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# Health

# CHAPTER 5

## Learning Objectives

- 5.1** Analyze health issues in childhood, including risks and protective factors for healthy development.
- 5.2** Discuss the prevalence, effects, and treatment of problem eating disorders and substance use in adolescents and emerging adults.
- 5.3** Identify common chronic diseases and sources of injury in adulthood, their risk factors, effects, and treatment.
- 5.4** Distinguish among common dementias, their risk factors, effects, and treatment.

## Digital Resources

-  **audio** Growth Hormone
-  **Lives in context** Fostering Gross Motor Skills in Early Childhood
- FPO**
-  **web** Brain-Based Education (p. 172)
-  **journal** Brain Plasticity
-  **Premium Video** The Development of Children's Drawing Abilities (p. 178)



Master these learning objectives with multimedia resources available at [edge.sagepub.com/kuther](https://edge.sagepub.com/kuther) and *Lives in Context* video cases available in the interactive eBook.

**A**lejandro has successfully traversed infancy, the most challenging time of life for mortality, and now at age 8 he has achieved the milestones of physical development for his age. Yet he is sometimes unable to run and play as hard as he would like because chronic asthma makes him wheeze and cough.

The doctor warns 14-year-old Zoe that, although her development is in the normal range, her weight is very low for her age and body size. Zoe looks into the mirror and instead sees an excess of “baby fat” she must lose.

Fifty-five-year-old Matthew is frustrated that knee pain from arthritis has forced him to cut back on his long runs.

These individuals are each experiencing health issues that may influence their development and functioning. Everyone experiences health issues throughout life, from the colds and flu that are common to all of us, to chronic conditions and diseases experienced by many people, to serious diseases that are experienced by relatively few people. Different health issues come into play at different ages. In this chapter, we examine common health issues throughout the lifespan, including risk and protective factors for common conditions.

## COMMON HEALTH ISSUES IN INFANCY AND CHILDHOOD

### LO 5.1 Analyze health issues in childhood, including risks and protective factors for healthy development.

The phrase *childhood diseases* often brings to mind infectious diseases like measles, mumps, whooping cough, and chicken pox. As we will see in this section, there is much more to health care for infants and children.

## INFECTIOUS DISEASE AND IMMUNIZATION



**PHOTO 5.1:** Infectious Disease and Immunization

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Over the past 50 years, serious and sometimes fatal childhood diseases such as measles, mumps, and whooping cough have declined dramatically because of the development of vaccines. A **vaccine** is a small dose of inactive virus that is injected into the body to stimulate the production of antibodies to guard against the disease. Because immunization of infants and young children is now widespread, vaccines control infectious diseases that once spread quickly and killed thousands of people. Vaccines are administered early in life because many preventable diseases are more common in infants and young children. Vaccinations protect the child as well as those in the child's community because an immunized person is less susceptible to a disease, and therefore also less likely to transmit it to others. Most public schools require that children be fully immunized before enrollment, a requirement that has increased vaccination rates and prevented many diseases (Salmon et al., 2005).

The Centers for Disease Control and Prevention (CDC) recommends that children be vaccinated against most vaccine-preventable disease by the time they are 2 years of age. Vaccination rates increased markedly between the mid-1990s and the mid-2000s: The proportion of children ages 19 to 35 months receiving the recommended series of vaccines increased from 69% to 83% between 1994 and 2004. However, the rate has stalled since, standing at 82% in 2013 (Child Trends, 2015). Why are not all children vaccinated? Throughout the world, poverty is associated with inadequate vaccination (Bustreo, Okwo-Bele, & Kamara, 2015). Although there are no ethnic differences in childhood vaccination rates in the United States, children in families with incomes below the poverty level are less likely to receive the recommended schedule of vaccination than their peers who reside in homes with incomes at or above the poverty level (Hill, Elam-Evans, Yankey, Singleton, & Kolasa, 2015). Many parents are unaware that children from low-income families who do not have medical insurance can receive vaccinations through the federal Vaccines for Children Program, begun in 1994 (CDC, 1994).

Another, more troubling reason for the stalled vaccination rate is particularly common in children from high-SES homes (Yang, Delamater, Leslie, & Mello, 2016) and based on the common misconception that vaccines are linked with autism (Gust et al., 2004). Extensive research indicates that there is no association between vaccination and autism (Gerber & Offit, 2009; Taylor, Swerdfeger, & Eslick, 2014). One reason for the misconception is that children tend to receive vaccines at the age when some chronic illnesses and developmental disorders—such as autism—tend to emerge, but this correlation is not indicative of a cause-and-effect relationship. (Recall from Chapter 1 that correlational research documents phenomena that occur together, but cannot demonstrate causation.) While specific causes of autism spectrum disorders have yet to be fully identified, we do know that autism has a strong genetic component and is also associated with both maternal and paternal age (Grether, Anderson, Croen, Smith, & Windham, 2009; Idring et al., 2014; Waltes et al., 2014).

Lack of vaccination poses serious risks to the child and also to the community. For example, in January 2015, the California Department of Health was notified of a suspected measles case in an unvaccinated 11-year-old child. The child had visited a popular theme park just prior to showing symptoms. Within weeks, 125 other cases were identified in 7 adjacent states as well as Mexico and Canada, with many of the patients having recently visited the same theme park (Zipprich et al., 2015). Most of the patients were unvaccinated (Gostin et al., 2015).

Even when children receive the full schedule of vaccinations, many do not receive them on the timetable recommended by the National Vaccine Advisory Committee (Luman, Barker, McCauley, & Drews-Botsch, 2005). Vaccine timeliness is important because the efficacy of early and late vaccination is not always known and may vary by disease (Luman et al., 2005). *When* a child receives a vaccination may be just as important as *whether* the child receives it in promoting disease resistance. Finally, several vaccinations are required or recommended for older children and adolescents, such as vaccines to protect against meningitis (a swelling of the membranes covering the brain and spinal cord) and the

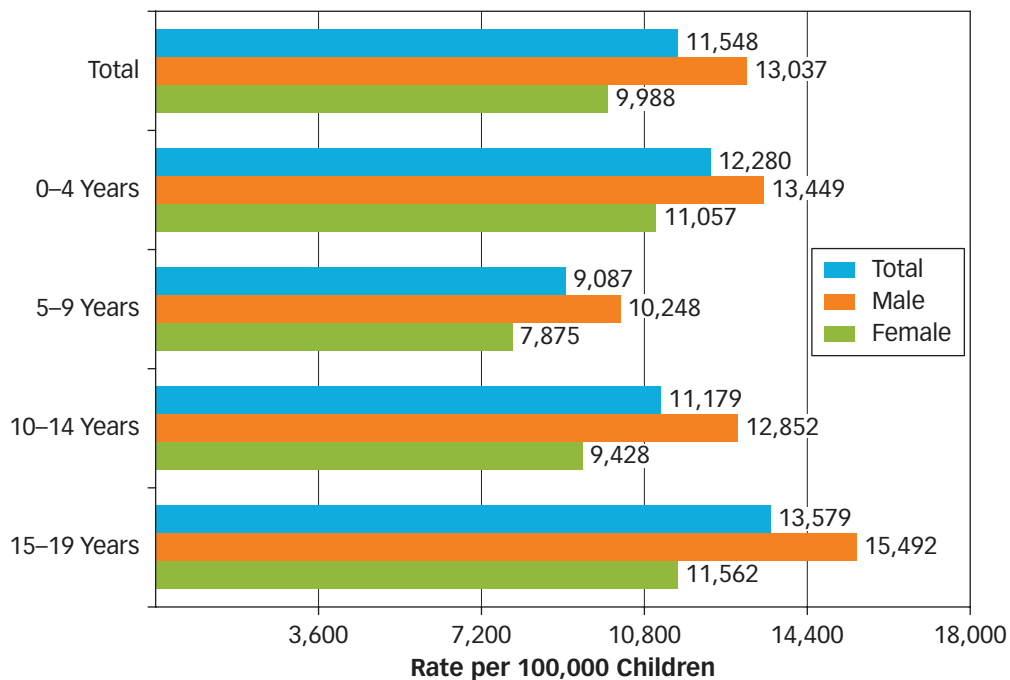
human papillomavirus (HPV, an infection transmitted by sexual activity that is linked with several types of cancer; Committee on Infectious Diseases & American Academy of Pediatrics, 2015). Adults should receive booster shots for measles, mumps, and rubella as well as chicken pox and, with age, shingles (a painful skin rash caused by the virus that causes chicken pox) and the pneumococcal virus, which causes many kinds of infections, such as pneumonia, ear infections, and meningitis (Kim, Bridges, & Harriman, 2016).

## CHILDHOOD INJURIES

Unintentional injuries from accidents are the most common cause of death in children and adolescents in the United States, causing about one in five deaths (Dellinger & Gilchrist, 2017; Xu, Murphy, Kochanek, & Bastian, 2016). Motor vehicle accidents are the most common cause of fatal injuries in children aged 5 to 19, and drowning is the most common cause of death among children aged 1 to 4 (Safe Kids Worldwide, 2015). Many more children incur nonfatal injuries. As shown by Figure 5.1, rates for nonfatal injuries vary dramatically with age, reaching heights in infancy and adolescence (ages 15 to 19; Child Trends Data Bank, 2014a). At all ages, males experience more injuries than females, likely due to their higher levels of activity and risk taking. The most common types of injuries also vary with age: Falls are the most common source of injuries in children under age 9, whereas adolescents are more often injured by being struck by an object or person (Child Trends Data Bank, 2014b).

A variety of individual and contextual influences place children at risk of injury. Poor parental and adult supervision is closely associated with childhood injury (Ablewhite et al., 2015; Morrongiello, Corbett, McCourt, & Johnston, 2006). Children’s risk for injury rises when their parents feel they have little control over them. Moreover, some parents hold the belief that injuries are an inevitable part of child development (Ablewhite et al., 2015) and may, therefore, provide less supervision and intervention. Children who are impulsive, overactive, and difficult, as well as those diagnosed with attention-deficit/hyperactivity

**FIGURE 5.1: Nonfatal Injury Among Children Aged 0–19 in the United States, 2012**



Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Injury Prevention & Control. National Electronic Injury Surveillance System—All Injury Program.

<https://mchb.hrsa.gov/chusa14/special-features/nonfatal-injury.html>

disorder (ADHD), experience higher rates of unintentional injuries (Acar et al., 2015; Lange et al., 2016; Morrongiello et al., 2006). Parents of these children are sometimes less likely to intervene and prevent dangerous behavior. Children's risk of injury rises when their parents report feeling little control over their behavior (Acar et al., 2015). Childhood injury is also associated with parental distraction, such as talking to another parent or using the phone (Huynh, Demeter, Burke, & Upperman, 2017). Parents who work long hours or multiple jobs and who live in challenging environments may find it difficult to keep tabs on their children or may feel overwhelmed.

Neighborhood disadvantage, specifically low SES and lack of resources, is associated with higher rates of injuries and bone fractures in children in the United States, Canada, and the UK (Lyons et al., 2000; McClure, Kegler, Davey, & Clay, 2015; Stark, Bennet, Stone, & Chishti, 2002). Disadvantaged neighborhoods may also contribute to children's injuries due to factors that increase overall injury risk, such as poor surface maintenance of streets and sidewalks and poor design or maintenance of housing and playgrounds. In addition to having few opportunities to be active, children in unsafe disadvantaged neighborhoods often have inadequate access to sources of healthy nutrition; this combination of circumstances can interfere with children developing healthy strong bodies.

Just as there are multiple contextual factors that place children at risk of injury, there are many opportunities for preventing and reducing childhood injuries. Parenting interventions that improve supervision and monitoring, teach parents about risks to safety, and model safe practices can help parents reduce injuries in their children (Kendrick, Barlow, Hampshire, Stewart-Brown, & Polnay, 2008). School programs can help students learn and practice safety skills. At the community level, installing and maintaining safe playground equipment and protected floor surfaces can reduce the injuries that accompany falls. Disadvantaged communities, however, may lack the funding to provide safe play spaces, placing residing children at risk.

## CHILD MALTREATMENT

According to the Child Abuse Prevention and Treatment Act, a U.S. federal law, **child abuse** is any intentional harm to a minor, an individual under 18 years of age, including actions that harm the child physically, emotionally, sexually, and through neglect (U.S. Department of Health and Human Services, 2016). Many children experience more than one form of abuse.

- *Physical abuse* refers to any intentional physical injury to the child, and can include striking, kicking, burning, or biting the child, or any action that results in a physical impairment of the child.
- *Sexual abuse*, more common among older children, refers to inappropriate touching, comments, or engaging in any sexual activity, coerced or persuaded, with a child.
- *Neglect* occurs when a child is deprived of adequate food, clothing, shelter, or medical care.

Each year there are more than 700,000 confirmed cases of abuse or neglect in the United States (U.S. Department of Health and Human Services, 2016). Child maltreatment results in more than 1,500 fatalities per year, about three quarters in children younger than 3 years. Parents are the most common perpetrators (in more than 80% of cases, on average), with relatives other than parents and unmarried partners of parents constituting an additional 10% of perpetrators (U.S. Department of Health and Human Services, 2016). It is estimated that about 27% of children under the age of 17 have experienced sexual abuse (Finkelhor, Shattuck, Turner, & Hamby, 2014; Kim, Wildeman, Jonson-Reid, & Drake, 2017). Sexual abuse may occur at any time during infancy, childhood,

or adolescence, but it is most often reported in middle childhood, with about half of cases occurring between ages 4 and 12 (U.S. Department of Health and Human Services, 2013b). Although these statistics are alarming, they underestimate the incidence of abuse because many more children experience maltreatment that is not reported. Moreover, abuse often is not a one-time event; some children experience maltreatment that persists for years (U.S. Department of Health and Human Services, 2013b).

### Effects of Child Maltreatment

The effects of physical maltreatment are immediate, ranging from bruises to broken bones to internal bleeding and more. Some physical effects are long lasting. Child abuse can impair brain development and functioning through physical damage, such as that caused by shaking an infant, which damages the brain (Twardosz & Lutzker, 2009). Physical harm and prolonged stress can alter the course of brain development, increasing the child's risk for post-traumatic stress disorder (PTSD), ADHD, conduct disorder, and various learning and memory difficulties (de Bellis, Hooper, Spratt, & Woolley, 2009). Children who are abused score lower on measures of problem solving, experience difficulty understanding and completing day-to-day schoolwork, and sometimes demonstrate learning difficulties serious enough to result in academic failure (Font & Berger, 2014; Widom, 2014).

The socioemotional effects of child maltreatment are especially daunting and long lasting. Young children who are abused tend to have poor coping skills, low self-esteem, difficulty regulating their emotions and impulses, and show more negative affect, such as anger and frustration, and less positive affect than other children (Barth et al., 2007). They tend to have difficulty understanding their own and other people's emotions and often have difficulty making and maintaining friendships (Cicchetti & Banny, 2014). The quality of relationships with peers is closely associated with abuse, such that the younger the child was when the abuse began and the longer it continued, the worse the relationships with peers (Bolger, Patterson, & Kupersmidt, 1998; Font & Berger, 2014). Moreover, children and adolescents who are abused are at risk for a range of psychological disorders, including anxiety, eating, and depressive disorders as well as behavioral problems, delinquency, teen pregnancy, illicit drug use, mental health problems, and risk behavior into young adulthood (Carlson, Oshri, & Kwon, 2015; Cecil, Viding, Fearon, Glaser, & McCrory, 2017; Cicchetti & Banny, 2014; Jones et al., 2013). Children who are sexually abused often are more knowledgeable about sex than is appropriate for their age and engage in age-inappropriate sexual activity such as masturbation, placing objects in their genital areas, or behaving seductively (Kenny et al., 2008). During adolescence they are more likely than same-age peers to engage in risky sexual activity (Abajobir, Kisely, Maravilla, Williams, & Najman, 2017). Many children who are sexually abused display symptoms of PTSD, an anxiety disorder that occurs after experiencing a traumatic event and includes flashbacks, nightmares, and feelings of helplessness (Maniglio, 2013; Putman, 2009).

### Risk Factors for Child Maltreatment

Risk factors for child abuse exist at all ecological levels: the child, parent, community, and society (McCoy & Keen, 2009). Certain child characteristics have been found to increase the risk or potential for maltreatment. Children with special needs, such as those with physical



**PHOTO 5.2:** Effects of Child Maltreatment

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and mental disabilities, preterm birth status, or serious illness, require a great deal of care that can overwhelm or frustrate caregivers, placing such children at risk of maltreatment (Bugental, 2009). Similarly, children who are temperamentally difficult, inattentive, overactive, or have other developmental problems are also at risk because they are especially taxing for parents (Crosse, Kaye, & Ratnofsky, 1993; Font & Berger, 2014).

