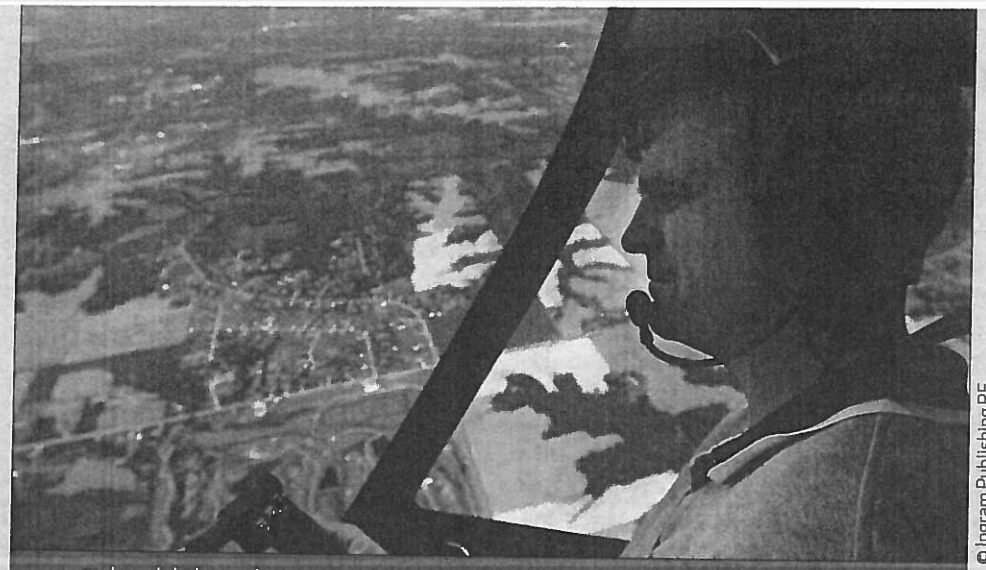


Should there be a mandatory retirement age for pilots?

Looking Ahead

1. What effect does aging have on creativity, wisdom, and intelligence?
2. How does aging change a person's ability to learn and remember?
3. What mental disorders are more common among the aged than among the young?
4. How does a person's personality affect his or her ability to cope with changes that come with age?
5. What stages of development do adults go through, and how do older men and women differ in their development?

On January 15, 2009, Captain Chesley Sullenberger, known as Sully, became a national hero when he landed an engineless plane in the Hudson River, saving the lives of all 154 passengers. It was the first time in 45 years that a major aircraft crash-landed in the water without fatalities. Sullenberger had decades of experience flying everything from a glider to a jumbo jet. After both engines blew, Sullenberger reportedly told his 150 passengers to brace for impact because they were going down before maneuvering over a bridge and between skyscrapers to land the plane safely on the river. He walked the length of the sinking jet twice to verify that all his passengers had got off safely before exiting himself. Sully was nearing his 60th birthday at the time of the crash. If he had not been flying that day, the outcome might well have been different. Yet as late as 2007, airline pilots were required to retire at age 60. The presumption was that older pilots are less alert and less able to act decisively than younger pilots. In this instance, however, experience clearly trumped age.

Do people lose some cognitive abilities as they age? Does experience compensate for declines in other functions?

In this chapter we will learn what is known about changes in intelligence, learning ability, and memory.

These issues are the subject matter of psychology, the scientific study of behavior and mental processes. Psychology is a discipline that focuses on the individual. Social gerontologists who study psychology attempt to explain processes of development and change that affect people over the life

course as well as individual differences in the level and type of change. This chapter begins with a discussion of the psychological elements of personality, individual identity, intelligence, and memory that comprise the basic elements of the self. Then we explore how psychological functioning changes with advancing age and consider various adaptations that individuals make to these changes. The last section of this chapter reviews stage theories and research on adult development.

Throughout the chapter, we emphasize that there is often a wider range of individual differences within a group such as the aged than between groups in various aspects of psychological functioning. Among the factors that create variation in psychological functioning are a person's health, psychosocial history, aspects of individual identity such as race or gender, and environmental influences such as social class, level of education, and social support system.

Aging and Cognitive Change

The mind not only coordinates bodily functions but determines who we are as individuals. As far back as the ancient Greeks, people have been curious about how the mind operates, because behavior, at least voluntary action, is the result of mental processes. **Cognitive psychology** is the study of mental processes. Psychologists have conducted extensive research on how mental processes change over the life course. Social gerontologists are concerned with identifying and understanding patterns of change in mental processes associated with age.

