after graduation, they reported on employment outcomes.

Participants' post-college paths varied widely. Some transitioned successfully to challenging work roles that launched them on a career track. But more than half were underemployed (in jobs not requiring a college education) or unemployed. Across institutions varying widely in admission requirements, senior-year collegiate learning scores predicted success at securing jobs requiring bachelor's level skills, along with student reports that their work was both cognitively challenging and personally fulfilling.

Successful graduates were keenly aware of this link between collegiate learning and post-college success. Ashley, who landed a well-paid job as a program coordinator at a senior center, commented that her college in-class

and out-of-class experiences taught her how “to work in groups, ... to think critically and be able to solve problems [and] to understand different perspectives” (Arum & Roksa, 2014, p. 77). In contrast, students with low collegiate learning scores found it hard to articulate the benefits of their college experiences. After an unsuccessful search for work related to his business degree, Nathan accepted a low-wage job as a delivery driver for a retail chain. Although he graduated with a high grade point average, he mentioned going to lots of parties, could think of little that stood out about his courses, and did not participate in any educationally relevant extracurricular activities.

Like Nathan, most participants gained little in collegiate learning during their four years of college. Since the 1970s, the time U.S. college students spend studying has declined by half, while the time they devote to socializing and other forms of entertainment has risen dramatically (Brint & Cantwell, 2010). As institutions redefined students as consumers, academic demands receded and grade inflation increased.

Surveys of employers indicate that less than one-fourth of U.S. college graduates enter the labor market with excellent collegiate skills (Fischer, 2013). Clear evidence that critical thinking, complex reasoning, and written communication have substantial labor market payoffs underscores the need



A Baylor University forensic science professor (center) and her students work to identify the remains of unidentified migrants who died trying to enter the United States without legal documents. Students who find their coursework both cognitively challenging and personally fulfilling are more likely to experience success in their post-college careers.

for colleges to promote students' involvement in academics and career-relevant extracurricular experiences, and to upgrade the rigor of their courses.

advisers or professors (Stewart, Lim, & Kim, 2015). At the same time, colleges that do little to help high-risk students, through developmental courses and other support services, have a higher percentage of dropouts.

Beginning to prepare young people in early adolescence with the necessary visions and skills can do much to improve college success. In a study that tracked nearly 700 young people from sixth grade until two years after high school graduation, a set of factors—grade point average, academic self-concept, persistence in the face of challenge, and parental SES and valuing of a college education—predicted college enrollment at age 20 (Eccles, Vida, & Barber, 2004). Although parental SES is difficult to modify, improving parents' attitudes and behaviors and students' academic motivation and educational aspirations is

within reach, through a wide array of strategies considered in Chapters 11 and 12.

Once young people enroll in college, reaching out to them, especially during the early weeks and throughout the first year, is crucial. Programs that forge bonds between teachers and students and that generously fund student services—providing academic support, counseling to address academic and personal challenges, part-time work opportunities, and meaningful extracurricular roles—increase retention. Membership in campus-based social and religious organizations is especially helpful in strengthening minority students' sense of belonging (Chen, 2012; Kuh, Cruce, & Shoup, 2008). Students who feel that their college community is concerned about them as individuals are far more likely to graduate.



## Vocational Choice

**13.10** Trace the development of vocational choice, and cite factors that influence it.

**13.11** What problems do U.S. non-college-bound young people face in preparing for a vocation?

Young adults, college-bound or not, face a major life decision: the choice of a suitable work role. Being a productive worker calls for many of the same qualities as being an active citizen and a nurturant family member—good judgment, responsibility, dedication, and cooperation. What influences young people’s decisions about careers? What is the transition from school to work like, and what factors make it easy or difficult?