Parents who engage in child maltreatment tend to perceive their child as stubborn and noncompliant and tend to evaluate the child's misdeeds as worse than they are, leading them to use strict and physical methods of discipline (Casanueva et al., 2010). Parents who maltreat their children often lack knowledge about child development and have unrealistic expectations for their children. They may be less skilled in recognizing emotions displayed on their children's faces; find it difficult to recognize, manage, and express their own feelings appropriately; and have poor impulse control, coping, and problem-solving skills (McCoy & Keen, 2009; Wagner et al., 2015). Abuse is more common in homes characterized by poverty, marital instability, and drug and alcohol abuse (Hilarski, 2008; Terry & Talon, 2004). Children who are raised in homes in which adults come and go—repeated marriages, separations, and revolving romantic partners—are at higher risk of sexual abuse. However, sexual abuse also occurs in intact middle-class families. In these families, children's victimization often remains undetected and unreported (Hinkelman & Bruno, 2008).

Community factors, such as inadequate housing, community violence, and poverty place children at risk for abuse (Dodge & Coleman, 2009; Widom, 2014). Neighborhoods with few community level support resources, such as parks, child care centers, preschool programs, recreation centers and churches, increase the likelihood of child maltreatment (Coulton, Korbin, & Su, 1999; Molnar et al., 2016). In contrast, neighborhoods with a low turnover of residents, a sense of community, and connections among neighbors support parents and protect against child maltreatment (McCoy & Keen, 2009; van Dijken, Stams, & de Winter, 2016).

At the societal level, several factors contribute to the problem of child abuse. Legal definitions of violence and abuse and political or religious views that value independence, privacy, and noninterference in families may influence the prevalence of child abuse within a given society (Tzeng, Jackson, & Karlson, 1991). Social acceptance of violence—for example as expressed in video games, music lyrics, and television and films—can send the message that violence is an acceptable method of managing conflict. Overall, there are many complex influences on child maltreatment.

Along with recognizing risk factors, it is important to be aware of signs that abuse may be taking place. Table 5.1 provides a non-exhaustive list of signs of abuse. Not all children who display one or more of the signs on this list experience maltreatment, but each sign is significant enough to merit attention and treatment. All U.S. states and the District of Columbia identify **mandated reporters**, individuals who are legally obligated to report suspected child maltreatment to the appropriate agency, such as child protective services, a law enforcement agency, or a state's child abuse reporting hotline (Child Welfare Information Gateway, 2013). Individuals designated as mandatory reporters typically have frequent contact with children: teachers, principals, and other school personnel; child care providers; physicians, nurses, and other health-care workers; counselors, therapists, and other mental health professionals; and law enforcement officers. Of course, anyone can, and is encouraged to, report suspected maltreatment of a child.

## MORTALITY IN INFANCY AND CHILDHOOD

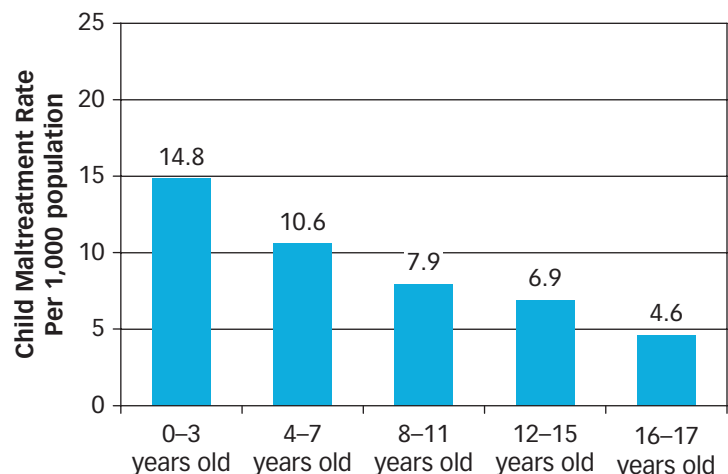
Rates of child mortality are highest among infants today, just as they have been throughout history. Children are much more likely to die during the first year of life than they are at older ages. As shown in Figure 5.2, childhood mortality declines after infancy and has declined over the last four decades in the United States (Child Trends, 2013). As

**TABLE 5.1 • Signs of Child Abuse and Neglect**

<p>The Child:</p> <ul style="list-style-type: none"><li>• Exhibits extremes in behavior, such as overly compliant or demanding behavior, extreme passivity, withdrawal, or aggression</li><li>• Has not received help for physical or medical problems (e.g., dental care, eyeglasses, immunizations) brought to the parents' attention</li><li>• Has difficulty concentrating or learning problems that appear to be without cause</li><li>• Is very watchful, as if waiting for something bad to happen</li><li>• Frequently lacks adult supervision</li><li>• Has unexplained burns, bruises, broken bones, or black eyes</li><li>• Is absent from school often, especially with fading bruises upon return</li><li>• Is reluctant to be around a particular person, or shrinks at the approach of a parent or adult</li><li>• Reports injury by a parent or another adult caregiver</li><li>• Lacks sufficient clothing for the weather</li><li>• Is delayed in physical or emotional development</li><li>• States that there is no one at home to provide care</li></ul> <p>The Parent:</p> <ul style="list-style-type: none"><li>• Shows indifference and little concern for the child</li><li>• Denies problems at home</li><li>• Blames problems on the child</li><li>• Refers to the child as bad or worthless or berates the child</li><li>• Has demands that are too high for the child to achieve</li><li>• Offers conflicting, unconvincing, or no explanation for the child's injury</li><li>• Uses harsh physical discipline with the child, or suggests that caregivers use harsh physical discipline if the child misbehaves</li><li>• Is abusing alcohol or other drugs</li></ul>
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Source: Adapted from Child Welfare Information Gateway (2013).

**FIGURE 5.2: Child Maltreatment Rate by Age, 2014**



<https://www.childtrends.org/indicators/child-maltreatment/>

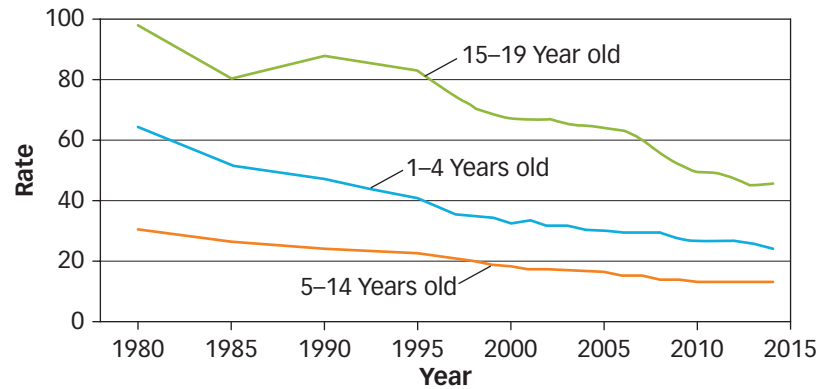
[https://www.childtrends.org/wp-content/uploads/2015/03/40\\_fig2.jpg](https://www.childtrends.org/wp-content/uploads/2015/03/40_fig2.jpg)

shown in Figure 5.3, similar patterns of declining childhood mortality appear throughout the world; however, developing regions and those plagued by poverty and violence, such as some countries in sub-Saharan Africa and South Asia, experience rates of childhood mortality 10 times the rate in North America (Roser, 2016).

Low socioeconomic status, poor access to nutrition and medical care, and stressful home and community environments are associated with higher rates of childhood mortality (Singh & Kogan, 2007). Advances in public health, such as increasing access to health care, prenatal care, and availability of vaccinations for potentially fatal illnesses, are effective in reducing child mortality (Soares, 2007).



**FIGURE 5.3:** Death rates for Children Ages 1 to 19 in the United States, 1980–2014



Sources: Data for ages 0 to 14, 1980–1999: Pastor, P. N., Makuc, D. M., Reuben, C., Xia, H. (2002). Health: United States: Chartbook on trends in the health of Americans. Hyattsville, Maryland: National Center for Health Statistics. Available at: <http://www.cdc.gov/nchs/data/hus/02.pdf>. Data for ages 15 to 19, 1980–1998: Federal Interagency Forum on Child and Family Statistics. (2002) America's Children: Key National Indicators of Well-Being, 2002. Federal Interagency Forum on Child and Family Statistics, Washington DC: U.S. Government Printing Office. Tables Health 6.A., Health 6.B. and Health 7. Available at: [http://www.childstats.gov/pdf/ac2002/ac\\_02.pdf](http://www.childstats.gov/pdf/ac2002/ac_02.pdf). Data for 1999–2013 Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999–2013 on CDC WONDER Online Database. Available at: <http://wonder.cdc.gov/ucd-icd10.html>. Data for 2014: Kochanek, K. D., Murphy, S. L., Xu, J., & Tejada-Vera, B. (2016). Deaths: Final data for 2014. National Vital Statistics Reports, 65(4). Hyattsville, Maryland: National Center for Health Statistics. Tables 3–4. Available at: [http://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65\\_04.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04.pdf)

[https://public.tableau.com/profile/childtrends#!/vizhome/Book1\\_15740/Dashboard1](https://public.tableau.com/profile/childtrends#!/vizhome/Book1_15740/Dashboard1)



### Thinking in Context 5.1

1. What kinds of accidents do you think are most likely in childhood? How might the nature of injuries change with age? What can parents, schools, and communities do to prevent injuries to children?
2. Child abuse is a problem with a complex set of influences at multiple bioecological levels. The most effective prevention and intervention programs target multiple levels of context. Referring to Bronfenbrenner's model (see Chapter 1), discuss factors at each bioecological level that might be incorporated into prevention and intervention programs to prevent child abuse and promote positive outcomes.

## COMMON HEALTH ISSUES IN ADOLESCENCE AND EMERGING ADULTHOOD

**LO 5.2 Discuss the prevalence, effects, and treatment of problem eating disorders and substance use in adolescents and emerging adults.**

Adolescence and emerging adulthood are generally healthy periods for most young people. The largest risks that adolescents and emerging adults face to their health stem from their own (and others') behavior. For example, many adolescents engage in unhealthy weight loss behaviors that can escalate into eating disorders.

### EATING DISORDERS

Adolescents' rapidly changing physique, coupled with media portrayals of the ideal woman as thin with few curves, leads many to become dissatisfied with their body image, and the dissatisfaction often persists into emerging adulthood (Benowitz-Fredericks, Garcia, Massey, Vasagar, & Borzekowski, 2012). In some girls, body image dissatisfaction may begin much earlier, in childhood, as discussed in the Lives in



## • • Body Image Dissatisfaction



**PHOTO 5.3:** Lives in Context: Body Image Dissatisfaction  
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“See how my stomach sticks out?” asked Amanda. “Sometimes it sticks out even worse, and I have to wear baggy tops. I hate that. I want to wear cropped tops like that one,” Amanda said, pointing to a page in a magazine. “But I’m too fat.” “Me too,” said her best friend, Betsy. At 9 years of age, Amanda and Betsy display signs of body image dissatisfaction—dissatisfaction with one’s physical appearance as shown by a discrepancy between one’s ideal body figure and actual body figure.

As early as age 4, children rate thin bodies as more attractive than the average-shaped bodies they report as normal and commonly seen (Brown & Slaughter, 2011). Body image dissatisfaction can be seen as early as the preschool years and rises quickly over the course of childhood (Tremblay & Limbos, 2009). For example, studies of 3- to 6-year-old children have shown that as many as 70% of girls of normal weight report dissatisfaction with their bodies (Tatangelo, McCabe, Mellor, & Mealey, 2016; L. Tremblay, Lovsin, Zecevic, & Larivière, 2011) and up to one-half of elementary school children (6–12 years) are dissatisfied with some aspect of their body and shape (Coughlin, Heinberg, Marinilli, & Guarda, 2003; Littleton & Ollendick, 2003; Smolak, 2011).

Body image dissatisfaction is associated with poor self-esteem, depression, unhealthy eating and exercise behaviors, and inadequate weight gain in childhood (Duchin et al., 2015; Poudevigne et al., 2003; Tiggeman & Wilson-Barrett, 1998). Dieting behaviors often begin in childhood, with about half of 8- to 10-year-old children reporting they have been on a weight-loss diet at least some of the time (Dohnt & Tiggemann, 2005; Littleton & Ollendick, 2003; McVey, Tweed, & Blackmore, 2004).

Although less well researched, body dissatisfaction also occurs in boys. Studies of United States, British, and Australian boys have shown that between one third and two thirds of boys between the ages of 5 and 10 report body dissatisfaction, desiring a thinner, larger, or broader frame (Cohane & Pope, 2001; Dion et al., 2016; Gustafson-Larson & Terry, 1992; Maloney, McGuire, Daniels, & Specker, 1989). Overall, body image dissatisfaction and body distortion increases with age in both boys and girls from early adolescence into young adulthood, especially with increases in BMI (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Calzo et al., 2012).

Parents’ direct comments about their child’s weight, particularly mothers’ comments, are most consistently associated with children’s reported body concerns and behaviors (Gattario, Frisé, & Anderson-Fye, 2014; McCabe et al., 2007). Peers, however, are also important. Girls and women often bond over “fat talk,” criticizing their own bodies (Comins & Gondoli, 2012; McVey, Levine, Piran, & Ferguson, 2013). Negative body talk is related to poor body image, body-related cognitive distortions, disordered eating, and psychological maladjustment in college women (Rudiger & Winstead, 2013). Many school-age girls believe that being thin would make them more likable by their peers and less likely to be teased (Dohnt & Tiggemann, 2005; McCabe, Riccardelli, & Finemore, 2002).

Finally, greater exposure to teen media and images of thin models is associated with dieting awareness, weight concerns, and body dissatisfaction in girls and women (Benowitz-Fredericks et al., 2012; Evans, Tovée, Boothroyd, & Drewett, 2013; Gattario et al., 2014). The influence of the media is perhaps best illustrated by longitudinal studies of teenagers in the Pacific island nation of Fiji before and after television became widely available in the islands. Disordered eating attitudes and behaviors rose after the introduction of television (Dasen, 1994). With the emergence of U.S. television programming, girls from rural Fiji reported comparing their bodies to the program characters and wanting to look like them (Becker, Keel, Anderson-Fye, & Thomas, 2004). Individuals’ perceptions of body ideals and their own bodies are influenced by multiple contextual factors.

Improving *media literacy* by teaching children about advertising is an important focus of many school-based intervention programs (McLean, Paxton, & Wertheim, 2016; Richardson, Paxton, & Thomson, 2009; Yager, Diedrichs, Ricciardelli, & Halliwell, 2013). Lessons might include information about the homogeneity of body shapes shown on television and magazines, airbrushing of photos, and why advertisers might want us to be unhappy with the way we look (i.e., to get us to buy the product; Neumark-Sztainer, Sherwood, Collier, & Hannan, 2000). For example, as part of a 2011 governmental initiative in British schools, Britney Spears allowed pre-airbrushed images of herself in a bikini to be shown alongside the airbrushed ones for children aged 10 to 11, to show how media might try to alter and improve images (Gattario et al., 2014). Effective programs emphasize providing children with alternative ways of thinking about beauty and body ideals (Gattario et al., 2014).

Context feature. Girls who have a negative body image are at risk of developing eating disorders, characterized by an obsession with weight control, extreme over- or under-control of eating, and extreme behavior patterns designed to control weight such as compulsive exercise, dieting, or purging (American Psychiatric Association, 2013). Two eating disorders, **anorexia nervosa** and **bulimia nervosa**, pose serious challenges to health.

Although both anorexia nervosa and bulimia nervosa entail excessive concern about body weight and attempts to lose weight, they differ in how this concern is manifested. Those who suffer from anorexia nervosa starve themselves and sometimes engage in extreme exercise in order to achieve thinness and maintain a weight that is substantially lower than expected for height and age (American Psychiatric Association, 2013). A distorted body image leads youth with anorexia to perceive themselves as “fat” despite their emaciated appearance, and they continue to lose weight (Gila, Castro, Cesena, & Toro, 2005; Hagman et al., 2015). Anorexia affects about 2% of girls 19 and under; however, many more girls show similar poor eating behaviors (Smink, van Hoeken, & Hoek, 2013; Smink, van Hoeken, Oldehinkel, & Hoek, 2014).

Bulimia nervosa is characterized by recurrent episodes of *binge eating*—consuming an abnormally large amount of food (thousands of calories) in a single sitting coupled with a feeling of being out of control—followed by *purging*, inappropriate behavior designed to compensate for the binge, such as vomiting, excessive exercise, or use of laxatives (American Psychiatric Association, 2013). Like individuals with anorexia, those with bulimia nervosa experience extreme dissatisfaction with body image and attempt to lose weight, but they tend to have a body weight that is normal or high-normal (Golden et al., 2015). Bulimia is more common than anorexia, affecting between 1% and 5% of females across Western Europe and the United States (Kessler et al., 2013; Smink et al., 2014) and many more young people show symptoms of bulimia but remain undiagnosed (Keel, 2014).

Both anorexia and bulimia pose serious health risks. Girls with anorexia may lose 25% to 50% of their body weight (Berkman, Lohr, & Bulik, 2007). They may not experience menarche or may stop menstruating because menstruation is dependent on maintaining at least 15% to 18% body fat (Golden et al., 2015). Starvation and malnutrition not only contribute to extreme sensitivity to cold, pale skin, and growth of fine hairs all over the body; they can also have serious health consequences such as bone loss, kidney failure, shrinkage of the heart, brain damage, and even death in as many as 16% of cases (Golden et al., 2015; Reel, 2012). Side effects of bulimia nervosa include nutritional deficiencies; bad breath and tooth damage; and sores, ulcers, and even holes in the mouth and esophagus—as well as increased risk of cancers of the throat and esophagus—caused by repeated exposure to stomach acids (Katzman, 2005).