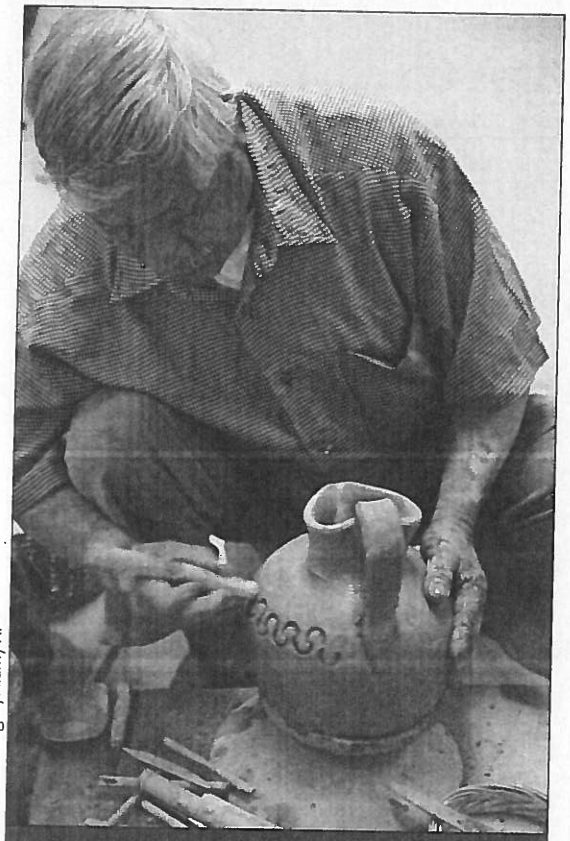
In this section, we report results of research on changes in intellectual functioning over the life course. Age-related changes in psychological functioning can affect an individual's ability to lead a normal life, so we also look at how cognitive changes influence social interactions, work performance, and interpersonal relationships.

Creativity and Wisdom

In 1994, the art world was consumed by a contentious debate over the most recent paintings of 90-year-old artist Willem de Kooning (1904–97). As a young man, de Kooning had established a reputation as one of the leading twentieth-century artists for his complex, richly detailed abstract compositions of the female figure. When he was in his late eighties, de Kooning was diagnosed with Alzheimer's. During the following years, he painted more than 300 abstract paintings. Some art critics consider these among the finest and most sensitive artistic achievements in modern art, while others believe the simplicity of these paintings demonstrates his loss of creative power and increasing senility (Marcus et al., 2009). Were de Kooning's spare new creations an indication of a "serene simplicity" and "new sense of rigor" as his admirers claimed, or did they reflect, as his critics contended, a loss of his creative powers and advancing senility? In fact, there was no way to adjudicate that debate, for **creativity** is the most elusive mental process to define and measure. Much lies in the eye of the beholder.

Because the most notable contributions of many scientists, artists, and authors have been made before the age of 40, some researchers believe that creativity peaks early. After all, Einstein won the Nobel Prize for his contribution to quantum theory when he was only 26. But novelist John Updike wrote his prize-winning book *Rabbit at Rest* when he was in his 60s, and Grandma Moses was still painting at 100.

Whereas creativity is a measure of divergent thinking, meaning the production of alternative solutions to a problem or situation, expert knowledge that people acquire in the fundamental pragmatics of life is what most people think of as **wisdom** (Jeste et al., 2010). What is wisdom? According to a study of college students, wisdom consists of such traits as the ability to reason, the ability to learn from experience, judgment, and the ability to use information. Verbal ability and practical problem-solving ability were viewed as components of wisdom in another study (Sternberg and Grigorenko, 2005). More precisely, wisdom is an ability to grasp paradoxes, reconcile contradictions, and accept compromises. Because wise people weigh the consequences of their actions on themselves and others, wisdom is suited to practical decision making. Older people



Wisdom involves the ability to learn from experience.

have been shown to evaluate a stranger's personality and judge character more accurately than do younger individuals (Helmuth, 2003). For example, when given a list of behaviors of fictional people, older people overlook distracting but relatively unimportant actions and focus on those behaviors that are more diagnostic of character (Hess and Auman, 2001).

Wisdom helps people adapt to aging. Although stressful life events such as a health problem are responsible for differences in well-being among the elderly, older people do not react to identical situations in the same way. What may be unbearable for one person might be tolerable or beneficial for another. Research suggests that wisdom does not alter the challenges facing an older person but that one who has this elusive characteristic is likely to be more satisfied with life (Ardelt, 1997).

Intelligence

Creativity and wisdom are components of intelligence. Researchers believe that the quality we refer to as **intelligence** is the product of two fundamental types of skills: fluid intelligence and crystallized intelligence.

Fluid intelligence

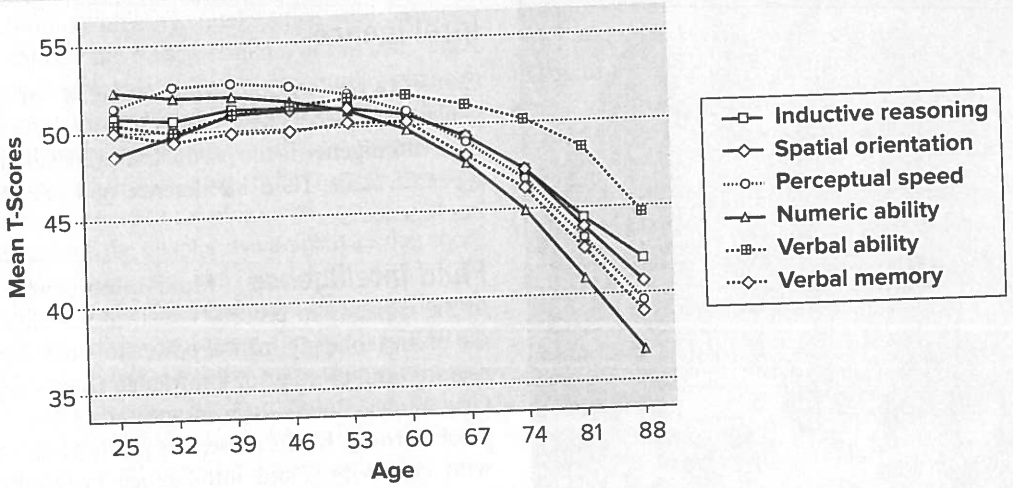
Fluid intelligence refers to the capacity to process novel information. It is the ability to apply mental power to situations that require little or no prior knowledge (Sternberg and Grigorenko, 2005). It is largely uninfluenced by prior learning. In this sense, it is partly synonymous with creativity. Fluid intelligence is required to identify relationships and to draw inferences on the basis of that understanding. Being able to figure out the rules governing a number series is an example of fluid intelligence.