### Selecting a Vocation

In societies with an abundance of career possibilities, occupational choice is a gradual process that begins long before adolescence and often extends into the mid-twenties. Major theorists view the young person as moving through several periods of vocational development (Gottfredson, 2005; Super, 1994):

- 1. The fantasy period:** In early and middle childhood, children gain insight into career options by fantasizing about them (Howard & Walsh, 2010). Their preferences, guided largely by familiarity, glamour, and excitement, bear little relation to the decisions they will eventually make.
- 2. The tentative period:** Between ages 11 and 16, adolescents think about careers in more complex ways, at first in terms of their *interests*, and soon—as they become more aware of personal and educational requirements for different vocations—in terms of their *abilities* and *values*. “I like science and the process of discovery,” Sharese thought as she neared high school graduation. “But I’m also good with people, and I’d like to do something to help others. So maybe teaching or medicine would suit my needs.”
- 3. The realistic period:** By the late teens and early twenties, with the economic and practical realities of adulthood just around the corner, young people start to narrow their options. A first step is often further *exploration*—gathering more information about possibilities that blend with their personal characteristics. In the final phase, *crystallization*, they focus on a general vocational category and experiment for a time before settling on a single occupation (Stringer, Kerpelman, & Skorikov, 2011). As a college sophomore, Sharese pursued her interest in science, but she had not yet selected a major. Once she decided on chemistry, she considered whether to pursue teaching, medicine, or public health.

### Factors Influencing Vocational Choice

Most, but not all, young people follow this pattern of vocational development. A few know from an early age just what they want to be and follow a direct path to a career goal. Some decide and

later change their minds, and still others remain undecided for an extended period. College students are granted added time to explore various options. In contrast, the life conditions of many low-SES youths restrict their range of choices.

Making an occupational choice is not simply a rational process in which young people weigh abilities, interests, and values against career options. Like other developmental milestones, it is the result of a dynamic interaction between person and environment (Sharf, 2013). A great many influences feed into the decision, including personality, family, teachers, and gender stereotypes, among others.

**Personality.** People are attracted to occupations that complement their personalities. John Holland (1985, 1997) identified six personality types that affect vocational choice:

- The *investigative person*, who enjoys working with ideas, is likely to select a scientific occupation (for example, anthropologist, physicist, or engineer).
- The *social person*, who likes interacting with people, gravitates toward human services (counseling, social work, or teaching).
- The *realistic person*, who prefers real-world problems and working with objects, tends to choose a mechanical occupation (construction, plumbing, or surveying).
- The *artistic person*, who is emotional and high in need for individual expression, looks toward an artistic field (writing, music, or the visual arts).
- The *conventional person*, who likes well-structured tasks and values material possessions and social status, has traits well-suited to certain business fields (accounting, banking, or quality control).
- The *enterprising person*, who is adventurous, persuasive, and a strong leader, is drawn to sales and supervisory positions or to politics.



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Young architects work on their award-winning model that shows how Los Angeles might look in the year 2106. Vocational choice is moderately influenced by personality, with external factors such as parenting, education, job opportunities, and life circumstances all playing important roles.

Research confirms a relationship between personality and vocational choice in diverse cultures, but it is only moderate (Spokane & Cruza-Guet, 2005; Tang, 2009). Many people are blends of several personality types and can do well at more than one kind of occupation.

Furthermore, career decisions are made in the context of family influences, financial resources, educational and job opportunities, and current life circumstances. For example, Sharese's friend Christy scored high on Holland's investigative dimension. But after she married, had her first child, and faced increasing financial pressures, she postponed her dream of becoming a college professor and chose a human services career that required fewer years of education and offered reasonable likelihood of employment after graduation. Thus, personality takes us only partway in understanding vocational choice.

**Family Influences.** Young people's vocational aspirations correlate strongly with their parents' jobs. Individuals who grew up in higher-SES homes are more likely to select high-status, white-collar occupations, such as doctor, lawyer, scientist, or engineer. In contrast, those with lower-SES backgrounds tend to choose less prestigious, blue-collar careers—for example, plumber, construction worker, food service employee, or office worker. Parent-child vocational similarity is partly a function of similarity in personality, intellectual abilities, and—especially—educational attainment (Ellis & Bonin, 2003; Schoon & Parsons, 2002). Number of years of schooling completed is a powerful predictor of occupational status.