What causes eating disorders? Both anorexia and bulimia occur more often in both members of identical twins than fraternal twins, indicating a genetic connection (Bulik, Kleiman, & Yilmaz, 2016; Strober, Freeman, Lampert, Diamond, & Kaye, 2014). Eating disorders are more prevalent in females than males, with about 1% of males diagnosed with an eating disorder as compared with about 6% of females (Raevuori, Keski-Rahkonen, & Hoek, 2014). Anorexia is associated with perfectionism and strict regulation of eating, thus it may be viewed as a way to exert control and reduce negative mood states (Kaye, Wierenga, Bailer, Simmons, & Bischoff-Grethe, 2013; Tyrka, Graber, & Brooks-Gunn, 2000). Eating disorders are associated with altered neural activity in several limbic system structures and parts of the prefrontal cortex responsible for aspects of emotion, rewards, and decision making (Fuglset, Landrø, Reas, & Rø, 2016).

Eating disorders occur in all ethnic and socioeconomic groups in Western countries and are increasingly common in Asian and Arab cultures (Isomaa, Isomaa, Marttunen, Kaltiala-Heino, & Björkqvist, 2009; Keski-Rahkonen & Mustelin, 2016; Pike, Hoek, & Dunne, 2014; Thomas et al., 2015). Girls who compete in sports and activities that idealize lean figures, such as ballet, figure skating, gymnastics, and long distance running, are at higher risk for developing eating disorders than are other girls

(Nordin, Harris, & Cumming, 2003; Voelker, Gould, & Reel, 2014). In the United States, white and Latina girls, especially those of higher socioeconomic status, are at higher risk for low body image and eating disorders than are black girls, who may be protected by cultural and media portrayals of African American women that value voluptuous figures (Smink et al., 2013). Some researchers suggest, however, that ethnic differences in eating disorders are not as large as they appear. Instead, eating disorders may exist in black girls but remain undetected and undiagnosed because of barriers to diagnosis and treatment (Wilson, Grilo, & Vitousek, 2007).

Eating disorders are difficult to treat. In one study of more than 2,500 adolescents, 82% of those diagnosed with an eating disorder continued to show symptoms 5 years later (Ackard, Fulkerson, & Neumark-Sztainer, 2011). Anorexia nervosa and bulimia nervosa are treated in similar ways but show different success rates. Standard treatment for anorexia includes hospitalization to remedy malnutrition and ensure weight gain, antianxiety or antidepressant medications, and individual and family therapy (Lock, 2011; Wilson et al., 2007). Therapy is designed to enhance girls' motivation to change and engage them as collaborators in treatment, providing them with a sense of control. However, the success of therapy depends on the patients' attitudes about their symptoms and illness (Bulik et al., 2007; Lock, Le Grange, & Forsberg, 2007; Lock, 2011). Unfortunately, girls with anorexia tend to deny that there is a problem as they are unable to objectively perceive their bodies and value thinness and restraint, making anorexia very resistant to treatment (Berkman et al., 2007). As a result, only about 50% of girls with anorexia make a full recovery and anorexia nervosa has the highest mortality rate of all mental disorders (Smink et al., 2013).

Bulimia tends to be more amenable to treatment because girls with bulimia often acknowledge that their behavior is not healthy. Girls with bulimia tend to feel guilty about bingeing and purging and are more likely than those with anorexia to seek help. Individual therapy, support groups, nutritional education, and antianxiety or antidepressant medications are the treatments of choice for bulimia nervosa (Hay & Bacaltchuk, 2007; le Grange & Schmidt, 2005). Individual and family-based therapy helps girls become aware of the thoughts and behaviors that cause and maintain their bingeing and purging behaviors, which decreases binge eating and vomiting and reduces the risk of relapse (Lock, 2011; Smink et al., 2013). Another risk to development in adolescence and emerging adulthood lies in experimentation with risky activities such as alcohol and substance use and abuse.

## ALCOHOL AND SUBSTANCE USE AND ABUSE

Nearly half of U.S. teens have tried an illicit drug and two-thirds have tried alcohol by the time they leave high school, as shown in Table 5.2. Experimentation with alcohol, tobacco, and marijuana use, that is, "trying out" these substances, is so common that it may be considered somewhat normative for North American adolescents. Rates of experimentation rise during the adolescent years into young adulthood (Miech, Johnston, O'Malley, Bachman, Schulenberg, & Patrick, 2017). Perhaps surprising to some adults is that a limited amount of experimentation with drugs and alcohol is common in well-adjusted middle and older adolescents and associated with psychosocial health and well-being (Mason & Spoth, 2011; Shelder & Block, 1990; Windle et al., 2008). Why? Alcohol and substance use may serve a developmental function in middle and late adolescence, such as a way of asserting independence and autonomy from parents, taking risks, forming social relationships, and learning about oneself (Englund et al., 2013).



**PHOTO 5.4:** Alcohol and Substance Use and Abuse

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**TABLE 5.2 • Substance Use by U.S. Adolescents, 2016**

		<b>LIFETIME PREVALENCE (%)</b>	<b>30-DAY PREVALENCE (%)</b>
Cigarettes	8th grade	9.8	2.6
	10th grade	17.5	4.9
	12th grade	28.3	10.5
E-Cigarettes	8th grade	—*	6.2
	10th grade	—	11.0
	12th grade	—	12.5
Alcohol	8th grade	22.8	7.3
	10th grade	43.4	19.9
	12th grade	61.2	33.2
Been Drunk	8th grade	8.6	1.8
	10th grade	26.0	9.0
	12th grade	46.3	20.4
Marijuana	8th grade	13	5.4
	10th grade	30	14.0
	12th grade	45	22.5
Other Illicit Drugs	8th grade	9	2.7
	10th grade	14	4.4
	12th grade	21	6.9

\*E-cigarettes is a new addition to survey; lifetime prevalence was not assessed

Source: Miech et al. (2017).

Substance use often increases during the transition to adulthood, when emerging adults usually live away from their parents for the first time in their lives and experience the drive to explore the world at the same time as they feel pressure to complete their education, establish a career, and find a mate. These circumstances, coupled with easy access to drugs and alcohol, increase the risk of using and abusing marijuana, alcohol, and other drugs in early adulthood. Substance abuse is most prevalent among people in their twenties, often with dangerous consequences such as overdose, injury, accidents, and even death (Chen & Jacobson, 2012). Substance use tends to decline as emerging adults transition into adult roles, such as becoming parents; however, substance use remains prevalent in adulthood, with about 6% of middle-aged adults reporting use within the past month (Substance Abuse and Mental Health Services Administration, 2014). The following sections examine three commonly used substances: alcohol, tobacco, and marijuana.

### Alcohol Use and Abuse

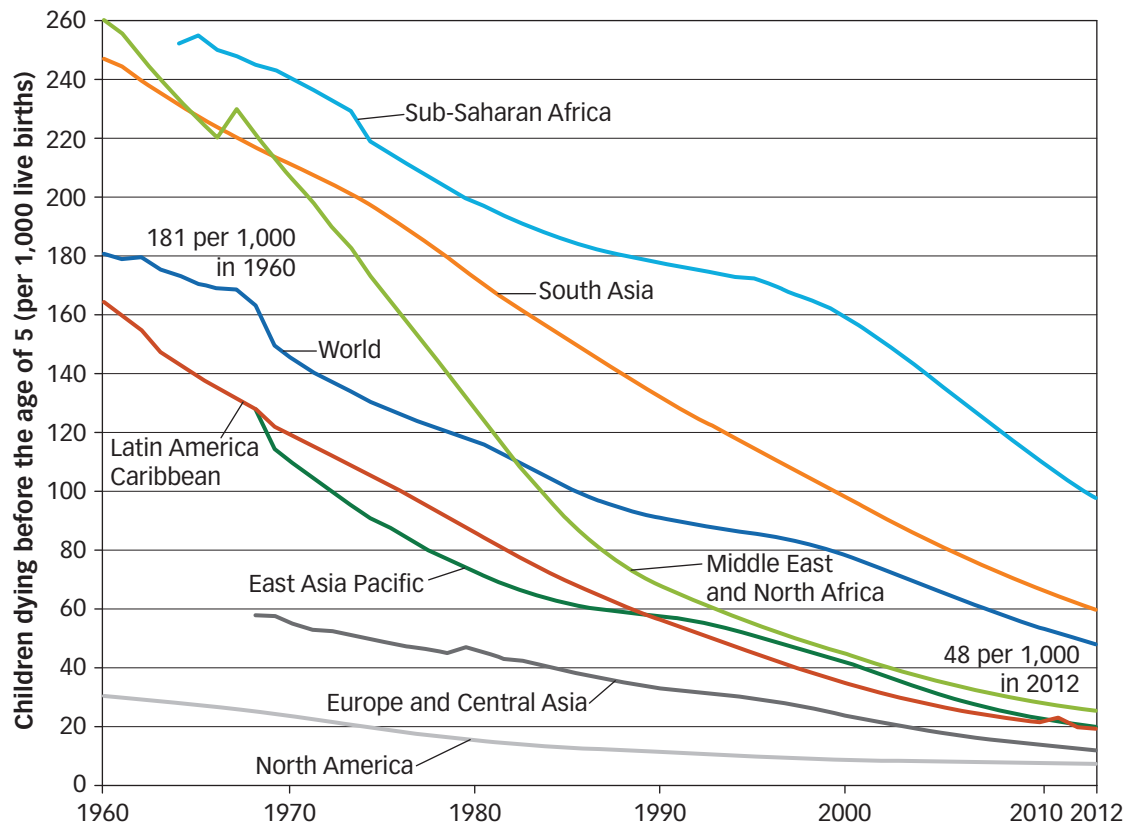
Adolescents are particularly vulnerable to alcohol abuse because they show reduced sensitivity to the effects of alcohol that serve as cues in adults to limit their intake, such as motor impairment, sedation, social impairment, and quietness or distress (Spear, 2011). Adolescents develop a tolerance to the impairing effects of alcohol and have reduced sensitivity to the aversive effects, such as nausea or hangover. They are at risk for developing dependence on alcohol more quickly than do adults (Schepis, Adinoff, & Rao, 2008; Simons, Wills, & Neal, 2014). Adolescents are also more sensitive to neurological damage and show more cognitive impairment in response to alcohol use as compared with adults. Alcohol use in adolescence, even moderate use, is associated with damage to the brain, particularly the prefrontal cortex and hippocampus (Bava & Tapert, 2010; Silveri, Dager, Cohen-Gilbert, & Sneider, 2016; Squeglia et al., 2015). Heavy drinking is associated with reduced frontal cortex response

during working memory tasks; slower information processing; and reductions in attention, visiospatial functioning, and problem solving (Carbia et al., 2017; Feldstein Ewing, Sakhardande, & Blakemore, 2014). At the same time, some research suggests that pre-existing individual differences, such as poor functioning in tests of inhibition and working memory, smaller gray and white matter volume, and altered brain activation, are not only influenced by substance use, but place adolescents at risk for heavy substance use (Brumback et al., 2016; Squeglia & Gray, 2016).

Of particular concern are rates of **binge drinking**, defined for men as consuming five or more drinks in one sitting and for women, four drinks in one sitting. Heavy drinking is defined as two or more instances of binge drinking within the past 30 days (Kanny, Liu, Brewer, & Lu, 2013). As shown in Figure 5.4, binge drinking and heavy drinking peak in young adulthood, with about one-third of adults aged 18 to 24 and 25 to 34, as well as one in five adults aged 35 to 44, reporting binge drinking within the past 30 days (Kanny et al., 2013). Binge drinking is associated with negative short- and long-term consequences for physical and psychological well-being, including academic problems, fatal and nonfatal injuries, violence and crime, unintended pregnancies, sexually transmitted diseases, and impaired driving (S. A. Brown et al., 2008; Cleveland, Mallett, White, Turrisi, & Favero, 2013; Mallett et al., 2013; Marshall, 2014). For example, as shown in Figure 5.5, in 2013, about 20% of 21- to 25-year-olds and 26- to 29-year-olds and about 18% of 30- to 34-year-olds reported driving under the influence of alcohol within the past year (U.S. Department of Health and Human Services, 2014). Each year alcohol is implicated in one-third of traffic fatalities (National Highway Traffic Safety Administration, 2016) and implicated in 40% of all crimes (National Council on Alcoholism and Drug Dependence, 2015).

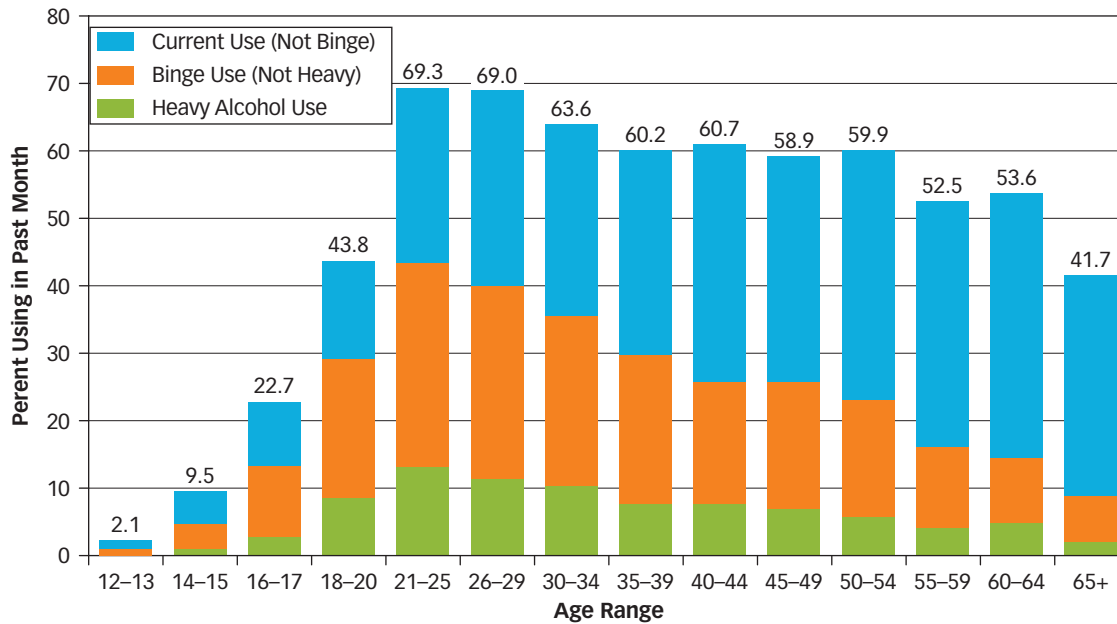
Research with college students has suggested that binge and heavy drinking may be part of a “stage of life phenomenon” for which the transition out of high school increases the risk (Jackson, Sher, & Park, 2005). As they enter college, young people experience greater exposure to drinking and encounter greater amounts of peer drinking and positive peer attitudes toward alcohol (White & Jackson, 2005), and alcohol use tends to increase (Simons-Morton et al., 2016). Most college students report experiencing more

**FIGURE 5.4: Child Mortality by World Region, 1960–2012**



From Rosner 2016 -- [https://ourworldindata.org/wp-content/uploads/2013/05/ourworldindata\\_child-mortality-since-1960.png](https://ourworldindata.org/wp-content/uploads/2013/05/ourworldindata_child-mortality-since-1960.png)

**FIGURE 5.5: Current, Binge, and Heavy Alcohol Use Among Persons Ages 12 and Older, by Age, 2014**



Source: Substance Abuse and Mental Health Services Administration (2014).

positive consequences of drinking (such as feeling social) than negative consequences (such as cognitive impairment), which contributes to high rates of binge and heavy drinking in this age group (Lee, Maggs, Neighbors, & Patrick, 2011). Research is mixed as to whether young adults who attend college drink more than their peers who do not attend college (Carter, Brandon, & Goldman, 2010; Goldman, Greenbaum, Darkes, Brandon, & Del Boca, 2011; Reckdenwald, Ford, & Murray, 2016; Vergés et al., 2011), but heavy drinking and alcohol-related problems are more common among young adults regardless of college enrollment (Barnes, Welte, Hoffman, & Tidwell, 2010; Lanza & Collins, 2006; Vergés et al., 2011).

Most young people show a spontaneous decline in drinking over the course of early adulthood. The transition to adult responsibilities such as career, marriage, and parenthood typically predicts declines in binge drinking and alcohol-related problems (Misch, 2007; Vergés et al., 2011). Most young people “mature out” of drinking, moving from heavy drinking to more moderate drinking (Lee, Chassin, & Villalta, 2013). Yet recent research suggests that although the frequency of drinking declines, for many young people, the amount consumed may remain unchanged (Arria et al., 2016; Reich, Cummings, Greenbaum, Moltisanti, & Goldman, 2015). Heavy drinking and binge drinking remains prevalent in adulthood, with 14% of middle-aged adults reporting binge drinking within the last month (Kanny et al., 2013).