Psychologists measure fluid intelligence along two broad dimensions, verbal and performance intelligence. On tests, the verbal component focuses on learned knowledge, including comprehension, arithmetic, and vocabulary; the performance component measures puzzle-solving ability involving blocks or pictures.

Early psychological research consistently found age-related declines in verbal and performance intelligence among people older than 60, a finding so persistent it was called the **classic aging pattern** (Moody, 1994). However, the Seattle Longitudinal Study conducted by psychologist K. Warner Schaie and his colleagues challenged the idea that intelligence inevitably declines with age. Schaie collected data on more than 5,000 individuals aged 25 to 88 during six waves beginning in 1956, with the last tests conducted in 1991. Schaie measured intelligence as verbal meaning, spatial orientation, inductive reasoning, and number and word fluency, which explain most individual differences in cognitive ability among children and adolescents (Schaie, 1994).

On average, the subjects in the Seattle Longitudinal Study showed a gain in all components of

Figure 7-1 Longitudinal Change in Primary Abilities.



Note: From seven-year within-subject data.

Source: Schaie (1994:306).

intelligence until they reached their late 30s or early 40s. The period of gain was followed by a period of stability until the early 60s, when most subjects showed a modest decline in some abilities. Then, around age 70 intelligence declined more rapidly (see Figure 7-1). Although all of Schaie's subjects had declined on at least one of five mental abilities by age 60, none had declined on all five, even by age 88. Schaie also found that, over time, the gap in test scores between young and old declined. Schaie concluded that significant intellectual decline occurs only late in life, that there is great variation in the type and level of change between individuals and between cohorts, and that many people maintain high levels of intellectual functioning on many measures in advanced old age (Schaie, 1996). To summarize, there are four main conclusions from Schaie's research:

- The classic aging pattern was generally confirmed but cognitive change in old age was more complex than a straightforward downward decline.
- Noticeable changes in intelligence occurred around age 70.
- There is great variation among individuals in the rate of decline and lifestyle factors can slow the rate of decline.
- Some individuals show no cognitive decline even in their 90s.

The idea that fluid intelligence, the ability to process new information, does decline with age has been confirmed by other studies (Aizpurua and Koutstaal, 2010). However, lifestyle factors can play an important role in maintaining brain health. People who exercise regularly, eat a healthy diet and remain socially engaged can reduce the losses in fluid intelligence that accompany advancing age (Weinstein and Erickson, 2011).

Another factor is health. Healthier people maintained higher levels of intellectual functioning than those who are ill. Socioeconomic status is also associated with variation in cognitive decline. People of high socioeconomic status are better able to maintain their intellectual abilities than those of low socioeconomic status, due to favorable environmental circumstances such as above-average education, interesting work, and above-average income. These resource provide them with access to

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Diversity in the Aging Experience

The Secrets of Super-Ager Brains

Although there is an abundance of research on mental decline in later life, some older people still have excellent memories well into their 80s and beyond. These individuals are "super-agers," an elite group of seniors whose memories are as sharp as people in their 50s. To find out why "super-agers" seemed to have such exceptional cognitive capacity, researchers viewed the MRI scans of 12 "super-agers" and compared them to the MRIs of 10 normally aging individuals and 14 middle-aged people. What they found was that the cortex of the super-agers' brains, that is, the outer layer that is important for memory, was much less likely to exhibit the thinning that usually occurs in old age. Rather the cortex of the super-agers' brains was more similar to people in their 50s. More astonishing were their findings about another area of the brain, called the anterior cingulate, that supports attention and thus affects memory. In the super-agers the anterior cingulate was actually larger than in the 50-year-olds.

Super-agers appear to be uniquely protected from the deterioration of memory and atrophy of brain cells that accompany aging for most people. By learning more about how super-agers' brains function, we may begin to understand why memory loss occurs and what goes wrong when people develop Alzheimer's disease (Harrison et al., 2012).

What Do You Think?

1. How accurate is the memory of older people in your family? Is anyone forgetful?
2. Do you know any older person who might be a super-ager?

intellectually stimulating activities such as reading, travel, attending cultural events, and participating in professional associations (Rabbitt, 2005).

Another factor is previous type of work. Research suggests that people who remain active have higher levels of cognition than people who are couch potatoes. Some people become less active after they retire and spend less time giving their brains a workout, while others seize upon their new freedom to do things they had never had time for. What distinguishes active from passive retirees? One answer is that the nature of one's former job has a spill-over effect in retirement. People who retired from managerial or professional jobs are more likely to spend time in retirement in cognitively demanding activities such as reading, socializing, and traveling. By contrast, people who retired from jobs involving skilled work or clerical work are more likely to spend time in passive activities like watching television (Baer et al., 2013).