Other factors also promote family resemblance in occupational choice. Higher-SES parents are more likely to give their children important information about the worlds of education and work and to have connections with people who can help the young person obtain a high-status position (Kalil, Levine, & Ziol-Guest, 2005; Levine & Sutherland, 2013). In a study of African-American mothers' influence on their daughters' academic and career goals, college-educated mothers engaged in a wider range of strategies to promote their daughters' progress, including gathering information on colleges and areas of study and identifying knowledgeable professionals who could help (Kerpelman, Shoffner, & Ross-Griffin, 2002).

Parenting practices also shape work-related preferences. Recall from Chapter 2 that higher-SES parents tend to promote curiosity and self-direction, which are required in many high-status careers. Still, all parents can foster higher aspirations. Parental guidance, pressure to do well in school, college-going expectations, and encouragement toward high-status occupations predict confidence in career choice and educational and career attainment beyond SES (Bryant, Zvonkovic, & Reynolds, 2006; Gregory & Huang, 2013; Stringer & Kerpelman, 2010).

**Teachers.** Young adults preparing for or engaged in careers that require extensive education often report that teachers influenced their educational aspirations and career choice. High school students who say that most of their teachers are caring and accessible, interested in their future, and demand that they work hard feel more confident about choosing a personally suitable

career and succeeding at it (Metheny, McWhirter, & O'Neil, 2008). And in longitudinal research, teacher expectations for educational attainment predicted students' enrollment in college two years after high school graduation more strongly than did parents' expectations (Gregory & Huang, 2013; Sciarra & Ambrosina, 2011). Teacher expectations mattered most for low-SES students.

These findings provide yet another reason to promote positive teacher-student relations, especially for high school students from low-SES families. Teachers who offer encouragement and communicate with students about their potential can serve as an important source of resilience for these young people.

**Gender Stereotypes.** Over the past four decades, young women have expressed increasing interest in nontraditional occupations (Gati & Perez, 2014; Gottfredson, 2005). Changes in gender-role attitudes, along with a dramatic rise in numbers of employed mothers who serve as career-oriented models for their daughters, are common explanations for women's attraction to nontraditional careers.

But women's progress in entering and excelling at male-dominated professions has been slow. As Table 13.2 shows, although the percentage of women architects, engineers, lawyers, doctors, and business executives has risen in the United States over the past three decades, it still falls far short of equal representation. Women remain concentrated in less-well-paid, traditionally feminine professions such as social work, education,

**TABLE 13.2**  
**Percentage of Women in Various Professions**  
**in the United States, 1983 and 2015**

PROFESSION	1983	2015
Architect or engineer	5.8	15.1
Lawyer	15.8	34.5
Physician	15.8	37.9
Business executive	32.4	39.2 <sup>a</sup>
Author, artist, entertainer	42.7	47.6
Social worker	64.3	83.8
Elementary or middle school teacher	93.5	80.7
Secondary school teacher	62.2	59.2
College or university professor	36.3	46.5
Librarian	84.4	83.0
Registered nurse	95.8	89.4
Psychologist	57.1	70.3

Source: U.S. Department of Labor, 2016.

<sup>a</sup>This percentage includes executives and managers at all levels. As of 2016, women made up only 4 percent of chief executive officers at Fortune 500 companies, although that figure represents twice as many as 10 years ago.



## Cultural Influences

### Masculinity at Work: Men Who Choose Nontraditional Careers

Ross had always planned to major in engineering, but in his sophomore year of college, he startled his family and friends by deciding to pursue a nursing degree instead. “I’ve never looked back,” Ross said. “I love the work.” He noted some benefits of being a male in a female work world, including rapid advancement and the high regard of women colleagues. “But as soon as they learn what I do,” Ross remarked with disappointment, “guys on the outside question my abilities and masculinity.”

What factors influence the slowly increasing number of men who, like Ross, enter careers dominated by women? Compared to their traditional-career counterparts, these men tend to be more liberal in their social attitudes, less gender-typed, less focused on the social status of their work, and more interested in working with people (Dodson & Borders, 2006; Jome, Surething, & Taylor, 2005). Perhaps their gender-stereotype flexibility allows them to choose occupations they find satisfying, even if those jobs are not typically regarded as appropriate for men. However, they do take into account the probable financial returns of their choice (Hardie, 2015). They orient more toward nontraditional careers with higher average incomes.