### Tobacco Use and Abuse

Nearly 90% of smokers have their first cigarette before age 18, but regular or daily smoking often does not begin until about age 20, and the overall risk of initiating smoking plateaus at about age 22 and is rare after 24 (U.S. Department of Health and Human Services, 2014; Edwards, Carter, Peace, & Blakely, 2013). Each month, more than one-third of 18- to 39-year-olds in the United States report smoking tobacco cigarettes (U.S. Department of Health and Human Services, 2014). Many smokers do not consider themselves smokers because they only engage in occasional social smoking, “bumming” cigarettes rather than

buying them, and smoking in social groups rather than as a daily habit (Brown, Carpenter, & Sutfin, 2011; Song & Ling, 2011).

Cigarette smoking is responsible for about one of every five deaths in the United States each year, including a third of all cancer deaths and about 90% of all cases of lung cancer, the top cancer killer of both men and women (U.S. Department of Health and Human Services, 2014). In addition, smoking substantially increases the risk of coronary heart disease, stroke, heart attack, vascular disease, and aneurysm (National Institute on Drug Abuse, 2009). When nonsmokers are exposed to secondhand smoke, they too experience negative health consequences, particularly increased risk of lung cancer and cardiovascular disease (U.S. Department of Health and Human Services, 2014).

Why is smoking such a tenacious habit? With each cigarette, a smoker consumes one to two milligrams of nicotine in about a five-minute period, which enters the blood and reaches the brain quickly and stimulates reward pathways, making it highly addictive. Withdrawal symptoms of nicotine begin quickly, within a few hours after the last cigarette; these include irritability, craving, anxiety, and attention deficits, which often send the smoker in search of another cigarette. Other withdrawal symptoms include depression, sleep problems, and increased appetite. When a smoker quits, withdrawal symptoms often peak within the first few days of smoking cessation and usually subside within a few weeks, but some people continue to experience symptoms for months. Nearly 35 million people in the United States wish to quit smoking each year, but more than 85% of those who try to quit relapse, often within a week (National Institute on Drug Abuse, 2009).

Some smokers turn to e-cigarettes as an alternative to tobacco cigarettes, viewing e-cigarettes as safer than conventional cigarettes (Goniewicz, Lingas, & Hajek, 2013; Huerta, Walker, Mullen, Johnson, & Ford, 2017). E-cigarettes are the most commonly used tobacco product among youth, with 16% of high school and 5% of middle school students reporting regular use (Singh et al., 2016), and their use is also increasing rapidly among adults (Miech, Johnston, O'Malley, Bachman, & Schulenberg, 2015). E-cigarettes aerosolize nicotine and produce a vapor that emulates the smoke of conventional cigarettes (Yamin, Bitton, & Bates, 2010). Although some posit that e-cigarettes may be a less harmful alternative to smoking (Farsalinos & Polosa, 2014), there is little research on their safety (Tremblay et al., 2015). What we do know is that nicotine and the aerosol created by e-cigarettes can include ingredients that are harmful, such as flavorings (e.g., diacetyl, a chemical linked to serious lung disease), heavy metals, and ultrafine particles that reach the lungs (Murthy, 2017; Office of the Surgeon General, 2016). One recent study found that adolescent e-cigarette users showed increased rates of chronic bronchitis symptoms (McConnell et al., 2017). In 2016, the federal government extended restrictions on tobacco production, advertising, and sale to include e-cigarettes; minors can no longer purchase e-cigarettes (U.S. Food and Drug Administration, 2016). Restricting minors' access to e-cigarettes may extend to other beneficial effects, as most adolescents who report e-cigarette use have used other tobacco products (Collins et al., 2017); therefore, adolescents who use e-cigarettes may be at risk for cigarette smoking (Barrington-Trimis et al., 2016; McCabe, West, Veliz, & Boyd, 2017).

### **Marijuana Use and Abuse**

A particularly common substance used by young adults in the United States is marijuana, with 14% of 10th-grade and 23% of 12th-grade students, 20% of 18- to 25-year-old emerging adults, and 13% of 26- to 34-year-old young adults reporting use in the last month (Azofeifa et al., 2016; Miech et al., 2017). Young people consume marijuana for different reasons; those who cite experimentation as their primary reason tend to report fewer marijuana-related problems than do those who list coping, relaxation, and enjoyment (Lee, Neighbors, & Woods, 2007; Patrick, Bray, & Berglund, 2016). For most young people, marijuana use is sporadic and limited in duration, but regular sustained use is



# LIFESPAN BRAIN DEVELOPMENT



## • • Substance Use and the Brain



**PHOTO 5.5:** Marijuana and the Brain

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Experimentation with alcohol and marijuana is normative during adolescence. However, many young people transition to regular use, to the concern of parents, educators, and developmental scientists. We know little about how drinking affects the developing brain and even less is known about the effects of marijuana use.

Research to date suggests that alcohol use is associated with changes in the structure and function of the adolescent brain. Compared with those who do not use alcohol, adolescents who drink alcohol show smaller brain volumes and grey matter density in areas responsible for executive control, including parts of temporal and parietal lobes, and especially, the frontal cortex (Feldstein Ewing, Sakhardande, & Blakemore, 2014; Whelan et al., 2014). Executive control is responsible for response inhibition, the ability to resist temptation, such as the rewards that come with risky but exciting activities, including drinking. Most worrisome is the inverse relationship between the quantity of alcohol consumed and brain volume, such that greater consumption of alcohol predicts decreased brain volume

and less white matter integrity (Silveri, Dager, Cohen-Gilbert, & Sneider, 2016). Yet there is room for optimism because some research has shown that the adolescent brain can return to typical patterns of functioning when alcohol use is discontinued (Lisdahl, Gilbert, Wright, & Shollenbarger, 2013).

Much less is known about the effects of marijuana use on the adolescent brain. Research to date suggests that regular marijuana use is associated with neurocognitive deficits in attention, learning and memory, and executive function (Lisdahl et al., 2013; Lubman, Cheetham, & Yücel, 2015). Like alcohol use, regular marijuana use is associated primarily with alterations, including reduce brain and grey matter volumes, in the frontal lobe, followed by the parietal, and temporal lobes (Lopez-Larson et al., 2012; Takagi, Youssef, & Lorenzetti, 2016). Moreover, early onset of marijuana use, before age 18 and especially prior to age 16, is associated with more severe consequences for addition, verbal intelligence, learning and memory and executive function (Lubman et al., 2015; Silveri et al., 2016). It is unknown whether abstinence over a long period is associated with a rebound in function.

Overall, research suggests that alcohol and marijuana have similar consequences for neurological development in adolescence. A challenge to this research is that alcohol and marijuana use tend to cooccur, making it difficult to disentangle the independent effects of each. Regardless, the literature to date suggests that, although normative, alcohol and marijuana use pose serious risks to neurological development in adolescence.

### What Do You Think?

1. **How might findings about the effects of alcohol and marijuana on brain development be applied to prevent or change adolescent behavior? Identify challenges that might arise in applying these findings as well as ways of countering challenges.**

associated with current and future dependence and adverse health and social outcomes, including the use of other substances (Griffin, Bang, & Botvin, 2010; Palamar, Griffin-Tomas, & Kamboukos, 2015; Swift, Coffey, Carlin, Degenhardt, & Patton, 2008). In addition, marijuana smokers experience many of the same respiratory problems common to tobacco smokers, such as cough, more frequent chest illnesses, and cancers. Marijuana smoke contains irritants and carcinogens and appears to have 50% to 79% more carcinogens than tobacco smoke (Tashkin, 2013).

Sustained marijuana use is associated with self-reported cognitive difficulties and a variety of personal problems during the middle to late twenties, including lower levels of academic attainment, lower income, greater unemployment, poor relationship satisfaction, conflict with partners, and poor life satisfaction (Conroy, Kurth, Brower, Strong, & Stein, 2015; Fergusson & Boden, 2008; Hall, 2014; Silins et al., 2014; Zhang, Brook,



## • • Marijuana Legalization



**PHOTO 5.6:** Lives in Context: Marijuana Legalization

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In response to anecdotal reports and some research suggesting that marijuana may be useful for easing symptoms of serious illnesses, such as cancer and AIDS, California passed Proposition 215 in 1996, legalizing marijuana sale and use for medical purposes. Yet despite Proposition 215, marijuana sale and possession remain federal offenses. The U.S. federal government does not distinguish medical marijuana from illicit marijuana. Although federal statutes have not changed, as of this writing, 29 states have legalized medical marijuana (National Conference of State Legislatures, 2017). Critics of medical marijuana argue that it has not been subjected to the careful scientific study and medical trials that other drugs are subjected to, and there are no reliable guidelines on use or implications of prolonged use (Martin, 2016; Monte, Zane, & Heard, 2015). In addition, since a common mode of ingesting marijuana remains smoking, users may be exposed to a variety of health threats common to cigarette smoke.

In 2012, Colorado and Washington became the first U.S. states to legalize the sale and possession of marijuana for recreational use, followed by Alaska, Oregon, and Washington, DC in 2014 and California, Maine, Massachusetts, and Nevada in 2016 (Steinmetz, 2016). Each regulates marijuana in a way similar to alcohol, allowing possession of a small quantity by adults aged 21 and older, with provisions against operating motor vehicles while under the influence. The laws allow for commercial cultivation and sale subject to state regulation and taxation. However, despite state legislation, marijuana remains illegal under federal statute. Yet in 2009, the Justice Department announced that the

federal government would not prosecute medical marijuana providers and consumers who were in compliance with state laws, and in 2013, the Justice Department announced that it would not interfere with the legalization laws in Washington and Colorado (Ammerman et al., 2015).

Supporters of legalized marijuana contend that taxes on the sale of marijuana can produce significant tax revenue. For example, Colorado's legal marijuana sales generated more than \$135 million in revenue from taxes and fees that the state used for public projects such as school construction and renovation (Huddleston, 2016). At the same time, marijuana-related emergency room visits and hospitalizations, as well as poison center calls, increased about 1% per month over the first year of legalization (Davis et al., 2016). The number of children evaluated in the emergency department for unintentional marijuana ingestion has also increased substantially (Monte et al., 2015; Wang et al., 2016). Some experts expect heavy use to increase after recreational legalization (Hall & Lynskey, 2016).

One concern of marijuana legalization is the effect on children and adolescents. Although this area of research is somewhat new, some studies have suggested that medical marijuana laws are not associated with increases in recreational use by adolescents in states where medical marijuana is legal (Hasin et al., 2015; Pacula, Powell, Heaton, & Seigny, 2015). A study of high school students in 14 states where medical marijuana is legal showed no increases in adolescent recreational marijuana use in all of the states but Delaware, and marijuana use declined in two states (Alaska and Montana; Ammerman et al., 2015). Comparisons of 10th-grade students in Washington from 2000 to 2014 found that the prevalence of adolescent use remained stable before and after the legalization of recreational marijuana (Fleming et al., 2016). However, across time, young people showed more risks for marijuana use and abuse, including more favorable attitudes about use, less perceived harm of use, and perceived community attitudes favorable to use. Likewise, Washington parents of adolescents reported increased parental use of marijuana and approval of adult use, as well as reductions in perceived harm after legalization of recreational use (Kosterman et al., 2016). Yet parents also showed wide opposition to marijuana use by adolescents and were opposed to allowing its use in the presence of children. Overall, high school students and their parents generally believe that their marijuana-related attitudes and behaviors changed little as a result of the law (Mason, Hanson, Fleming, Ringle, & Haggerty, 2015). The long-term effects of marijuana legislation, particularly for recreational use, have yet to be determined.

Leukefeld, & Brook, 2016). Regular marijuana use can interfere with completing developmental tasks of young adulthood, such as reaching education and career goals, forming intimate relationships and marriage, and taking on adult roles (Blair, 2010). Marijuana users tend to be less responsive to negative consequences in making decisions (Wesley, Hanlon, & Porrino, 2011). Heavy use of marijuana interferes with thinking, impairing a person's ability to shift attention from one item to another and to learn, form memories,

and recall material (Bartholomew, Holroyd, & Heffernan, 2010; Crean, Crane, & Mason, 2011). Heavy marijuana use interferes with executive functioning (problem solving, abstract reasoning, and judgment), and the earlier the age of onset, the greater the negative effects (Crean et al., 2011; Gruber, Sagar, Dahlgren, Racine, & Lukas, 2011). Marijuana use in young adulthood may predict cognitive functioning later in life. One 25-year longitudinal study of more than 5,100 black and white U.S. adults found that current use of marijuana in middle age was associated with worse verbal memory and processing speed; cumulative lifetime exposure was associated with worse verbal memory, with differences for each 5 years of exposure (Auer et al., 2016).

Marijuana is addictive because when it is inhaled, the active ingredient, THC, passes from the lungs to the bloodstream to the brain and activates the brain's reward system. Marijuana is neurologically reinforcing, making the user crave the drug and have a hard time stopping. The usual effects of marijuana include euphoria, a feeling of well-being or elation. Time may seem to pass more slowly and sensations such as color and sound may seem more intense. Sometimes, however, a user may feel anxious, fearful, or distrustful instead of euphoric. THC binds to receptors in the cerebellum, which is responsible for balance, coordination of movement, and integration of thought, critical to executive functioning (Skosnik et al., 2008).

People who try to quit marijuana use report irritability, difficulty sleeping, and anxiety, similar to withdrawal from other substances such as tobacco. In psychological tests, people trying to quit show increased aggression, which peaks about a week after stopping the drug (National Institute on Drug Abuse, 2005). There has been little study of treatments for marijuana dependence because habitual marijuana abuse is very often accompanied by the abuse of alcohol and other drugs.

Although U.S. federal laws prohibit the sale and possession of marijuana, a growing number of countries, including Germany, the Netherlands, Australia, Spain, India, and Canada, have authorized its sale for medical and, increasingly, recreational purposes (Kalvapallé, 2017; Rodriguez, 2017). The issue of marijuana legalization in the United States is examined in the Lives in Context feature.



### Thinking in Context 5.2

1. How might adolescents' physical, cognitive, and social characteristics interact with their context to influence their likelihood of developing an eating disorder such as anorexia nervosa or bulimia nervosa? What roles can various contexts, such as home, peers, and school, play in influencing treatment options?
2. Are there dangers in taking the perspective that some alcohol and substance use is common and simply a part of growing up? How should parents, teachers, and professionals respond to adolescent alcohol and substance use?
3. Explain some of the reasons why substance use is highest in young adulthood. What contributes to its decline as adults grow older?

## COMMON HEALTH ISSUES IN ADULTHOOD

### LO 5.3 Identify common chronic diseases and sources of injury in adulthood, their risk factors, effects, and treatment.

Over the course of adulthood, the rate of chronic illnesses increases, as do doctor visits and hospital stays. Most adults view themselves as healthy (CDC, 2016; Federal Interagency Forum on Aging-Related Statistics, 2016); however, self-reports of health vary by contextual condition. For example, in nearly all countries of the world, self-reports of health and death rates vary by socioeconomic status. People of high socioeconomic status report better health than those of low socioeconomic status (Chen & Miller, 2013; Mackenbach et al., 2008; Mielck et al., 2014). Education is also positively associated with

perceived health (CDC, 2016). The following sections highlight the leading health concerns of middle-aged and older adults. Note that, until recently, nearly all studies of health in adulthood were conducted on men, particularly Caucasian men. Women and minorities are underrepresented in research on prevention and treatment of illness. Researchers have only recently begun to address this deficit in our understanding of illness. The following sections describe what we know about common illnesses in adulthood, discussing sex and ethnic differences when possible.

## CANCER

Overall, cancer-related mortality has declined 25% since 1991, yet cancer remains the leading cause of death in adulthood (CDC, 2017; Siegel, Ma, Zou, & Jemal, 2014). The probability of invasive cancer increases with age: 1 in 5 for people aged 50 to 59; 1 in 7 for ages 60 to 69; and 1 in 3 at age 70 and older (Siegel, Miller, & Jemal, 2016). Overall, men tend to be diagnosed with cancer at a higher rate than women (Siegel et al., 2014). Sex differences in cancer are influenced by genetics and lifestyle factors such as workplace exposure to toxins, health-related behaviors such as smoking, and making fewer visits to the doctor. People of low SES tend to experience cancer at higher rates than do other adults, a difference attributable to a range of causes including inadequate access to medical care, poor diet, high levels of stress, and occupations that may place them in contact with toxins (Jemal et al., 2008; Kish, Yu, Percy-Laurry, & Altekruise, 2014; Vona-Davis & Rose, 2009).

What is cancer? Cancerous cells are abnormal cells. Everyone has some of these abnormal cells. Cancer occurs when the genetic program that controls cell growth is disrupted. As a result, abnormal cells reproduce rapidly and spread to normal tissues and organs and the person is diagnosed with cancer (Lin et al., 2007; Vogelstein & Kinzler, 2004). Whether an individual develops cancer is affected by a complex web of genetic and environmental influences.