Cognitive functioning is also associated with mental health. As people age, they are more likely to experience difficulty performing memory tasks if they are depressed or experience a great deal of daily stress. It may be that stress and depression make it more difficult to focus on a task

(Bunce et al., 2008). People are also less likely to exhibit cognitive decline if they have regular social ties. Social activity appears to influence the way the brain processes information and helps the brain to function better (Ristau, 2011). One study found that women with larger social networks were significantly less likely to develop dementia than more isolated women (Diament, 2008).

One study of older people in Australia followed more than 700 men and women over a period of six years to determine whether staying active could prevent cognitive decline. The subjects were rated in terms of how often they engaged in four types of activities—household maintenance like gardening or taking care of their car, domestic activities like washing dishes or cooking dinner, social activities like participating in a club or a sport, and service to others (caring for a family member, doing volunteer work). They found that activity level had a significant effect on various measures of cognitive functioning. The lesson? Stay active and you will age well (Newson and Kemps, 2005).

Other research suggests that there is a strong genetic influence (heritability) on intelligence that remains stable over the life course. Swedish researchers studied 240 sets of identical twins with an average age of 83. Tests of the twins' cognitive ability showed that genetic factors accounted for about half of the individual differences in cognitive ability. The rest were caused by environmental factors such as their jobs, eating habits, and exposure to stress (McClearn et al., 1997). Thus, nature and nurture were about equally important.

Heritability may also be involved with "super-agers," those exceptional individuals who maintain the cognitive abilities of much younger adults well into their 80s. The "Diversity in the Aging Experience" feature tells more about those individuals who seem to defy the normal course of aging.

Crystallized intelligence Although research does show some decline in fluid intelligence in old age, there is little or no decline in crystallized intelligence. **Crystallized intelligence** is based on the information, skills, and strategies that people have learned through experience. It reflects accumulated past experience and socialization. Defining a word draws on crystallized intelligence. Whereas fluid intelligence denotes a capacity for abstract creativity, crystallized intelligence refers to the acquisition of practical expertise in everyday life. On most measures, adults remain stable or improve with advancing age although they do show a decline on a measure of intellectual interest (Zimprich et al., 2009).

Some studies have found that as people grow older, they demonstrate increasing competence in solving problems in their chosen fields and in their ability to handle daily challenges. For example, older chess players have poorer recall but are better able to plan ahead than less experienced players. Their ability to plan their moves helps them win (Sternberg and Grigorenko, 2005).

Everyday problem solving cannot be studied as an isolated act of pure cognition in a laboratory or test-taking situation. Problem solving in the real world is largely defined by the goals of daily living that allow the elderly to maintain an independent lifestyle. Stimulating activities can help to reduce dependence and allow people to remain active (Wilson, 2011). What older people fear most is being unable to care for themselves and becoming institutionalized. "An Issue for Public Policy" discusses the 2007 change in mandatory retirement for airline pilots.

Learning and Memory

Have you ever tried to introduce a friend to another person and found, to your embarrassment, that you could not remember her name? This rather common ocurrence, known as the tip-of-the-tongue phenomenon, reflects a problem in retrieving information from memory. As people get older, such annoying minor lapses in memory become more frequent. These lapses reflect normal age-related changes in cognitive functioning (Maylor, 2005).

In most individuals these memory lapses are not symptoms of Alzheimer's or any other disease. They are simply part of normal aging processes that have a minimal effect on functioning. Although forgetfulness can be frightening, most people find ways to compensate. They may make lists of things

An Issue for Public Policy

Should There Be Mandatory Retirement for Airline Pilots?

On November 23, 2006, the International Civil Aviation Organization (ICAO) relaxed the controversial upper age limit of 60 years for airline pilot captains. Known as the Age-60 Rule, the new standard allows airline pilots to fly until they reach age 65 as long as they work in a multi-crew cockpit where the other pilot is under age 60. The rule was changed following an investigation into whether mandatory retirement at age 60 was unfair to experienced pilots. Research into the safety performance of aging pilots found that there was no evidence to support the mandatory retirement age and that the risk associated with incapacitation of pilots age 60 or older was minimal. Further, countries that had an age limit higher than 60 had had positive experiences with older pilots, suggesting that they posed no significant risk to flight safety. The conclusion from the investigation was that pilots' retirement age could be safely increased by several years as long as older pilots worked in a multi-crew environment (Cornell et al., 2007). Any decrease in the cognitive ability of older pilots was more than compensated by the increased years of experience.

The new regulation did not end the controversy about a mandatory retirement age for airline pilots, because the new international standard merely extends the retirement age from 60 to 65. If it can be shown conclusively that older pilots pose no threat to safety, then the ICAO may further extend the age limit or eliminate it entirely.

What Do You Think?

1. Should there be an age limit for certain kinds of jobs?
2. Would you feel comfortable flying in a plane with a 70-year-old pilot?

to do, keep keys and glasses in the same place when they aren't using them, and attempt to memorize the name of a new acquaintance by associating the name with a physical feature. All these techniques help improve memory and avoid the tip-of-the-tongue phenomenon. Some people use age as an excuse to manage conversations when they experience a memory lapse. Older people who forget a friend's phone number or where they put a shopping list may say things like "Getting old does that to your memory." Others may try to put the blame elsewhere, perhaps saying, "I've never been able to remember phone numbers" or "There is so much going on it's impossible to remember anything" (Ryan et al., 2002). These techniques help keep them from feeling embarrassed about temporary forgetfulness. In the following section we first describe age-related changes in memory and then describe differences between short-term and long-term memory.

