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**INSTITUTE OF SCIENCE AND TECHNOLOGY**

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## **SCHOOL OF SCIENCE AND HUMANITIES DEPARTMENT OF PSYCHOLOGY**

### **UNIT – I -INTRODUCTION - DEVELOPMENT PSYCHOLOGY–SPYA1302**

# DEVELOPMENT PSYCHOLOGY

## INTRODUCTION

Before the advent of modern medical technology, cultures devised spiritual practices that were intended to ensure a healthy pregnancy with a happy outcome. For instance, godh bharan is a centuries-old Hindu ceremony that honors a woman's first pregnancy. In the seventh month of her pregnancy, the mother-to-be dresses in formal garments that are given to her by her mother. A relative ties a yellow thread around the pregnant woman's wrist as ceremony attendees pronounce blessings on the unborn child. The purpose of the thread is to provide mother and baby with the spiritual protection required for a complication-free birth.

As rates of adverse pregnancy outcomes declined in the twentieth century, the godh bharan has become more celebratory than protective in nature. Likewise, a uniquely American prenatal institution, the baby shower, has also grown in popularity as pregnancy and childbirth have become safer. And as U.S.-based entertainment media have spread across the world, godh bharan ceremonies and others like it have increasingly come to resemble American baby showers. The growing popularity and homogenization of prenatal celebrations suggest that the technological advances that have reduced maternal and fetal mortality rates have transformed the subjective and social experience of pregnancy from one of fear and dread to one of joy and anticipation. These advances have also been accompanied by innovations that have allowed researchers and parents-to-be to gain insight into prenatal developmental processes that were shrouded in mystery just a few decades ago. As you explore this chapter, you will become acquainted with some of these insights and, we hope, gain a greater appreciation for the amazing process of prenatal development.

**Conception and Genetics** The first step in the development of a human being is that moment of conception, when two single cells—one from a male and the other from a female—join together to form a new cell called a zygote. This event sets in motion powerful genetic forces that will influence the individual over the entire lifespan. Watch at [MyDevelopmentLab](#) The Process of Conception Ordinarily, a woman produces one ovum (egg cell) per month from one of her two ovaries. The ovum is released from an ovary roughly midway between two menstrual periods. If it is not fertilized, the

ovum travels from the ovary down the fallopian tube toward the uterus, where it gradually disintegrates and is expelled as part of the next menstrual flow. If a couple has intercourse during the crucial few days when the ovum is in the fallopian tube, one of the millions of sperm ejaculated as part of each male orgasm may travel the full distance through the woman's vagina, cervix, and uterus into the fallopian tube and penetrate the ovum. A child is conceived. The zygote then continues on its journey down the fallopian tube and eventually implants itself in the wall of the uterus.

The Basic Genetics of Conception Except in individuals with particular types of genetic abnormality, the nucleus of each cell in the human body contains a set of 46 chromosomes, arranged in 23 pairs. These chromosomes include all the genetic information for that individual, governing not only individual characteristics like hair color, height, body shape, temperament, and aspects of intelligence, but also all those characteristics shared by all members of our species, such as patterns of physical development and inborn biases of various kinds. The only cells that do not contain 46 chromosomes are the sperm and the ovum, collectively called gametes, or germ cells. In the early stages of development, gametes divide as all other cells do (a process called mitosis), with each set of 23 chromosome pairs duplicating itself. In the final step of gamete division, however, called meiosis, each new cell receives only one chromosome from each original pair. Thus, each gamete has only 23 chromosomes instead of 23 pairs. When a child is conceived, the 23 chromosomes in the ovum and the 23 in the sperm combine to form the 23 pairs that will be part of each cell in the newly developing body. The chromosomes are composed of long strings of molecules of a chemical called deoxyribonucleic acid (DNA). In an insight for which they won the Nobel Prize in 1953, James Watson and Francis Crick deduced that DNA is in the shape of a double helix, somewhat like a twisted ladder. The remarkable feature of this ladder is that the rungs are constructed so that the entire helix can "unzip"; then each half can guide the duplication of the missing part, thus allowing multiplication of cells so that each new cell contains the full set of genetic information. The string of DNA that makes up each chromosome can be subdivided further into segments called genes, each of which controls or influences a particular feature of an organism or a portion of some developmental pattern. A gene controlling or influencing a specific characteristic always appears in the same place (the locus; plural is loci) on the same chromosome in every individual of the same species. For example, the locus of the gene that determines whether you have type A, B, or O blood is on chromosome 9, and similar genes for blood type are found on chromosome 9 in every other human being. In February, 2001, scientists working on a remarkable group of studies known as the Human Genome Project (HGP) announced that they had identified the locus of every human gene (U.S. Department of Energy, 2001)

(see Figure 2.1 on page 32). Watch at [MyDevelopmentLab](#) There are actually two types of chromosomes. In 22 of the chromosome pairs, called autosomes, the members of the pair look alike and contain exactly matching genetic loci. The 23rd pair, however, operates differently. The chromosomes of this pair, which determine the child's sex and are therefore called the sex chromosomes, come in two varieties, referred to as the X and the Y chromosomes.

A normal human female has two X chromosomes in this 23rd pair (an XX pattern), while a normal human male has one X and one Y chromosome (an XY pattern). The X chromosome is considerably larger than the Y chromosome and contains many genetic loci not found on the Y. Note that the sex of the child is determined by the sex chromosome it receives from the sperm. Because a woman has only X chromosomes, every ovum carries an X. But because a man has both X and Y chromosomes, when the father's gametes divide, half the sperm will carry an X, and half a Y. If the sperm that fertilizes the ovum carries an X, then the child inherits an XX pattern and is a girl. If the fertilizing sperm carries a Y, then the combination is XY, and the child is a boy. Geneticists have pushed this understanding a step further, discovering that only one very small section of the Y chromosome actually determines maleness—a segment referred to as SRY (sex-determining region of the Y chromosome). Sometime between 4 and 8 weeks after conception, SRY genetic codes signal the male embryo's body to begin secreting hormones called androgens. These hormones cause male genitalia to develop. If androgens are not present, female genitalia develop, no matter what the embryo's chromosomal status is.

## **Genotypes, Phenotypes, and Patterns of Genetic Inheritance**

When the 23 chromosomes from the father and the 23 from the mother come together at conception, they provide a mix of “instructions.” When the two sets of instructions are the same at any given locus (such as genes for type A blood from both parents), geneticists say that the genetic pattern is homozygous. When the two sets of instructions differ, the genetic pattern is said to be heterozygous, such as a gene pair that includes a gene for type A blood from one parent and a gene for type O blood from the other. How are these differences resolved? Geneticists are still a long way from having a complete answer to this question, but some patterns are very clear. Table 2.1 gives a few examples of physical characteristics that follow the rules you'll be reading about in this section.

**Genotypes and Phenotypes** First, it's important to know that geneticists (and psychologists) make an important distinction between the genotype, which is the specific set of “instructions” contained in a given individual's genes, and the phenotype, which is the set of actual observed characteristics of the

individual. The phenotype is a product of three things: the genotype, environmental influences from the time of conception onward, and the interaction between the two. A child might have a genotype associated with high IQ, but if his mother drinks too much alcohol during the pregnancy, there may be damage to his nervous system, resulting in mild retardation. Another child might have a genotype including the mix of genes that contribute to a “difficult” temperament, but if his parents are particularly sensitive and thoughtful, he may learn other ways to handle himself.

**Dominant and Recessive Genes** Whenever a given trait is governed by a single gene, as is true of some 1,000 individual physical characteristics, inheritance patterns follow well-understood rules. Figure 2.2 offers a schematic look at how the dominant/recessive pattern of inheritance works, using the genes for curly and straight hair as an example. Because straight hair is controlled by a recessive gene, an individual must inherit the straighthair gene from both parents in order for her phenotype to include straight hair. A child who receives only one gene for straight hair will have curly hair, but she may pass the straight-hair gene on to her offspring. Since curly hair is controlled by a dominant gene, a child who inherits a gene for curly hair from either parent will actually have curly hair. However, her hair may not be as curly as that of the parent from whom she received the gene. Genes vary in expressivity, a term that simply means that the same gene may be expressed differently in two individuals who have it. The dominant/recessive pattern doesn’t always work in such a straightforward way. For example, humans carry genes for three kinds of blood type: A (dominant), B (dominant), and O (recessive). Each individual has only two of these genes. If one gene is A and the other is O, then the individual’s blood type is A. As you know, an individual must inherit two recessive O genes to have type O blood. But what happens if an individual receives an A and a B gene? Since both are dominant, the individual has type AB blood, and the genes are said to be co-dominant

**Twins and Siblings** In most cases, babies are conceived and born one at a time. However, 3 out of every 100 births in the United States today are multiple births (Martin et al., 2010). This number has risen dramatically in recent decades, in large part because widely prescribed new medications given to infertile women frequently stimulate multiple ovulation. The great majority of multiple births in the United States are twins; triplets or higher multiples occur only about once in every 1,000 births (Martin et al., 2010).

Roughly two-thirds of twins are fraternal twins. Fraternal twins develop when two ova have been produced and both have been fertilized, each by a separate sperm. Such twins, also called dizygotic twins, are no more alike genetically than any other pair of siblings and may not even be of the same

sex. The remaining one-third of twins are identical twins (also called monozygotic twins). In such cases, a single fertilized ovum apparently initially divides in the normal way, but then for unknown reasons separates into two parts, with each part developing into a separate individual. Because identical twins develop from precisely the same original fertilized ovum, they have identical genetic heritages. You'll remember from Chapter 1 that comparison of the degree of similarity of these two types of twins is a major research strategy in the important field of behavior genetics.

**The Stages of Prenatal Development** The period of gestation of the human infant is 38 weeks (about 265 days). These 38 weeks are divided into three stages of unequal length, identified by specific changes within the developing organism (see Table 2.2 on page 36).

**The Germinal Stage** The germinal stage begins at conception and ends when the zygote is implanted in the wall of the uterus. After conception, the zygote spends roughly a week floating down the fallopian tube to the uterus. Cell division begins 24 to 36 hours after conception; within 2 to 3 days, there are several dozen cells and the whole mass is about the size of the head of a pin. Approximately 4 days after conception, the mass of cells, now called a blastocyst, begins to subdivide, forming a sphere with two layers of cells around a hollow center. The outermost layer will form the various structures that will support the developing organism, while the inner layer will form the embryo itself. When it touches the wall of the uterus, the outer cell layer of the blastocyst breaks down at the point of contact. Small tendrils develop and attach the cell mass to the uterine wall, a process called implantation. When implantation is complete (normally 10 days to 2 weeks after conception), the blastocyst has perhaps 150 cells (Tanner, 1990). The sequence is illustrated schematically in Figure 2.3.

**Development from Conception to Birth** Little was known about prenatal development until fairly recently. Consequently, there was a lot of confusion about the connection between the experiences of the pregnant woman and the intrauterine development and experiences of the child. For example, pregnancy has traditionally been divided into three trimesters of equal length, so doctors as well as expectant couples tended to think of prenatal development as consisting of three analogous stages. Of course, technology has changed all this. Scientists have learned that there are indeed three stages of prenatal development, but the developing child has already reached the third stage before the mother ends her first trimester.

**The Embryonic Stage** The embryonic stage begins when implantation is complete. The blastocyst's outer layer of cells specializes into two membranes, each of which forms critical support structures. The inner membrane becomes a sac or bag called the amnion, filled with liquid (amniotic fluid) in

which the embryo floats. The outer membrane, called the chorion, develops into two organs, the placenta and the umbilical cord. The placenta, which is fully developed by about 4 weeks of gestation, is a platelike mass of cells that lies against the wall of the uterus. It serves as the liver and kidneys for the embryo until the embryo's own organs begin to function. It also provides the embryo with oxygen and removes carbon dioxide from its blood.

Connected to the embryo's circulatory system via the umbilical cord, the placenta also serves as a critical filter between the mother's circulatory system and the embryo's. Nutrients such as oxygen, proteins, sugars, and vitamins from the maternal blood can pass through to the embryo or fetus; digestive wastes and carbon dioxide from the infant's blood pass back through to the mother, whose own body can eliminate them. At the same time, many (but not all) harmful substances, such as viruses or the mother's hormones, are filtered out because they are too large to pass through the various membranes in the placenta. Most drugs and anesthetics, however, do pass through the placenta, as do some disease organisms.

While the support structures are developing, the mass of cells that will form the embryo itself is differentiating further into several types of cells that form the rudiments of skin, sense receptors, nerve cells, muscles, circulatory system, and internal organs—a process called organogenesis.

A heartbeat can be detected roughly 4 weeks after conception; the beginnings of lungs and limbs are also apparent at this time. By the end of the embryonic period, rudimentary fingers and toes, eyes, eyelids, nose, mouth, and external ears are all present, as are the basic parts of the nervous system; these and other developmental milestones are summarized in Table 2.2. The embryonic stage ends when organogenesis is complete and bone cells begin to form, typically about 8 weeks after conception.

**The Fetal Stage** Once organogenesis is complete, the developing organism is known as a fetus and the final phase of prenatal development, the fetal stage, begins (lasting from approximately 8 weeks until birth). From a weight of about 1/4 ounce and a length of 1 inch, the fetus grows to a baby weighing about 7 pounds and having a length of about 20 inches, who is ready to be born. In addition, this stage involves refinements of the organ systems that are essential to life outside the womb (see Table 2.3). By the end of week 23, a small number of babies have attained viability, the ability to live outside the womb (Moore & Persaud, 1993). However, most babies born this early die, and those who do survive struggle for many months. Remaining in the womb just 1 week longer, until the end of week 24, greatly increases a baby's chances of survival. The extra week probably allows time for lung

function to become more efficient. In addition, most brain structures are completely developed by the end of the 24th week. For these reasons, most experts accept 24 weeks as the average age of viability.

**The Fetal Brain** As you learned earlier, the foundational structures of all of the body's organ systems are formed during the embryonic stage. Yet most of the formation and finetuning of the brain take place during the fetal stage (see Figure 2.4). Neurons, the specialized cells of the nervous system, actually begin developing during the embryonic stage, in week 3. But the pace of neural formation picks up dramatically between the 10th and 18th weeks, a process known as neuronal proliferation.

Between the 13th and 21st weeks, neuronal migration takes place, a process in which newly formed neurons migrate to the specialized regions of the brain where they will reside for the rest of the individual's life (Johnson, M. 2011). While migrating, neurons consist only of cell bodies, the part of the cell that contains the nucleus and in which all the cell's vital functions are carried out (see Figure 2.5). Once they have reached their final destinations in the fetal brain, the neurons begin to develop connections. These connections, called synapses, are tiny spaces between neurons across which neural impulses travel from one neuron to the next. Several changes in fetal behavior signal that the process of synapse formation is under way. For instance, the fetus exhibits alternating periods of activity and rest and begins to yawn (Walusinski, Kurjak, Andonotopo, & Azumendi, 2005; see Figure 2.6). When observed, these changes tell physicians that fetal brain development is proceeding normally.

Synapse formation requires the growth of two neuronal structures. Axons are tail-like extensions that can grow to be several feet in length. Dendrites are tentaclelike branches.

**Teratogens: Drugs** There is now a huge literature on the effects of prenatal drugs, especially controlled substances such as heroin and marijuana (Barth, 2001). Sorting out the effects of drugs has proved to be an immensely challenging task because many women use multiple substances: Women who drink alcohol are also more likely than nondrinkers to smoke; those who use cocaine are also likely to take other illegal drugs or to smoke or drink to excess, and so on. In addition, many women who use drugs have other problems, such as depression, that may be responsible for the apparent effects of the drugs they use (Pajulo, Savonlahti, Sourander, Helenius, & Piha, 2001). Furthermore, the effects of drugs may be subtle, visible only many years after birth in the form of minor learning disabilities or increased risk of behavior problems. **Smoking** Research suggests that smoking during pregnancy may cause genetic damage in the developing fetus (de la Chica, Ribas, Giraldo, Egozcue, & Fuster, 2005). In addition, the link between smoking and low birth weight is well established. Infants of mothers who



smoke are on average about half a pound lighter at birth than infants of nonsmoking mothers (Mohsin, Wong, Baumann, & Bai, 2003) and are nearly twice as likely to be born with a weight below 2,500 grams (5 pounds 8 ounces), the common definition of low birth weight. The primary problem-causing agent in cigarettes is nicotine, which constricts the blood vessels, reducing blood flow and nutrition to the placenta. The effects of smoking on both height and weight are still evident when the children of smoking and nonsmoking mothers reach school age (Cornelius, Goldschmidt, Day, & Larkby, 2002). Medical researchers have also found that prenatal smoking increases children's risk of a number of health problems (DiFranza, Aligne, & Weitzman, 2004). These problems include susceptibility to respiratory infections, asthma, and ear infections. Prenatal exposure to tobacco also appears to have long-term effects on children's cognitive and social development. Some studies suggest that there are higher rates of learning problems and antisocial behavior among children whose mothers smoked during pregnancy (DiFranza, Aligne, & Weitzman, 2004). Moreover, children of women who smoked during pregnancy are more likely than their schoolmates to be diagnosed with attention-deficit hyperactivity disorder (Lindblad & Hjern, 2010)

**Drinking** The effects of alcohol on the developing fetus range from mild to severe. At the extreme end of the continuum are children who exhibit a syndrome called fetal alcohol syndrome (FAS), which affects 1 to 2 of every 1,000 infants in the United States (Vaux & Rosenkrantz, 2010). Projecting these figures to all children born in the United States means that up to 12,000 children with FAS are born every year. These children, whose mothers were usually heavy drinkers or alcoholics, are generally smaller than normal, with smaller brains and often with distinct physical anomalies or deformities. They frequently have heart defects, and their faces have certain distinctive features (visible in the two photos below), including a somewhat flattened nose and nose bridge and often an unusually long space between nose and mouth. However, the disorder is often difficult to diagnose. Experts recommend that physicians who suspect that a child may have FAS carry out a multidisciplinary assessment, one that includes a comprehensive medical and behavioral history of both the mother and the child as well as neuropsychological testing (Vaux & Rosenkrantz, 2010). The best single study of the consequences of prenatal alcohol exposure has been done by Ann Streissguth and her colleagues (Baer, Sampson, Barr, Connor, & Streissguth, 2003), who followed a group of over 500 women who drank moderate to heavy amounts of alcohol while pregnant and their children. Streissguth tested the children repeatedly, beginning immediately after birth, again later in infancy, at age 4, at school age, and again at ages 11, 14, and 21. She found that the mother's alcohol consumption in pregnancy was associated with sluggishness and weaker sucking in infancy; lower scores on measures of intelligence at 8 months, 4

years, and 7 years; and problems with attention and vigilance at 4, 7, 11, and 14. Teachers also rated the 11-year-olds on overall school performance and on various behavior problems, and on both of these measures, children whose mothers had consumed the most alcohol during pregnancy were rated significantly worse. Streissguth also asked mothers about their diet, their education, and their life habits. She found that the links between a mother's alcohol consumption and poor outcomes for the child held up even when all these other variables were controlled statistically. Investigators have also found that these children's deficiencies in information processing skills persist into adulthood (Connor, Sampson, Bookstein, Barr, & Streissguth, 2001). Moreover, they are more likely than peers who were not prenatally exposed to alcohol to have alcohol abuse problems themselves (Baer et al., 2003).

**Other Teratogens and Maternal Factors** A variety of additional factors, from vitamins to environmental pollutants to maternal emotions, can affect prenatal development. A few are listed in Table 2.5, and others are discussed in more detail in this section.

**Prescription and Over-the-Counter Drugs** In general, doctors advise against taking any unnecessary medicines during pregnancy. But some pregnant women must take drugs in order to treat health conditions that may be threatening to their own and their unborn child's life. For instance, pregnant women with epilepsy must take antiseizure medication because the seizures themselves are potentially harmful to the unborn child. Other drugs that pregnant women may have to risk taking, even though they can be harmful, include medications that treat heart conditions and diabetes, those that control asthma symptoms, and some kinds of psychiatric drugs. In all such cases, physicians weigh the benefits of medication against potential teratogenic effects and look for a combination of drug and dosage that will effectively treat the mother's health condition while placing her unborn child at minimal risk. In contrast to prescription drugs, most people, pregnant or otherwise, take over-the-counter medicines on a casual, as-needed basis without consulting a doctor. Many of these drugs, such as acetaminophen, are safe for pregnant women unless taken to excess (Organization of Teratology Information Specialists, 2005). However, experts advise pregnant women to discuss the medicines they usually take with physicians at the outset of their pregnancies. These discussions should deal with both drugs and any vitamins or supplements that the pregnant woman usually takes. Their doctors will advise them as to which of the substances are safe and which are risky. Often, too, physicians can suggest safer alternatives; typically most look to older drugs that have been thoroughly tested (Vogin, 2005).