Interviews with male nurses, flight attendants, primary school teachers, and librarians confirm Ross’s observations: In line with stereotypes of men’s greater desire for promotion and leadership, co-workers tend to assume

they are more knowledgeable than they actually are. These men often report being offered choice job placements and opportunities to move quickly into supervisory positions, although many did not seek such advancement (Simpson, 2004; Williams, 2013). As one teacher commented, “I just want to be a good classroom teacher. What’s wrong with that?”

But when asked to reflect on how others reacted to their choice, many men express anxiety about being stigmatized—mostly by other men. To reduce these feelings, they frequently describe their job in ways that minimize its feminine image. For example, several librarians emphasized technical requirements by referring to their title as “information scientist” or “researcher.” Nurses sometimes distance themselves from a feminine work identity by specializing in “adrenaline-charged” areas such as accident or emergency (Simpson, 2005). Despite these tensions, as with Ross, a high level of private comfort with their career choice seems to prevail over uneasiness about the feminine public image of their work.

Still, men face certain barriers that resemble those of women preparing for nontraditional careers. For example, male students in college nursing programs often mention lack of male mentors and a “cooler” educational climate, which they attribute to implicit gender discrimination and unsupportive behaviors of women nurse educators (Meadus & Twomey, 2011). And many encounter the view



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This elementary school teacher is among the increasing number of men entering careers dominated by women. Compared with his traditional-career counterparts, he is likely to be less gender-typed and more interested in working with people.

that they are less able than women to perform stereotypically “feminine” aspects of their jobs, such as those requiring sensitivity and caring—experiences that can increase work-related stress (Sobiraj et al., 2015). These findings reveal that to facilitate entry into nontraditional careers, men, too, would benefit from supportive relationships with same-gender role models and an end to gender-biased beliefs and behaviors.

librarianship, and nursing (U.S. Department of Labor, 2016). In virtually all fields, women’s achievements lag behind those of men, who write more books, make more discoveries, hold more positions of leadership, and produce more works of art.

Ability cannot account for these dramatic sex differences. Recall from Chapter 11 that girls are advantaged in reading and writing achievement, and the gender gap favoring boys in math is small and has been shrinking. Rather, gender-stereotyped messages play a key role. Although girls earn higher grades than boys, they reach secondary school less confident of their abilities, more likely to underestimate their achievement, and less likely to express interest in STEM careers (see page 395).

In college, the career aspirations of many women decline further as they question their capacity and opportunities to succeed in male-dominated fields and worry about combining a highly demanding career with family responsibilities (Chhin, Bleeker, & Jacobs, 2008; Sadler et al., 2012). Many college women talented in math and science settle on nonscience majors or non-STEM fields. An investigation of science-oriented young people in 50 nations revealed uniform findings: In every country, female students preferred careers in biology, agriculture, medicine, or another health profession, whereas male students favored computing, engineering, or math. And almost without exception, males expressed greater confidence in their science ability—

a gender difference that was considerably larger in industrialized than developing nations (Sikora & Pokropek, 2012). In economically advanced countries, the researchers speculated, gender-typed beliefs about science ability had far greater opportunity to become deeply ingrained and widespread.

These findings reveal a pressing need for programs that sensitize educators to the special problems women face in developing and maintaining high vocational aspirations and selecting nontraditional careers. Young women's aspirations rise in response to career guidance that encourages them to set goals that match their abilities and faculty who take steps to enhance their experiences in math and science courses. Contact with women scientists and engineers adds to female students' interest in and expectancies for success in STEM fields (Holdren & Lander, 2012). And such mentoring may help them see how altruistic values—which are particularly important to females—can be fulfilled within STEM occupations.

Compared to women, men have changed little in their interest in nontraditional occupations. See the Cultural Issues box on the previous page for research on the motivations and experiences of men who do choose female-dominated careers.