Age-related changes

Learning and memory are important and intimately related components of cognition. **Learning** is the process of acquiring knowledge and skills; **memory** is the retention or storage of that knowledge. During a stage of memory termed **encoding,** information that is learned is placed into memory and stored for later use.

Research also shows that the testing conditions that are used to probe age-related changes in memory can have a significant effect on the results (Helmuth, 2003). Hasher tested 20-year-olds in the late afternoon and 60- to 70-year-olds in the morning and found age differences on basic memory tests were cut in half (Hasher et al., 2002). It was concluded that older people were "morning people" and college-age students were "afternoon people" in terms of this test-taking task. To comprehend why some memory processes work less efficiently in older people, we must understand the structure of memory—where information is kept and how it is handled.

Short-term and long-term memory

Think about all the sights and sounds you experience in a single day. You take notes in class. You receive an assignment from your teacher. You read information in a textbook. You try a new recipe for dinner. You watch a rerun of *Seinfeld*. You agree to meet your friends at a basketball game at a certain time and place. How does your mind keep track of all this information? It does so by processing it in two different but related storehouses. The first storehouse is **working memory,** which refers to the ability to temporarily store and manipulate information. An example would be a backwards span test where people are asked to recall a list of numbers in reverse order. Research shows that declines in working memory do occur with advancing age.

Older people have shown increasing interest in using the Internet.

These declines have important implications for navigating everyday tasks such as memorizing lists of words, reasoning, producing complex written and spoken language and word-by-word processing of complex sentences (Zelinski et al., 2011).

Long-term memory is the permanent storage site for past experiences. It involves our ability to recall distant people and events, such as those from our childhood, as well as various skills we have learned, such as reading and driving. Our stored memories allow us to remember places, events, and individuals from our past. They also help us make meaningful connections between the past and the present. We need our long-term memory to negotiate our day-to-day activities. We call on these memories for such simple tasks as shopping, finding our way around town, and recognizing acquaintances.

Long-term memory is relatively stable and declines only slightly with age, although older people may take longer to retrieve information from memory than young people and are more subject to false or inaccurate memories (Maylor, 2005).

Overall, older adults find it more difficult to remember new information such as lists of words or the details of specific events and are more likely to falsely remember events that might have possibly occurred but did not actually happen. In trying to recall familiar words and names, they also report more "tip-of-the-tongue" experiences than younger adults. A more positive finding is that vocabulary scores increase at least until people are in their seventies (Zelinski et al., 2011). Decision making based on experience also improves with age.

Yet what matters most in performing daily activities and maintaining an independent lifestyle is the ability to use problem-solving skills. In this regard, most older people have few difficulties unless poor health undermines their sense of self-reliance.

Learning and Information Technology

The Internet has revolutionized the world. Children as young as age 2 play computer games, college students get class assignments and communicate with their teachers by email, and workers in many industries and occupations spend much of their day on the computer. The Internet can be an important source of information, enhance communication with family and friends, and even help with routine tasks such as banking and shopping (Czaja and Lee, 2001).

Older adults are among the fastest growing computer and Internet users in both a personal context and in the workplace. An increasing number of older adults are using computers for communication, entertainment, and information. Benefits of the computer for older people include a sense of being connected, general satisfaction, and having a positive learning experience. However, the needs and concerns of older adults as computer users differ from those of younger users due to the natural changes associated with the aging process (Wagner et al., 2010). Yet more so than younger people, older adults may feel frustration in using the computer due to physical and mental limitations and a sense of mistrust (Gatto and Tak, 2008). Older people also have more trouble working the mouse to point, double click, and drag. These problems are largely due to declines in motor control and manual dexterity rather than to any decline in learning ability.

Is it possible to improve working memory? In one clever study, scientists devised a video game called NeuroRacer to target deficits in cognitive skills in older people. NeuroRacer is a three-dimensional video game that involves three tasks: a simulated driving task, a perceptual discrimination task (reading a road sign), and multitasking, which involves both driving and reading the road sign simultaneously. In the first phase of the study, 180 participants of all ages played the game and sure enough, older people had more trouble multitasking. In a second experiment that only included older adults, one group played NeuroRacer in the multitasking training mode for a month, another group played NeuroRacer just once, and a third group did no game playing. The group that received the month-long training not only improved in their ability to multitask while playing the game but also showed a general improvement in working memory and attention span (Anguera et al., 2013). These results suggest that cognitive declines associated with aging can be improved and maybe even reversed.

Mental Disorders

There are many disorders in brain functioning that can cause problems in old age. The two main brain disorders are dementia and Alzheimer's, as shown in Table 7-1. The section that follows describes three of the more common problems: Alzheimer's, vascular dementia, and depression.

Dementias

Dementias are mental disorders caused by severe organic deterioration of the brain. They affect memory, cognitive functions, and personality to a degree sufficient to interfere with normal activities and social functioning (American Psychiatric Association, 1994). Symptoms of dementia include impairment of memory, intellect, judgment, and orientation and excessive or shallow emotions. Dementia may also be accompanied by depression, anxiety, delusions, and challenging or aggressive behavior (Woods, 2005). The two most common forms of dementia are Alzheimer's disease and vascular dementia.