**Diet** Both the general adequacy of a pregnant woman's diet, measured in terms of calories, and the presence of certain key nutrients are critical to prenatal development (Christian & Stewart, 2010). Dietitians recommend that expectant mothers take in about 300 calories more per day than before they were pregnant (March of Dimes, 2011). When a woman

experiences severe malnutrition during pregnancy, particularly during the final 3 months, she faces a greatly increased risk of stillbirth, low infant birth weight, or infant death during the first year of life (Di Mario, Say, & Lincetto, 2007). Autopsies show that infants born to malnourished mothers have smaller brains, with fewer and smaller brain cells than normal (Georgieff, 1994). A vital specific nutrient whose importance during pregnancy has become clear is folic acid, a B vitamin found primarily in liver, beans, leafy green vegetables, broccoli, orange juice, fortified breakfast cereals, and grain products, especially wheat germ. Inadequate amounts of this nutrient have been clearly linked to the risk of neural tube defects such as spina bifida, a deformity in which the lower part of the spine does not close (Ellenbogen, 2009). Many (but not all) such children are retarded; most have some lower-body paralysis. Because the neural tube develops primarily during the very earliest weeks of pregnancy, before a woman may even know she is pregnant, it is important for women who plan a pregnancy to ingest at least the minimum level of folic acid: 400 micrograms daily. To help raise the normal intake above the desired level, new regulations by the Food and Drug Administration in the United States now require that 140 micrograms of folic acid be added to each 100 grams of enriched flour, thus greatly increasing the likelihood that the majority of women will receive sufficient quantities of folic acid. Since the mandate was instituted, the number of infants born with spina bifida in the United States has been reduced by about one-third (Ellenbogen, 2009). There are also risks associated with gaining too much weight during pregnancy. In particular, women who gain too much weight are more likely to have a cesarean section delivery (Takimoto, 2006); they are also prone to postpartum obesity, which carries a whole set of health risks, including heart disease and diabetes (Amorim et al., 2007). Gains within the recommended ranges appear optimal, although there is wide variability from one woman to the next. Finally, women who are obese before they become pregnant have some additional risks, regardless of the amount of weight they gain. Such women are about twice as likely to have infants with neural tube defects, regardless of their intake of folic acid (Scialli, 2007). Research shows that, for obese women, weight-loss diets that include all of the nutrients needed for prenatal development are safe (Kiel et al., 2007).

## **Stages of Childbirth**

Labor is the process through which a fetus and placenta are delivered from the uterus through the vagina. Human labor divides into three stages. The first stage is further divided into two phases. Successful labor involves three factors: maternal efforts and uterine contractions, fetal characteristics, and pelvic anatomy. This triad is classically referred to as the passenger, power, and passage. Clinicians typically use multiple modalities to monitor labor. Serial cervical examinations are used to determine

cervical dilation, effacement, and fetal position, also known as the station. Fetal heart monitoring is employed nearly continuously to assess fetal well-being throughout labor. Cardiotocography is used to monitor the frequency and adequacy of contractions. Medical professionals use the information they obtain from monitoring and cervical exams to determine the patient's stage of labor and monitor labor progression.

### **Initial Evaluation and Presentation of Labor**

Women will often self-present to obstetrical triage with concern for the onset of labor. Common chief complaints include painful contractions, vaginal bleeding/bloody show, and fluid leakage from the vagina. It is up to the clinician to determine if the patient is in labor, defined as regular, clinically significant contractions with an objective change in cervical dilation and/or effacement. When women first present to the labor and delivery unit, vital signs, including temperature, heart rate, oxygen saturation, respiratory rate, and blood pressure, should be obtained and reviewed for any abnormalities. The patient should be placed on continuous cardiotocographic monitoring to ensure fetal wellbeing. The patient's prenatal record, including obstetric history, surgical history, medical history, laboratory, and imaging data, should undergo review. Finally, a history of present illness, review of systems, and physical exam, including a sterile speculum exam, will need to take place.

During the sterile speculum exam, clinicians will look for signs of rupture of membranes such as amniotic fluid pooling in the posterior vaginal canal. If the clinician is unsure whether or not a rupture of membranes has occurred, additional testing such as pH testing, microscopic exam looking for ferning of the fluid, or laboratory testing of the fluid can be the next step. Amniotic fluid has a pH of 7.0 to 7.5, which is more basic than normal vaginal pH. A sterile gloved exam should be done to determine the degree of cervical dilation and effacement. The measurement of cervical dilation is made by locating the external cervical os and spreading one's fingers in a 'V' shape, and estimating the distance in centimeters between the two fingers. Effacement is measured by estimating the percentage remaining of the length of the thinned cervix compared to the uneffaced cervix. During the cervical exam, confirmation of the presenting fetal part is also necessary. Bedside ultrasound can be employed to confirm the presentation and position of the fetal presenting part. Particular mention should be noted in the case of breech presentation due to its increased risks regarding fetal morbidity and mortality compared with the cephalic presenting fetus.

### **Management of Normal Labor**

Labor is a natural process, but it can suffer interruption by complicating factors, which at times necessitate clinical intervention. The management of low-risk labor is a delicate balance between allowing the natural process to proceed while limiting any potential complications.<sup>[3]</sup> During labor, cardiotocographic monitoring is often employed to monitor uterine contractions and fetal heart rate over time. Clinicians monitor fetal heart tracings to evaluate for any signs of fetal distress that would warrant intervention as well as the adequacy or inadequacy of contractions. Vital signs of the mother are taken at regular intervals and whenever concerns arise regarding a clinical status change. Laboratory testing often includes the hemoglobin, hematocrit, and platelet count and is sometimes repeated following delivery if significant blood loss occurs. Cervical exams are usually performed every 2 to 3 hours unless concerns arise and warrant more frequent exams. Frequent cervical exams are associated with a higher risk of infection, especially if a rupture of membranes has occurred. Women should be allowed to ambulate freely and change positions if desired. An intravenous catheter is typically inserted in case it is necessary to administer medications or fluids. Oral intake should not be withheld. If the patient remains without food or drink for a prolonged period of time, intravenous fluids should be considered to help replace losses but do not need to be used continuously on all laboring patients. Analgesia is offered in the form of intravenous opioids, inhaled nitrous oxide, and neuraxial analgesia in those who are appropriate candidates. Amniotomy is considered on an as-needed basis for fetal scalp monitoring or labor augmentation, but its routine use should be discouraged. Oxytocin may be initiated to augment contractions found to be inadequate.

## **First Stage of Labor**

The first stage of labor begins when labor starts and ends with full cervical dilation to 10 centimeters. Labor often begins spontaneously or may be induced medically for a variety of maternal or fetal indications. Methods of inducing labor include cervical ripening with prostaglandins, membrane stripping, amniotomy, and intravenous oxytocin. Although precisely determining when labor starts may be inexact, labor is generally defined as beginning when contractions become strong and regularly spaced at approximately 3 to 5 minutes apart. Women may experience painful contractions throughout pregnancy that do not lead to cervical dilation or effacement, referred to as false labor. Thus, defining the onset of labor often relies on retrospective or subjective data. Friedman et al. were some of the first to study labor progress and defined the beginning of labor as starting when women felt significant and regular contractions. He graphed cervical dilation over time and determined that normal labor has a sigmoidal shape. Based on the analysis from his labor graphs, he proposed that labor has three divisions. First, a preparatory stage marked by slow cervical dilation, with large

biochemical and structural changes. This is also known as the latent phase of the first stage of labor. Second, a much shorter and rapid dilational phase is also known as the active phase of the first stage of labor. Third, a pelvic division phase, which takes place during the second stage of labor.

The first stage of labor is further subdivides into two phases, defined by the degree of cervical dilation. The latent phase is commonly defined as the 0 to 6 cm, while the active phase commences from 6 cm to full cervical dilation. The presenting fetal part also begins the process of engagement into the pelvis during the first stage. Throughout the first stage of labor, serial cervical exams are done to determine the position of the fetus, cervical dilation, and cervical effacement. Cervical effacement refers to the cervical length in the anterior-posterior plane. When the cervix is completely thinned out, and no length is left, this is referred to as 100 percent effacement.[\[1\]](#) The station of the fetus is defined relative to its position in the maternal pelvis. When the bony fetal presenting part is aligned with the maternal ischial spine, the fetus is 0 station. Proximal to the ischial spines are stations -1 centimeter to -5 centimeters, and distal to the ischial spines is +1 to +5 station.[\[1\]](#) The first stage of labor contains a latent phase and an active phase. During the latent phase, the cervix dilates slowly to approximately 6 centimeters. The latent phase is generally considerably longer and less predictable with regard to the rate of cervical change than is observed in the active phase. A normal latent phase can last up to 20 hours and 14 hours in nulliparous and multiparous women, respectively, without being considered prolonged. Sedation can increase the duration of the latent phase of labor. The cervix changes more rapidly and predictably in the active phase until it reaches 10 centimeters and cervical dilation and effacement are complete. Active labor with more rapid cervical dilation generally starts around 6 centimeters of dilation. During the active phase, the cervix typically dilates at a rate of 1.2 to 1.5 centimeters per hour. Multiparas, or women with a history of prior vaginal delivery, tend to demonstrate more rapid cervical dilation. The absence of cervical change for greater than 4 hours in the presence of adequate contractions or six hours with inadequate contractions is considered the arrest of labor and may warrant clinical intervention.

## **Second Stage of Labor**

The second stage of labor commences with complete cervical dilation to 10 centimeters and ends with the delivery of the neonate. This was also defined as the pelvic division phase by Friedman. After cervical dilation is complete, the fetus descends into the vaginal canal with or without maternal pushing efforts. The fetus passes through the birth canal via 7 movements known as the cardinal movements. These include engagement, descent, flexion, internal rotation, extension, external rotation,

and expulsion. In women who have delivered vaginally previously, whose bodies have acclimated to delivering a fetus, the second stage may only require a brief trial, whereas a longer duration may be required for a nulliparous female. In parturients without neuraxial anesthesia, the second stage of labor typically lasts less than three hours in nulliparous women and less than two hours in multiparous women. In women who receive neuraxial anesthesia, the second stage of labor typically lasts less than four hours in nulliparous women and less than three hours in multiparous women. If the second stage of labor lasts longer than these parameters, then the second stage is considered prolonged. Several elements may influence the duration of the second stage of labor, including fetal factors such as fetal size and position, or maternal factors such as pelvis shape, the magnitude of expulsive efforts, comorbidities such as hypertension or diabetes, age, and history of previous deliveries.

### **Third Stage of Labor**

The third stage of labor commences when the fetus is delivered and concludes with the delivery of the placenta. Separation of the placenta from the uterine interface is hallmarked by three cardinal signs, including a gush of blood at the vagina, lengthening of the umbilical cord, and a globular shaped uterine fundus on palpation. Spontaneous expulsion of the placenta typically takes between 5 to 30 minutes. A delivery time of greater than 30 minutes is associated with a higher risk of postpartum hemorrhage and may be an indication for manual removal or other intervention. Management of the third stage of labor involves placing traction on the umbilical cord with simultaneous fundal pressure to effect faster placental delivery.

**The postpartum period**, also known as the puerperium and the "fourth trimester," refers to the time after delivery when maternal physiologic changes related to pregnancy return to the nonpregnant state. In addition to physiologic changes and medical issues that may arise during this period, health care providers should be aware of the psychological needs of the postpartum mother and be sensitive to cultural differences that surround childbirth, which may involve eating particular foods and restricting certain activities [\[1\]](#).

This topic will provide an overview of normal physiologic changes and routine maternal care during the postpartum period. An overview of postpartum disorders and complications and their management is available separately

### **DEFINITION OF THE POSTPARTUM PERIOD**

There is consensus that the postpartum period begins upon delivery of the infant. The end is less well defined, but is often considered the six to eight weeks after delivery because the effects of pregnancy on many systems have largely returned to the prepregnancy state by this time. However, all organ systems do not return to baseline within this period, and the return to baseline is not necessarily linear over time. For this reason, the American College of Obstetricians and Gynecologists considers postpartum care to extend up to 12 weeks after delivery [2]. Some investigators have considered women to be postpartum for as long as 12 months after delivery.

## POSTPARTUM FINDINGS AND CHANGES

**Shivering** — Postpartum shivering or chills are observed in 25 to 50 percent of women [3,4]. Shivering usually starts 1 to 30 minutes postdelivery and lasts for 2 to 60 minutes. The cause is unknown; it may be a response to a fall in body temperature following labor, fetal-maternal bleeding, micro-amniotic emboli, placental separation, anesthesia, bacteremia, or administration of certain drugs (eg, misoprostol)

Treatment is supportive with warm blankets and/or warm air. Anesthesia-related shivering can be treated pharmacologically

## POSTPARTUM COMPLICATION

### Excessive uterine bleeding

Usually the amount of lochia is similar to a normal menstrual period. If the discharge is heavier, consider retained placenta and/or endometritis.

In case of suspected retained placenta:

- Digital curettage or manual vacuum aspiration or extremely cautious instrumental curettage, with antibiotic coverage (Chapter 9).

- Antibiotherapy for 5 days:

**amoxicillin/clavulanic acid** PO (dose expressed in amoxicillin):

Ratio 8:1: 3000 mg daily (2 tablets of 500/62.5 mg 3 times daily)

Ratio 7:1: 2625 mg daily (1 tablet of 875/125 mg 3 times daily)

or

**amoxicillin** PO: 1 g 3 times daily + **metronidazole** PO: 500 mg 3 times daily



## Infectious complications

Look for an infection in patients with fever higher than 38 °C for more than 48 hours.

### Postpartum endometritis and salpingitis

#### Clinical features

- Fever, usually high
- Abdominal and/or pelvic pain, foul-smelling or purulent vaginal discharge
- Uterus enlarged, soft, painful when mobilized; open cervix; swelling in the posterior fornix

#### Management

- Admit to inpatient department; administer antibiotherapy:

**amoxicillin/clavulanic acid** IV (dose expressed in amoxicillin): 1 g every 8 hours + **gentamicin** IM: 5 mg/kg once daily

or

**ampicillin** IV: 2 g every 8 hours + **metronidazole** IV: 500 mg every 8 hours + **gentamicin** IM: 5 mg/kg once daily

Continue this treatment 48 hours after resolution of fever and other clinical signs<sup>2</sup>.

For early, minor forms (no fever, minor pain), outpatient treatment is possible with:

**amoxicillin/clavulanic acid** PO (dose expressed in amoxicillin) for 5 to 7 days:

Ratio 8:1: 3000 mg daily (2 tablets of 500/62.5 mg 3 times daily)

Ratio 7:1: 2625 mg daily (1 tablet of 875/125 mg 3 times daily)

- Look for retained placenta and perform uterine evacuation after 24 to 48 hours of antibiotherapy. If the patient is haemodynamically unstable due to haemorrhage or infection, perform uterine evacuation immediately.

### Pelvic abscess or peritonitis

A complication of untreated puerperal endometritis/salpingitis.

#### Clinical features

- Abdominal guarding or spasm, ileus, pelvic mass

## **Management**

- Laparotomy or, in case the abscess is confined to the Pouch of Douglas, colpotomy to drain the abscess.
- Same antibiotherapy as for postpartum endometritis and salpingitis.

## **Other infectious complications**

- Abscess after caesarean section.
- Lymphangitis and breast abscess ([Section 11.4.3](#)).
- Pyelonephritis (Chapter 4, [Section 4.2.3](#)).

Note: in case of fever, systematically test for malaria in endemic areas.

Breast-related complications

## **Cracked nipples**

### **Clinical features**

- Nipple erosion and intense pain when starting to nurse.
- No fever (except when associated with lymphangitis).

## **Management**

- Clean with soap and clean water before and after each feeding; dry carefully.
- Observe the neonate while nursing, and correct the position if necessary. Cracked nipples are often caused by incorrect latching onto the breast.

## **Breast engorgement**

### **Clinical features**

- Bilateral pain 2 to 3 days after childbirth; firm, painful breasts.

## **Management**

- Cold or warm compresses (before nursing); more frequent nursing.
- Gentle manual expression ([Appendix 3](#)) before nursing, if the neonate cannot latch onto the overly

distended breast or after nursing to finish emptying the breast.

Engorgement subsides in 24 to 48 hours.

## **Lymphangitis**

### **Clinical features**

- Unilateral pain, 5 to 10 days after childbirth. Local inflammation, red, hot painful with no fluctuation.
- High fever (39-40 °C); enlarged axillary lymph node.
- No pus in the milk collected on a compress.

### **Management**

- Empty the breast by nursing the neonate frequently on the involved side. If the mother finds nursing too painful, temporarily stop nursing on the painful side (but empty the breast manually) and continue breastfeeding with the other breast.
- Routine analgesia (paracetamol PO, [Appendix 7](#)).

## **Breast infections (mastitis, abscess)**

### **Clinical features**

- Mastitis:
  - Firm, red, painful, swollen area of one breast associated with fever.
  - Axillary lymph node may be enlarged.
  - Purulent discharge from the nipple.
- Breast abscess: fluctuant, tender, palpable mass.

### **Management**

- Temporarily stop nursing on the affected side. Carefully express all milk from the infected breast (manually).
- Routine analgesia (paracetamol PO, [Appendix 7](#)); cold or warm compresses.
- Antibiotherapy with activity against staphylococci may prevent progression to breast abscess (**cloxacillin** PO: 1 g 3 times daily for 7 days).
- Breast abscess: urgent drainage as the abscess can quickly spread, and antibiotherapy as above.

Urine leakage

## **Clinical features**

– Look for a possible vesicovaginal fistula, especially after a prolonged labour.

## **Management**

– If there is a fistula:

– If there is no fistula, stress incontinence is likely: propose exercises to strengthen the pelvic floor.

Stress incontinence is more common among grand multiparas, after a forceps or vacuum extraction, and in cases of foetal macrosomia. It usually disappears within 3 months with pelvic floor exercises.

## **Psychological disorders**

### **“The baby blues”**

This syndrome has its onset within days after the delivery and lasts usually 2 weeks.

It is characterised by mood swings, crying, irritability, anxious worrying centred on the neonate, and doubts about the ability to be a “good mother”, combined with insomnia, loss of appetite and concentration problems.

These problems generally diminish within a few days. Reassurance, family support and follow-up to ensure that the patient does not develop depression are usually sufficient.

## **Postpartum depression**

Postpartum depression develops in the first weeks after childbirth; it can be severe and is often underestimated.

The characteristic symptoms of depression are sadness, frequent crying, loss of self-confidence, constant concerns about the child (or, on the contrary, a feeling of indifference), feeling incompetent as a mother, and feelings of guilt (or even aggressive thoughts toward the child) combined with insomnia and loss of appetite. These symptoms last more than 2 weeks and gradually worsen, leading to a state of exhaustion.

The interview should look for possible suicidal thoughts and assess the mother’s ability and desire to take care of the child (depression can have repercussions for the child’s development).

An understanding and reassuring attitude and help with daily activities by family and friends are

essential.

Antidepressant medication may be necessary (choose an antidepressant compatible with breastfeeding, which should be continued whenever possible). Refer to the [Clinical guidelines](#), MSF.

Note: postpartum depression is more frequent after a stillbirth or intrauterine foetal death.

## Postpartum psychosis

This occurs less frequently and is characterised by the onset of psychotic symptoms after childbirth.

Symptoms include irritability, major mood swings, delusions, hallucinations, and disorganised, bizarre and sometimes violent behaviour.

The patient should be sent to a doctor immediately. Antipsychotic treatment, and usually hospitalisation, is necessary. Refer to the [Clinical guidelines](#), MSF.

## QUESTIONS

1. Review the stages of prenatal development.
2. Explain how the developing embryo and fetus may be harmed by the presence of       teratogens and describe what a mother can do to reduce her risk
3. Describe the various stages of Childbirth.
4. Define Postpartum. Explain the Postpartum complication.

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**SCHOOL OF SCIENCE AND HUMANITIES**  
**DEPARTMENT OF PSYCHOLOGY**

## **UNIT – II - INFANCY AND EARLY CHILDHOOD - DEVELOPMENT PSYCHOLOGY–SPYA1302**

### **INTRODUCTION**

Think about tadpoles for a moment. There are clearly some important differences between tadpoles and children, but they have some interesting features in common. It is remarkable how much change a frog undergoes as it develops. Its whole physical shape is transformed dramatically from its fishlike, long-tailed infancy to pot-bellied, pop-eyed, strong-legged adulthood. It has little to say for itself initially, but as a grown-up it can croak for hours. Although the human infant has more in common, visibly, with mature humans, it will also change in appearance substantially over the course of its lifespan. For example, the body-to-head ratio changes, the limbs elongate and strengthen, the child becomes able to stand upright and move about independently, and it continues to increase in size over a period of about two decades. The child also has a modest vocal repertoire at the start, but in due course can sing songs or discuss the sports results.