Scientific breakthroughs have increased our knowledge of genetic risk factors for cancer. For example, women now can be tested for mutations in the genes responsible for suppressing the proliferation of breast cancer cells. Genetics, however, is not destiny. Only about 35% to 50% of women who test positive for the genetic mutation actually develop breast cancer. Those who do show more genetic mutations and tend to develop breast cancer especially early in life, often before age 30 (Stephens et al., 2012). Whether a genetic risk factor for breast cancer leads to developing breast cancer is influenced by the presence of environmental risk factors, such as heavy alcohol use, overweight, use of oral contraceptives, exposure to toxins, and low socioeconomic status (Khan, Afaq, & Mukhtar, 2010; Nickels et al., 2013). The biology of breast cancer is age dependent: early-onset breast cancer is qualitatively different than late-onset breast cancer. While early-onset breast cancers are largely inherited and are often invasive, spreading quickly, late-onset breast cancers tend to grow more slowly, are less biologically aggressive, and likely follow extended exposures to environmental stimuli as well as disruptions in cell division that occur with aging (Anderson, Rosenberg, Prat, Perou, & Sherman, 2014; Benz, 2008). Although many people persist in the centuries-old belief that a diagnosis of cancer is a death sentence, today's medical advances permit more people to survive



Manuel Litran/Paris Match/Getty

**PHOTO 5.7:** Cancer

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cancer than ever before. The survival rate for adults diagnosed with cancer, defined as surviving at least 5 years, and remission (“beating” cancer) varies by type of cancer.

## DIABETES

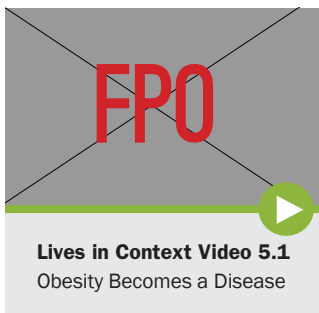
After each meal we eat, the body digests and breaks down food, releasing glucose into the blood. Insulin, a hormone released by the pancreas, maintains a steady concentration of glucose in the blood and excess glucose is absorbed by muscle and fat. **Diabetes** is a disease marked by high levels of blood glucose. Diabetes occurs when the body is unable to regulate the amount of glucose in the bloodstream because there either is not enough insulin produced (Diabetes 1) or the body shows insulin resistance and becomes less sensitive to it, failing to respond to it (Diabetes 2; American Diabetes Association, 2014). Symptoms of diabetes include fatigue, great thirst, blurred vision, frequent infections and slow healing. When glucose levels become too low, hypoglycemia occurs with symptoms of confusion, nervousness, and fainting. Hyperglycemia is characterized by overly high glucose levels, also resulting in serious illness. Managing diabetes entails careful monitoring of the diet and often self-injection of insulin, which permits the body to process glucose, critical to body functioning.

About 16% of adults aged 45 to 64 have diabetes, rising to more than one-quarter of older adults over the age of 65 (CDC, 2014). Diabetes is the fifth leading cause of death among people aged 55 to 64 and sixth leading cause of death among people aged 45 to 54 and 65 and older (CDC, 2017; National Center for Health Statistics, 2015). African American, Mexican American, and Canadian Aboriginal people are diagnosed with diabetes at higher rates than European Americans because of genetic as well as contextual factors, such as the higher rates of obesity, poor health, and a sedentary lifestyle that accompanies poverty (American Diabetes Association, 2014; Best, Hayward, & Hidajat, 2005; Jeffreys et al., 2006). Being overweight at any point during life is associated with an increased risk of diabetes (Djoussé, Driver, Gaziano, Buring, & Lee, 2013; Jeffreys et al., 2006). Diabetes has a genetic component (Patel et al., 2016), but lifestyle choices such as diet and exercise are important risk factors that interact with genetic propensities to influence diabetes risk (Leong, Porneala, Dupuis, Florez, & Meigs, 2016; Scott et al., 2013); hence, many researchers emphasize the role of epigenetics in diabetes (Franks & Pare, 2016; Keating, Plutzky, & El-Osta, 2016).

People with diabetes are at risk for a variety of health problems. A high level of glucose in the bloodstream raises the risk of heart attack, stroke, circulation problems in the legs, blindness, and reduced kidney functions (DeFronzo & Abdul-Ghani, 2011). Although women are about as likely as men to be diagnosed with diabetes, for largely unknown reasons, women with diabetes experience a much larger risk of heart attack and stroke than men (Peters, Huxley, & Woodward, 2014). Diabetes has serious cognitive effects including declines in executive function, processing speed, memory, and motor function (Palta, Schneider, Biessels, Touradji, & Hill-Briggs, 2014). Over time, diabetes is associated with accelerated brain aging, including losses of gray matter, abnormalities in white matter, and a heightened risk of dementia and Alzheimer’s disease in older adults (Espeland et al., 2013; R. O. Roberts et al., 2014; Vagelatos & Eslick, 2013).

Diabetes also influences psychosocial functioning. Depression is two to three times more common among people with diabetes compared to their peers and they are more likely to experience chronic depression with up to 80% of those treated for depression experiencing a relapse of depressive symptoms within a 5-year period (Park, Katon, & Wolf, 2013; Roy & Lloyd, 2012). Adults with depression are less likely to follow dietary restrictions, comply with medication, and monitor blood glucose—behaviors associated with worse outcomes, including increased risk of mortality (Park et al., 2013; van Dooren et al., 2013).

Maintaining a healthy weight through diet and exercise is a powerful way of preventing diabetes. Individuals can successfully manage the disease by adopting a diet that carefully



controls the amount of sugar entering the bloodstream as well as engaging in regular exercise (American Diabetes Association, 2014; Jannasch, Kroger, & Schulze, 2017; Mavros et al., 2013). Frequent blood testing permits the individual to monitor his or her glucose levels and take insulin when needed to lower levels of glucose in the blood. Coping with diabetes requires a great deal of self-monitoring and self-care, but appropriate self-treatment enables adults to manage this chronic illness and live an active life.

## CARDIOVASCULAR DISEASE

**Cardiovascular disease**, commonly referred to as **heart disease**, is responsible for more than one-quarter of all deaths of middle-aged Americans each year (National Center for Health Statistics, 2015). Markers of cardiovascular disease include high blood pressure, high blood cholesterol, plaque buildup in the arteries (atherosclerosis), irregular heartbeat, and, particularly serious, heart attack (blockage of blood flow to the heart caused by a blood clot occurring within a plaque-clogged coronary artery; Koh, Han, Oh, Shin, & Quon, 2010). Cardiovascular disease can also cause a stroke—a blockage of blood flow to brain cells, which can result in neurological damage, paralysis, and death. A stroke occurs when a blood clot, often originating in the coronary arteries, travels to the brain or when a clot forms in the brain itself.

Awareness of the symptoms of heart attack is critical to surviving it. About half of heart attack victims die before being admitted to a hospital (American Heart Association, 2008a). The most common symptom of heart attack is chest pain, uncomfortable pressure, squeezing, fullness, or pain in the chest that may come and go or last. Other symptoms include discomfort or pain in other areas of the upper body, especially the left arm, but also the back, neck, jaw, or stomach. Shortness of breath, nausea, or light-headedness can also occur. Cardiovascular disease has been traditionally viewed as an illness affecting men, as men are more likely to be diagnosed with cardiovascular disease.

However, women are more likely than men to die from cardiovascular disease, especially heart attack (Flink, Sciacca, Bier, Rodriguez, & Giardina, 2013). Many people are unaware that women tend to show different symptoms of heart attack (Kirchberger, Heier, Kuch, Wende, & Meisinger, 2011). The most common symptom experienced by women is shortness of breath and only about one-third report chest pain, the hallmark symptom in men (McSweeney Cody, O’Sullivan, Elberson, Moser, & Garvin, 2003). When they do, women are more likely to describe it as pressure or tightness than pain. Women are more likely than men to report pain in the left shoulder or arm, pain in the throat or jaw, pain in the upper abdomen, pain between the shoulder blades, nausea, dizziness, and vomiting (Kirchberger, Heier, Kuch, Wende, & Meisinger, 2011). Because of these differences, many women do not recognize their symptoms as severe and life threatening (Madsen & Birkelund, 2016).

Risk factors for cardiovascular disease include heredity, age, a diet heavy in saturated fats and trans fatty acids, and smoking (Go et al., 2013). One important risk factor, hypertension, has increased rapidly in the last two decades to account for more than one-third of cardiovascular disease in U.S. adults aged 45 to 59 (Egan, Zhao, & Axon, 2010). By 2030, 41% of the U.S. population is projected to have some form of cardiovascular disease (Heidenreich et al., 2011). Hypertension is a global problem responsible for about 13% of all deaths in the world each year (World Health Organization, 2015). Anxiety,



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**PHOTO 5.8:** Diabetes

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psychological stress, and a poor diet have negative effects on the heart and contribute to hypertension and cardiovascular disease (Backé, Seidler, Latza, Rossnagel, & Schumann, 2012; Holt et al., 2013).

Treatment for cardiovascular disease varies depending on the severity. Medication and behavioral changes, such as increasing physical activity, changing diet, and consuming more fish oil, may reduce hypertension and cholesterol levels (Harris et al., 2008; Koh et al., 2010). In serious cases, a health care provider may recommend coronary bypass surgery, in which damaged coronary blood vessels are replaced with those from the leg, and angioplasty, in which a needle is threaded through the arteries and a tiny balloon is inflated to flatten plaque deposits against the arterial walls and enable blood to flow unobstructed. During angioplasty, a coronary stent is often inserted to help keep the artery open.

## OSTEOPOROSIS

In middle adulthood, women undergo hormonal changes accompanying menopause. These changes are associated with bone loss, increasing women's risk for **osteoporosis**, a disorder characterized by severe bone loss resulting in brittle and easily fractured bones (Siris et al., 2014; Walker, 2008). We tend to think of our bones as static and unchanging—almost like sticks of concrete—but the skeleton is actually a dynamic organ made of living cells that continually dissolve and regenerate. In the first 10 years after menopause, women typically lose about 25% of their bone mass, largely due to menopausal declines in estrogen; this loss increases to about 50% by late adulthood (Avis, Brockwell, & Colvin, 2005; Vondracek, 2010). Men experience a more gradual and less extreme loss of bone because age-related decreases in testosterone, which their bodies convert to estrogen, occur slowly, and therefore the loss of bone mass that occurs with declines in estrogen occurs gradually over the adult years (Avis & Crawford, 2006; Walker, 2008). About half of U.S. adults are affected by osteoporosis (10 million people) or low bone mass (Wright et al., 2014); these conditions can be identified through a routine, noninvasive bone scan. Most people—men and women—are diagnosed with osteoporosis only after experiencing bone fractures, but one out of every two women and one in four men over 50 will have an osteoporosis-related fracture in their lifetime (NIH Osteoporosis and Related Bone Diseases National Resource Center, 2007). Men at risk for osteoporosis are those with low body mass and the very old. Because women are more widely known to be at risk, however, men often go undiagnosed and untreated (Liu et al., 2008).

Heredity and lifestyle contribute to the risk of osteoporosis. For example, at least 15 genes contribute to osteoporosis susceptibility (Li et al., 2010). Identical twins are more likely to share a diagnosis of osteoporosis than are fraternal twins (Andersen, 2007). Thin, small-framed women tend to attain a lower peak bone mass than do other women, and are at relatively higher risk of osteoporosis. Other risk factors include a sedentary lifestyle, calcium deficiency, cigarette smoking and heavy alcohol consumption (Bleicher et al., 2011; Nachtigall, Nazem, Nachtigall, & Goldstein, 2013).

The risk of osteoporosis can be reduced by encouraging individuals to maximize their bone density by consuming a diet rich in calcium and vitamin D and engaging in regular exercise from childhood into emerging adulthood, when bone reaches its peak density (Nachtigall et al., 2013; Weaver et al., 2016). These same



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**PHOTO 5.9:** Osteoporosis

Osteoarthritis, a degenerative joint disease, often occurs in the hands, knees, and hips.

guidelines, specifically having a bone-healthy lifestyle by consuming a diet rich in calcium and vitamin D, avoiding smoking and heavy drinking, and engaging in moderate alcohol consumption and weight-bearing exercise, can offset bone loss in postmenopausal women (Bleicher et al., 2011; Cosman et al., 2014). Medication can increase the absorption of calcium and slow the bone loss associated with osteoporosis in middle and late adulthood (Vondracek, 2010).

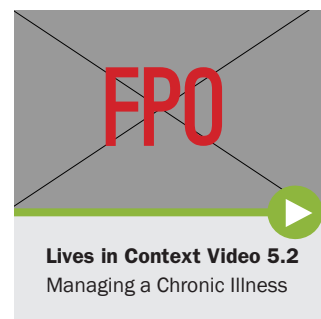
## ARTHRITIS

One illness that goes hand in hand with aging is arthritis, a degenerative joint disease. There are more than 100 different types of arthritis; the most common is **osteoarthritis**, which affects joints that are injured by overuse, most commonly the hips, knees, lower back, and hands. The cartilage that protects the ends of bones where they meet at joints wears away and joints become less flexible and swell. Those who suffer from osteoarthritis experience a loss of movement and a great deal of pain. Aging is the most prominent risk factor for osteoarthritis; it often first appears in middle adulthood, occurring in about one-third of adults ages 45 to 64, but becomes more common and worsens in severity during older adulthood (Aigner, Haag, Martin, & Buckwalter, 2007; Cooper, Javaid, & Arden, 2014). About half of adults aged 65 or older report a diagnosis of arthritis, and it is likely that many more cases remain undiagnosed (National Center for Chronic Disease Prevention and Health Promotion, 2010). Nearly all older adults show at least some signs of osteoarthritis, but there are great individual differences. People whose job or leisure activities rely on repetitive movements are most likely to experience osteoarthritis. Office workers who type every day, for example, might experience osteoarthritis in their hands. Runners might experience it in their knees. Obesity can also be a cause as it places abnormal pressure on joints.

A second common type of arthritis, rheumatoid arthritis, is not age- or use-related. Rheumatoid arthritis is an autoimmune illness in which the connective tissues, the membranes that line the joints, become inflamed and stiff. They thicken and release enzymes that digest bone and cartilage, often causing the affected joint to lose its shape and alignment. Most people are diagnosed with rheumatoid arthritis between ages 20 and 50 and the prevalence increases with age (Lindstrom & Robinson, 2010). Older adults with rheumatoid arthritis often have lived with a painful chronic illness for many years and likely experience multiple physical disabilities.

Arthritis is a chronic disease because it is managed, not cured. When inflammation flares, more rest is needed as well as pain relief. However, instead of uninterrupted rest, it is best to deal with an arthritis flare-up with some activities or exercises to help the muscles maintain flexibility, known as range of motion. People whose osteoarthritis is related to obesity may experience some relief with weight loss. In some cases, a synthetic material can be injected into a joint to provide more cushioning and improve movement; or a severely affected joint, such as the hip or knee, can be surgically replaced. Joint replacement surgery has become increasingly common in recent decades.

Because adults with arthritis live with chronic pain and reduced ability to engage in activities, they are often at risk for depression (Lin, 2008; Margaretten, Katz, Schmajuk, & Yelin, 2013). In one study, more than one-third of a sample of Latino adults with arthritis experienced depression (Withers, Moran, Nicassio, Weisman, & Karpouzas, 2015). Although arthritis-related stressors are the predominant factors affecting well-being for European American women with arthritis, well-being in African Americans with arthritis is also closely tied to broader life contextual stressors (McIlvane, Baker, & Mingo, 2008). African American patients with rheumatoid arthritis are less likely to receive medication and seek care from a specialist (Solomon et al., 2012). Low SES is associated with a delay in seeking care, greater arthritis-related symptoms, poorer well-being and greater use of maladaptive coping strategies among African Americans, yet socioeconomic status does not predict depressive symptoms and coping among European Americans diagnosed with arthritis (McIlvane, 2007; Molina, del Rincon, Restrepo, Battafarano, & Escalante, 2015).