## Vocational Preparation of Non-College-Bound Young Adults

Sharese's younger brother Leon graduated from high school in a vocational track. Like approximately one-third of U.S. young people with a high school diploma, he had no current plans to go to college. While in school, Leon held a part-time job selling candy at the local shopping mall. He hoped to work in data processing after graduation, but six months later he was still a part-time sales clerk at the candy store. Although Leon had filled out many job applications, he got no interviews or offers.

Leon's inability to find a job other than the one he held as a student is typical for U.S. non-college-bound high school graduates. Although they are more likely to find employment than youths who drop out, they have fewer work opportunities than high school graduates of several decades ago. Nearly 20 percent of U.S. recent high school graduates who do not continue their education are unemployed (U.S. Department of Labor, 2015). When they do find work, most hold low-paid, unskilled jobs. In addition, they have few alternatives for vocational counseling and job placement as they transition from school to work.

American employers regard recent high school graduates as unprepared for skilled business and industrial occupations and manual trades. And there is some truth to this impression. As noted in Chapter 11, unlike European nations, the United States has no widespread training system for non-college-bound youths. As a result, most graduate without work-related skills.

In Germany, young people who do not go to a *Gymnasium* (college-preparatory high school) have access to one of the most successful work-study apprenticeship systems in the world for entering business and industry. About 60 percent of German youths participate. After completing full-time schooling at age 15 or 16, they spend the remaining two years of compulsory

education in the *Berufsschule*, combining part-time vocational courses with an apprenticeship that is jointly planned by educators and employers. Students train in work settings for more than 300 blue- and white-collar occupations. Apprentices who complete the program and pass a qualifying examination are certified as skilled workers and earn union-set wages. Businesses provide financial support because they know that the program guarantees a competent, dedicated work force. Many apprentices are hired into well-paid jobs by the firms that train them (Audretsch & Lehmann, 2016). Because of the apprenticeship system, Germany has the lowest unemployment rate among 18- to 25-year-olds in Europe—less than 8 percent.

The success of the German system—and of similar systems in Austria, Denmark, Switzerland, and several East European countries—suggests that a national apprenticeship program would improve the transition from high school to work for U.S. young people. The many benefits of bringing together the worlds of schooling and work include helping non-college-bound young people establish productive lives right after graduation, motivating at-risk youths to stay in school, and contributing to the nation's economic growth. Nevertheless, implementing an apprenticeship system poses major challenges: overcoming the reluctance of employers to assume part of the responsibility for vocational training, ensuring cooperation between schools and businesses, and preventing low-SES youths from being concentrated in the lowest-skilled apprenticeship placements or from being unable to find any placement, an obstacle that Germany itself has not yet fully overcome (Lang, 2010). Currently, small-scale school-to-work projects in the United States are attempting to solve these problems and build bridges between learning and working.

Although vocational development is a lifelong process, adolescence and early adulthood are crucial periods for defining occupational goals and launching a career. Young people who are well-prepared for an economically and personally satisfying work life are much more likely to become productive citizens, devoted family members, and contented adults. The support of families, schools, businesses, communities, and society as a whole can contribute greatly to a positive outcome. In Chapter 14, we will take up the challenges of establishing a career and integrating it with other life tasks.

## Ask yourself

**CONNECT** What have you learned in previous chapters about development of gender stereotypes that helps explain women's slow progress in entering and excelling at male-dominated professions? (*Hint:* See Chapter 10, page 338, and Chapter 11, page 395.)

**APPLY** Diane, a first-year college student, knows that she wants to "work with people" but doesn't yet have a specific career in mind. Her father is a chemistry professor, her mother a social worker. What can Diane's parents do to broaden her awareness of the world of work and help her focus on an occupational goal?

**REFLECT** Describe personal and environmental influences on your progress in choosing a vocation.



## Summary / chapter 13

### PHYSICAL DEVELOPMENT

#### Biological Aging Is Under Way in Early Adulthood (p. 438)

##### 13.1 Describe current theories of biological aging, both at the level of DNA and body cells and at the level of tissues and organs.