As for our mental and social capacities, a moment's reflection tells us that these change dramatically, too. The emergence of language during childhood presages a far more remarkable metamorphosis than the tadpole's emerging legs. The social life of a six-year-old is much more diverse than that of

an infant. And the reasoning powers of a ten-year-old provide for intellectual activity unimaginable in a toddler.

The changes our bodies undergo are largely preordained by nature. There may be some variations as a function of nutrition, exercise or exposure to environmental hazard but, by and large, the physical progress of a young human follows a predictable course, as in tadpoles or the young of other species. Can we say the same of the human child's mental progress?

The tadpole's social future is dictated largely by nature – the need to find food, survive and reproduce. Are human lives so predictable? Clearly, some of children's major early tasks will be influenced by the surrounding culture. The language a child begins to learn reflects the language of his community. Whether a child spends her leisure time surfing the Internet or gathering witchety grubs depends on which society she is born into. Does this mean that developing minds are shaped by the environment?

These are the kinds of questions that are investigated by developmental psychologists. As we examine specific aspects of development in infancy and childhood (this chapter) through adolescence and adulthood (chapter 10), some general themes will recur. How much is given by nature, and how much by experience? How does change come about? In particular, is change gradual or stage-like?

## **INFANCY**

What leads to one young person growing up to beg on the streets, while his peer starts a career in the central business district?

The influential early behaviourist John B. Watson once proclaimed: 'Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant-chief, and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocation, and race of his ancestors' (1924, p. 82). But are people really empty vessels to be filled up or shaped by their environments?

People often think of infants as helpless and malleable. Clearly, in some quite fundamental respects, they are dependent upon others. They are unable to meet their own physical needs (feeding, cleansing, finding shelter) or to move around or engage in discussion. Observations such as these have led to a traditional belief that the child is shaped by experience. The strongest expressions of this assumption have been provided by behaviouristic psychologists, like Watson, who assert that the child is the product of its reinforcement history (see chapter 4).

However, more recent research by developmental psychologists has radically altered our understanding, and the traditional notion of babies as empty vessels waiting to be filled by experience has now been abandoned. In this section, we will examine an array of evidence pointing to the remarkable complexity and competencies of the normal human infant.

## **PHYSICAL AND SENSORY DEVELOPMENT**



You and I experience the world via our senses, and our everyday negotiation of the environment depends upon our skills in exploiting and coordinating the information they provide (see chapters 7 and 8). But these abilities did not emerge suddenly. We have enjoyed the benefits of sensory equipment since we first came into the world (and maybe before).

Babies have a rich array of perceptual and physical capacities, which enable them to engage with the world in more complex ways than was once believed. Some of these capacities seem to be present at birth, some develop rapidly during the first year or so, and some vary according to the opportunities for exercising them.

## VISION

The human infant's visual system provides a crucial means of exploring and reacting to the environment (Slater & Johnson, 1998). Although newborns' visual acuity is less than perfect, they can certainly take in a great deal of visual information, and they soon show signs of pursuing it actively (von Hofsten, 2001).

If you hold an object about 30 cm from a neonate's face, he can focus on it and may track it if you move it slowly from side to side. At this stage, the baby's visual attention is likely to be concentrated on the object's edges, but over the next few weeks he will begin to explore its whole surface (Aslin, 1987). Within the first couple of months, infants can switch visual attention from objects immediately in front of them to events (such as a light flashing) on the periphery of their visual field (Maurer & Lewis, 1998). By three or four months, they are able to organize complex visual configurations, distinguishing between intersecting forms (Quinn, Brown & Streppa, 1998) and exploiting illusory contours to perceive boundaries and depth (Johnson & Aslin, 1998).

Babies appear to be particularly interested in faces, which hold their attention and elicit smiles (Fantz, 1961). Some evidence indicates that even neonates less than one hour old prefer illustrations of a human face to other patterns of similar complexity, and they prefer regularly organized representations to pictures that jumble the facial features (Johnson & Morton, 1991). Such early preferences raise the serious (if controversial) possibility that infants have innate 'face detectors', which direct their attention to this aspect of the visual environment (Slater et al., 2000).

## *Hearing, taste and smell*

The infant exploits all her senses as she learns about and reacts to her world. Hearing, although not fully developed at birth, is well developed at this stage, enabling young infants to discriminate among sounds that vary in volume, duration and repetitiveness, and to organize their perception of and responses to the spatial environment (Kellman & Arterberry, 1998). So when exposed to the 'approach' of an illusory object (a sound increasing in volume), quite young infants lean away as the noise gets louder (Freiberg, Tually & Crassini, 2001).

Perhaps one of the starkest pieces of evidence against the 'empty vessel' theory of human nature comes from the infant's discrimination among tastes (Mennella & Beauchamp, 1997). Babies are not passive when it comes to food and drink, and display clear preferences. Their sucking rate increases for sweet liquids, but decreases for salty or bitter liquids (Crook, 1978). They show by their facial or vocal expressions whether they like or dislike a particular taste, and will protest vigorously if offered something they find unpalatable (Blass, 1997).

These preferences are by no means arbitrary and may well have survival value. Infants do not have conscious nutritional information to help them decide whether a foodstuff is good or bad for them, but they know what they like. For example, alcohol is potentially harmful to infants, and research suggests that they would prefer not to drink it.

Mennella and Beauchamp (1994) compared babies' consumption of breastmilk when their mothers had been drinking either alcoholic beer or non-alcoholic beer. In the alcohol condition, the babies drank significantly less milk. Babies' taste preferences can also be exploited by adults – certain tastes, such as milk or sweetened drinks, help to calm down a crying infant (Blass, 1997). Infants react to smells in similar ways. Their facial expressions or head orientations reveal whether they find a smell pleasant or unpleasant (Soussignan, 1997). Again, the sensory preferences may have survival value. For instance, there is evidence that infants are attracted to the smell of amniotic fluid and to milk (Marlier, Schaal & Soussignan, 1998).

## **Motor development**

The neonate has several reflexes (automatic physical responses to external stimulation), including:

- the rooting reflex – a tendency to orient the head and mouth towards an object touching the face;
- the sucking reflex – a tendency to suck on objects placed in the mouth;
- the grasping reflex – a response to stimuli (such as a finger) placed in the open palm;
- the Moro reflex – a reaction to sudden loss of support to the neck and head in which the baby thrusts out his arms and legs as if striving for support; and
- the stepping reflex – the infant attempts to take 'steps' if held upright with feet touching a surface.

Some of these reflexes have important benefits. For example, the rooting and sucking reflexes ensure that the normal infant will respond to contact with the mother's breast by seeking out the nipple and feeding (Widstrom & Thingstrom, 1993).

Although biology provides the reflexes, early experience is important insofar as it can affect their manifestation. In one study, neonates who were separated from the mother during the first hour after birth were less likely to demonstrate correct sucking techniques, and babies whose mothers were sedated during the birth did not suck at all during the first two hours (Righard & Alade, 1990).

## **COGNITIVE DEVELOPMENT**

'Cognition' is a broad term encompassing reasoning abilities, knowledge and memory (see chapters 11, 12 and 17). The study of cognitive processes is fundamental to many topics in psychology. Developmental psychologists are interested in the origins and course of cognitive capacities, with a great deal of interest therefore being paid to their manifestation in infancy.

Infants react to information provided by their senses by attempting to organize experience, make sense of phenomena, and anticipate events or outcomes. In fact, when we examine what infants do with the data they obtain from the world, we find that they appear to behave in much the same way as scientists. They try things out, they collect more evidence (by exploring and by trial and error), and they start to develop theories.

The idea that babies, without the benefit of a formal education and not even able to speak, could generate theories about the world seems surprising on first consideration. Yet, one of the most influential psychologists of the last century has argued exactly this, and his account has attracted enormous interest from other psychologists and educators.

## **THE SENSORIMOTOR STAGE OF DEVELOPMENT**

Jean Piaget (1896 –1980), a Swiss psychologist, developed a model of cognitive development which holds that children’s thinking progresses through a series of orderly stages. According to Piaget, each stage reflects qualitative differences in the way the child understands and acts upon the world relative to its status at another developmental phase.

**sensorimotor stage** the first stage of cognitive development, according to Piaget, extending from birth to approximately two years, when the child constructs an elementary understanding of the world and thought is tied closely to physical or sensory activity

Later in this chapter, and in the next, we will consider the other stages of Piagetian development, but for the moment we will focus on the first, *sensorimotor stage*, which Piaget described as extending from birth to approximately two years.

Piaget saw the child in this stage as acting to learn about itself and its relations to the environment. A key emphasis here is on the child’s actions.

Piaget believed that children learn by doing, and that they advance their understanding by testing what they know to its limits (much as scientists do).

Piaget argued that initially infants lack the ability to reflect consciously on their experiences, but they do have a set of reflexive capacities (including those that we considered earlier in this chapter) that cause them to react to environmental stimuli. These are simple, but important processes. If something is placed near an infant’s mouth, she will attempt to suck it. If you place your finger in a baby’s hand, she will grasp it. The baby can also make vocal sounds. All of these actions can be repeated, and babies do indeed repeat them, generally becoming more proficient with practice.

The actions can also be modified to cope with new experiences. As well as grasping your finger, infants will respond similarly if you place a rattle or toy in their hand, or if they find a bar on the side of their crib. In this way, the infant develops action-based schemes – organized patterns of behaviour that she comes to rely on in dealing with her world.

Before long, the infant discovers interesting new consequences from her initially reflexive schemes. Grasping some objects (toys) causes the infant to produce interesting noises (squeaks or music). Sometimes a shake (of a rattle) or a push (of a mobile) yields other appealing sounds or movements. The infant repeats the action, and the same thing happens. In these ways, babies are learning about cause–effect relations, and their own ability to influence the world. Infants show delight as they learn how to control things, and repeat the actions frequently – until it becomes too easy, and then they seek new challenges. In the course of all this seemingly playful activity, infants are learning a great deal. But at any one stage, there are limits to what they know. For example, in the first few months of life, although babies get better at manipulating objects, the stability of objects in their lives is generally beyond their control – things (such as toys) come and go. Piaget maintained that very young infants have no conception of the durability of objects: according to Piaget, at this age, while something is within reach or sight, it exists, but ‘out of sight is out of mind’.

The notion that an object can continue to exist even when we cannot see it is termed *object permanence*. Piaget believed that this is a relatively late achievement of

**object permanence** understanding that an object continues to exist even when it cannot be seen or touched

the sensorimotor period (around nine months). Other developments during this sensorimotor stage of development include greater experimentation with the things the infant can do with objects, learning to use objects as tools, and systematically copying others’ behaviour to achieve new skills.

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## **Piaget challenged**

Piaget’s descriptions and explanations of infant activities are persuasive and continue to have a great deal of influence upon developmental psychology. But they have been challenged. Subsequent research has demonstrated that Piaget tended to underestimate infants’ abilities. For example, several studies have shown that object permanence is available earlier than Piaget believed to be the case. Hood and Willatts (1986) presented five-month-olds with objects within their reaching distance. The researchers turned off the lights, removed the objects and released the babies’ arms. The infants tended to reach towards the place where the object had been located before the lights went out, indicating that the infants could maintain a representation not only of the object but also of its location.

Some of the perceptual abilities that have been described

in infants (e.g. face perception, discrimination among speech sounds) also present a problem for Piaget’s theory. One of his core assumptions was that children have only a limited amount of innate knowledge and that they construct their understanding of the world through active and general developmental processes. By ‘general’, Piaget has in mind that changes are proceeding at roughly the same pace in most areas of the child’s knowledge. There is a broad sweep improvement going on in mental capacities that is reflected in different areas of understanding roughly simultaneously. This seems to make sense: after all, we know that babies can do a lot more at 15 months than they can at five months.

But if some abilities are ‘built in’, then considerably more is innate than Piaget maintains. As well as face perception and speech discrimination, there is also intriguing evidence that infants as young as five months can add and subtract with small numbers, leading to speculation that humans are born with the capacity to perform simple arithmetical operations (Wynn, 1992). There is little basis for explaining the development of these abilities by the outcome of general changes resulting from continuous activity.

Furthermore, whether these abilities are innate or not, they seem to develop at different times. Some emerge quite early, such as face perception, which is well developed (though not complete) in the preschooler. Others take a bit longer, such as language, which starts during the first year but progresses into middle childhood. Arithmetic ability is still developing into the teens.

Maybe, then, Piaget is mistaken to conceive of development as one all-embracing general process, with changes occurring at about the same time across all areas of knowledge. On the basis of observations like these, some psychologists believe that it may be better to regard the growth of knowledge as involving specific domains, each with its own developmental course (Keil, 1999).

This debate – between those who (like Piaget) favour domain-general theories and those who favour domain-specific theories – highlights fundamental questions about the nature of the human mind and is central to much of contemporary developmental psychology (see Garton, 2004; Hatano & Inagaki, 2000).



**constructivist** theorist who attributes the acquisition of knowledge to the active processes of the learner, building on increasingly complex representations of reality

Piaget made a key contribution to psychology by highlighting the importance of the infant's actions as a source of development. Piaget was a *constructivist*: he saw development as a kind of self-directed building process, in which the child constructs schemes of action, applies them to new situations, tests their limits, and then improves upon them in the light of new discoveries.

Although details of his theory have been challenged, in the light of Piaget's contributions most researchers agree that infants are active cognitive beings, not the blank slates supposed by the early behaviourists.

## THE BEGINNINGS OF LANGUAGE AND COMMUNICATION

The word 'infant' means literally 'without speech'. Babies cannot join us in verbal conversation, cannot answer our queries, and cannot articulate all of their needs and interests. Yet they can certainly communicate.

Communication between the infant and others does not await the emergence of language but proceeds throughout the first year. Very young infants tell us about their feelings and needs by crying and smiling. They show responsiveness to voices, orienting their attention to speakers, and even their larger body movements indicate sensitivity to the rhythm of speech. Caregivers are usually very responsive to the infant's sounds, treating vocalizations – even the humble burp – as though they were contributions to a conversation (Kaye, 1982). Initially, caregivers have to do much of the work to sustain the to-and-fro of the interchange, but gradually the infant comes to take an increasingly active role (Rutter & Durkin, 1987; Schaffer, 1996).

Infants' ability to discriminate among speech sounds appears to be quite general at first. In their first few months, they can discriminate among sounds that are critical in the language of their own community but, interestingly, they can also distinguish sounds in foreign languages that are not used in their own (Hernandez, Aldridge & Bower, 2000; Werker & Tees, 1999). But this capacity does not last, which is why you (depending on your linguistic background) may now experience difficulties with some of the sounds of, say, Cantonese or Estonian. Sometime during the second half of your first year of life, you probably began to lose your sensitivity to phonetic contrasts in languages other than the one(s) you were learning. Polka and Werker (1994) found that while four-month-old American infants could discriminate vowel contrasts in German, six-month-old Americans could not.

In due course, the child becomes able to understand some of the things that are addressed to him. Labels for key objects or events (e.g. 'biscuit', 'bedtime') are repeated frequently in meaningful contexts, and many parents try to coax words out of the infant (e.g. 'Da-da. Say "da-da"').

Around the end of the first year, normally developing children typically have a few words available (Barrett, 1995; Barrett, Harris & Chasin, 1991). At this stage, these words may not always conform perfectly to the structure of the adult language (e.g. 'da' for 'daddy', 'mi' for 'give me'), but they are typically used appropriately, and people familiar with the child usually know what is meant. At this stage, the child's utterances typically consist of just single words, but, by changes in intonation, and coupled with gesture, these can be used to express a variety of meaningful relations, including possession, location, negation and interrogation. For example, 'da', in different situations, could mean 'It's daddy's', 'Daddy has it', 'Not daddy', or 'Did daddy do it?'

Exactly how the child begins to master language presents many mysteries, but two things are clear: the process begins well before overt speech appears, and it occurs in a social context.

## SOCIAL AND EMOTIONAL DEVELOPMENT

Human beings are social creatures (see chapters 17 and 18). Connecting to the social world is all the more crucial for the infant, because without the attention and care of others, she would not survive. Fortunately, others (particularly parents) tend to be strongly motivated to involve children in the social world, and to attend to their needs. Just as importantly, the infant is well equipped to participate in the social world from the beginnings of life.

Perceptual abilities are closely implicated in the infant's early

social experiences. For example, we noted earlier that infants reveal a very early interest in the human face. This is an interesting perceptual preference, but it is still more important as a social characteristic. After all, faces are one of the best means of differentiating between people, and a valuable source of information about how others are reacting to us or the environment. There is evidence that infants can gather information about faces remarkably swiftly. Researchers using visual preference techniques or measurements of sucking rates have shown that newborns only days or even hours old prefer their mother's face to that of a female stranger (Bushnell, Sai & Mullin, 1989; Walton, Bower & Bower, 1992). The other senses are exploited similarly. For example, infants as young as one or two weeks of age can discriminate the smell of their own mother's breasts from those of other breastfeeding women (Porter et al., 1992).

## **Fear of strangers**

Anyone with an interest in babies and a little patience could provide much of the stimulation (coos, cuddles, facial displays, gentle handling) that infants enjoy, and babies will generally respond to opportunities for interaction with others. However, quite early in life, infants begin to show one of the distinguishing features of human social behaviour – selectivity (Schaffer, 1996). During the first few months, much of the infant's early social experience takes place in the microcosm of the family, and the most intense interactions will usually be with the primary caregiver(s). But other people appear from time to time (healthcare professionals, visitors, neighbours) and the infant's social world gradually broadens. However, before long, it becomes very clear that the infant prefers the company of particular individuals – not surprisingly, but importantly, the primary caregivers.

Schaffer and Emerson (1964) followed a sample of Scottish infants during the first year, observing them in various social situations at home with their primary caregivers (mother, father, grandparents, etc.) and with female strangers. By monitoring the babies' nonverbal reactions, they found a gradual increase in preference for specific individuals from around the age of five months. It appears from research such as this that, by at least the middle of the first year, the child has formed an attachment (or attachments) to a specific person (or persons). At around the same time, the child begins to show a quite different reaction – anxiety – when approached by unfamiliar people.

At this point, spare another thought for the tadpole. One of the gravest problems about being a tadpole is that fish consider them a gourmet delight. As a result, tadpole survival rates are poor. But evolution has given tadpoles a chance of escaping the unwelcome attentions of passing fish. Tadpoles respond to chemical and tactile cues from predators, and swim fast to get as far away from them as they can (Stauffer & Semlitsch, 1993). This response appears to be built in, as it has been observed in laboratory-reared tadpoles, which have had no opportunities to learn about escape tactics.

What does this have to do with the human infant? At around five to eight months, human infants begin to display a form of behaviour that has much in common with that of the cue-sensitive tadpole: they start to show wariness of strangers and strive to maximize their distance from them.

Human infants also seem to be sensitive of a number of cues emitted by the stranger. All of their perceptual capacities seem to help them to determine that ‘this person is not mum or dad’. But, unlike the tadpole, the human infant’s reaction also entails a cognitive component. The child tends to cease other activity and monitors the stranger carefully. If the stranger attempts direct interaction (e.g. by picking the child up), there may be resistance, protest and distress on the part of the infant. When this happens, the infant can usually be calmed only by being returned to the caregiver. The development of the two aspects of social selectivity – attachment and wariness of strangers – are closely related in onset and developmental significance (Schaffer, 1996; Schaffer & Emerson, 1964; see also chapters 1 and 6). Many social developmentalists believe that the formation of attachments is a vital aspect of early relations. Through attachment, the infant maximizes opportunities for nurturing and protection, establishing a secure base from which to explore the rest of the world (Bowlby, 1988).

According to Bowlby (a British psychiatrist who developed an influential theory of attachment and its consequences), through

**internal working model** a set of basic assumptions (a schema) about the nature of relationships

the course of the first attachment (i.e. to the principal caregiver) the infant also begins to formulate an *internal working model* of what a relationship involves. If this

it could be the most important relationship that the child ever forms. In fact, a great many studies by attachment researchers indicate that the type of attachment formed during this first relationship has long-term implications.

Mary Ainsworth, an American colleague of Bowlby’s, proposed that there are three main types of attachment relationship formed by infants and their caregivers (Ainsworth et al., 1971). She tested her typology by observing infants’ reactions to a laboratory test – the ‘strange situation’. The baby is initially playing with his mother and is then approached by a stranger. After a while the mother leaves, and later she returns. This departure– return sequence may be repeated.