## INJURIES

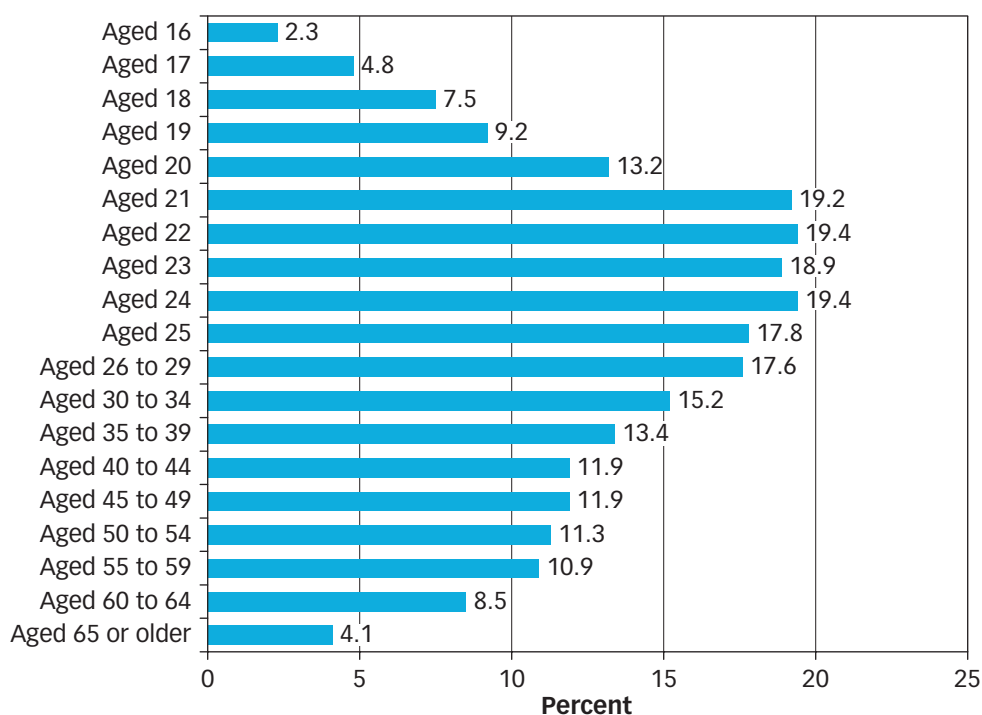
Although injury-related fatalities are high in adolescence and emerging adulthood (58.6 deaths per 100,000), deaths from unintentional injuries are even more common in later adulthood. They account for 61.5 deaths per 100,000 in 65-year-old adults and a striking 361.9 deaths per 100,000 in adults age 85 and older—about six times the rate in emerging adulthood (see Figure 5.6; U.S. Department of Health and Human Services, 2015). Such injuries arise from a variety of causes, including motor vehicle accidents and falls.

### Motor Vehicle Accidents

Driving a car represents autonomy. Many older adults continue to drive as long as they are able to because driving provides a sense of control and freedom. As the Baby Boom generation ages, older adults are more likely to keep their driver's licenses, make up a larger proportion of the driving population, and drive more miles than ever before. The proportion of the 70-and-older drivers increased by one third between 1997 and 2012, as have the typical miles traveled (Insurance Institute for Highway Safety, 2015). Accidents involving older drivers, both nonfatal and fatal, have declined over the last two decades, but there remain predictable age-related increases in accidents in older adulthood. Per mile traveled, crash rates and fatal crash rates also start increasing when the driver reaches age 70 (see Figure 5.7).

Compared with younger drivers, senior drivers are more likely to be involved in collisions in intersections, when merging into traffic, and switching lanes (Cicchino & McCartt, 2015). Although they drive more slowly and carefully than young adults, older adults are more likely to miss traffic signs, make inappropriate turns, fail to yield the right of way, and show slower reaction time—all risks to safe driving. Declines in vision account for much of the decline in older adults' driving performance (Owsley, McGwin, Jackson,

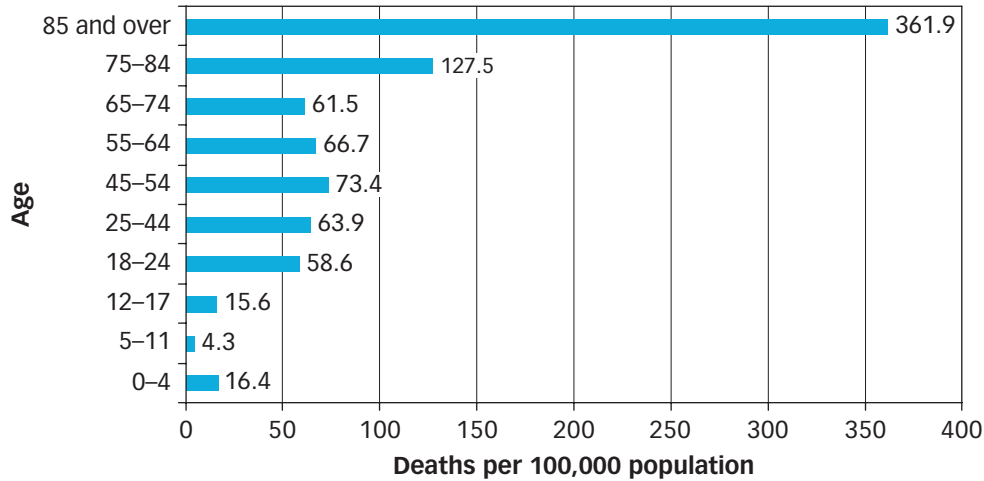
**FIGURE 5.6: Driving under the influence of alcohol in the past year among people aged 16 or older, by age: 2014**



Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health (NSDUH), 2014.

[https://www.samhsa.gov/data/sites/default/files/report\\_2688/ShortReport-2688.pdf](https://www.samhsa.gov/data/sites/default/files/report_2688/ShortReport-2688.pdf)

**FIGURE 5.7: Fatal Injury Rate by Age in the United States, 2013**

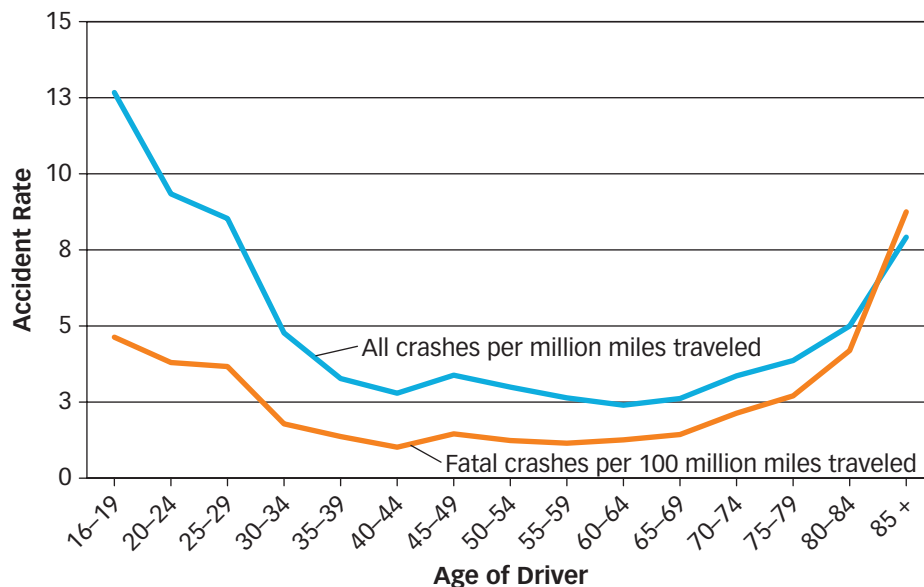


Kallies, & Clark, 2007). They are likely to have difficulty with night vision and reading the dashboard. Changes in working memory and attention also account for some of the problems in older adults' driving competence. Many older adults appear to adapt to these changes, naturally reducing their driving as they notice that their vision and reaction time are less acute (see Figure 5.8). In this way they may, at least partially, compensate for their higher risk for motor vehicle accidents (Festa, Ott, Manning, Davis, & Heindel, 2013; Sandlin, McGwin, & Owsley, 2014).

### Falls

More than one-quarter of U.S. adults over the age of 65 fall each year (Crews, Chou, Stevens, & Saaddine, 2016) including about half of those over the age of 80 (Hosseini & Hosseini, 2008). Many aspects of aging increase the risk of falls, including changes in

**FIGURE 5.8: Rate of Vehicle Accidents per Million Miles Traveled in the United States, by Driver Age, 2015**



Source: Insurance Institute for Highway Safety (2015).

vision, hearing, motor skills and neuromuscular control, and cognition (Dhital, Pey, & Stanford, 2010). Older adults are less able than their younger counterparts to balance and regulate body sway (Johansson, Nordstrom, Gustafson, Westling, & Nordstrom, 2017; Lee & Chou, 2007), have reduced muscular density (i.e., strength; Frank-Wilson et al., 2016), and are less adept at navigating and avoiding obstacles (Weerdesteyn, Nienhuis, Geurts, & Duysens, 2007). Declines in cognition, particularly in executive functioning and processing speed, also increase the risk of falls (Mirelman et al., 2012; Welmer, Rizzuto, Laukka, Johnell, & Fratiglioni, 2016).

Falls are a serious hazard for older adults because the natural loss of bone and high prevalence of osteoporosis increase the risk of bone fractures, especially a fractured hip. Hip fractures are particularly dangerous as they immobilize an older adult, are painful, and take a great deal of time to heal. Following hip fracture, many elderly adults lose the capacity for independent living, and up to 25% die as a result of complications, such as infection, within a year after the fall (Panula et al., 2011).

After experiencing a fall, at least half of older adults report fear of falling (Visschedijk, Achterberg, van Balen, & Hertogh, 2010). Adults who fear falling tend to become more cautious, avoiding activities that pose a risk of falling, but also limiting opportunities for physical activities that support physical health, retention of mobility, psychological well-being, and social connections (Visschedijk et al., 2010). There are a variety of ways to prevent falls and help older adults become more confident about their mobility. Exercise programs such as Tai Chi and strength and agility training can improve older adults' strength, balance, and confidence (Kaniewski, Stevens, Parker, & Lee, 2015). Environmental modifications such as addressing slippery floors, installing handrails on steps, and equipping shower/bath facilities with grip bars can also help to prevent falls.



### Thinking in Context 5.3

Recall from Chapter 1 that development is multidimensional; we develop in many different ways. In addition, changes in one area of development hold implications for other areas of functioning. Consider this principle with regard to health issues and disease in adulthood. How might chronic illnesses in adulthood, such as diabetes or arthritis, influence cognitive and socioemotional development? How might these changes influence individuals' interactions in all of the contexts in which they are embedded?

## DEMENTIA IN OLDER ADULTHOOD

### LO 5.4 Distinguish among common dementias, their risk factors, effects, and treatment

We saw in Chapter 4 that some loss of neural connections is part of normal aging and does not prevent older adults from engaging in everyday activities. Some older adults, however, experience the high rates of cell death and severe brain deterioration that characterize dementia. **Dementia** refers to a progressive deterioration in mental abilities due to changes in the brain that influence higher cortical functions such as thinking, memory, comprehension, and emotional control, and are reflected in impaired thought and behavior, interfering with the older adult's capacity to engage in everyday activities (McKhann et al., 2011; World Health Organization, 2012). Given that dementia can take many forms, with similar and different neurological features, the most recent version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) has replaced the term *dementia* with *neurocognitive disorder* (American Psychiatric Association, 2013). Throughout our discussion we will use the more commonly used term, *dementia*.

In 2013, there were 44.4 million people with dementia worldwide. This number is predicted to increase to an estimated 75.6 million in 2030, and 135.5 million in 2050

(Alzheimer’s Disease International, 2015). Much of the increase will be in developing countries, as shown in Figure 5.9. Worldwide, currently 62% of people with dementia live in developing countries; by 2050 this will rise to 71%. The fastest growth in the elderly population is taking place in China, India, and their south Asian and western Pacific neighbors (Alzheimer’s Disease International, 2015).

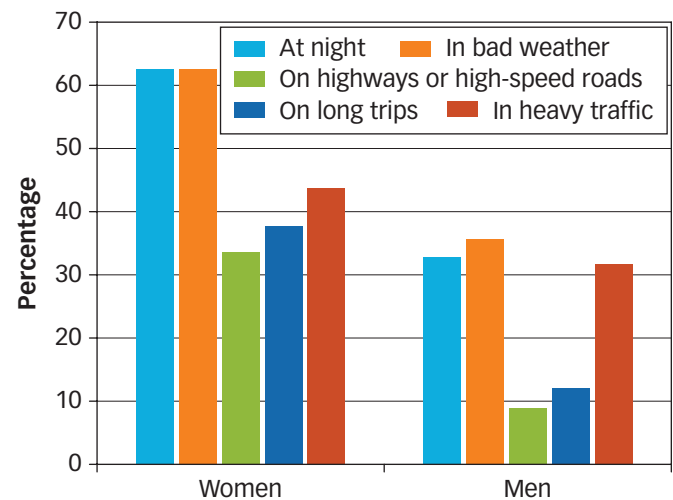
The most common cause of dementia is Alzheimer’s disease, followed by vascular dementia. Dementia, even in its very early stages, is associated with higher rates of mortality (Andersen, Lolk, Martinussen, & Kragh-Sørensen, 2010). Frequently these forms of dementia co-occur; adults may suffer from more than one form of dementia (Corriveau et al., 2016; Iadecola, 2013). The most common forms of dementia are discussed in the following sections.

## ALZHEIMER’S DISEASE

**Alzheimer’s disease** is a neurodegenerative disorder that progresses from general cognitive decline to include personality and behavior changes, motor complications, severe dementia, and death (Bradley-Whitman & Lovell, 2013; Finder, 2011). The risk of Alzheimer’s disease grows exponentially with age, doubling approximately every 5 to 6 years in most Western countries (see Figure 5.10; Ziegler-Graham, Brookmeyer, Johnson, & Arrighi, 2008). Currently 5.5 million Americans, including 1 in 9 people over the age of 65, have Alzheimer’s disease (Alzheimer’s Association, 2017). Of those with Alzheimer’s disease, an estimated 4% are under age 65, 16% are 65 to 74, 44% are 75 to 84, and 38% are 85 or older.

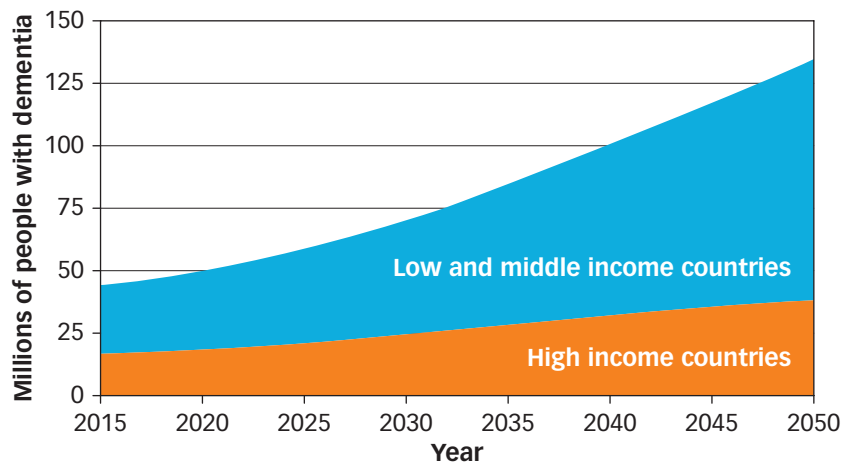
Alzheimer’s disease is characterized by widespread brain deterioration associated with inflammation and accumulations of *beta-amyloid*, a protein present in the tissue that surrounds neurons in the healthy brain (Vinters, 2015). Alzheimer’s patients experience inflammation that causes the beta-amyloid to accumulate and join with clumps of dead neurons and glial cells, forming large masses called **amyloid plaques** (Finder, 2011; Perl, 2010). It is thought that amyloid plaques disrupt the structure and function of cell membranes (Yang, Askarova, & Lee, 2010), and contribute to the formation of **neurofibrillary tangles**, twisted bundles of threads of a protein called *tau* that occur when neurons collapse (Blurton-Jones & LaFerla, 2006; Takahashi, Nagao, & Gouras, 2017). Even healthy brains have some tangles, but in cases of Alzheimer’s there is inflammation and a proliferation of plaques and tangles, as well as a progressive loss of neurons that interfere with brain functioning (Vasto et al., 2008). As neurons die, brain functioning declines. Alzheimer’s disease is associated with altered neurogenesis in the hippocampus, impairing the generation and development of new neurons (Grote & Hannan, 2007; Mu & Gage, 2011).

**FIGURE 5.9: Older Adult Drivers Who Tend to Avoid Driving Under Specific Conditions by Gender, 2015**



Source: CDC (2015).

**FIGURE 5.10: Projected Growth in Dementia Prevalence: Low-Income vs. High Income Countries, 2015–2050 (Projected)**

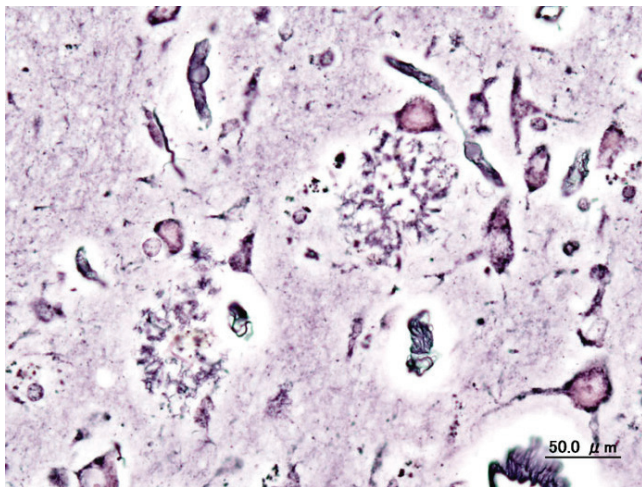


<https://www.alz.co.uk/research/statistics>

Source: World Alzheimer Report 2015



Wikimedia



Wikimedia

**PHOTO 5.10:** Progression of Alzheimer's Disease

Alzheimer's disease entails a wasting of the brain, as illustrated by the decreased size in the diseased brain (top) as compared with the healthy brain (middle). Alzheimer's disease is characterized by the presence of plaques (bottom) that damage neurons and disrupt functioning.

world (Storandt, 2008). Early Alzheimer's disease can be hard to distinguish from normal aging—or at least popular views and stereotypes of aging.