There are many causes of dementia, but evidence suggests that early life adversity significantly increases the risk of developing dementia in old age. Infants who are deprived of adequate nutrition have smaller brains than do infants who are well-nourished. Although those who experienced such adversity may function normally throughout their lives, the aging process aggravates poor early brain development, leading to dementia. Early life adversity associated with poor nutrition and poverty can also operate indirectly by reducing the chance for higher education and thus the mental stimulation that comes from challenging courses and the interesting jobs available to those with a college degree. There is also evidence that cognitive impairment is hereditary. The Carolina African American Twin Study of Aging included 95 pairs of African American twins who were 50 years of age and older. Forty-three of the twins were monozygotic, meaning they came from

Table 7-1 Erikson's Stages of Psychosocial Development

Opposing Possibilities	*Developmental Tasks*
1. Basic trust versus mistrust	Birth to 12 months—Baby develops sense of whether world is good or bad
2. Autonomy versus shame	18 months to 2 years—Child develops balance of independence over doubt
3. Initiative versus guilt	3 to 6 years—Child begins to try out new things and is not overwhelmed by failure
4. Industry versus inferiority	6 years to puberty—Child must learn basic skills of the culture or develop a sense of incompetence
5. Identity versus identity confusion	Puberty to young adulthood—Adolescent must gain a sense of self or experience confusion about roles
6. Intimacy versus isolation	Young adulthood—individual attempts to make commitments to others or suffers from isolation and self-absorption
7. Generativity versus stagnation	Middle adulthood—Mature adult is concerned with guiding the next generation or feels a lack of fulfillment
8. Integrity versus despair	Old age—Individual must integrate caring for others with the need to accept care and the possibility of death

Source: Papalia and Olds (1998:76).

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the same egg and shared the exact same genes and 52 were dizygotic, meaning they came from different eggs. Thirty percent of the monozygotic twins (30.2%) were cognitively impaired compared with just 17 percent of the dizygotic twins. Based on these results, the authors concluded that cognitive impairment was inherited and that genetics plays a relatively large role in its development (Whitfield et al., 2009). Poverty also is linked to greater risk of hypertension, heart disease, and stroke, all conditions that increase the risk of cognitive impairment (Zhang et al., 2008).

Traumatic head injuries also increase the risk of Parkinson's disease, cognitive impairment and perhaps dementia (Jordan, 2009). One study examined the effect of chronic repetitive head injuries on former football players. In this study, 2,500 retired professional football players with an average age of 53.8 years and an average professional football playing career of 6.6 years completed a general health questionnaire. Sixty-one percent had sustained at least one concussion during their football careers, and 24 percent had sustained three or more concussions. Compared with retirees without a history of concussion, those who had experienced recurrent concussions were significantly more likely to exhibit mild cognitive impairment. Retired players with three or more reported concussions were five times as likely to show mild cognitive impairment and three times as likely to report significant memory problems. Although there was not an association between recurrent concussion and the rate of Alzheimer's disease, retired football players did show an earlier onset of Alzheimer's disease than in the general American male population (Guskiewicz et al., 2005).

As the proportion of older individuals in the population increases, the prevalence of dementia will also increase, because age is the greatest risk factor for this condition. Yet there is some good news as well. In higher income countries, more recent cohorts of older people exhibit better health, are more highly educated, and have improved nutrition than previous generations. The "Aging Around the World" feature describes a recent study of older people in England, Wales, and Denmark that suggests that mental functioning of older people may improve as well.

Alzheimer's disease

Alzheimer's disease is a common type of dementia. The risk of Alzheimer's disease gradually increases with age. Half of all people who reach 85 will exhibit some symptoms of Alzheimer's disease. Alzheimer's disease is not reversible, and no known cure exists. It is now the sixth leading cause of death in the U.S. (Centers for Disease Control, 2007). Recently, scientists have been able to identify early markers that may predict the likelihood that someone will eventually develop Alzheimer's disease.

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Aging Around the World

Declining Dementia Rates in England, Wales, and Denmark

Several recent studies suggest that the prevalence of dementia may be decreasing worldwide. These studies indicate that although population aging has continued, older individuals born more recently are, on average, in better physical health and appear to develop dementia later in life. One of these studies was conducted among individuals aged 65 years or older in England and Wales. Comparing their results to earlier studies, the researchers concluded that rates of dementia had declined in the past two decades (Matthews et al., 2013). A second study compared two cohorts of elderly people in Denmark. The first cohort was born in 1905 and evaluated at age 93, and the second cohort was born in 1915 and evaluated at age 95. The cohort born in 1915 scored significantly higher on a test of mental ability than the cohort born in 1905. This study then also provides evidence that younger cohorts have better cognitive functioning than people born before them (Christensen et al., 2013). Although these findings are good news, they should be viewed with caution. The number of people with dementia worldwide is already large and likely to grow considerably simply because of population aging. The prevalence rate may be falling, but the absolute number of people with dementia has not decreased. Dementia will still be a huge challenge for health and elder care systems around the world.

What Do You Think?

1. What kind of programs are we likely to need in the future to properly care for people with dementia?
2. Has anyone in your family suffered from dementia? If so, who cared for that person?

The onset of Alzheimer's disease is often slow and involves subtle changes. One of the early signs of Alzheimer's, which also occurs in many aging individuals without this disorder, is the loss of short-term memory. However, Alzheimer's patients forget permanently, whereas aging adults with normal memory loss may forget only temporarily. For example, a normal individual may forget where she put her keys but then trace back her steps and remember she left them on her desk. An Alzheimer's patient will never find his keys.