Based on a careful coding system for scoring details of the child’s responses throughout the session, Ainsworth identified the following three types of relationship:

*Type A* Insecurely attached/avoidant. This infant is relatively indifferent to the mother’s presence, does not seem greatly disturbed by her departure, and does not show enthusiasm for contact on her return.

*Type B* Securely attached. The infant plays happily in the new environment, shows some distress when the mother departs (especially for a second time), but responds positively to her return.

*Type C* Insecurely attached/resistant. The infant tends to explore less, is greatly distressed by the mother’s departure, is difficult to console upon her return, and may struggle to be released from her embrace

Much subsequent research has supported this classification, which has been used in studies of early child development around the world (Van Ijzendoorn & Sagi, 1999). Ainsworth and colleagues (1978) found that approximately 70 per cent of infants form Type B relationships, about 20 per cent fall into the category referred to as Type A, and around 10 per cent of infants form Type C relationships.

If it is true that the primary attachment is the base from which the infant begins to tackle the rest of life’s challenges, then you can see at once that the Type B child appears to have an advantage. Feeling secure and supported, she is ready to explore and learn. If problems occur, the caregiver is there, but the child feels confident to try things out. Furthermore, because the basic relationship is a positive and enjoyable one, the child should expect (i.e. have an internal working model) that other relationships will be enjoyable, and hence respond favourably to opportunities to interact with other people. Many studies show that Type B infants tend to demonstrate higher levels of cognitive and social skills during their preschool or later years (Meins et al., 1998; Suess, Grossman & Sroufe, 1992; Youngblade & Belsky, 1992). The topic is

controversial (see Schaffer, 1996), but it does appear that the quality of the infant's initial relationship can help predict aspects of subsequent development.

## THE PRESCHOOL YEARS

During infancy, children develop considerably and learn a great deal about themselves and the world. In some respects, the child has already undergone major transformation, from the relatively dependent neonate to an individual capable of expressing and meeting many of her own needs. Nevertheless, there is much development ahead. In this section, we consider some of the developments of the preschool years, from approximately age two to five years.

### PERCEPTUAL AND MOTOR DEVELOPMENT

By the end of the second year, the child's perceptual abilities have developed considerably. In many respects, they are now on a par with those of an adult. But there is still a long way to go in terms of motor skills and coordination, and substantial progress will take place over the next few years.

By the age of two, many children have begun to walk unaided and can manipulate objects independently, but their gait is unsteady and their manual dexterity is limited. Over the next couple of years, they gain competence in these respects, becoming more certain of their control over their bodies. A three-year-old is likely to be quite mobile (e.g. able to run) but may find it difficult to respond to a need to change direction or stop – leading to mishaps with inconveniently placed furniture or walls – and may have difficulties with balance (Grasso et al., 1998). A four-year-old is more agile and beginning to develop skills such as throwing and catching, jumping and hopping. And a five-year-old is quite competent in basic movements.

Motor development during these years reflects an interaction between biological maturation, experience and cognition (Thelen, 2000).

## COGNITIVE DEVELOPMENT

When we left the infant towards the end of the sensorimotor period, he had attained object permanence, was increasingly able to manipulate objects as playthings and tools, and was exploiting the greater skills of others by copying behaviours that appeared successful.

These kinds of developments enable the child to engage in a higher level of representation. While the early sensorimotor infant's schemes consisted of concrete actions, towards the end of this stage he becomes able to develop mental schemas.

**preoperational period** the second major phase of cognitive development, according to Piaget, extending from approximately two to six years, when the child begins to represent the world symbolically but remains intuitive and egocentric

The child can now use objects to symbolize others, and is beginning to use sounds (words) for the same purpose. These skills are very useful, and the child exploits them increasingly. This leads to a new stage in development, which Piaget called the *preoperational period*.

### The preoperational period

This stage of development extends from approximately two to six years, and a number of important cognitive developments are achieved during this time. Foremost is the ability to symbolize – to represent the world in images and language. This enables children to extend their



understanding fundamentally. The child becomes able to represent past and future, and to think about objects or events that are not immediately present. This soon becomes evident in forms of activity like pretend play (figure 9.6). If the sensorimotor child disappoints her parents by playing more with the wrapping than the present, the preoperational child will surprise them with the news that the box is actually a helicopter and it plans to land on the building – represented by the coffee table.

Although Piaget saw the preoperational period as a time of important cognitive advances, he also emphasized the limitations of the child's thought processes at this stage. He believed

that one of the most profound limitations during this phase is *egocentrism* – a tendency to own point of view, along with an inability to take another's point of view. Piaget found many illustrations of egocentrism in his interviews with preschool children, their language in preschool settings, and in his experiments.

The next time you get an opportunity to listen to the language of preschool children, consider the extent to which they are conversing in the way you and I would understand a conversation, such as exchanging a series of linked remarks about the same topic. A typical preschooler in one of Piaget's major studies, Lev, engaged regularly in monologues, talking about his own activities to no one in particular:

(Sitting down alone at a table): I want to do that drawing, there

... I want to draw something, I do. I shall need a big piece of paper to do that.

(After knocking over a game): There! Everything's fallen down. (Upon finishing his drawing): Now I want to do something else.

(Piaget, 1926, p. 14)

Preschoolers like Lev accompany their actions with words in this way when alone and when in the presence of audiences. Close connections to others' utterances do not appear to be essential to the activity:

Pie (aged 6y 5m): Where could we make another tunnel? Ah, here, Eun?

Eun (4y 11m): Look at my pretty frock.

(Piaget, 1926, p. 58)

Pie (the older child) is trying to establish coordinated efforts but Eun has her own concerns. In a major study of the language of preschoolers (1926), Piaget noted that, although the children were being studied in close proximity to their peers, more than one-third of their utterances were either not directed to anyone or were so esoteric that nobody else could understand them.

So, according to Piaget, the preoperational child tends to be dominated by his perceptual experiences and finds it difficult to imagine other aspects of an experience, such as how another person perceives things. The preschooler talks but does not always link her remarks to those of others. In an experimental task, the child centres attention on one aspect of a task, and fails to consider the relevance of other dimensions. Piagetians call this cognitive bias *centration*. Probably the best known example of this is Piaget's famous *conservation* test. A preoperational child is presented with two beakers of the same shape and size. The equivalent amount of water

**centration** when a preoperational child focuses on only one aspect of a problem at a time

is poured into each beaker, and the child is asked whether the

amount in each is the same. Once this is agreed, a new beaker, taller and thinner than the original, is used. The amount of liquid in the new beaker is transferred from one of the original beakers. The child is asked if the amount is the same. Preoperational children often insist that the amount is the same. They may see it as more than before, or less than before, but certainly not the same. If the amount of liquid is actually unchanged, the child's perceptual experience indicates otherwise – it *looks* taller – and this tends to dominate the child's judgement. The child appears to have centred on one aspect of the transformation in the liquid (the increase in height) but has failed to take account of the other (the decrease in width).

Another example is the 'three mountains' perspective task (see Research close-up 2).

### Piaget challenged

Piaget's account of the limitations on preschool children's thinking has been subject to many challenges. Some researchers have objected that the standard conservation task induces the child to give erroneous responses by asking the same question – 'Are they the same or different?' – twice. In between, the experimenter has changed the display, and, in any case, every child knows that when a grown-up asks you a question twice, it usually means you gave the wrong answer the first time. When the question is asked only once, higher proportions of preschoolers give the correct (conserving) answer (Rose & Blank, 1974).

The task demands also appear to bear heavily on children's performance. Borke (1975) provided three- and four-year-olds with a perspective task, which involved viewing a set of familiar objects on a turntable. The task was to rotate the set to show how the objects would look from the perspective of a *Sesame Street* character, Grover, as he drove around the display.

A majority of the children performed well, and only a small proportion made egocentric errors. It seemed as if the combination of more familiar materials and a more motivating task appeared to enable these preschoolers to demonstrate competencies that Piaget believed are attained much later in development.

Other research has also shown that preschool children are able to incorporate complex ideas into their pretend play, to follow successive actions and to make predictions about their consequences. For example, Harris, Kavanaugh, and Meredith (1994) had two- and three-year-olds watch puppets pour pretend cereal into a bowl. Children could understand this idea, and could also follow the next step, in which the puppet pretended to use the pretend cereal to feed a toy animal. They could anticipate that if a puppet poured pretend milk or powder into a bowl and then tipped the bowl over an animal, the animal would get wet or powdery. This seems simple enough to us, but it points to impressive representational abilities in the child, who creates a mental image of the cereal, milk or powder and then operates on the mental image to imagine subsequent transformations. These are cognitive skills that Piaget maintained were not available during the preoperational stage.

Piaget certainly pointed to some intriguing aspects of child thought, indicating that preschoolers may sometimes interpret the world quite differently from adults. Subsequent research indicating that he may have underestimated the competence of the preschooler (see also Bryant, 1974; Donaldson, 1978) qualifies rather than invalidates his work. After all, even if the conservation task and the 'three mountains' task do have methodological limitations, these tasks do appear to pose problems for preschoolers but not for older children. If you can, try the tasks out yourself with a few children aged three to eight. Invite the children to explain their responses, and judge for yourself whether Piaget has provided us with fascinating (or misleading) insights into developmental changes in children's thinking.

## THEORY OF MIND

Another important aspect of early cognitive development is a capacity that we take for granted. And yet it is a distinctive human ability whose origins and developmental course prove difficult to uncover. This is the phenomenon of theory of mind.

Theory of mind refers to the understanding that people (one- self and others) have mental states (thoughts, beliefs, feelings, desires) and that these mental states influence our behaviour. It seems pretty obvious to you and me that we have minds. But how do we know? We can never see or touch a mind; we cannot directly observe mental processes in action. The ‘mind’ is quite an abstract concept. Indeed, perhaps you are studying psychology because you would like to find out more about this intriguing but elusive possession.

Preschoolers cannot read psychology textbooks. So how do they find out about minds? Do young children appreciate that they and other people are thinking beings? Do they understand that what a person thinks or believes can affect what she does? Maxi has a bar of chocolate, which he puts in the green cupboard. He goes out to play, and while he is out his mother moves the chocolate to the blue cupboard. Then Maxi comes in, and he wants to eat some chocolate. Where will he look for the chocolate?

Would you expect Maxi to look in the green cupboard, where he last saw his chocolate and where he believes it still to be? Or would he look in the blue cupboard, where *you* know the chocolate is now? If you have a theory of mind – so you understand that people act according to what they believe to be the case – then you will answer that Maxi will look in the green cupboard.

Interestingly, Wimmer and Perner found that children under the age of about five or six often answer, with great confidence, that Maxi will look in the blue cupboard. So preschoolers seem to be dominated by their own knowledge and find it difficult to grasp that Maxi would be guided by his own false belief. Slightly older children are more likely to take account of Maxi’s mental state. They know that he is wrong, but they can understand that, on the evidence available to him, he is likely to think that his chocolate should be where he stashed it. The researchers also checked whether the preschool participants could remember where this was: they could, yet they still insisted that Maxi would look in the new location.

This experiment led to a great deal of discussion about young children’s grasp of mental processes. It seemed to indicate that preschoolers have serious difficulties understanding that people’s behaviour is an outcome of their mental states (in this case, their beliefs). Because the difficulty could not be explained merely as a problem with memory, Wimmer and Perner suggested that some special cognitive skill must be emerging around the period between four and six years of age: the child is developing a theory of mind.

This topic excited a great deal of subsequent research. Other investigators showed that, if the task is simplified a little, four- year-olds demonstrated understanding of false belief (Baron- Cohen, Leslie & Frith, 1985). In non-experimental settings (such as everyday conversations), others found that even younger children do make spontaneous and contextually appropriate references to mental states, which suggests that they do have some early awareness of the relevance of mind to human behaviour (Flavell, 2000). For example, Dunn (1999) reports that a three-year-old participant turned to her four-month-old sibling and said: ‘You don’t remember Judy. I do!’ This brief remark indicates not only that the child had some understanding of the phenomenon of memory but also that she could simultaneously (and accurately) appraise the relevant contents of her own mind and that of her baby sister.

The emergence of theory of mind raises some fascinating ques-

tions and has provoked a lot of ingenious research (see Smith, Cowie & Blades, 2003). For our purposes, it is enough to state that important developments in children's understanding of mental states seem to occur at around age three to four years. Given the complexity of the concept of mind, this is remarkably early. Yet, given the centrality of mind to our everyday interactions with other people, it is clearly an essential capacity, and it would be hard to imagine life without it.

In fact, there are people who do have particular difficulty with theory of mind tasks – children with *autism* (Baron-Cohen et al.,

**autism** early onset, biologically caused disorder of communication and social interaction, usually accompanied by obsessive and stereotyped behaviour and intellectual disability

1985). Interestingly, one of the defining characteristics of people with autism is that they have severe difficulties communicating and interacting with other people. Could this be because they lack a theory of mind? The nature

and, and its implications for other aspects of their reasoning and social behaviour, are central topics in contemporary developmental psychology.

## LANGUAGE AND COMMUNICATION

By the end of infancy, children are beginning to attempt words. They add to these first efforts slowly for a while, but then during their second year (usually between 18 and 24 months) they enter a period that some developmental psycholinguists call the *nam-*

**naming explosion** a period, usually in the second half of the second year after birth, when children's early vocabulary development accelerates rapidly

*ing explosion* (Barrett, 1995). During this time, vocabulary increases rapidly, with children adding between eight and forty new words to their productive lexicon each month (Goldfield & Reznick, 1990).

To put this in perspective, imagine you were to take a class in and your instructor expected to hear you using around 40 new words each month over the next year. Then remember that the infant does not have your advantage of already knowing at least one language, and of being able to use explicit tools (dictionaries, pronunciation guides, tape recordings). You would be surprised to see an 18-month-old sitting beside you in the language laboratory. Yet she is already performing much more impressive feats at home.

### Putting words together

Learning a lot of words is useful, but it is only one component of language acquisition. Children also have to discover how to put words together, and this proves to be a still more remarkable process. Researchers who have compiled detailed observational records of children's early language have found that after a period of single word utterances, many children undergo a transitional period in which they begin to place separate utterances in close and meaningful juxtaposition.

Hoff (2001) describes a girl she was studying who woke up

with an eye infection. The child pointed to her eye and said, 'Ow. Eye.' Hoff-Ginsberg reports that each word was spoken as if it had been said by itself, and there was a pause between them. This is not a sentence, but the meaning is conveyed as effectively as if the child had said, 'Darn it! My eye hurts.' The child has begun to exploit the potential for language to express relationships by placing words next to each other.

These transitional efforts are soon replaced by frequent uses of longer word strings – usually two-word utterances at first, and then lengthier combinations (Braine, 1976; Brown, 1973). There is evidence that the increase in word combinations in turn prompts the child to learn more words – perhaps because the child is compelled to search for more specific ways of expressing more complex meanings (Anisfeld et al., 1998; see figure 9.9).



These early language structures can tell us a great deal about developmental processes. Firstly, they display regularity – children tend to use particular words in particular locations. For example, a child studied by Braine (1976) produced the following utterances (at different times):

daddy coffee daddy shell daddy hat daddy chair  
daddy cookie daddy book daddy bread

In each case, the child appeared to be expressing a possessive relationship – talking about daddy's coffee, daddy's hat, etc. Very occasionally, the child produced possessives with a different structure ('juice daddy'), but showed a clear preference for the order given above.

The child's early utterances are also revealing for what they omit. The examples above convey possessive relationships but do not include the conventional inflection ('s), and there are no articles, pronouns or verbs.

As children's utterances increase in length, there are clear consistencies in terms of what they include and omit (Brown, 1973). Children select the words with high informational content ('daddy', 'book', 'cookies'), and economize on the minor (function) words and inflections. They produce occasional over-regularizations – 'mans', 'foots', 'runned', 'shooted' – in which a regular rule (such as add -s to get the plural, or add -ed to get the past tense) is applied to an irregular word.

Three main points have emerged from research conducted in this field so far:

1. Children are selective and structured in their early attempts at language.
2. Children sometimes commit errors, but their errors suggest that they are trying to convey meanings as effectively as they can, and they are sensitive to grammatical rules.
3. Progress is quite rapid, from a handful of words at 12– 15 months to large vocabularies and complex word combinations at age three or four.

### **Chomsky and the innatenature of language**

We have only touched upon a few examples of how language is acquired, but they speak directly to the debate about the nature of child development.

Many laypeople and some psychologists have assumed that language is learned by observation, imitation and reinforcement (Skinner, 1957; Staats, 1968). But the examples given above pose some fundamental challenges to this account. Whom is the child imitating when she says, 'Ow. Eye', 'daddy bread', 'I brush my toothes' or 'Me don't want none'? The child is very unlikely to have heard adults produce these strings of words. In fact, even when adults produce a sentence deliberately and invite the child to imitate it, toddlers and preschoolers frequently respond with versions of the original sentence that reflect the processes of selectivity and omission discussed above (Fraser, Bellugi & Brown, 1963).

An influential American linguist, Noam Chomsky (1965, 1972), argued that it is impossible to account for children's language acquisition in terms of traditional learning theories (see chapter 4). As we have seen, children are learning many aspects of language quickly. Chomsky points out that the rules of language children have to master are very complex, and most parents are not able to articulate them. In fact, in much of everyday adult speech we do not even reveal the rules very clearly – we make errors, false starts, inject 'er's and 'um's, leave sentences incomplete. Yet not only do children make rapid progress in their language development (mastering

most of the basic rules by about age five), but they are able to create and understand novel linguistic expressions. Chomsky argues that language acquisition in the normal child constitutes ‘a remarkable type of theory construction’ (1959, p. 58).

Chomsky seems here to be agreeing with Piaget, who also saw

the child as constructing theories (see above). But Chomsky took the argument in a different direction. He maintained that any theory involved in coming to grips with a human language has to be extraordinarily complex. It must be general enough to accommodate any language that a child is exposed to, and it must be shared by all normal humans (because we all learn a language, and we all do so at roughly the same pace).

Where could such a theory come from if parents are not able to teach it or even model it? How does everybody get access to it? Chomsky’s controversial answer is that it must already be there: the child must have some innate knowledge of what the structure of language will be like. In fact, Chomsky insists that language is not learned at all – it grows and matures, rather like limbs and organs grow.

## Chomsky challenged

Chomsky has many supporters, but also many critics. There is much research to confirm that language acquisition is complex and relatively rapid. On the other hand, there is plenty of evidence that parents do play a role in their children’s language acquisition. Consider, for example, the research we discussed above concerning the social context of early communication, and the ways in which adults modify their speech for the benefits of the learner (see Durkin, 1995).

There are also objections from Piagetians, who regard language not as an innate, highly specific ability, but as one aspect of the child’s broader representational capacity, which emerges during the preoperational period (Sinclair-de-Zwart, 1969).

## SOCIAL AND EMOTIONAL DEVELOPMENT

The family is the primary social environment for children during the preschool years, but it is also the base from which they venture into new social contexts. The family is influential in several ways, particularly in the kinds of social behaviour it fosters, and with respect to the kinds of social contacts it offers for the preschooler (Dunn, Creps & Brown, 1996; Schaffer, 1996).

## Making friends

Many researchers believe that the patterns of behaviour predominant in the preschooler’s home influence the behaviour the child manifests outside the home (Barth & Parke, 1993; Rubin et al., 1998). A good illustration of this principle is Russell and Finnie’s (1990) study of Australian preschoolers and their mothers in situations where the child had to join unfamiliar peers. The researchers found that the mothers guided their children towards strategies that affected the child’s acceptance. Mothers of popular children suggested ways in which they might join in with peers’ current activity, while mothers of children neglected by their peers were more likely to guide them to focus on the materials to hand. There is also evidence that children with a Type B (securely attached) attachment relationship in infancy tend to score higher on measures of social participation with peers at preschool (LaFreniere & Sroufe, 1985). In other words, aspects of the

relationship with the primary caregiver are reflected subtly but influentially in how the preschooler begins his peer relations.

Peer relations among preschoolers show another continuity with early relations: they are selective. Although children of this age will play with a wide array of peers if given the opportunity, they do demonstrate clear preferences (Hartup, 1999). Individuals identify others with whom they play more frequently; they seek out each other's company and they become friends (Hartup, 1999). These early friendships serve a number of important functions, including fostering the growth of social competence and providing sources of emotional support (Asher & Parker, 1989; Erwin, 1993).

The value of these relationships is made clearer by the problems suffered by children who lack them. Unfortunately, some children do not establish friendships and are either neglected or rejected by their peers. Children who experience difficulties like this in the preschool years are at risk of continuing problems in peer relations and personal adjustment throughout childhood and even into adulthood (Coie et al., 1995).

## Learning about gender

One of the major areas of social development during the preschool years is learning about gender.