Over time, the cognitive impairments broaden to include severe problems with concentration coupled with more severe memory problems. Older adults may set the TV remote control down and, a moment later, be unable to find it. The person may ask the

## Diagnosis of Alzheimer's Disease

Because the characteristic beta-amyloid plaques can only be assessed in a postmortem examination of brain tissue, Alzheimer's disease is generally diagnosed in living patients through exclusion: by ruling out all other causes of dementia (Rektorova, Rusina, Hort, & Matej, 2009). Symptoms, a medical history, comprehensive set of neurological and cognitive tests, and conversations with the adult and family members can provide useful information about a person's level of functioning (Guarch, Marcos, Salamero, Gastó, & Blesa, 2008). Brain imaging can help physicians rule out other, potentially treatable, causes of dementia, such as a tumor or stroke (Hort, O'Brien, et al., 2010).

Advances in brain imaging techniques offer opportunities to diagnose Alzheimer's by studying changes in brain volume and activity. Research with animals has suggested that modified MRI scans can capture images of plaques and tangles (Marcus, 2008). Other research points to the search for biomarkers, genetic or biological traces, of the disease (Castro-Chavira, Fernandez, Nicolini, Diaz-Cintra, & Prado-Alcala, 2015; Fletcher et al., 2013). For example, cerebrospinal fluid concentrations of beta-amyloid appear to serve as biomarkers for Alzheimer's (Kang et al., 2015; Olsson et al., 2016; Smach et al., 2009). These biomarkers are used in clinical diagnosing Alzheimer's disease in Europe; however, countries vary in the cut-off values used to diagnose Alzheimer's (Hort, Bartos, Pirttilä, & Scheltens, 2010). Searching for biomarkers is not part of a routine diagnosis in North America, researchers have concluded that such markers have promise but have not yet determined how to use them to diagnose individuals (Blennow, Mattsson, Schöll, Hansson, & Zetterberg, 2015; Rosén, Hansson, Blennow, & Zetterberg, 2013).

## Progression of Alzheimer's Disease

Alzheimer's disease progresses through several predictable steps, including specific patterns of cognitive and memory loss. The earliest symptoms of Alzheimer's disease are memory problems, likely because the neurological disruptions that comprise Alzheimer's disease usually begin in the hippocampus, which is influential in memory (Grote & Hannan, 2007). First, the older adult experiences impairments in memory that are usually attributed to absentmindedness (Bäckman, 2008). The person may forget the names of new people, recent events, appointments, and tasks such as taking a tea kettle off of the stove or turning off the iron. Memory deficits are soon accompanied by impaired attentional control, which, to an outside observer, may appear as further absentmindedness and inattention, being "lost" in one's own

same question repeatedly, forgetting that an answer has just been given moments earlier. As memory problems increase, the Alzheimer's patient is frequently confused (Carson, Vanderhorst, & Koenig, 2015). The older adult's vocabulary becomes more limited as he or she is likely to forget or mix up words. Speech becomes more long-winded and tangential. Communication skills deteriorate and the person sometimes becomes unpredictably angry or paranoid (Carson et al., 2015). Some adults may show unpredictable aggressive outbursts (Agronin, 2014). Others may

become more withdrawn. Personality changes are common. People who are naturally suspicious may become more so, deciding that they are not simply forgetting the location of items but that others are deceiving them (Verkaik, Nuyen, Schellevis, & Francke, 2007).

Up to 50% of Alzheimer's patients experience depression or depressive symptoms (Chi, Yu, Tan, & Tan, 2014; Starkstein, Jorge, Mizrahi, & Robinson, 2005). Some researchers believe that depression may occur prior to and increase risk for Alzheimer's disease, but the mechanism is not clear (Herbert & Lucassen, 2016). Depression is particularly harmful to Alzheimer's patients as it is associated with greater cognitive and behavioral impairment, disability in activities of daily living, and a faster cognitive decline (Spalletta et al., 2012; Starkstein, Mizrahi, & Power, 2008; Van der Mussele et al., 2013). A predictable routine filled with activities that are enjoyed can provide structure to aid adults who are sometimes confused about their surroundings. In addition to antidepressants, some patients' depressive symptoms improve with the use of anti-dementia medication, commonly prescribed drugs that improve memory by increasing the chemical activity in various parts of the brain (Chi et al., 2014).

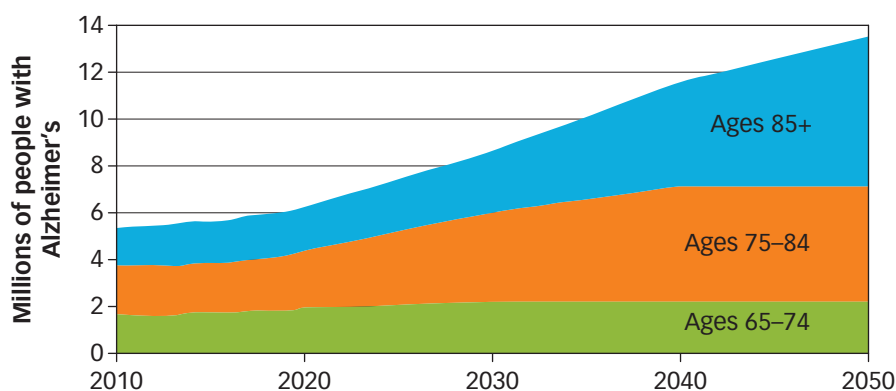
As the disease progresses patients become unable to care for themselves. They may forget to eat, to dress themselves properly for the weather, or how to get back inside their home after they step outside—for example, to bring in the mail or daily newspaper. Eventually, the brain will fail to process information, no longer recognizing objects and familiar people. A woman may insist on seeing her daughter and not realize that the woman in front of her is her daughter. In the final stages of the disease, Alzheimer's patients lose the ability to comprehend and produce speech, to control bodily functions, and to respond to stimuli (Carson et al., 2015). They show heightened vulnerability to infections and illnesses that often lead to death. Eventually, brain functions deteriorate to the point where organs fail and life cannot be sustained. The average patient progresses to the final stage of Alzheimer's disease over the course of about 10 years, with a typical range of 7 to 15 years (Rektorova et al., 2009).

### Risk Factors for Alzheimer's Disease

A person's risk for developing Alzheimer's disease varies with gender, age, and ethnicity. Women are at greater risk than men, perhaps because of their longer lifespans (Kirbach & Mintzer, 2008). In the United States, African Americans and Hispanic older adults are disproportionately more likely to have Alzheimer's disease and other dementias than their European American counterparts (Alzheimer's Association, 2015). The Cultural Influences on Development feature explores this question.

Alzheimer's disease has genetic influences and often runs in families (Bettens, Slegers, & Van Broeckhoven, 2013; Lambert et al., 2011). Several chromosomes are implicated, including

**FIGURE 5.11: Projected Prevalence of Alzheimer's Disease in the U.S. Population, 2010–2015 (projected)**



Source: Alzheimer's Association (2015).

# CULTURAL INFLUENCES ON DEVELOPMENT



## • • Ethnicity and Alzheimer's Disease



**PHOTO 5.11:** Cultural Influences on Development: Ethnicity and Alzheimer's Disease

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Alzheimer's disease knows no bounds. It is diagnosed in adults around the world, but ethnic differences appear in rates of diagnoses. For example, African Americans are twice as likely, and Hispanic populations 1.5 times as likely, to be diagnosed with Alzheimer's as non-Hispanic whites (Mayeda, Glymour, Quesenberry, & Whitmer, 2016; Mehta & Yeo, 2017).

There is a genetic component to Alzheimer's, but genetics is not thought to influence ethnic differences in rates of diagnoses (Raj et al., 2017). Instead, social and cultural factors are found to play a large role in ethnic differences in Alzheimer's and other dementias. High blood pressure, diabetes, and cardiovascular disease—risk factors for many dementias—are more common among African American and Hispanic groups. These chronic diseases have a large lifestyle component and are influenced by diet, which often varies dramatically across cultural groups. Differences in educational attainment may also influence risk for Alzheimer's. One study of African American, Latino, and

non-Latino white adults found that level of education was strongly associated with rates of dementia and, when age and education were taken into account, ethnic differences in rates of Alzheimer's were no longer consistent (Gurland et al., 1999). Differences in education and socioeconomic status, important contextual factors that influence access to opportunities, may account for some of the ethnic differences in susceptibility to Alzheimer's (Manly, 2006).

Other contextual factors that contribute to Alzheimer's include cultural beliefs about aging, spirituality, and views of the medical profession. African Americans are more likely than white adults to express beliefs that Alzheimer's symptoms, such as substantial memory loss, are just a normal part of aging (Connell, Scott Roberts, McLaughlin, & Akinleye, 2009; J. S. Roberts et al., 2003). Differences in knowledge about normative aging and Alzheimer's may partially explain why African Americans often receive delayed care for dementia (Chin, Negash, & Hamilton, 2011). Religious and spiritual beliefs may also influence views of Alzheimer's. One study found that a larger proportion of African Americans indicated that they believed "God's will" determined who developed Alzheimer's (Connell et al., 2009). Patients may question the efficacy of medicines in treating a disease that stems from a spiritual cause or may resist acting in opposition to a divine plan. In this way, religion and spirituality may play a strong role in the health of African Americans (Chin et al., 2011).

Finally, individuals from minority communities may be distrustful of the medical establishment. Discrimination, including historic events in which minority groups have been denied equal medical treatment, influences individuals' views of the health care system and doctors. Whether or not a patient trusts his or her doctor may determine whether or not he or she will report symptoms of dementia. An understanding of these cultural and contextual influences can help those who work with older adults to be more effective in identifying symptoms of Alzheimer's disease.

the 21st chromosome. Individuals with Down syndrome are at high risk to develop Alzheimer's disease as many show plaques and tangles in their brains as early as age 40 (Lemere, 2013; Wiseman et al., 2015). Contextual and lifestyle factors also matter. Research suggests that the same factors that contribute to cardiovascular risk, such as high blood pressure and obesity, also heighten the risk for Alzheimer's disease (Knopman & Roberts, 2010; J.-Q. Li et al., 2016; Tosto et al., 2016). Although vitamins such as Vitamin B and E and folate were once thought to reduce the incidence of Alzheimer's, research is mixed (Daviglius et al., 2010; Douaud et al., 2013) and some researchers caution that there are no known nutritional recommendations for preventing Alzheimer's disease (von Arnim, Gola, & Biesalski, 2010).

Education acts as an important protective factor against Alzheimer's disease. The process of learning that accompanies higher education and occupational complexity promotes neural activity and increases connections among neurons, thickening the cortex and boosting cognitive reserve (Boots et al., 2015; Liu et al., 2012; Sattler, Toro, Schönknecht, & Schröder, 2012). Cognitive reserves can protect patients from the handicapping effects of brain atrophy and synaptic loss (Stern, 2012; Xu, Yu, Tan, & Tan, 2015). One recent study showed that patients with higher levels of education showed similar cognitive functioning

to those with lower levels of education despite demonstrating more severe neurofibrillary tangles, suggesting that their greater cognitive reserve buffered against losses (Hoenig et al., 2017). Conversely, low socioeconomic status predicts mortality in adults diagnosed with dementia, likely due to the limited access to health care and social resources that promote cognitive reserve (van de Vorst, Koek, Stein, Bots, & Vaartjes, 2016).

It is not simply education that buffers against losses. People who remain socially and physically active show a lower risk of Alzheimer's as well because such activities stimulate and improve blood flow to the brain and increase synaptic connections (Gallaway et al., 2017; Tan et al., 2016). One recent study showed that mice who voluntarily engage in regular running showed reductions in the neurological hallmarks of Alzheimer's, as well as reduced neuronal loss, increased hippocampal neurogenesis, and reduced spatial memory loss (Tapia-Rojas, Aranguiz, Varela-Nallar, & Inestrosa, 2016). Regular physical exercise may not only prevent but reverse neural damage.

## VASCULAR DEMENTIA

**Vascular dementia**, also known as *multi-infarct dementia*, is the second most common form of dementia and loss of mental ability in older adulthood, worldwide (Jiwa, Garrard, & Hainsworth, 2010). Vascular dementia is caused by strokes, or blockages of blood vessels in the brain (Iadecola, 2013). Typically these strokes are very small and unnoticeable to the victim and those around him or her. With each small stroke, brain cells die and an immediate loss of mental functioning occurs. For example, over the last few months Joan had been feeling more scattered. Her daughter noticed that she had some memory lapses such as failing to pay bills and leaving the stove on. One day Joan woke from her nap to find that her arm felt heavy and weak. She called to her daughter, who noticed that Joan's speech was slurred and she seemed especially confused. A visit to the hospital confirmed that Joan had suffered a small stroke. The doctor noted that Joan likely suffered several small strokes over the last few months and that the deficits slowly accumulated. It was only after the most recent stroke that Joan noticed the changes.

Whereas individuals with Alzheimer's disease show slow and steady decrements in mental abilities, those with vascular dementia, like Joan, tend to show sudden, but often mild, losses with each stroke (Kalaria, 2016; Korczyn, Vakhapova, & Grinberg, 2012; Raz, Rodrigue, Kennedy, & Acker, 2007). As time passes, individuals tend to show improvement because the brain's plasticity leads other neurons to take on functions of those that were lost. Additional strokes usually follow, however, and with each stroke brain matter is lost and it becomes harder for the remaining neurons to compensate for losses (Troncoso et al., 2008). As vascular dementia worsens, the symptoms are similar to those of Alzheimer's disease (Korczyn et al., 2012; O'Brien & Thomas, 2015). However, vascular dementia is neurologically different from Alzheimer's disease. Postmortem analyses of the brains of people with vascular dementia show substantial deterioration of areas of the brain and disruptions in white matter (Iadecola, 2013), but not the widespread abundance of plaques and tangles that accompany Alzheimer's disease (Salmon & Bondi, 2009).

Like many disorders, vascular dementia is influenced by both genetic and environmental factors (Schmidt, Freudenberger, Seiler, & Schmidt, 2012; Srinivasan, Braid, Chan, Xu, & Chan, 2016; Sun et al., 2015). Genetics may influence factors that are known to be linked with vascular dementia, such as obesity, diabetes, and cardiovascular disease. Cardiovascular disease significantly increases the risk of vascular dementia (Lee et al., 2002; Sharp, Aarsland, Day, Sønnesyn, & Ballard, 2011). Men are more likely to suffer early vascular dementia in their 60s than are women because of their heightened vulnerability to cardiovascular disease. Behavioral influences on vascular dementia, such as heavy alcohol use, smoking, inactivity, stress, and poor diet, are more prevalent in men (Andel et al., 2012; Seshadri & Wolf, 2007).

There are also cross-cultural differences in the prevalence of vascular dementia, likely influenced by cultural and socioeconomic factors such as diet and activity patterns. In Europe and North America, vascular dementia constitutes only about 20% of dementia



cases (Kalaria et al., 2008; Plassman et al., 2007), but it is the most common form of dementia in Asia (Jhoo et al., 2008; Kalaria et al., 2008). In recent decades, however, the prevalence of vascular dementia in Japan has shifted to the second most common cause of dementia, behind Alzheimer's (Catindig, Venketasubramanian, Ikram, & Chen, 2012). The shift may be attributable to changes in lifestyle, such as diet and accompanying declines in hypertension, that reduce the risk of vascular dementia. Alternatively, increased life expectancy and Westernization of lifestyle, including diet, might have contributed the increased prevalence of Alzheimer's disease, thereby making vascular dementia the second most common form of dementia (Rizzi, Rosset, & Roriz-Cruz, 2014).

Factors that prevent cardiovascular disease, such as physical activity, can also prevent or slow the progression of vascular dementia (Aarsland, Sardaheae, Anderssen, & Ballard, 2010; Gallaway et al., 2017; Verdelho et al., 2012). Thus, prevention and management of vascular risks may be the best weapon in a fight against age-related cognitive decline (Chertkow, 2008; Corriveau et al., 2016; Raz et al., 2007). In addition, when symptoms of stroke arise such as sudden vision loss, weakening or numbness in part of the body, or problems producing or understanding speech, anti-clotting drugs can prevent the blood from clotting and forming additional strokes.

## PARKINSON'S DISEASE

Some dementias first damage the subcortical parts of the brain, areas below the cortex. These dementias are characterized by a progressive loss of motor control. Because the damage occurs first in the subcortical areas of the brain, mental abilities, which are controlled by the cortex, are not initially affected. As the disease progresses and brain deterioration spreads to include the cortex, thought and memory deficits appear (Toulouse & Sullivan, 2008). The most common cause of subcortical dementia is Parkinson's disease.