Other signs of Alzheimer's are repetition and confusion. Alzheimer's patients may ask the same question over and over or confuse day and night. They may do things that are dangerous, like leaving a pot of food cooking on a stove or wandering outside and getting lost. Alzheimer's patients may also mistake TV pictures or images in a picture for real people. About one-third have delusions involving theft (Woods, 2005). Memory loss slowly progresses until the individual is unable to perform daily activities such as dressing and bathing.

Alzheimer's patients may also exhibit dramatic personality changes. People who were once outgoing and personable may become withdrawn and verbally or physically aggressive. These changes are particularly disturbing to their caregivers and can place great stress on family relationships. Family members often feel sorrow because they have lost the person they once knew. One study of caregivers found that those who reported higher levels of caregiving stress had poorer self-rated health, poorer physical function, and high levels of depressed mood (Lu, Y.F., and Wykle, M., 2007). The spouse may also feel lonely and unappreciated, as people with dementia seldom show affection or seek intimacy. As one man described his sense of loss with tears in his eyes, "She no longer even smiles at me" (Stephens and Qualls, 2007:55). Most Alzheimer's patients are cared for at home until they reach advanced stages when they lose bodily functions and require skilled nursing care. Eventually the disease causes their death.

The daily fluctuation in the level of functioning of people with Alzheimer's disease is often confusing to family members and professional caregivers. C. Johnson and R. Johnson (2000) conceptualize Alzheimer's disease as a "trip back in time." Their "trip back in time" model explains why a person with Alzheimer's disease can discuss in detail something that happened 40 years ago but may be unable to recall what they had for lunch or the current year. It also helps explain why people who suffer from Alzheimer's disease might not recognize their reflection in a mirror—in their minds they are not elderly.

The exact cause of Alzheimer's disease is unknown, but there are many theories, which fit into two general categories: genetic predisposition and environmental influences such as nutrition, disease, or stress (Cisse and Mucke, 2009). Support for the view that people are genetically predisposed comes from research showing that a family history of Alzheimer's increases one's risk. One study of 8,000 twins who were World War II veterans and ranged in age from 65 to 75 found a low prevalence of Alzheimer's overall, less than 1 percent (Breiter et al., 1990). Among the veterans who were fraternal twins, there were no cases where both twins were diagnosed with Alzheimer's disease. This is what one would expect, because the genetic background of fraternal twins is no more alike than that of any other siblings. The story was quite different for identical twins, who do share the same genetic material. Among the veterans who were identical twins, 35 percent of those who had Alzheimer's also had a twin who was afflicted with the disease. This study strongly supports the theory that a tendency to Alzheimer's is inherited. At the same time, it suggests a strong environmental component, since 65 percent of the identical twins who had Alzheimer's had twins who did not. Researchers continue to search for a specific gene associated with Alzheimer's.

At present there is no cure for Alzheimer's disease, and the downward progression of failing memory may be rapid. Some medications may help control the behavioral symptoms of AD such as sleeplessness, agitation, wandering, anxiety, and depression. There is some evidence, however, that people can exert control over the risk of developing Alzheimer's disease. The Cardiovascular Health Study followed more than 900 men and women over a period of 10 years. The subjects completed medical tests, filled out questionnaires about their physical activities and daily lives, and received MRI scans of their brains. Those who exercised regularly such as walking, cycling, swimming, dancing, and even gardening had less risk of memory decline or developing Alzheimer's than those who were least active (Raji et al., 2016).

Vascular dementia The second most common cause of dementia is called **vascular dementia,** accounting for as many as 40 percent of cases. Vascular dementia, which typically begins between the ages of 60 and 75, affects men more often than women. It is caused by atherosclerosis (commonly called "hardening of the arteries") of blood vessels in the brain. The arteries become clogged, blocking blood flow to the brain. Disruption of blood flow leads to damaged brain tissue, resulting in "mini" or silent strokes. A **stroke** is a rupture or obstruction of a blood vessel to the brain that damages brain tissue. **Aphasia,** damage to the speech and language centers in the brain, is one of the

consequences of a stroke. Aphasia occurs when the brain is deprived of oxygen. Symptoms include confusion or problems with short-term memory; wandering, or getting lost in familiar places; and losing bladder or bowel control. There is no treatment, and the damage to the brain cannot be reversed. The patient usually gets worse over time as more mini strokes occur.

The major risk factor for vascular dementia is high blood pressure. Eighty percent of vascular dementia patients have a history of high blood pressure. Other risk factors are diabetes, obesity, and smoking. The symptoms of vascular dementia and Alzheimer's disease are so similar it can be difficult for a doctor to make a firm diagnosis (Reed et al., 2007). As is the case with Alzheimer's, there is no cure and the damage is irreversible.