Even in the preschool years, children tend to segregate by gender and to show different behavioural preferences. Boys tend to be more physical and active in their play, while girls often like to play with dolls (Maccoby, 2000). One theory is that these differences reflect biological pre-programming. We know that the young of other species – such as tadpoles – are pre-programmed to develop particular patterns of behaviour according to their gender, and these behaviours underpin later social and reproductive activities, such as patterns of aggressiveness or how they call out to attract mates (Emerson & Boyd, 1999; Summers, 2000). It has been argued that, in a similar way, evolution has designed human males and females for different functions ('males as providers', 'females as caregivers'), and children's play behaviours are early emerging signs of this 'biological imperative' (Hutt, 1978).

An alternative view is that children are 'shaped' by the surrounding culture. Unlike tadpoles, human young receive a lot of direct and indirect advice from their parents about gender expectations. This could serve to reinforce some behaviours (see chapter 4) and extinguish others (e.g. by dressing daughters in pink or telling sons not to cry). Children themselves try to influence each other's gender behaviour, too. Even preschoolers develop strong opinions about how boys and girls should behave. For example, boys might intervene to stop a peer playing with 'girls' toys' (Bussey & Bandura, 1992). Finally, children also receive many stereotyped messages from the larger community and the mass media about gender role expectations (Durkin, 1985).

But some developmentalists have argued that both of these explanations (biology versus environment) overlook a still more basic question: how does a child know that he or she is a male or female in the first place?

This brings us to another aspect of gender role development – cognition, or the child's active search for and interpretation of information about what is expected of males and females (Kohlberg, 1966). Unlike tadpoles, by the end of infancy most children know whether they are a boy or girl and can distinguish men from women (Thompson, 1975). During the next few years, they begin to appreciate how fundamental this distinction is. For example, preschoolers discover an interesting fact about gender that is not apparent to the infant: whichever gender one belongs to, it is going to be a lifelong commitment. While this seems obvious to an adult, it is not understood instantaneously by toddlers.

Children learn the labels for male and female and begin to apply these during their third year of life (Fagot & Leinbach, 1993). Over the next couple of years, they build up an increasing amount of knowledge about what it means to be a male or a

female (Martin, 2000), and this learning appears to be linked to broader cognitive development (Szkrybalo & Ruble, 1999). Rather than simply absorbing messages from parents or the mass media, by age four or five children can predict accurately the gender of a person stereotypically associated with a particular activity (such as fixing a car or doing the sewing) before they have actually seen the person (Durkin & Nugent, 1998).

It is clear that, even at this early age, gender is a fundamental category around which the social world is organized, and that children are active in determining their own social experiences.

## THE SCHOOL YEARS

Although the school years extend right through to the mid to late teens, we will focus here on the period from around age five to twelve, turning to adolescence in chapter 10.

Middle childhood is a period of relatively steady growth in physical terms, but great progress in cognitive and social development. It is also a period in which individual differences in the rate and extent of development become more evident.

### PERCEPTUAL AND MOTOR DEVELOPMENT

By the early school years, children's sensory capacities are generally well developed and, in many respects, functioning at adult levels. Physical development is well advanced, too, though of course the child is still growing and there are certainly many skills that undergo further development. Children are now capable of a wide range of physical activities, and development tends to consist of increasing control and integration of movements (Cleland & Gallahue, 1993; Gallahue, 1989; Krombholz, 1997).

Individual differences in physical growth and development are influenced by genetic and environmental factors. Some evidence indicates that some disadvantages can persist throughout middle childhood. For example, high proportions of children born prematurely exhibit perceptual-motor problems at age six (Jongmans et al., 1998). Dowdney, Skuse, Morris and Pickles (1998) studied a sample of British children who were exceptionally short at age four. Very small stature tends to be associated with delayed cognitive development. These children also came from economically disadvantaged homes. At age 11, many of these children continued to fare poorly on tests of cognitive abilities compared to a normal comparison group.

### COGNITIVE DEVELOPMENT

Once again, researchers' perspectives on this period have been influenced strongly by Piagetian theory – but once again, this is not to say that all researchers accept the details of Piaget's account.

#### The period of concrete operations

**concrete operations period** the third major phase of cognitive development, according to Piaget, lasting from approximately seven to 11 years, when the child's problem solving is more logical but his/her reasoning is largely dependent on application to immediate physical entities and tasks

Early in the school years, at around age six or seven, children undergo another major stage transition, entering what Piaget called the *concrete operations period*.

The child can now handle the kinds of intellectual problems that the preoperational child struggled with (such

as, for example, the concrete operational child is capable of decentration, i.e. taking into more than one aspect of a problem. He is likely to dismiss scornfully the kinds of responses that a preoperational child gives to a conservation task; for example, on the beaker



task the concrete operational child can explain readily that the amount of liquid remains the same, despite changes in visual appearance.

The concrete operational child is able to draw upon logical abilities that Piaget thought were unavailable during the pre- operational stage. With respect to the liquid conservation task, these include the ability to:

- reverse the operation mentally (reversibility) – ‘If the water filled this much of the first beaker, it must fill the same amount when it is poured back’;
- maintain identity (identity) – ‘Nothing has been added or removed, so it must be the same amount’; and
- compensate to take account of combined changes (compensation) – ‘It’s higher, but it’s also thinner – these changes cancel each other out, so there’s no change in amount.’

The ability to deal with experimenters asking you how much liquid there is in different shaped beakers may in itself seem to be of limited value. However, what is much more important is the breadth of applicability of the underlying cognitive changes mediating performance on these tasks. Conservation ability is fundamental to many other intellectual tasks, and children’s education would not proceed far without it. For instance, the achievement of reversibility, identity and compensation underpins much of elementary mathematical and scientific understanding. Consider, for example, how these skills could be used in relation to tasks such as simple numerical operations (e.g. comprehending that if  $3 \times 2 = 6$ , then  $6 \div 3 = 2$ ), and investigating the interaction of key variables (e.g. comparing the eventual progress of two moving objects, one moving very fast for a short time and the other moving very slowly for a long time).

## **Other developments and some limitations**

There are many other advances during these concrete operational years, too. Children now have greater facility in classifying objects and sorting them into sets and subsets. They appreciate that the same objects could be sorted differently if different criteria were applied (e.g. boys and girls, or blue-eyed and brown-eyed children). They find easy the kinds of seriation (or ordering) tasks that thwarted preschoolers. Their improved grasp of cause– effect relations enables them to comprehend a greater range of phenomena in the natural and social environments. Their greater ability to take other perspectives into account means that they can produce and understand spatial representations, such as maps and diagrams. All of these cognitive skills afford the child new means of acting upon the world to build greater understanding. But there are still some important limitations. In particular, Piaget saw the concrete operational child’s newfound intellectual organizational abilities as restricted to readily accessible (i.e. concrete) contexts, such as immediately present objects and events or easily imagined circumstances. According to Piaget, dealing with abstract ideas and contemplating alternative explanations in the absence of practical examples came later, in the formal operational period (see chapter 10).

## **LANGUAGE AND COMMUNICATION**

By the school years, typically developing children have mastered the basic grammar of their language and are generally able to make themselves understood as well as understand others. Nevertheless, important developments continue through middle childhood. These include improving phonological skills in coordinating speech production, pronouncing multisyllabic words, and understanding speech in noisy contexts (Dodd et al., 2003; Hoff, 2001).

Vocabulary growth continues at an impressive pace (Biemiller

& Slonim, 2001), and children become increasingly competent at using and understanding complex grammatical constructions (Hoff, 2001). There are marked improvements in the ability to construct and understand narratives (Hoff, 2001; Low & Durkin, 2000).

As well as improving their use and understanding of language during school years, children also get better at reflecting on language. In other words, they develop metalinguistic awareness – the ability to think and talk about language and its properties (Bialystock, 1993). Ask a preschooler which is the bigger word – ‘horse’ or ‘caterpillar’ – and she is likely to answer ‘horse’. Young children find it difficult to conceive of the word as an object in its own right. But school age children become increasingly competent in such tasks. During middle childhood, they learn to distinguish words according to whether they obey the phonological rules of their language (‘kerpod’ versus ‘kzkdff’) (Edwards & Kirkpatrick, 1999). The emergence of metalinguistic awareness is important because it facilitates many other cognitive and educational processes. For example, once a child knows what words are and is able to conceive of manipulations upon them (‘What does “cow” sound like if we take away the “c”?’), he is better equipped to handle the demands of learning to read and write (Tunmer & Chapman, 2002; Wood & Terrill, 1998).

### **Gender role Development**

We saw above that during the preschool years, children begin to organize their social worlds around gender and to accumulate information about what it means to be male or female. These processes continue during middle childhood.

By this stage, children know quite a lot about the traditional expectations of their society concerning gender. For example, by the age of five or six years, children have firm views on who will be most competent as a car mechanic or aeroplane pilot, or as a clothes designer or secretary (Levy, Sadovsky & Troseth, 2000; see figure 9.11).

Yet there is a broad difference in terms of how boys and girls conform to traditional roles. During middle childhood, boys tend to follow the requirements of masculinity more rigidly than girls follow the requirements of femininity (Archer, 1992). Cross-sex activities are disapproved of by most boys, while girls are often happy to participate in leisure activities that are perceived as masculine (e.g. some girls of this age will play soccer, climb trees, ride skateboards, wear ‘male clothes’).

A large study of North American women of different generations found that a clear majority recalled engaging in ‘tomboyish’ activities during their childhood, with the mean age of starting these activities being five years and the mean age of concluding them being around 12 and a half (Morgan, 1997). This type of behaviour therefore appears to be normative for females and socially accepted as such, whereas the corresponding cross-sex behaviour in boys (e.g. taking an interest in sewing, playing with dolls, dressing up) results in peer hostility and parental concern (Archer, 1992; Raag, 1999).

Seems unfair? Indeed, but this pattern of behaviour during middle childhood seems to reflect a social advantage for males. Archer (1992) argues that because males have traditionally been the most powerful gender, socialization patterns have developed

### **SOCIAL AND EMOTIONAL DEVELOPMENT**

While the family remains the principal context of social relations for most children during the school years, interactions with others become much more extensive. Children are learning more about themselves while participating in increasingly complex social tasks. Consider the range of tasks to be met in the course of middle childhood. The young person has to figure out who she is – what makes her unique. This involves discovering her own capacities and limitations (during a period of continual change) and coming to terms with the emotions that these assessments

provoke (pride, shame, anxiety, ambition). It also involves comparison with others – we discover ourselves partly through measuring how we stand relative to our peers. In fact, during this phase of life, children come to assess themselves and their peers in increasingly profound ways.

to ensure that young males are prepared for their ultimately dominant role in society. As a result, their gender role may become more rigid during the school years, whereas females are seemingly allowed a longer period of ‘gender flexibility’, although not an indefinite one, as Morgan’s (1997) findings reveal (see also chapter 10).

## Peer relations

Middle childhood is also a time of increasing peer interaction. The school years present a dramatic increase in the amount of time spent with peers, and the relationships themselves become more complex as cognitive development progresses and social demands increase.

We saw earlier that preschoolers begin to demonstrate selectivity and preferences among their peers. Although some of these relationships are close and enduring, many are short-lived. If five-year-olds are asked to identify their friends, they will most likely mention whichever peer is nearby, or children with whom they have played recently (Damon, 1983; Erwin, 1993). These affiliations may be quite transitory and subject to termination when disagreements occur. During middle childhood, however, friendships become more enduring, more dependent upon personality compatibility, and characterized by a greater degree of mutual expectation (Damon, 1988; Erwin, 1993; Hartup, 1998).

Researchers have investigated children’s concepts of friendship using interview techniques. Typically, interviewers ask questions such as: ‘What is a friend?’ ‘How do you make friends?’ ‘How do you know someone is your friend?’ (Damon, 1983). Younger children (aged four to seven) tend to define friendships in terms of mutual liking and shared activities. Children at this age do have interpersonal expectations (like being nice to each other and sharing toys), but they rarely express psychological dimensions of the relationship. In middle childhood, by contrast, there is more emphasis on provision of mutual support and trust (Erwin, 1993). For example, at around the age of seven or eight, children still tend to describe friends in relatively concrete terms, but they the opposite sex and show signs of unease about their own body.

To date, GID has been identified more in children who are biologically boys than girls. According to research, roughly six times more boys than girls seek guidance on how to respond to GID. As noted in this chapter, Western society is much more accepting of girls being tomboys than of boys engaging in ‘girlish’ behaviour. So adults may detect differences in boys’ gender-related behaviour much sooner than they would in a girl. So the prevalence of GID may in fact be similar for both sexes, but occurrence in girls is less often picked up.

Most of us feel at ease with our gender, and we tend to assume that other people do, too. But individuals with GID remind us that there is a range of experiences and perspectives even in something as fundamental as which sex people feel they belong to. Developmental–clinical psychologists play an important role in understanding and ameliorating the obstacles and ostracism that some individuals with GID may face. increasingly make references to shared activities and cooperation (‘we play soccer together’, ‘we take turns in goal’). Over the next few years, there is an increasing emphasis on reciprocity, the obligations of friendship and the

psychological characteristics of friends ('she's kinda shy, but she stands up for me and I'd do the same for her').

This is not to suggest that friendships are invariably harmonious. In fact, during middle childhood relations with friends can involve a great deal of conflict – more so than relations with 'non-friends' (Hartup, French, Laursen et al., 1993). Children at this age learn that relationships have a strong emotional aspect, and that sometimes friendships can be volatile. In short, relationships during middle childhood become more complex as children come to understand more about the nature of people and their interdependencies. In this way, social development is closely interwoven with cognitive development.

Many questions about human psychological development remain challenging and controversial. We do not have all the answers yet, but developmental psychologists are addressing issues that are fundamental to our understanding of the nature of the human mind.

We asked at the beginning of this chapter: how much is given by nature and how much by experience? The most convincing answer would seem to be: a lot of both.

Some capacities emerge very early in human infants, and almost all children do some of the same things on roughly the same schedule, suggesting that development is a natural and predetermined process. For example, we have seen that children can distinguish speech sounds in infancy, their vocabularies explode in the toddler years, and they are quite fluent with complex grammars by the age of four or five.

But what would happen to a child who had no opportunities to talk to other people (i.e. no language experience)? It would scarcely be possible for children to progress in understanding the complex characteristics of other people's attributes, behaviours, thoughts and emotions without extensive experience of the diversity of people and relationships. Nature and nurture are both important in child development – and often so interwoven that they are indistinguishable.

We also asked: how does change come about? Is it gradual or stage-like? For some early psychologists, the answer seemed obvious: children change as a result of learning and the additive effects of experiences. For psychologists of this persuasion, change is externally driven and gradual. Others maintain that the processes are internally driven but responsive to and building on lessons derived from experience. For them, change is domain general and involves radical, stage-like transformations. Yet others see development as domain specific – each domain involving its own structures and principles.

Many of the developments that take place during infancy and childhood remain mysterious, but this makes our investigations all the more exciting. And, as we will see in the next chapter, the developments do not end with childhood.

## QUESTIONS

1. What are the arguments for and against stage theories of children's development?
2. When does the infant begin to make sense of the visual environment?
3. Do infants need other people for anything more than food and physical care?
4. Why might a toddler use the same word to convey several different meanings?
5. Are preschoolers egocentric?
6. In what ways do the cognitive abilities of the school age child differ from those of the preschooler?

7. How do children's friendships reflect their cognitive development? Why is acquiring language important for the child?

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**UNIT – III -MIDDLE CHILDHOOD AND ADOLESCENCE - DEVELOPMENT  
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## Historical Perspective on Middle Childhood

Until the beginning of the twentieth century, children were viewed primarily in economic terms within most European countries and the United States (Fass & Mason, 2000). Emphasis was often placed on the child's productivity and ability to contribute to the family's financial well-being. Middle childhood represented a period during which children became increasingly able to play a role in maintaining or improving the economic status of the family and community. Beginning in the early twentieth century, however, a radical shift occurred in the Western world's perceptions of children. Children passing through middle childhood became categorized as "school age" and their education became a societal priority. Child labor and compulsory education laws supported and reinforced this shift in societal values. This shift has not taken place in many parts of the nonindustrialized world where children continue to play important economic roles for families. In Latin America, Africa, and some parts of Asia, childhood is short, and many children in middle childhood live and work on the streets (called "street children"). There is no time for the luxury of an indulged childhood. In rapidly industrializing countries, children must balance their economic productivity with time spent in school (Leeder, 2004).

Mirroring political ideals, the shift toward the public education of children was intended to be an equalizer, enabling children from a variety of economic backgrounds to become successful citizens. Public schools were to be free and open to all. Instead, however, they reflected traditional public ambiguity toward poverty and diversity, and they embodied particular value systems and excluded certain groups (Allen-Meares, Washington, & Walsh, 1996). In the United States, the first public schools were, in effect, open to European Americans only, and children from marginalized or nondominant groups rarely received advanced education. Today, schools continue to play a pivotal role in reinforcing segregation and **deculturalizing** various groups of children (Kozol, 2005; Spring, 2004). In essence, as schools pressure children from nondominant groups to assimilate, they play a role in intentionally or unintentionally destroying or severely limiting a culture's ability to sustain itself. These marginalized groups consistently achieve more poorly than the rest of the student population, a situation often referred to as the "achievement gap."

Today, the evolution of our perceptions of middle childhood continues. Although there is incredible diversity among children, families, and communities, generally speaking, middle childhood has come to be viewed in the United States as a time when education, play, leisure, and social activities should dominate daily life (Fass & Mason, 2000). Sigmund Freud perceived middle childhood as a relatively uneventful phase of development. But in the twenty-first century, middle childhood is recognized as a potentially turbulent time in children's lives.

The age range classified as middle childhood is subject to debate. In the United States, it is most often defined as the period beginning at approximately ages 5 or 6 and ending at approximately ages 10 to 12 (Berk, 2002a, 2002b; Broderick & Blewitt, 2006; Craig & Baucum, 2002). However, some assert that middle childhood begins a bit later than 6 (Allen & Marotz, 2003) and ends at the onset of puberty (Davies, 2004), which ranges tremendously among children.

Images of middle childhood often include children who are physically active and intellectually curious, making new friends and learning new things. But as Anthony Bryant, Brianna Shaw, and Manuel Vega demonstrate, middle childhood is filled with both opportunities and challenges. For some children, it is a period of particular vulnerability. In fact, when we think of school-aged children, images of child poverty and related school inequities, family and community violence, sexual victimization or **precociousness** (early development), learning challenges and physical and emotional ailments like depression, asthma, and Attention Deficit/Hyperactivity Disorder may dominate our thoughts. In some parts of the world, children between the ages of 6 and 12 are vulnerable to war, land mines, and forced enlistment as soldiers. They are also vulnerable to slave-like labor and being sold as sex workers in an international *child trafficking* economy (Human Rights Watch, 2006).

## Development in Middle Childhood

New developmental tasks are undertaken in middle childhood and development occurs within the physical, cognitive, cultural identity, emotional, and social dimensions. Although each developmental domain is considered separately for our analytical purposes, changes in the developing child reflect the dynamic interaction continuously occurring across these dimensions.

### Physical Development

During middle childhood, physical development continues steadily but children of the same chronological age may vary greatly in stature, weight, and sexual development. For most children, height and weight begin to advance less rapidly than



during prior developmental phases, but steady growth continues. The nature and pace of physical growth during this period is shaped by both genetic and environmental influences in interaction (Craig & Baucum, 2002).

As children progress from kindergarten to early adolescence, their fine and gross motor skills typically advance. In the United States today, children in this age range are often encouraged to gain a high level of mastery over physical skills associated with a particular interest such as dance, sports, or music. However, medical professionals caution that school-age children continue to possess unique physical vulnerabilities related to the growth process and they therefore remain quite susceptible to injuries associated with excessive physical activity or training (Craig & Baucum, 2002).

Middle childhood is a developmental phase of entrenchment or eradication of many potent risk or protective factors manifesting in this developmental domain. Focusing on risk, for children residing in chronically impoverished countries and communities, issues such as malnutrition and disease threaten physical health. Seemingly innocuous issues such as poor dental hygiene or mild visual impairment may become more serious as they begin to impact other areas of development such as cognitive, emotional, or social well-being. In the United States, health issues such as asthma and obesity are of contemporary concern and often either improve or become severe during middle childhood.

## THE CHANGING LIFE COURSE

Unintentional physical injuries change in nature but continue as a major threat to well-being (Berk, 2002b). In the United States, motor vehicle injuries and drowning are currently the leading causes of injury-related death among children ages 5 to 14 (National Center for Injury Prevention and Control, 2001). Nearly one-third of bicyclists killed in traffic accidents are children in this age range. Playground-related injuries are also common in middle childhood and are often severe or even fatal, including falls from playground surfaces and strangulation on playground equipment.