**Parkinson's disease** is a brain disorder that occurs when neurons in a part of the brain called the *substantia nigra* die or become impaired. Neurons in this part of the brain produce the neurotransmitter dopamine, which enables coordinated function of the body's muscles and smooth movement. Parkinson's symptoms appear when at least 50% of the nerve cells in the substantia nigra are damaged (National Parkinson Foundation, 2008). Parkinson's disease includes motor and cognitive symptoms. Motor symptoms occur first and include tremors, slowness of movement, difficulty initiating movement, rigidity, difficulty with balance, and a shuffling walk (Maetzler, Liepelt, & Berg, 2009). Typically these symptoms occur in one part of the body and slowly spread to the extremities on the same

side of the body before appearing on the opposite side of the body (Truong & Wolters, 2009). Because the stiffness and rigidity are first located in one part of the body, individuals may assume that it is ordinary stiffness, perhaps the result of too much activity or simply because of aging. As the disease progresses individuals have difficulties with balance and controlling their body movements. Neurons continue to degenerate, brain functioning declines, cognitive and speech abilities deteriorate, dementia and, finally, death occurs (Maetzler et al., 2009).

Similar to Alzheimer's patients, Parkinson's patients with larger cognitive reserves and more synaptic connections among neurons have a slower progression of neurological changes before dementia appears. The prevalence of Parkinson's disease increases with age, and Parkinson's is found throughout the world, with similar rates occurring in Asia, Africa, South America, Europe, North America, and Australia (Pringsheim, Jette, Frolkis, & Steeves, 2014). People diagnosed with Parkinson's disease at advanced ages tend to develop dementia earlier



Mark Wilson/Getty

**PHOTO 5.12:** Parkinson's Disease

Boxer Muhammad Ali and actor Michael J. Fox, both diagnosed with Parkinson's disease, pretend to spar before giving their testimony before the U.S. Senate Appropriations Subcommittee on Health and Human Services advocating that more funding be directed to finding a cure for the disease

into their disease than do younger people, likely because of age-related differences in cognitive capacities and neural reserves (Grossman, Bergmann, & Parker, 2006). Multiple studies support a genetic component to Parkinson's (Nalls et al., 2014; Wirdefeldt, Adami, Cole, Trichopoulos, & Mandel, 2011). However, there are few consistent findings regarding environmental and lifestyle influences (Wirdefeldt et al., 2011), suggesting that Parkinson's might be influenced by the complex gene–environment interactions characteristic of epigenetics (Cannon & Greenamyre, 2013; Feng, Jankovic, & Wu, 2014). Physical activity may act as a protective factor in developing Parkinson's disease, slowing its progression, and improving motor control (Bellou, Belbasis, Tzoulaki, Evangelou, & Ioannidis, 2016; Paillard et al., 2015). Parkinson's disease shows no gender, ethnic, social, economic or geographic boundaries (National Parkinson Foundation, 2008). In the United States, it is estimated that 60,000 new cases are diagnosed each year, joining the 1.5 million Americans who currently have Parkinson's disease. While the condition usually develops after the age of 65, 15% of those diagnosed are under 50 (National Parkinson Foundation, 2008).

Diagnosing Parkinson's disease is difficult because, like Alzheimer's disease, there is no test that confirms the presence of the disease. Incorrect diagnoses are common, potentially delaying treatment to Parkinson's patients (Rizzo et al., 2015). It is diagnosed by exclusion, by a thorough examination to rule out other possible causes. As is being done with Alzheimer's disease, researchers are searching for biomarkers that may be used to diagnose Parkinson's disease, but the work is still in its early stages (Miller & O'Callaghan, 2015; Parnetti, Cicognola, Eusebi, & Chiasserini, 2016). Parkinson's symptoms can be treated. Some research has suggested that deep brain stimulation, stimulating specific parts of the brain with electricity, as well as resistance training can improve some of the motor symptoms, such as poor gait and posture (Lamotte et al., 2015; Roper et al., 2016). Most medications either replace or mimic dopamine, which temporarily improves the motor symptoms of the disease; anti-inflammatory medications may also help reduce neurodegeneration (Brichta, Greengard, & Flajolet, 2013; Emre, Ford, Bilgiç, & Uç, 2014; Phani, Loike, & Przedborski, 2012). Medication can temporarily reduce symptoms and perhaps slow its path, but Parkinson's disease is not curable.

## REVERSIBLE DEMENTIA

Not all dementias represent progressive and irreversible brain damage. Symptoms of dementia sometimes are caused by psychological and behavioral factors that can be reversed. For example, older adults who are socially isolated and lonely can show declines in mental functioning that reverse with the provision of social support (Fisher, Yury, & Buchanan, 2006). The challenge is that reversible dementias are often unrecognized and untreated. Reviews of medical records have suggested that 7% to 18% of the dementia cases had reversible causes (Djukic, Wedekind, Franz, Gremke, & Nau, 2015; Muangpaisan, Petcharat, & Srinonprasert, 2012). Another review of more than 340 medical records over a 10-year period revealed that of the 193 patients with dementia, 37 (19%) were reversible (Bello & Schultz, 2011).

Other common causes of reversible dementia are poor nutrition and dehydration (Gupta, Chari, & Ali, 2015; Muangpaisan et al., 2012; Panza, Solfrizzi, & Capurso, 2004; Srikanth & Nagaraja, 2005). As we have discussed, older adults require fewer calories than do younger adults, but nutritional demands remain or increase with age. In addition, older adults may eat less than younger adults because of depression or a loss of appetite that occurs with some medications. As a result, older adults are at risk for malnutrition and vitamin deficiencies, which are associated with declines in mental abilities and increases in psychological distress including depression and anxiety (Baker, 2007). Specifically, vitamin B12 deficiencies can mirror dementia symptoms, yet correcting for this deficiency restores older adults' functioning (Ringman & Varpetian, 2009).

Prescription and nonprescription drugs and drug interactions can also contribute to symptoms of dementia. Many medications impair nutrition by reducing the body's ability to absorb vitamins. Some pain killers, corticosteroid drugs, and other medications can

# APPLYING DEVELOPMENTAL SCIENCE



## • • Disclosing a Dementia Diagnosis



**PHOTO 5.13:** Applied Developmental Science: Disclosing a Dementia Diagnosis

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The recognition of patients' autonomy, their right to understand and make decisions about their treatment, is a cornerstone of modern physician-patient relations. There is wide agreement that offering clear, honest information about diagnosis can improve psychological adjustment and reduce distress, providing it is done appropriately (Keightley & Mitchell, 2004). For these reasons, most ethical guidelines strongly promote disclosure of a diagnosis of dementia to the affected individual (Fisk, Beattie, Donnelly, Byszewski, & Molnar, 2007). However, the practice of nondisclosure persists in the field of dementia. It is estimated that 50% of Alzheimer's patients are not told about their diagnosis (Alzheimer's Association, 2015). People with dementia are given euphemisms ("memory loss") more often by family members (Woods & Pratt, 2005). Family members often prefer the person not to be told, despite agreeing they would want to know if they were in that situation (Monaghan & Begley, 2004). The defense for withholding information is based on the duty of doctors to do no harm because the lack of certainty about the diagnosis, lack of treatment or cure, cognitive decline leading to poor retention of diagnostic information, and the possibility that receiving such a diagnosis may cause or worsen an existing depression.

However, the majority of people without cognitive impairment as well as those referred to memory clinics say

that they wish to know of a diagnosis of dementia (Hort, O'Brien, et al., 2010; Iliffe et al., 2009; van den Dungen et al., 2014). Learning of a diagnosis of dementia may give people with dementia and their families time to adjust and, for people with dementia, to discuss their management and care preferences and engage in advanced decision-making regarding care. Disclosure has actually been found to decrease anxiety and depression in patients and caregivers (Hort, O'Brien, et al., 2010).

It is often assumed that cognitive decline is accompanied by increasing unawareness (Woods & Pratt, 2005). However, it is becoming increasingly clear that making assessments of awareness may not be at all straightforward. For example, some people with dementia who are described as unaware by those around them may demonstrate greater levels of awareness in different contexts. In recognition of this, it may be helpful to consider disclosure of a dementia diagnosis as a process and modify disclosure practices and descriptions to the patients' level of understanding, adopting an individualized patient-centered approach that maintains the individual's personal integrity (Fisk et al., 2007).

The process of disclosure begins when cognitive impairment is first suspected, and it evolves over time as information is obtained. Whenever possible and appropriate, this process should involve not only the affected individual but also their family and/or other current or potential future care providers (Mastwyk, Ames, Ellis, Chiu, & Dow, 2014). Some recommend that additional time and follow-ups in order to employ a progressive disclosure process to address issues including: discussions of diagnostic uncertainty, treatment options, future plans, financial planning, assigning power of attorney, wills and "living wills," driving privileges and the need to eventually stop driving, available support services, and potential research participation.

### What do you think?

1. **In your view, should older adults diagnosed with dementia be informed of their diagnosis?**
2. **Discuss the characteristics and qualities of dementia that influence your decision of whether to inform a patient.**

cause confusion and erratic behavior similar to dementia (Bansal & Parle, 2014; Fisher et al., 2006). Older adults may be more easily overmedicated than younger adults because of their slower metabolism. Physical illnesses themselves can sometimes cause dementia symptoms such as memory loss and agitation which go away as the illness is treated.

Symptoms of depression and anxiety in older adults, such as forgetfulness, disorientation, and other cognitive difficulties, are often mistaken for dementia (de la Torre, 2016; Engmann, 2011). If anxiety or depressive symptoms are misdiagnosed as dementia, the older adult may be prescribed medications that can increase dementia-like symptoms such as fatigue and slowed mental reactions to stimuli and events. Treating anxiety and depression

with combinations of antianxiety and antidepressant medications as well as therapy reduces the cognitive symptoms commonly mistaken for dementia (Davies & Thorn, 2002).

The question of whether or not a patient diagnosed with dementia should be informed of the diagnosis is a sensitive one, carrying implications for not only the patient but also family, other loved ones, and caregivers. The issue is discussed in the Applied Developmental Science feature.

Most individuals of all ages are well, although many experience health issues at various times in life. Although some health problems are influenced by genetics, many are also influenced by contextual factors, including lifestyle. Moreover, people play a large role in their own health through their choices, such as food, and behavior, such as engaging in physical activity and seeking routine health care. Individuals' understanding of their options and their changing capacity to reason, both cognitive factors, also hold implications for their health. In the next chapter, we examine cognitive development and its implications for how individuals function in their world.



### Thinking in Context 5.4

1. Describe some of the differences between the various forms of dementia. What behaviors characterize each? Identify currently known causes of each.
2. What would you suggest to someone who wishes to reduce his or her risk for dementia? What lifestyle factors would you suggest? How might someone take advantage of contextual factors in order to reduce the risk of dementia or show better adjustment in the face of dementia?



### Apply Your Knowledge

At 14, Kendra had her very first alcoholic drink when her friends took her to a party hosted by Dylan, a high school senior. Soon Kendra and Dylan began dating. Kendra had always felt especially self-conscious about her body, as she had started needing a bra at age 10, and by age 13 she had sometimes been mistaken for an adult. She thought of herself as “too big,” but Dylan insisted her body was “smokin’.” With Dylan, Kendra began drinking regularly at parties as she found it eased her nerves and helped her feel more comfortable interacting with the older kids. After a few drinks she would feel comfortable enough to take off her sweatshirt and show off her tank top. Dylan also introduced Kendra to marijuana, which she preferred over alcohol because it made it easy to forget her self-consciousness. Being high on marijuana made goofing around like her friends much more fun. One

night they climbed the fence surrounding the high school and spray-painted the windows black. Another time they sneaked onto a local golf course and went skinny-dipping in the pond. However, a neighbor called the police and Kendra, Dylan, and their friends were arrested for trespassing and possession of alcohol and drugs.

- What might you discern about Kendra's physical development, relative to her peers? What role might physical development play in Kendra's behavior?
- How might neurological development account for some of Kendra's behavior?
- What role might cognitive factors play?
- What are some of the outcomes that accompany risky activity?



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# CHAPTER 5

**5.1** Analyze health issues in childhood, including risks and protective factors for healthy development.



## SUMMARY

Declining rates of child mortality are associated with advances in public health, such as increasing access to health care, prenatal care, and availability of vaccinations for diseases that are serious and sometimes fatal. Unintentional injuries are the most common cause of death in children and adolescents in the United States. Children's risk for injury is influenced by their own characteristics, poor parental and adult supervision, neighborhood disadvantage, and low socioeconomic status. Children who are abused are at risk for psychological, cognitive, and social problems. Risk factors for child abuse exist at all ecological levels. Both child and parent characteristics and community factors increase the risk or potential for maltreatment.

## KEY WORDS

vaccine  
child abuse

mandated reporters

## THINKING IN CONTEXT

1. What kinds of accidents do you think are most likely in childhood? How might the nature of injuries change with age? What can parents, schools, and communities do to prevent injuries to children?
2. Child abuse is a problem with a complex set of influences at multiple bioecological levels. The most effective prevention and intervention programs target multiple levels of context. Referring to Bronfenbrenner's model (see Chapter 1), discuss factors at each bioecological level that might be incorporated into prevention and intervention programs to prevent child abuse and promote positive outcomes.

**5.2** Discuss the prevalence, effects, and treatment of problem eating disorders and substance use in adolescents and emerging adults.



## SUMMARY

Individuals who suffer from eating disorders often experience a distorted body image. Both anorexia and bulimia are influenced by genetic and contextual factors and occur in all ethnic and socioeconomic groups in Western countries and are becoming increasingly common in some non-Western countries and Arab cultures. Treatment is challenging and often includes medication, therapy, support groups, nutritional education, and sometimes hospitalization to remedy malnutrition. Alcohol and substance use tend to begin during adolescence and peak during young adulthood. They may serve developmental functions but are associated with short- and long-term effects such as accidents, academic problems, risks for dependence and abuse, and impaired neurological development. Alcohol and substance abuse is influenced by genetics as well as contextual factors. Effective prevention and intervention programs provide adolescents with education; teach them skills to resist pressure,

refuse offers, and cope; and increase parental awareness of risks and appropriate behavior. Binge drinking and heavy drinking generally peak in young adulthood and decline by the end of early adulthood with the transition to adult responsibilities; however, alcohol use remains prevalent in adulthood.

## KEY WORDS

anorexia nervosa  
bulimia nervosa

binge drinking

## THINKING IN CONTEXT

1. How might adolescents' physical, cognitive, and social characteristics interact with their context to influence their likelihood of developing an eating disorder such as anorexia nervosa or bulimia nervosa? What roles can various contexts, such as home, peers, and school, play in influencing treatment options?
2. Are there dangers in taking the perspective that some alcohol and substance use is common and simply a part of growing up? How should parents, teachers, and professionals respond to adolescent alcohol and substance use?
3. Explain some of the reasons why substance use is highest in young adulthood. What contributes to its decline as adults grow older?

**5.3** Identify common chronic diseases and sources of injury in adulthood, their risk factors, effects, and treatments.



## SUMMARY

Cancer and chronic health conditions are the result of a complex web of genetic and environmental influences. Advances in medicine have changed the nature of disease. More people survive cancer than ever before. Risk factors for cardiovascular disease include heredity, high blood pressure, poor diet, diabetes, smoking, and psychological stress. Medication and behavioral changes, such as changes in diet and physical activity, may reduce hypertension and risk of diabetes as well as cardiovascular disease. Declines in estrogen place postmenopausal women at risk for osteoporosis. Intervention in the form of weight-bearing exercise, diet, and medication can prevent and slow its course. Likewise, nearly all adults will show some signs of osteoarthritis and continuing physical activity can help in managing symptoms. Injury-related fatalities are high in adolescence and emerging adulthood, decline in adulthood, and rise in late adulthood. Motor vehicle accidents and falls are major sources of injuries among older adults. Declines in vision and changes in working memory, attention, and neuromuscular control account for the increased risk.

## KEY WORDS

Diabetes  
Cardiovascular disease  
heart disease

osteoporosis  
osteoarthritis

### THINKING IN CONTEXT

Recall from Chapter 1 that development is multidimensional; we develop in many different ways. In addition, changes in one area of development hold implications for other areas of functioning. Consider this principle with regard to health issues and disease in adulthood. How might chronic illnesses in adulthood, such as diabetes or arthritis, influence cognitive and socioemotional development? How might these changes influence individuals' interactions in all of the contexts in which they are embedded?

### KEY WORDS

Dementia	neurofibrillary tangles
Alzheimer's disease	Vascular dementia
amyloid plaques	Parkinson's disease

5.4

Distinguish among common dementias, their risk factors, effects, and treatment.



### THINKING IN CONTEXT

1. Describe some of the differences between the various forms of dementia. What behaviors characterize each? Identify currently known causes of each.
2. What would you suggest to someone who wishes to reduce his or her risk for dementia? What lifestyle factors would you suggest? How might someone take advantage of contextual factors in order to reduce the risk of dementia or show better adjustment in the face of dementia?

### SUMMARY

The risk for dementia increases with age. Alzheimer's disease is characterized by the presence of beta-amyloid plaques and neurofibrillary tangles in the cerebral cortex. Alzheimer's disease progresses through several predictable steps, beginning with memory loss. Vascular dementia is caused by a series of strokes. Parkinson's disease includes motor and muscle symptoms and dementia often emerges in the late stages. Genetic factors influence susceptibility to dementia, and education and social and physical activity are associated with a lower risk. Symptoms of dementia sometimes are caused by psychological and behavioral factors that can be reversed, such as medication, poor nutrition, or depression.

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