Depression

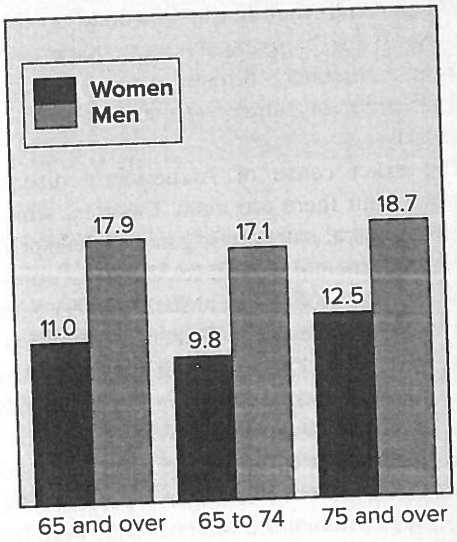
Is it depressing to grow old? The answer partly depends on how depression is defined. According to current psychiatric philosophy, depression is more than a fleeting sense of sorrow or despondency that we all feel on occasion (Beck and Alford, 2009). Rather, **clinical depression** is a set of symptoms that include (1) depressed mood, (2) loss of interest in pleasurable activities, (3) loss of appetite, (4) sleep disturbance, (5) fatigue, (6) feelings of worthlessness and guilt, (7) difficulties in thinking and concentration, (8) psychomotor disturbances, and (9) suicidal notions for at least a two-week period (Beck and Alford, 2009). To be diagnosed with major clinical depression, an individual must report five of those symptoms, and the five must include the first two symptoms listed.

According to strict diagnostic categories, the elderly are less likely than younger people to be depressed. The problem is that current psychiatric measures of depression exclude much of the sadness caused by illness, grief, restricted physical activity, and disability. When depression is measured more broadly to include such feelings and behaviors as an inability to get going, feeling sad, having trouble sleeping, feeling lonely, being unable to shake the blues, and having trouble concentrating, the results differ dramatically. By these criteria, many more older people can be considered depressed. Factors that put older people at risk of becoming depressed include bereavement due to the loss of a spouse, other family members, and close friends, and the strain of caring for an ill spouse (Fiske and Jones, 2005; Fiske et al., 2003).

Women of all ages exhibit more depressive symptoms than men, and the gender gap increases with age. (Wilhelm et al., 2008). The sources of this gender gap include the loss of a support network, declining health, and decreased income. These losses have less effect on men because they are more likely than women to remarry if they become widowed and because they are less likely to become disabled. Figure 7-2 shows rates of depressive symptoms among people 65 and older. Depression increases slightly among the old–old and is higher among women than men.

People who continue working past age 65 are less likely to be depressed than non-workers. This is especially true among people who continue working because they get a sense of personal

Figure 7-2 Percent of People Aged 65 and Over with Clinically Relevant Depressive Symptoms, by Age and Sex, 2002.



Source: U.S. Census Bureau (2005b).

fulfillment from their jobs rather than those who work out of financial need. Workers also are less likely than non-workers to be disabled, which partially accounts for their better mental health (Christ et al., 2007).

There are also racial differences in the risk of depression in later life. In the adult population as a whole, African Americans exhibit more symptoms of depression than whites. The question is whether this is also true among the elderly. The Chicago Health and Aging Project is a longitudinal study of community-dwelling people aged 65 and older. More than 6,000 people were interviewed for the first time between 1993 and 1997. They were then interviewed twice more, between 1997 and 2000 and between 2000 and 2003. The results showed that African Americans were more likely than whites to report symptoms of depression and that the disparity worsened over time (Skarupski et al., 2005).

Rates of depression are especially high among nursing home residents, ranging anywhere from 25 to 50 percent. Depression is three to five times higher among nursing home residents than among older people who live in the community (Minicuci et al., 2002). Important causes include loss of independence, feelings of social isolation and loneliness, lack of privacy and frustration at the inconvenience of having a roommate and sharing a bathroom, the loss of autonomy, ever-present death and grief, staff turnover, and lack of meaningful activities (Choi et al., 2008). Some depression among nursing home residents may be alleviated by antidepressants. Moderate exercise can also reduce anxiety and depression (Gaboda et al., 2011). Training staff to recognize depression in residents is also important so help can be provided before problems escalate (Abrams et al., 2016).

It is important to treat depression in older people, because depression can have a negative effect on both physical and mental health. One study found that depression can increase the risk of a heart attack or stroke and that treating people for depression can reduce these risks (Stewart et al., 2014). Other research has found that middle-aged and older people who are depressed are more likely to develop dementia as they age. No one really knows why this happens, but we do know that the risks for both Alzheimer's disease and vascular dementia nearly double among people who have suffered from depression after the age of 50. These findings have important implications for mental health services: preventing clinical depression could reduce dementia (Diniz et al., 2013).

Personality and Adaptation

We have seen in the previous sections that multiple changes occur as a result of normal aging. How an individual adapts to these changes is greatly influenced by his or her personality. Personality is a social construct that defines who we are and how we react to our environment. In this section, we explore the research on personality continuity and examine how personality styles affect the ability of older people to adjust to changes in sensory capacity and cognition.

Personality and Aging

In the broadest sense, personality includes all facets of who we are and how we react to events and situations in our environment. It is often measured according to attributes called **personality traits,** which are enduring dispositions toward thoughts, feelings, and behavior, both inherited and learned.

According to **trait theory,** everyone has most personality traits to some degree, but everyone also has a core group of traits that define his or her personality. These defining traits can be organized into five major factors: neuroticism, extroversion, openness, agreeableness, and conscientiousness (Roberts and Mroczek, 2008).

Personality traits have an influence on how people adapt to some of the natural changes that accompany aging. In one study, people who scored high on neuroticism were less likely than others to perceive old age as a time of psychological growth. For example, more neurotic individuals were less likely to agree that "wisdom comes with age" or that "my life has made a difference." People who scored high on extraversion and agreeableness had more positive attitudes and disagreed that "old age