Moreover, school-age children gain new risks: almost one-third of rapes occur before age 12 and, among children ages 10 to 14, suicide is the third leading cause of death. Some speculate that the physical injuries unique to middle childhood may be indirectly facilitated by declines in adult supervision and adult over-estimation of children's safety-related knowledge and ability to implement safety practices. In addition, children's continued physical and cognitive (specifically, judgment and decision making processes) vulnerabilities combine, potentially, with an increasing propensity to engage in risk-taking activities and behaviors. Middle childhood is the developmental phase that leads from *prepubescence* (the period prior to commencement of the physiological processes and changes associated with puberty) to *pubescence* (the period during which the child begins to experience diverse and gradual physical processes associated with puberty). Pubescence includes the growth of pubic hair for boys and girls, breast development for girls, and genitalia development for boys. Many of us may not think of middle childhood as the developmental phase during which puberty becomes relevant. Precocious puberty has traditionally been defined as puberty beginning before age 8 in girls and 9 in boys (Nakamoto, 2000). However, although ongoing consultation with a child's pediatrician or other health care provider is always recommended, recent research suggests that the initial signs of pubic hair and breast development may be considered normative when it begins as early as 7 to 8 years of age among non-Hispanic white girls and 6 to 7 years of age

among non-Hispanic black girls (Nakamoto, 2000). Kaplowitz (2006) explains that "it now appears that the great majority of early-maturing girls (using the 8-years-old definition) are normal girls who are at the early end of the normal age distribution for pubertal onset" Exhibit 5.1 summarizes recent research focusing on puberty onset differences according to race and gender. Understanding of sexual development and puberty trends broadens knowledge of development generally, as well as increases our ability to detect maturation patterns indicating a need for more thorough assessment, for example, to rule out endocrine pathology including growth disorders or hormone imbalances. Professionals working with children should be knowledgeable about the full spectrum of pubescence as well as related personal biases or misconceptions. Focusing on racial differences, many studies have found that in the United States, non-Hispanic African American girls begin puberty earlier than other children (Adair & Gordon-Larsen, 2001; Benefice, Caius, & Garnier, 2004; Chumlea et al., 2003; Peck, 1997). However, Sun et al. (2002) point out that across gender and racial groups, children continue to *complete* their **secondary sexual development**, or development of secondary sex characteristics, at approximately the same age.

A trend toward earlier age of puberty onset, particularly among girls, has brought much attention to the potential causes. Some have argued that the trend may be due to certain food-based or environmental chemicals known to impact hormonal activity (Wang, Needham, & Barr, 2005), or changing social conditions including family characteristics (Ellis & Garber, 2000; Moffitt, Caspi, Belsky, & Silva, 1992); popular media speculates that the sexualization of young girls may play a role (Irvine, 2006; Levin, 2005). Recently, an oft cited cause is a gradual increase in children's average Body Mass Index (BMI) and the related issue of childhood obesity.

There is evidence suggesting that a fat-protein called leptin may be the underlying link between the weight and puberty trend association. Kaplowitz (2006) explains that leptin levels typically rise in girls, but not boys, at the time of puberty and states "we can speculate that overweight girls with higher leptin levels are more likely to enter puberty and reach menarche at an earlier age. Such a connection between leptin and normal reproductive functioning makes evolutionary sense, in that it ensures that pregnancy will not occur unless there are adequate fat stores to sustain the viability of the fetus" (p. 490). However, Wang, Needham, and Barr (2005) caution that "the signaling pathway for leptin in the development of puberty is not known, and further work is necessary to define this mechanism and the difference in leptin levels among

racial/ethnicity groups” (p. 1101). Wang, Needham, and Barr (2005) identify nutritional status; genetic predisposition, including race/ethnicity; and environmental chemical exposure as associated with age of puberty onset.

It should be noted that careful examination of puberty onset trends suggests that the “trend toward earlier onset of puberty in U.S. girls over the past 50 years is not as strong as some reports suggested” (Kaplowitz, 2006, p. 487). Indeed, within the United States, research suggests that there is evidence supporting this trend, but only to a certain point. Specifically, the average age of menarche decreased from approximately 14.8 years in 1877 to about 12.8 years in the mid 1960s (Kaplowitz, 2006). Most researchers have concluded that the general trend observed during this broad historical time period is due to health and nutrition improvement within the population as a whole. A recent examination of available data concludes that there is little evidence to support a clear continued decline in more recent years. Nevertheless, some have suggested that our public education and health systems should reconsider the timing and nature of health education for children because the onset of puberty may impact social and emotional development and has traditionally been associated with a variety of “risky and unhealthy behaviors” (Wang et al., p. 1101) among children and adolescents. Indeed a relationship, albeit complex, appears to exist between puberty and social development for both boys and girls (Felson, 2002; Kaltiala-Heino, Kosunen & Rimpela, 2003; Martin, 1996; McCabe & Ricciardelli, 2003). As they progress through puberty, girls in particular may be faced with new sexual attention from both peers and adults (American Association of University Women, 1995). Intervention focused on self-protection and individual rights and responsibilities may be beneficial, and schools committed to the safety of their students must diligently educate staff and students about sexual development, sexual harassment, and sexual abuse.

Middle childhood is the developmental phase when increased public attention and self-awareness is directed toward various aspects of physical growth, skill, or activity patterns and levels deemed outside the normal range. Because physical development is outwardly visible, it affects perceptions of self and the way a child is viewed and treated by peers and adults in a cyclical fashion. Physical development can also affect children’s peer relationships. School-age children constantly compare themselves to others, and physical differences are often the topic of discussion. Whereas “late” developers may feel inferior about their size or lack of sexual development, “early” developers may feel awkward and out of place among their peers. Many children worry about being “normal.” Reassurance by adults that physical development varies among people and that all development is “normal” is crucial.

## Cognitive Development

For most children, the acquisition of cognitive abilities that occurs early in middle childhood allows the communication of thoughts with increasing complexity. Public education plays a major role in the cognitive development of children in the United States, if only because children attend school throughout the formative years of such development. When Anthony Bryant, Brianna Shaw, and Manuel Vega first entered school, their readiness to confront the challenges and opportunities that school presents was shaped by prior experiences. Anthony, for example, entered school generally prepared for the academic emphases associated with kindergarten. He was perhaps less prepared for the social expectations present in the school environment.

In Jean Piaget’s (1936/1952) terms, children start school during the second stage (preoperational thought) and finish school when they are completing the fourth and final stage of cognitive development (formal operations). In the third stage (concrete operations), children are able to solve concrete problems using logical problem-solving strategies. By the end of middle childhood, they enter the formal operations stage and become able to solve hypothetical problems using abstract concepts (refer back to Exhibit 3.4 for an overview of Piaget’s stages of cognitive development). School children rapidly develop conceptual thought, the ability to categorize complicated systems of objects, and the ability to solve problems (Allen-Meares, 1995). Bergen and Coscia (2001) point out that as you observe children moving into and through middle childhood, you will note these rapid gains in intellectual processes and memory. These

brain-produced shifts in the child’s understanding of him or herself and the surrounding world are consistent with the transition into Piaget’s concrete operational stage of cognitive development. Potential gains in cognitive development enable new learning in a variety of environments. For example, children gain enhanced ability to understand people, situations, and events within their surrounding environments. The task for caregivers and others within the child’s environment is to recognize and respond to this ability sensitively by nurturing and supporting the child’s expanding cognitive abilities. Beyond Piaget’s ideas, brain development and cognitive functioning during middle childhood have received relatively little

attention when compared to research devoted to brain development in prior developmental phases. However, our ever-expanding general understanding of the human brain illuminates opportunities and vulnerabilities present throughout childhood. For example, professionals working with children are increasingly aware of the meaning and implications of *brain plasticity*. As pointed out in Chapter 3, infancy, toddlerhood, and early childhood appear to represent “sensitive periods” in brain development. By middle childhood, a child’s brain development and functioning has been profoundly shaped by the nature of earlier experiences and development. And yet, remarkable **brain plasticity** continues, with brain structure and functioning capable of growth and refinement throughout life (Shonkoff & Phillips, 2000). The conceptual framework perhaps most useful to understanding this potential and the processes at play is nonlinear dynamic systems theory, also known as complexity or chaos theory (Applegate & Shapiro, 2005). In this context, this theoretical perspective proposes that changes in one area or aspect of the neurological system may stimulate or interact with other neurological or broader physiological system components in an unpredictable fashion, potentially leading to unanticipated outcomes. Brain development follows a coherent developmental process, but brain plasticity in particular demonstrates the role of complex nonlinear neurological system dynamics and processes.

There are at least two aspects of brain development of particular interest when we focus on middle childhood. The first is the idea that different brain regions appear to develop according to different time lines. In other words, middle childhood may be a “sensitive period” for certain aspects of brain development not yet clearly understood. The second important idea is the notion that brain synapses (connections between cells in the nervous system) that are initially present as children enter this developmental phase may be gradually eliminated if they are not used. As reported in Chapter 3, there seems to be a pattern of *synaptogenesis*, or creation and fine-tuning of brain synapses, in the **human cerebral cortex** during early childhood which appears to be followed by a gradual pruning process that eventually reduces the overall number of synapses to their adult levels (Shonkoff & Phillips, 2000). Ongoing positive and diverse learning opportunities during middle childhood may help facilitate continued brain growth and optimal refinement of existing structures. The National Research Council of Medicine (Shonkoff & Phillips, 2000) argues that it is essential to recognize that although genetic factors and the nature and timing of early experiences matter, “more often than not, the developing child remains vulnerable to risk and open to protective influences throughout the early years of life and into adulthood”

Variations in brain development and functioning appear to play a critical role in learning abilities and disabilities as well as patterns of behavior (Bergen & Coscia, 2001). During middle childhood, identification and potential diagnosis of special needs, including issues such as Attention Deficit Hyperactivity Disorder and autism spectrum disorders, typically peak. In recent years, an area of public interest is gender or sex-based differences in brain functioning and, possibly, learning styles. This interest has been stimulated in part by evidence suggesting that boys are currently at higher risk than girls for poor literacy performance, special education placement, and school drop out (Weaver-Hightower, 2003).

Gurian (2001) and Sax (2005) have argued that brain-based cognitive processing, behavior, and learning style differences may be responsible for the somewhat stable trends observed in gender differences in educational achievement. The importance of sex, or gender, in shaping the human experience cannot be overstated. Gender is a profoundly important organizing factor shaping human development and its biological correlates may impact behavior and learning processes in ways we do not clearly understand. In particular, the nature and causes of educational achievement differences among girls and boys are “complex and the interconnections of the causes are poorly understood” (Weaver-Hightower, 2003, p. 487). Also, it is critically important to remember that among children, gender is but one of several personal and group characteristics relevant to understanding educational privilege specifically, as well as risk and protection generally.

Concern about the well-being of boys in schools has been stimulated, in part, by the assertion that in the late twentieth and early twenty-first centuries, boys’ performance has been declining on indicators of educational achievement and attainment. Some argue that boys have suffered, in educational contexts, from the amount of attention dedicated to supporting girls’ educational success during the late twentieth century

## Emotional Development

As most children move from early childhood into and through middle childhood, they experience significant gains in their ability to identify and articulate their own emotions as well as the emotions of others. Exhibit 5.3 summarizes several gains school-age children often make in the area of emotional functioning. It is important to recognize, however, that culture and other aspects of group identity may shape emotional development. For example, cultures vary in their acceptance of expressive displays of emotion.

Many children in this age range develop more advanced coping skills that help them when encountering upsetting, stressful, or traumatic situations. As defined by Daniel Goleman (1995), **emotional intelligence** refers to the ability to “motivate oneself and persist in the face of frustrations, to control impulse and delay gratification, to regulate one’s moods and keep distress from swamping the ability to think, to empathize and to hope” (p. 34). To Goleman (2006), emotional and social intelligence are inextricably linked, and many other developmentalists agree. As a result, interventions used with children experiencing social difficulties often focus upon enhancing some aspect of emotional intelligence.

Goleman also asserts that social and emotional intelligence are key aspects of both moral reasoning and moral conduct. In other words, although often it may seem that advancing capacities in the moral domain occurs naturally for children, positive conditions and interactions must exist in a child’s life in order for optimal emotional and social competencies to develop. Thus, a child like Anthony Bryant, with seemingly great academic

### Exhibit 5.3 Common Emotional Gains During Middle Childhood

- Ability to mentally organize and articulate emotional experiences
- Cognitive control of emotional arousal
- Use of emotions as internal monitoring and guidance systems
- Ability to remain focused on goal directed actions
- Ability to delay gratification based on cognitive evaluation
- Ability to understand and use the concept of planning
- Ability to view tasks incrementally
- Use of social comparison
- Influence of internalized feelings (e.g., self-pride, shame) on behavior
- Capacity to tolerate conflicting feelings
- Increasingly effective defense mechanisms

## Social Development

Perhaps the most widely recognized developmental task of this period is the acquisition of feelings of *self-competence*. Traditional developmentalists have pointed out that the school-age child searches for opportunities to demonstrate personal skills, abilities, and achievements. This is what Erik Erikson (1963) was referring to when he described the developmental task of middle childhood as industry versus inferiority (refer back to Exhibit 3.6 for a description of all eight of Erikson’s psychosocial stages). *Industry* refers to a drive to acquire new skills and do meaningful “work.” The experiences of middle childhood may foster or thwart the child’s attempts to acquire an enhanced sense of *mastery* and self-efficacy.

Family, peer, and community support may enhance the child’s growing sense of competence; lack of such support undermines this sense. The child’s definitions of self and accomplishment vary greatly according to interpretations in the surrounding environment. But superficial, external bolstering of self-esteem is not all that children of this age group require. External appraisal must be supportive and encouraging but also accurate in order for children to value such feedback. Some theorists argue that children of this age must learn the value of perseverance and develop an internal drive to succeed (Kindlon, 2003; Seligman, Reivich, Jaycox, & Gillham, 1995). Thus, opportunities to both fail and succeed must be provided, along with sincere feedback and support. Ideally, the developing school-age child acquires the sense of personal competence and tenacity that will serve as a protective factor during adolescence and young adulthood.

Families play a critical role in supporting development of this sense. For example, as the child learns to ride a bike or play a sport or musical instrument, adults can provide specific feedback and praise. They can counter the child’s frustration by identifying and complimenting specific improvements and emphasizing the role of practice and perseverance in producing such improvements. Failures and setbacks can be labeled as temporary and surmountable rather than attributed to personal flaws or deficits. The presence of such feedback loops is a key feature of high-quality adult-child relationships, in the family, school, and beyond. Middle childhood is a critical time for children to acquire this sense of competence. In the process they gain an increasing awareness of their fit in the network of relationships in their surrounding environments. Each child experiences events and daily interactions that enhance or diminish feelings of self-competence. A systems perspective is critical to understanding the multiple influences on children’s development during this period.

Children are not equally positioned as they enter this developmental phase, as Anthony Bryant's, Brianna Shaw's, and Manuel Vega's stories suggest. Developmental pathways preceding entry into middle childhood are extremely diverse. Children experience this phase of life differently based not only on differences in the surrounding environment—such as family structure and socioeconomic status—but also on their personality differences. A particular personality and learning style may be valued or devalued, problematic or nonproblematic, in each of the child's expanding social settings (Berk, 2002a, 2002b; Green, 1994). Thus, although Anthony, Brianna, and Manuel are moving through the same developmental period and facing many common tasks, they experience these tasks differently and will emerge into adolescence as unique individuals. Each individual child's identity development is highly dependent upon social networks of privilege and exclusion. There is a direct relationship between the level of control and power a child experiences and the degree of balance that is achieved in the child's emerging identity between feelings of power (privilege) and powerlessness (exclusion) (Johnson, 2005; Tatum, 1992). As children move toward adolescence and early adulthood, the amount of emotional, social, spiritual, and economic capital, or resources, acquired determines the likelihood of socioeconomic and other

## The Peer Group

Nearly as influential as family members during middle childhood are *peer groups*—collections of children with unique values and goals (Hartup, 1983). As children progress through middle childhood, peers have an increasingly important

impact on such everyday matters as social behavior, activities, and dress. By this phase of development, a desire for group belongingness is especially strong. Within peer groups, children potentially learn three important lessons. First, they learn to appreciate different points of view. Second, they learn to recognize the norms and demands of their peer group. And, third, they learn to have closeness to a same-sex peer (Newman & Newman, 2006). Whereas individual friendships facilitate the development of critical capacities such as trust and intimacy, peer groups foster learning about cooperation and leadership.

Throughout middle childhood, the importance of *group norms* is highly evident (von Salisch, 2001). Children are sensitive, sometimes exceedingly so, to their peers' standards for behavior, appearance, and attitudes. Brianna Shaw, for instance, is beginning to devalue herself because she recognizes the discrepancy between her appearance and group norms. Often it is not until adolescence that group norms may become more flexible, allowing for more individuality. This shift reflects the complex relationship among the developmental domains. In this case, the association between social and cognitive development is illustrated by simultaneous changes in social relationships and cognitive capacities.

In most middle childhood peer groups, *dominance hierarchies* establish a social order among group participants. Those hierarchies may predict outcomes when conflict arises (Pettit, Bakshi, Dodge, & Coie, 1990; Savin-Williams, 1979); typically, more dominant children prevail. Furthermore, through reinforcement, modeling, and direct pressure to conform to expectations, children's dominance hierarchies contribute to socialization.

## ADOLESCENCE

Adolescence, the transition between childhood and adult life, is one of the most dynamic stages of human development. Adolescence is accompanied by dramatic physical, cognitive, social, and emotional changes that present both opportunities and challenges for adolescents, families, health professionals, educators, and communities. Although early life experiences form the foundation for personality development, experiences during the adolescent years contribute significantly to the unique characteristics and maturation of the young adult. The health professional needs to be sensitive to the changes that will occur in the health supervision partnership as adolescents become increasingly capable of making independent decisions about their health.

Adolescence has usually been thought of as a period characterized by good health; however, millions of adolescents face significant challenges that can result in physical, emotional, and social morbidities. Among these challenges are high-risk behaviors such as alcohol, tobacco, and other drug use, and sexual behaviors that can lead to adolescent pregnancy and sexually transmitted diseases; mental health concerns such as eating disorders and depression; learning disabilities and school dropout rates; serious family problems, including neglect and



abuse; and socioeconomic factors such as poverty and lack of health insurance. These health issues, most of which are preventable, can lead to significant morbidity and even mortality. Unintentional injuries, homicide, and suicide are leading causes of death in adolescence. Adolescence is a time when some childhood health problems may be resolved, when new issues may emerge, and when risks for some long-term adult health problems may become evident. Thus, this pivotal developmental period offers special opportunities for preventive and health-promoting services. A major role of health supervision is the periodic assessment and support of the adolescent's adaptation to new roles and challenges that accompany growth and development. Nurturing a sense of self-assurance in adolescents, providing them with knowledge of how to meet life's challenges (and the belief that they can), and encouraging and reinforcing healthy choices help them develop the social competence and sense of responsibility needed for personal health, academic achievement, and competence at work.

## **PHYSICAL DEVELOPMENT**

The most noticeable changes during adolescence involve physical, psychological, and sexual growth and development, including the appearance of secondary sexual characteristics and the ability to reproduce. Young adolescents in particular are preoccupied with these physical changes and how they are perceived by others. Many adolescents and families are reassured to learn that the maturation process takes place at a different pace for each individual. Changes may occur earlier in some and later in others, but eventually they will occur.

Adolescent sexuality involves complex and interrelated issues such as sexual exploration, development of sexual identity, self-esteem, sexual responsibility, and pressures to become sexually active. Sexual activity during adolescence can involve serious health consequences for which the adolescent is not prepared, such as unintentional pregnancy or sexually transmitted diseases. As the changes associated with adolescence affect core family relationships, the health professional can further develop a supportive partnership with the adolescent and the family, providing sensitive and effective anticipatory guidance that can help prepare them to navigate this developmental rite of passage successfully.

## **COGNITIVE DEVELOPMENT**

The changes in cognitive development during adolescence are, in their own way, as dramatic as those in the physical domain. During this period, adolescents who previously focused on the present begin to mature and to consider the future implications of their current actions. This shift obviously has major implications for health supervision. For the first time, adolescents begin to develop the cognitive capacity to comprehend the impact of their present behaviors on their future health. It is important to note, however, that this emerging way of thinking is still limited and occurs erratically throughout much of adolescence and sometimes into adulthood.

The limited capacity to see beyond simple solutions to complex problems evolves into a tolerance for ambiguity and the growing recognition that many issues have multiple causes and interrelationships. This emerging capability for abstract thinking helps to account for the frequent questions posed by adolescents, their sometimes argumentative behavior, and their recurring challenges to parental authority and limit setting.