- Once body structures reach maximum capacity and efficiency in the teens and twenties, **biological aging**, or **senescence**, begins.

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- The programmed effects of specific genes may control certain age-related biological changes. For example, **telomere** shortening results in senescent cells, which contribute to disease and loss of function.
- DNA may also be damaged as random mutations accumulate, leading to less efficient cell repair and replacement and to abnormal cancerous cells. Release of **free radicals**, once thought to be a major contributor to age-related DNA and cellular damage, may instead activate DNA repair systems within cells, thereby lengthening life.
- The **cross-linkage theory of aging** suggests that over time, protein fibers form links and become less elastic, producing negative changes in many organs. Declines in the endocrine and immune systems may also contribute to aging.

#### Physical Changes (p. 440)

##### 13.2 Describe the physical changes of aging, paying special attention to the cardiovascular and respiratory systems, motor performance, the immune system, and reproductive capacity.

- Gradual physical changes take place in early adulthood and later accelerate. Declines in heart and lung performance are evident during exercise. Heart disease is a leading cause of death in adults, although it has decreased since the mid-twentieth century due to lifestyle changes and medical advances.

- Athletic skills requiring speed, strength, and gross-motor coordination peak in the early twenties; those requiring endurance, arm–hand steadiness, and aiming peak in the late twenties and early thirties. Inactivity rather than biological aging is largely responsible for age-related declines in motor performance.
- The immune response declines after age 20 because of shrinkage of the thymus gland and increased difficulty coping with physical and psychological stress.
- Women's reproductive capacity declines with age due to reduced quality and quantity of ova. In men, semen volume and sperm motility decrease gradually after age 35, and the percentage of abnormal sperm rises.

#### Health and Fitness (p. 444)

##### 13.3 Describe the influence of SES, nutrition, and exercise on health, and discuss obesity in adulthood.

- Health inequalities associated with SES increase in adulthood. Health-related circumstances and habits underlie these disparities.
- Sedentary lifestyles and diets high in sugar and fat have contributed to the U.S. overweight and obesity epidemic. Excess weight is associated with serious health problems, social discrimination, and early death.
- Some weight gain in adulthood reflects a decrease in **basal metabolic rate (BMR)**, but many young adults add excess weight. Effective treatment includes a nutritious diet low in calories plus regular exercise, recording of food intake and body weight, social support, and teaching problem-solving skills.
- Regular exercise reduces body fat, builds muscle, fosters resistance to disease, and enhances cognitive functioning and psychological well-being.

ALAMY



##### 13.4 What are the most commonly abused substances, and what health risks do they pose?

- Tobacco, marijuana, and alcohol are the most commonly abused substances. Cigarette smokers, most of whom began before age 21, are at increased risk for many health problems, including decline in bone mass, heart attack, stroke, and numerous cancers.
- About one-third of heavy drinkers suffer from alcoholism, to which both heredity and environment contribute. Alcohol is implicated in liver and cardiovascular disease, certain cancers and other physical disorders, motor vehicle fatalities, crime, and sexual coercion.

##### 13.5 Describe sexual attitudes and behavior of young adults, and discuss sexually transmitted infections and sexual coercion.

- Most adults are less sexually active than media images suggest, but they display a wider range of sexual choices and lifestyles and have had more sexual partners than earlier generations. The Internet has become a popular way to initiate relationships.
- Adults in committed relationships report high satisfaction with their sex lives. Only a minority report persistent sexual problems—difficulties linked to biological factors and to low SES and psychological stress.

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- Attitudes toward same-sex couples have become more accepting. Same-sex partners, like heterosexual partners, tend to be similar in education and background and more satisfied in committed relationships.
- Sexually transmitted infections (STIs) continue to be prevalent throughout the twenties; women are at great risk for lasting health consequences. AIDS, the most deadly STI, is spreading most rapidly through men having sex with men and through heterosexual contact in poverty-stricken minority groups.



- Most rape victims are women under age 25 who have been harmed by men they know well. Personal characteristics of perpetrators and cultural acceptance of strong gender typing and of violence contribute to sexual coercion. Although less often reported and recognized by authorities, men are also victims. Regardless of gender, rape survivors experience extreme trauma.