## **SOCIAL/EMOTIONAL DEVELOPMENT**

Peer relationships play a major role in the adolescent's emotional separation and emerging individuality. Adolescents often seek out peers whose beliefs, values, and even behaviors are similar to those of their families. While peer and other social influences often reinforce familial values, some influences may expose the adolescent

to values that differ significantly from the family's. Thus, the need to balance peer pressure and family expectations creates both new challenges and family tensions as adolescents begin to make independent decisions. In their struggle to gain autonomy while retaining interdependence, they may be understandably ambivalent about replacing their familiar comfort with and dependence on their parents with the uncertainty of relationships with others. The health professional is in a key position to offer guidance and support for adolescents and families as they adapt to these changes. The ability to integrate emotional and physical intimacy in a love relationship is an important developmental task for the older adolescent. Health supervision must address sexual experimentation and the risks that accompany this aspect of development.

## **HEALTH BEHAVIORS**

Adolescence is a time of exploring a variety of new behaviors. While this experimentation is essential for development, it may lead to an increase in risky behaviors. The potentially negative health consequences of such behaviors (for example, alcohol use) are likely to be underestimated by the adolescent. Continued periodic health supervision during adolescence is imperative in order to provide anticipatory guidance, support health-promoting behaviors, and help the adolescent apply increasingly sophisticated thinking in evaluating the consequences of new behaviors and roles.

## **FAMILY**

The dramatic changes that have occurred in contemporary family life are particularly significant for adolescents. The decreased amount of time that many parents, extended family members, and neighbors are able to spend with adolescents leads to decreased communication, support, and supervision from adults at a crucial period in development. At an age when adolescents are most likely to experiment with behaviors that can have serious health consequences, they may have less parental involvement and more unsupervised time and activities.

Parents should maintain a continuing interest in their adolescent's daily activities and concerns.

Adolescents are more likely to become healthy, fulfilled adults if their families remain actively involved, providing loving parenting, needed limits, and respect for the process of developing maturity. Families are better able to be supportively involved when they receive accurate information on the physical, cognitive, social, and emotional changes that occur during adolescence.

As the nature of family relationships changes, the skilled health professional plays an important role in helping families adapt to the adolescent's need for confidentiality as they learn to negotiate a healthy balance between providing parental supervision and giving the adolescent some "space." In strengthening health partnerships with families, the health professional can affirm the parents as ethical and behavioral models for their adolescent and can encourage parents to communicate family expectations clearly and respectfully. Although adolescence is characterized by growing independence and separation from parental authority, the adolescent still needs the family's love, support, and availability.

## **COMMUNITY**

Success in school contributes substantially to the adolescent's self-esteem and progress toward becoming a socially competent adult. Health promotion programs in schools can help adolescents establish good health habits and avoid those that may lead to morbidity and mortality.

Health promotion curricula can include family life education and social skills training, as well as information on pregnancy prevention, abstinence, conflict resolution, healthy nutritional practices, and avoidance of unhealthy habits such as smoking, drinking, and substance abuse. On-site integrated health services in the schools—with referrals to



primary care physicians and community agencies (including mental health centers) for supplementary services—are evolving as one way to deliver adolescent health care in medically underserved areas. School-based health settings can be especially effective in ensuring immunizations, promoting sports safety, and providing access for students with special health care needs.

Communities need to provide safe, supervised recreational programs and facilities for adolescents, opportunities for adolescents to pursue meaningful work experiences and community service activities, and access to training programs. These opportunities enhance the adolescent's sense of being needed and valued within the community. Communities need to provide appropriate, accessible resources that help adolescents address mental health concerns and sexual health issues such as family planning, contraception, and prevention of sexually transmitted diseases. Regulating the sale and use of alcohol, cigarettes, and guns, mandating safety belt and helmet use, and instituting a graduated driver's license are key health supervision measures and areas for community involvement.

## **Health Supervision As a Partnership**

Health supervision efforts are most likely to succeed when they foster joint participation and shared responsibility among adolescents, families, health professionals, educators, and others who have a personal, professional, or supervisory relationship with adolescents. Key components of successful health supervision include a respect for individual differences, support for the adolescent's emerging autonomy, a developmental approach, and a focus on the adolescent's strengths. Because adolescents seek office-based health care less frequently than any other age group, they may need special efforts to help them participate in regular health supervision. Strategies to improve access to health care for adolescents can be evaluated with seven criteria: Services should be available, visible (convenient and recognizable), quality based, confidential, affordable, flexible (meeting diverse needs), and coordinated.<sup>1</sup>

Confidentiality is an especially significant component of health partnerships during adolescence. Health professionals need to clearly communicate to adolescents and their parents a firm commitment to the principle of confidentiality, and to explain that only a very serious risk to the health of the adolescent would override that commitment. Building effective health partnerships during adolescence depends, in part, on the health professional's ability to form a trusting relationship with the adolescent and the family. This will in turn enable the health professional to provide medical expertise and health supervision that engender confidence and to enjoy the rewards of helping adolescents achieve their full potential.

Adolescents sometimes feel more comfortable with health professionals who have the specialized training and experience necessary for understanding and addressing their particular issues. Another valuable strategy for encouraging health-promoting behaviors is the use of peer influence, such as trained adolescent peer counselors, adolescent focus groups in offices and schools, or volunteer adolescent speakers.

Different types of settings, such as community or school health clinics, may also be more successful in encouraging adolescents to participate in regular health supervision.

Dramatic physical changes are the hallmark of early adolescence. The profound biological and hormonal changes of puberty engender feelings of vulnerability and sensitivity to physical appearance. Young adolescents are egocentric, intensely preoccupied with the question "How do I look?" They often have the feeling of being "on stage" and may spend hours grooming in front of the mirror.

## **PHYSICAL DEVELOPMENT**

Typically, girls show signs of puberty 2 years earlier than boys. During early adolescence, most girls experience a rapid growth spurt, changes in fat distribution, and development of secondary sexual characteristics such as pubic hair and breasts. For most boys, the early adolescent period marks the beginning of the biological changes of puberty, including testicular growth, voice changes, and development of acne, pubic hair, and nocturnal emissions. Many young adolescents are unaware that the onset of puberty and rate of sexual development can vary greatly; teens can benefit from learning about the progression of physiologic changes and should be given reassurance that their own growth and development are normal. Because of their sensitivity and modesty about their bodies, young teens have an increased need for privacy, so families must learn to respect a “closed-door policy.”

Many young adolescents, preoccupied with their attractiveness, will attempt to change their appearance through dieting or lifting weights.

Eating disorders may develop during this period, especially among females. Some teens engage in physical activity regularly and develop bodies that are extremely fit; others choose sedentary behaviors such as watching television or playing video games. Because these behaviors are often predictors of adult lifestyles, helping sedentary adolescents develop an individualized plan to refocus their energies on healthier pursuits, such as participating in physical activities at school or after school, may have life-long consequences for their well-being.

## **COGNITIVE AND MORAL DEVELOPMENT**

In addition to adolescents’ changing physiology and heightened perceptions of body image during this period, their cognitive abilities are continuing to develop. Young adolescents have increasing potential for abstract, complex thinking, although their cognition still focuses primarily on the concrete and the present—the “here and now.” Their sense of morality, like their cognition, tends to be concrete and governed by conventional standards or rules. Young teens tend to see individuals and their behaviors in somewhat rigid terms as good or bad, right or wrong, and have not yet developed an understanding of complex interrelationships or long-term consequences.

## **SOCIAL/EMOTIONAL DEVELOPMENT**

Puberty is a time not only of increased risks but also of intense changes in emotions. Young adolescents may display erratic or moody behavior, especially with the stresses of academic achievement, sports performance, peer pressure, and changing family relationships. Young teens may be very opinionated, challenging family rules, values, and behaviors. Families need to continue supervising the adolescent and setting appropriate limits. At the same time, they need to affirm their adolescent’s growing self-efficacy and promote skills and confidence in decision-making.

Parents remain important role models, serving as a consistent, stabilizing influence, especially as adolescents become exposed to a wide range of risky behaviors among peers. Family members, too, need support in dealing with feelings of confusion and anxiety as they try to negotiate new understandings with their teenager.

## **SCHOOL**

As adolescents make the transition to middle school or high school and have to cope with less adult support and greater anonymity, they frequently experience anxiety. Some youth who leave the familiar community of elementary school must learn to navigate the classrooms and corridors of a larger, more impersonal institution where they encounter higher academic expectations and significantly greater peer pressures. Scholastic demands require students to be more organized and efficient; there may be a reduction in overall academic performance for males and females, as well as a gender gap in math and science. This gap increases with age so that by 12th grade, boys significantly outscore girls in standardized math and science tests.

Truancy and school dropout rates tend to rise in early adolescence. Some adolescents find incentive to stay in school by participating in meaningful in-school and after-school activities such as sports, music, drama, journalism, or community volunteering; others participate in cultural and religious youth groups. These activities provide both positive group recognition and adult mentoring to ease the transition to middle school or high school. Unfortunately, many public schools have reduced costs by cutting back on after-school clubs and activities, and many youth now lack constructive, supervised recreational opportunities. School now becomes the primary setting through which peer group standards or expectations are communicated. The attraction of peer groups is a powerful phenomenon. Preparing young adolescents to deal with increasing peer pressure is an important part of health supervision. Although parents' modeling of healthy behaviors remains an important influence, schoolmates can significantly influence adolescents' perceptions and attitudes about healthy and risky behaviors.

### **Risky Behaviors**

Although exploration and experimentation— usually in the company of peers—serve important developmental purposes, adolescent experimentation can also have serious health consequences. Experimentation with alcohol and tobacco are significant health concerns during early adolescence. In a CDC national survey, 72 percent of ninth graders had already experimented with alcohol, and 25 percent reported at least one episode of heavy drinking (five or more drinks) during the preceding month. Two out of three ninth-grade students had tried cigarette smoking, and 13 percent reported smoking regularly. Nearly 40 percent of the ninth-graders also reported having used marijuana, and nearly 7 percent had used cocaine.<sup>3</sup> Inhalant abuse is a growing problem among young adolescents, with nearly 20 percent of students in ninth grade having reported inhalant use

### **INJURY PREVENTION**

More than half the injury-related deaths in this age group involve motor vehicles, with the adolescent as passenger, pedestrian, or cyclist. Few young adolescents take measures to reduce their risk of injury. Overall, 21 percent of ninth-grade students have reported rarely or never using a safety belt, and 87 percent have reported rarely or never wearing a bicycle helmet.<sup>3</sup> Youth are also at serious risk for unintentional injuries received in sports or other physical activities, performing work duties, or operating farm machinery.

### **SEXUALITY**

Sexual exploration is a concern during early adolescence, although both the teen pregnancy rate and the number of teens who report being sexually active have decreased since 1991. However, many young adolescents do not have accurate information about sexual development or the risks and consequences of early and unprotected sexual activity.

Parents and health professionals need to talk with adolescents about issues such as the menstrual cycle, fertility, and prevention of sexually transmitted diseases; correct any misinformation; and sensitively address adolescent concerns. Adolescents should be strongly advised to delay having sexual intercourse and should be fully supported in that decision. Young teens who are already sexually active need guidance in understanding and practicing protective behaviors to minimize their risk of becoming pregnant or acquiring sexually transmitted diseases.

## **ABUSE AND VIOLENCE**

For a significant number of adolescents, sexual abuse is a serious problem. Some have experienced sexual victimization from an early age; many are forced to have sexual intercourse without their consent. Because sexual identity and sexual behavior patterns are established in adolescence, it is important to understand the link between previous sexual abuse and current risky behaviors and to conduct a thorough and sensitive assessment of the adolescent's sexual health.

In addition to the risk of sexual abuse, adolescents today face an unprecedented risk of injury or death from violence—in their homes, schools, and communities. Youth may experience intense pressure to join gangs or other groups, or may feel threatened by gang activities or other types of violence. Many youth grow up with guns in the home. Some carry weapons as a means of protecting themselves—or intimidating others. Students in grade 9 are significantly more likely than students in grades 11 and 12 to have carried a weapon and to have been threatened or injured with a weapon on school property.<sup>3</sup>

## **COMMUNITY**

Many communities have become more transient and impersonal, offering less support and supervision to young adolescents. Many communities lack visible positive adult role models. The media tend to compound this problem, since most of the videos, music, films, and television programs that fascinate adolescents often glamorize violence and other unhealthy behaviors.

Communities also vary in their efforts to establish and enforce regulations protecting the health and safety of adolescents (e.g., restricting access to cigarette machines, alcohol, and guns; mandating helmet use).

## **ESTABLISHING A TRUSTING RELATIONSHIP**

Although their minds and bodies are developing rapidly and becoming more capable and mature, young adolescents still lack the experience and judgment to use these new capabilities wisely. The challenge for the health professional is to establish a trusting relationship that supports the adolescent and the family so that opportunities for exploration and continued growth are presented in a safe and nurturing context.

## **QUESTIONS**

1. Explain the four level of developmental change during Early Childhood.
2. Illustrate the intellectual ability of the late childhood.
3. List out the Educational implications of childhood.

4. Explain the Emotional and social development in early childhood.
5. Sketch out the Development of motor skills and knowledge.
6. How do adolescents express their emotions? Give illustrative examples.
7. What are the prominent social characteristics shown by the adolescents.
8. How do adolescents differ from children in their cognition?
9. List some developmental tasks of the adolescents?

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**SCHOOL OF SCIENCE AND HUMANITIES  
DEPARTMENT OF PSYCHOLOGY**

**UNIT – IV -EARLY ADULthood AND MIDDLE ADULthood - LIFE SPAN  
DEVELOPMENT–SPYA1302**

## Introduction

People in their mid-twenties to mid-forties are considered to be in early adulthood. By the time we reach early adulthood, our physical maturation is complete, although our height and weight may increase slightly. Those in their early twenties are probably at the peak of their physiological development, including muscle strength, reaction time, sensory abilities, and cardiac functioning. The reproductive system, motor skills, strength, and lung capacity are all operating at their best. Most professional athletes are at the top of their game during this stage, and many women have children in the early-adulthood years (Boundless, 2016).

The aging process actually begins during early adulthood. Around the age of 30, many changes begin to occur in different parts of the body. For example, the lens of the eye starts to stiffen and thicken, resulting in changes in vision (usually affecting the ability to focus on close objects).

Sensitivity to sound decreases; this happens twice as quickly for men as for women. Hair can start to thin and become gray around the age of 35, although this may happen earlier for some individuals and later for others. The skin becomes drier and wrinkles start to appear by the end of early adulthood. This includes a decline in response time and the ability to recover quickly from physical exertion. The immune system also becomes less adept at fighting off illness, and reproductive capacity starts to decline (Boundless, 2016).

## Obesity

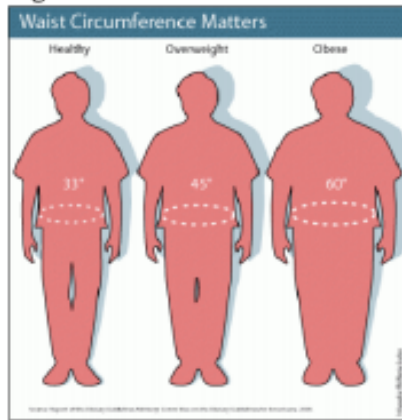
Although at the peak of physical health, a concern for early adults is the current rate of obesity. Results from the National Center for Health Statistics indicated that an estimated 70.7% of U.S. adults aged 20 and over were overweight in 2012 (CDC, 2015b) and by 2016, 39.8% were considered obese (Hales, Carroll, Fryar, & Ogden, 2017)). **Body mass index (BMI)**, expressed as weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ), is commonly used to classify overweight (BMI 25.0–29.9), obesity (BMI greater than or equal to 30.0), and extreme obesity (BMI greater than or equal to 40.0). The current statistics are an increase from the 2013-2014 statistics that indicated that an estimated 35.1% were obese, and 6.4% extremely obese (Fryar, Carroll, & Ogden, 2014). The CDC also indicated that one's 20s are the prime time to gain weight as the average person gains one to two pounds per year from early adulthood into middle adulthood. The average man in his 20s weighs around 185 pounds and by his 30s weighs approximately 200 pounds. The average American woman weighs 162 pounds in her 20s and 170 pounds in her 30s.

The American obesity crisis is also reflected worldwide (Wighton, 2016). In 2014, global obesity rates for men were measured at 10.8% and among women 14.9%. This translates to 266 million obese men and 375 million obese women in the world, and more people were identified as obese than underweight. Although obesity is seen throughout the world, more obese men and women live in China and the USA than in any other country. Figure 7.6 illustrates how waist circumference is also used as a measure of obesity. Figure 7.7 demonstrates the percentage growth for youth (2-19 years) and adults (20-60+ years) identified as obese between 1999 and 2016.

Figure 7.6



**Figure 7.6 Waist Circumference**

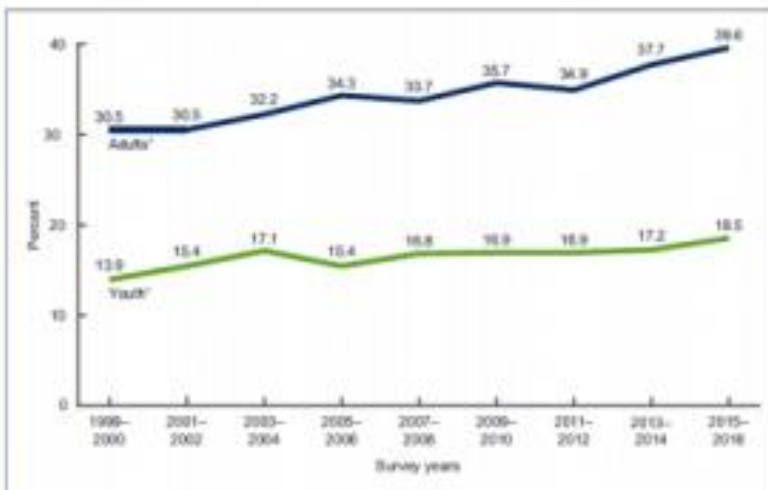


Source

**Causes of Obesity:** According to the Centers for Disease Control and Prevention (CDC) (2016), obesity originates from a complex set of contributing factors, including one's environment, behavior, and genetics. Societal factors include culture, education, food marketing and promotion, the quality of food, and the physical activity environment available. Behaviors leading to obesity include diet, the amount of physical activity, and medication use. Lastly, there does not appear to be a single gene responsible for obesity. Rather, research has identified variants in several genes that may contribute to obesity by increasing hunger and food intake. Another genetic explanation is the mismatch between today's environment and "energy-thrifty genes" that multiplied in the distant past when food sources were unpredictable. The genes that helped our ancestors survive occasional famines are now being challenged by environments in which food is plentiful all the time. Overall, obesity most likely results from complex interactions among the environment and multiple genes.

Figure 7.7

**Figure 7.7 Adult and Youth Obesity Trends (1999-2016)**



\*Significant increasing trend from 1999-2000 through 2015-2016

NOTES: All estimates for adults are age-adjusted to the direct method to the 2000 U.S. census population using the age groups 20-24, 45-54, and 75 and over.

Survey data from Figure 7.4 at <http://www.cdc.gov/nchs/data/tables/obesity/1999-2016.pdf>

SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999-2016

**Obesity Health Consequences:** Obesity is considered to be one of the leading causes of death in the United States and worldwide. Additionally, the medical care costs of obesity in the United States were estimated to be \$147 billion in 2008. According to the CDC (2016) compared to those with a normal or healthy weight, people who are obese are at increased risk for many serious diseases and health conditions including:

- All-causes of death (mortality)
- High blood pressure (Hypertension)
- High LDL cholesterol, low HDL cholesterol, or high levels of triglycerides (Dyslipidemia)
- Type 2 diabetes
- Coronary heart disease
- Stroke
- Gallbladder disease
- Osteoarthritis (a breakdown of cartilage and bone within a joint)
- Sleep apnea and breathing problems
- Some cancers (endometrial, breast, colon, kidney, gallbladder, and liver)
- Low quality of life
- Mental illness, such as clinical depression, anxiety, and other mental disorders
- Body pain and difficulty with physical functioning

## **A Healthy, But Risky Time**

Doctor's visits are less frequent in early adulthood than for those in midlife and late adulthood and are necessitated primarily by injury and pregnancy (Berger, 2005). However, the top five causes of death in emerging and early adulthoods are non-intentional injury (including motor vehicle accidents), homicide, and suicide with cancer and heart disease completing the list (Heron, & Smith, 2007). Rates of violent death (homicide, suicide, and accidents) are highest among young adult males and vary by race and ethnicity. Rates of violent death are higher in the United States than in Canada, Mexico, Japan, and other selected countries. Males are 3 times more likely to die in auto accidents than are females (Frieden, 2011).