### 13.6 How does psychological stress affect health?

- Chronic psychological stress induces physical responses that contribute to cardiovascular disease, several types of cancer, and gastrointestinal problems. The challenges of early adulthood increase stress; young people can reduce stress by forming supportive social ties.

## COGNITIVE DEVELOPMENT

### Changes in the Structure of Thought (p. 456)

#### 13.7 Explain how thinking changes in early adulthood.

- Development of the cerebral cortex in early adulthood results in continued fine-tuning of the prefrontal cognitive-control network, which achieves a better balance with the brain's emotional/social network, contributing to improvements in planning, reasoning, and decision making.
- Cognitive development beyond Piaget's formal operations is known as **postformal thought**. In early adulthood, personal effort and social experiences combine to spark increasingly rational, flexible, and practical ways of thinking.
- In Perry's theory of **epistemic cognition**, college students move from **dualistic thinking**, dividing information into right and wrong, to **relativistic thinking**, awareness of multiple truths. The most mature individuals progress to **commitment within relativistic thinking**, which synthesizes contradictions.
- Advances in epistemic cognition depend on gains in metacognition. Peer collaboration on challenging, ill-structured problems is especially beneficial.

- In Labouvie-Vief's theory, the need to specialize motivates adults to move from hypothetical to **pragmatic thought**, which uses logic as a tool for solving real-world problems and accepts contradiction, imperfection, and compromise. Adults' enhanced reflective capacities permit gains in **cognitive-affective complexity**—coordination of positive and negative feelings into a complex, organized structure.

### Expertise and Creativity (p. 458)

#### 13.8 What roles do expertise and creativity play in adult thought?

- Specialization in college and in an occupation leads to **expertise**, which is necessary for both problem solving and creativity. Although creativity tends to rise in early adulthood and to peak in the late thirties or early forties, its development varies across disciplines and individuals. Diverse personal and situational factors jointly promote creativity.



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### The College Experience (p. 460)

#### 13.9 Describe the impact of a college education on young people's lives, and discuss the problem of dropping out.

- College students' explorations, both academic and nonacademic, yield gains in knowledge and reasoning ability, broadening of attitudes and values, enhanced self-understanding and self-esteem, and a firmer sense of identity.
- Personal and institutional factors contribute to college dropout, which is more common in less selective colleges and among ethnic minority students from low-SES families. High-risk students benefit from interventions that show concern for them as individuals.

### Vocational Choice (p. 462)

#### 13.10 Trace the development of vocational choice, and cite factors that influence it.

- Vocational choice moves through a **fantasy period**, in which children explore career options by fantasizing about them; a **tentative period**, in which teenagers evaluate careers in terms of their interests, abilities, and values; and a **realistic period**, in which young people settle on a vocational category and then a specific occupation.



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- Vocational choice is influenced by personality; parents' provision of educational opportunities, vocational information, and encouragement; and close relationships with teachers who hold high educational expectations.
- Women's progress in male-dominated professions has been slow, and their achievements lag behind those of men in virtually all fields. Gender-stereotyped messages play a key role.

#### 13.11 What problems do U.S. non-college-bound young people face in preparing for a vocation?

- Most U.S. non-college-bound high school graduates are limited to low-paid, unskilled jobs, and many are unemployed. Work-study apprenticeships, like those widely available in Europe, would improve the transition from school to work for these young people.

## Important Terms and Concepts

basal metabolic rate (BMR) (p. 446)  
 biological aging, or senescence (p. 438)  
 cognitive-affective complexity (p. 458)  
 commitment within relativistic thinking (p. 457)  
 cross-linkage theory of aging (p. 440)  
 dualistic thinking (p. 456)

epistemic cognition (p. 456)  
 expertise (p. 458)  
 fantasy period (p. 462)  
 free radicals (p. 440)  
 postformal thought (p. 456)  
 pragmatic thought (p. 458)

realistic period (p. 462)  
 relativistic thinking (p. 457)  
 telomeres (p. 438)  
 tentative period (p. 462)