**Alcohol Abuse:** A significant contributing factor to risky behavior is alcohol. According to 2014, National Survey on Drug Use and Health (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2016) 88% of people ages 18 or older reported that they drank alcohol at some point in their lifetime; 71% reported that they drank in the past year, and 57% reported drinking in the past month. Additionally, 6.7% reported that they engaged in heavy drinking in the past month. Heavy drinking is defined as drinking five or more drinks on the same occasion on each of five or more days in the past 30 days. Nearly 88,000 people (approximately 62,000 men and 26,000 women) die from alcohol-related causes annually, making it the fourth leading preventable cause of death in the United States. In 2014, alcohol-impaired driving fatalities accounted for 9,967 deaths (31% of overall driving fatalities).

The NIAAA defines binge drinking when blood alcohol concentration levels reach 0.08 g/dL. This typically occurs after four drinks for women and five drinks for men in approximately two hours. In 2014, 25% of people ages 18 or older reported that they engaged in binge drinking in the past month. According to the NIAAA (2015) "Binge drinking poses serious health and safety risks, including car crashes, drunk-driving arrests, sexual assaults, and injuries. Over the long term, frequent binge drinking can damage the liver and other organs," (p. 1).

**Alcohol and College Students:** Results from the 2014 survey demonstrated a difference between the amount of alcohol consumed by college students and those of the same age who are not in college (NIAAA, 2016). Specifically, 60% of full-time college students ages 18–22 drank alcohol in the past month compared with 51.5% of other persons of the same age not in college. In addition, 38% of college students ages 18–22 engaged in binge drinking; that is, five or more drinks on one occasion in the past month, compared with 33.5% of other persons of the same age. Lastly, 12% of college students’ (ages 18–22) engaged in heavy drinking; that is, binge drinking on five or more occasions per month, in the past month. This compares with 9.5% of other emerging adults not in college.

The consequences for college drinking are staggering, and the NIAAA (2016) estimates that each year the following occur:

- 1,825 college students between the ages of 18 and 24 die from alcohol-related unintentional injuries, including motor-vehicle crashes.
- 696,000 students between the ages of 18 and 24 are assaulted by another student who has been drinking.
- Roughly 1 in 5 college students meet the criteria for an Alcohol Use Disorder.
- About 1 in 4 college students report academic consequences from drinking, including missing class, falling behind in class, doing poorly on exams or papers, and receiving lower grades overall. (p. 1)
- 97,000 students between the ages of 18 and 24 report experiencing alcohol-related sexual assault or date rape.

The role alcohol plays in predicting acquaintance rape on college campuses is of particular concern. “Alcohol use in one the strongest predictors of rape and sexual assault on college campuses,” (Carroll, 2016, p. 454). Krebs, Lindquist, Warner, Fisher and Martin (2009) found that over 80% of sexual assaults on college campuses involved alcohol. Being intoxicated increases a female’s risk of being the victim of date or acquaintance rape (Carroll, 2007). Females are more likely to blame themselves and to be blamed by others if they were intoxicated when raped. College students view perpetrators who were drinking as less responsible, and victims who were drinking as more responsible for the assaults (Untied, Orchowski, Mastroleo, & Gidycz, 2012).

**Factors Affecting College Students’ Drinking:** Several factors associated with college life affect a student’s involvement with alcohol (NIAAA, 2015).

These include the pervasive availability of alcohol, inconsistent enforcement of underage drinking laws, unstructured time, coping with stressors, and limited interactions with parents and other adults.

Due to social pressures to conform and expectations when entering college, the first six weeks of freshman year are an especially susceptible time for students. Additionally, more drinking occurs in colleges with active Greek systems and athletic programs. Alcohol consumption is lowest among students living with their families and commuting, while it is highest among those living in fraternities and sororities.

**College Strategies to Curb Drinking:** Strategies to address college drinking involve the individual-level and campus community as a whole. Identifying at-risk groups, such as first-year students, members of fraternities and sororities, and athletes have proven helpful in changing students’ knowledge, attitudes, and behavior regarding alcohol (NIAAA, 2015).

Interventions include education and awareness programs, as well as intervention by health professionals. At the college-level, reducing the availability of alcohol has proven effective by decreasing both consumption and negative consequences.

**Non-Alcohol Substance Use:** Illicit drug use peaks between the ages of 19 and 22 and then begins to decline. Additionally, 25% of those who smoke cigarettes, 33% of those who smoke marijuana, and 70% of those who abuse cocaine began using after age 17 (Volkow, 2004).

Emerging adults (18 to 25) are the largest abusers of prescription opioid pain relievers, anti-anxiety medications, and Attention Deficit Hyperactivity Disorder medication (National Institute on Drug Abuse, 2015). In 2016, opioid misuse within the past 12 months was reported by 3.6% of 12-17 year-olds and was twice as high among those 18-25 (Office of Adolescent Health, 2019). In 2014 more than 1700 emerging adults died from a prescription drug overdose. This is an increase of four times since 1999. Additionally, for every death, there were 119 emergency room visits.

Daily marijuana use is at the highest level in three decades (National Institute on Drug Abuse, 2015). For those in college, 2014 data indicate that 6% of college students smoke marijuana daily, while only 2% smoked daily in 1994. For noncollege students of the same age, the daily percentage is twice as high (approximately 12%). Additionally, according to a recent survey by the National Institute of Drug Abuse (2018), daily cigarette smoking is lower for those in college in comparison to non-college groups (see Figure 7.10).

Rates of violent death are influenced by substance use which peaks during emerging and early adulthood. Drugs impair judgment, reduce inhibitions, and alter mood, all of which can lead to dangerous behavior. Reckless driving, violent altercations, and forced sexual encounters are some examples. Drug and alcohol use increase the risk of sexually transmitted infections because people are more likely to engage in risky sexual behavior when under the influence. This includes having sex with someone who has had multiple partners, having anal sex without the use of a condom, having multiple partners, or having sex with someone whose history is unknown. Lastly, as previously discussed, drugs and alcohol ingested during pregnancy have a teratogenic effect on the developing embryo and fetus.

## Gender

As previously discussed in chapter 4, **gender** is the cultural, social and psychological meanings associated with masculinity and femininity. A person's sense of self as a member of a particular gender is known as **gender identity**. Because gender is considered a **social construct**, meaning that it does not exist naturally, but is instead a concept that is created by cultural and societal norms, there are cultural variations on how people express their gender identity. For example, in American culture, it is considered feminine to wear a dress or skirt. However, in many Middle Eastern, Asian, and African cultures, dresses or skirts (often referred to as sarongs, robes, or gowns) can be considered masculine. Similarly, the kilt worn by a Scottish male does not make him appear feminine in his culture.

For many adults, the drive to adhere to masculine and feminine **gender roles**, or the societal expectations associated with being male or female, continues throughout life. In American culture, masculine roles have traditionally been associated with strength, aggression, and dominance, while feminine roles have traditionally been associated with passivity, nurturing, and subordination. Men tend to outnumber women in professions such as law enforcement, the military, and politics, while

women tend to outnumber men in care-related occupations such as childcare, healthcare, and social work. These occupational roles are examples of stereotypical American male and female behavior, derived not from biology or genetics, but from our culture's traditions. Adherence to these roles may demonstrate fulfillment of social expectations, however, not necessarily personal preferences (Diamond, 2002).

Consequently, many adults are challenging gender labels and roles, and the long-standing **gender binary**; that is, categorizing humans as only female and male, has been undermined by current psychological research (Hyde, Bigler, Joel, Tate, & van Anders, 2019). The term gender now encompasses a wide range of possible identities, including cisgender, transgender, agender, genderfluid, genderqueer, gender nonconforming, bigender, pangender, ambigender, non-gendered, intergender, and **Two-spirit** which is a modern umbrella term used by some indigenous North Americans to describe gender-variant individuals in their communities (Carroll, 2016). Hyde et al. (2019) advocate for a conception of gender that stresses multiplicity and diversity and uses multiple categories that are not mutually exclusive.

**Gender Minority Discrimination:** Gender nonconforming people are much more likely to experience harassment, bullying, and violence based on their gender identity; they also experience much higher rates of discrimination in housing, employment, healthcare, and education (Borgogna, McDermott, Aita, & Kridel, 2019; National Center for Transgender Equality, 2015). Transgender individuals of color face additional financial, social, and interpersonal challenges, in comparison to the transgender community as a whole, as a result of structural racism. Black transgender people reported the highest level of discrimination among all transgender individuals of color. As members of several intersecting minority groups, transgender people of color, and transgender women of color, in particular, are especially vulnerable to employment discrimination, poor health outcomes, harassment, and violence. Consequently, they face even greater obstacles than white transgender individuals and cisgender members of their own race.

**Gender Minority Status and Mental Health:** Using data from over 43,000 college students, Borgona et al. (2019) examined mental health differences among several gender groups, including those identifying as cisgender, transgender and gender nonconforming. Results indicated that participants who identified as transgender and gender nonconforming had significantly higher levels of anxiety and depression than those identifying as cisgender. Borgona et al. explained the higher rates of anxiety and depression using the **minority stress model**, which states that an unaccepting social environment results in both external and internal stress which contributes to poorer mental health. External stressors include discrimination, harassment, and prejudice, while internal stressors include negative thoughts, feelings, and emotions resulting from one's identity. Borgona et al. recommend that mental health services that are sensitive to both gender minority and sexual minority status be available.

The transgender children discussed in chapter 4 may, when they become an adult, alter their bodies through medical interventions, such as surgery and hormonal therapy so that their physical being is better aligned with gender identity. However, not all transgender individuals choose to alter their bodies or physically transition. Many will maintain their original anatomy but may present themselves to society as a different gender, often by adopting the dress, hairstyle, mannerisms, or other characteristics typically assigned to a certain gender. It is important to note that people who cross-dress or wear clothing that is traditionally assigned to the opposite gender, such as transvestites, drag kings, and drag queens, do not necessarily identify as transgender (though some do). People often confuse the term **transvestite**, which is the practice of dressing and acting in a style or manner traditionally



associated with another sex (APA, 2013) with transgender. Cross-dressing is typically a form of self-expression, entertainment, or personal style, and not necessarily an expression about one's gender identity.

## Sexuality

**Human sexuality** refers to people's sexual interest in and attraction to others, as well as their capacity to have erotic experiences and responses. Sexuality may be experienced and expressed in a variety of ways, including thoughts, fantasies, desires, beliefs, attitudes, values, behaviors, practices, roles, and relationships. These may manifest themselves in biological, physical, emotional, social, or spiritual aspects. The biological and physical aspects of sexuality largely concern the human reproductive functions, including the human sexual response cycle and the basic biological drive that exists in all species. Emotional aspects of sexuality include bonds between individuals that are expressed through profound feelings or physical manifestations of love, trust, and care. Social aspects deal with the effects of human society on one's sexuality, while spirituality concerns an individual's spiritual connection with others through sexuality. Sexuality also impacts and is impacted by cultural, political, legal, philosophical, moral, ethical, and religious aspects of life.

**The Sexual Response Cycle:** Sexual motivation, often referred to as **libido**, is a person's overall sexual drive or desire for sexual activity. This motivation is determined by biological, psychological, and social factors. In most mammalian species, sex hormones control the ability to engage in sexual behaviors. However, sex hormones do not directly regulate the ability to copulate in primates (including humans); rather, they are only one influence on the motivation to engage in sexual behaviors. Social factors, such as work and family, also have an impact, as do internal psychological factors like personality and stress. Sex drive may also be affected by hormones, medical conditions, medications, lifestyle stress, pregnancy, and relationship issues.

The **sexual response cycle** is a model that describes the physiological responses that take place during sexual activity. According to Kinsey, Pomeroy, and Martin (1948), the cycle consists of four phases: excitement, plateau, orgasm, and resolution. The **excitement phase** is the phase in which the intrinsic (inner) motivation to pursue sex arises. The **plateau phase** is the period of sexual excitement with increased heart rate and circulation that sets the stage for orgasm. **Orgasm** is the release of tension, and the **resolution period** is the unaroused state before the cycle begins again.

**The Brain and Sex:** The brain is the structure that translates the nerve impulses from the skin into pleasurable sensations. It controls the nerves and muscles used during sexual behavior. The brain regulates the release of hormones, which are believed to be the physiological origin of sexual desire. The cerebral cortex, which is the outer layer of the brain that allows for thinking and reasoning, is believed to be the origin of sexual thoughts and fantasies. Beneath the cortex is the limbic system, which consists of the amygdala, hippocampus, cingulate gyrus, and septal area. These structures are where emotions and feelings are believed to originate, and they are important for sexual behavior.

The **hypothalamus** is the most important part of the brain for sexual functioning. This is the small area at the base of the brain consisting of several groups of nerve-cell bodies that receives input from the limbic system. Studies with lab animals have shown that the destruction of certain areas of the hypothalamus causes the complete elimination of sexual behavior. One of the reasons for the importance of the hypothalamus is that it controls the pituitary gland, which secretes hormones that control the other glands of the body.

**Hormones:** Several important sexual hormones are secreted by the pituitary gland. **Oxytocin**, also known as the hormone of love, is released during sexual intercourse when an orgasm is achieved. Oxytocin is also released in females when they give birth or are breastfeeding; it is believed that oxytocin is involved with maintaining close relationships. Both prolactin and oxytocin stimulate milk production in females. **Follicle-stimulating hormone (FSH)** is responsible for ovulation in females by triggering egg maturity; it also stimulates sperm production in males. **Luteinizing hormone (LH)** triggers the release of a mature egg in females during the process of ovulation. In males, testosterone appears to be a major contributing factor to sexual motivation. **Vasopressin** is involved in the male arousal phase, and the increase of vasopressin during erectile response may be directly associated with increased motivation to engage in sexual behavior.

The relationship between hormones and female sexual motivation is not as well understood, largely due to the overemphasis on male sexuality in Western research. **Estrogen** and **progesterone** typically regulate motivation to engage in sexual behavior for females, with estrogen increasing motivation and progesterone decreasing it. The levels of these hormones rise and fall throughout a woman's menstrual cycle. Research suggests that testosterone, oxytocin, and vasopressin are also implicated in female sexual motivation in similar ways as they are in males, but more research is needed to understand these relationships.

**Sexual Responsiveness Peak:** Men and women tend to reach their peak of sexual responsiveness at different ages. For men, sexual responsiveness tends to peak in the late teens and early twenties. Sexual arousal can easily occur in response to physical stimulation or fantasizing. Sexual responsiveness begins a slow decline in the late twenties and into the thirties, although a man may continue to be sexually active. Through time, a man may require more intense stimulation in order to become aroused. Women often find that they become more sexually responsive throughout their 20s and 30s and may peak in the late 30s or early 40s. This is likely due to greater self-confidence and reduced inhibitions about sexuality.

**Sexually Transmitted Infections:** **Sexually transmitted infections (STIs)**, also referred to as sexually transmitted diseases (STDs) or venereal diseases (VDs) are illnesses that have a significant probability of transmission by means of sexual behavior, including vaginal intercourse, anal sex, and oral sex. Some STIs can also be contracted by sharing intravenous drug needles with an infected person, as well as through childbirth or breastfeeding.

#### **Common STIs include:**

- chlamydia;
- herpes (HSV-1 and HSV-2);
- human papillomavirus (HPV);
- gonorrhea;
- syphilis;
- trichomoniasis;
- HIV (human immunodeficiency virus) and AIDS (acquired immunodeficiency syndrome).

According to the Centers for Disease Control and Prevention (CDC) (2014), there was an increase in the three most common types of STDs in 2014. These include 1.4 million cases of chlamydia, 350,000 cases of gonorrhea, and 20,000 cases of syphilis. Those most affected by STDs include those younger, gay/bisexual males, and females. The most effective way to prevent transmission of STIs is to practice



safe sex and avoid direct contact of skin or fluids which can lead to transfer with an infected partner. Proper use of safe-sex supplies (such as male condoms, female condoms, gloves, or dental dams) reduces contact and risk and can be effective in limiting exposure; however, some disease transmission may occur even with these barriers.

**Societal Views on Sexuality:** Society's views on sexuality are influenced by everything from religion to philosophy, and they have changed throughout history and are continuously evolving. Historically, religion has been the greatest influence on sexual behavior in the United States; however, in more recent years, peers and the media have emerged as two of the strongest influences, particularly among American teens (Potard, Courtois, & Rusch, 2008).

Mass media in the form of television, magazines, movies, and music continues to shape what is deemed appropriate or normal sexuality, targeting everything from body image to products meant to enhance sex appeal. Media serves to perpetuate a number of social scripts about sexual relationships and the sexual roles of men and women, many of which have been shown to have both empowering and problematic effects on people's (especially women's) developing sexual identities and sexual attitudes.

**Cultural Differences:** In the West, premarital sex is normative by the late teens, more than a decade before most people enter marriage. In the United States and Canada, and in northern and eastern Europe, cohabitation is also normative; most people have at least one cohabiting partnership before marriage. In southern Europe, cohabiting is still taboo, but premarital sex is tolerated in emerging adulthood. In contrast, both premarital sex and cohabitation remain rare and forbidden throughout Asia. Even dating is discouraged until the late twenties when it would be a prelude to a serious relationship leading to marriage. In cross-cultural comparisons, about three-fourths of emerging adults in the United States and Europe report having had premarital sexual relations by age 20, versus less than one fifth in Japan and South Korea (Hatfield & Rapson, 2006).

**Sexual Orientation:** A person's **sexual orientation** is their emotional and sexual attraction to a particular gender. It is a personal quality that inclines people to feel romantic or sexual attraction (or a combination of these) to persons of a given sex or gender. According to the American Psychological Association (APA) (2016), sexual orientation also refers to a person's sense of identity-based on those attractions, related behaviors, and membership in a community of others who share those attractions. Sexual orientation is independent of gender; for example, a transgender person may identify as heterosexual, homosexual, bisexual, pansexual, polysexual, asexual, or any other kind of sexuality, just like a cisgender person.

**Sexual Orientation on a Continuum:** Sexuality researcher Alfred Kinsey was among the first to conceptualize sexuality as a continuum rather than a strict dichotomy of gay or straight. To classify this continuum of heterosexuality and homosexuality, Kinsey et al. (1948) created a seven-point rating scale that ranged from exclusively heterosexual to exclusively homosexual. Research done over several decades has supported this idea that sexual orientation ranges along a continuum, from exclusive attraction to the opposite sex/gender to exclusive attraction to the same sex/gender (Carroll, 2016).

However, sexual orientation now can be defined in many ways. **Heterosexuality**, which is often referred to as being straight, is attraction to individuals of the opposite sex/gender, while **homosexuality**, being gay or lesbian, is attraction to individuals of one's own sex/gender. **Bisexuality** was a term traditionally used to refer to attraction to individuals of either male

or female sex, but it has recently been used in nonbinary models of sex and gender (i.e., models that do not assume there are only two sexes or two genders) to refer to attraction to any sex or gender. Alternative terms such as **pansexuality** and **polysexuality** have also been developed, referring to attraction to all sexes/genders and attraction to multiple sexes/genders, respectively (Carroll, 2016).

**Asexuality** refers to having no sexual attraction to any sex/gender. According to Bogaert (2015), about one percent of the population is asexual. Being asexual is not due to any physical problems, and the lack of interest in sex does not cause the individual any distress. Asexuality is being researched as a distinct sexual orientation.

**Development of Sexual Orientation:** According to current scientific understanding, individuals are usually aware of their sexual orientation between middle childhood and early adolescence. However, this is not always the case, and some do not become aware of their sexual orientation until much later in life. It is not necessary to participate in sexual activity to be aware of these emotional, romantic, and physical attractions; people can be celibate and still recognize their sexual orientation. Some researchers argue that sexual orientation is not static and inborn but is instead fluid and changeable throughout the lifespan.

There is no scientific consensus regarding the exact reasons why an individual holds a particular sexual orientation. Research has examined possible biological, developmental, social, and cultural influences on sexual orientation, but there has been no evidence that links sexual orientation to only one factor (APA, 2016). However, biological explanations, that include genetics, birth order, and hormones will be explored further as many scientists support biological processes occurring during the embryonic and early postnatal life as playing the main role in sexual orientation (Balthazart, 2018).

**Genetics:** Using both twin and familial studies, heredity provides one biological explanation for same-sex orientation. Bailey and Pillard (1991) studied pairs of male twins and found that the concordance rate for identical twins was 52%, while the rate for fraternal twins was only 22%. Bailey, Pillard, Neale, and Agyei (1993) studied female twins and found a similar difference with a concordance rate of 48% for identical twins and 16% for fraternal twins. Schwartz, Kim, Kolundzija, Rieger, & Sanders (2010) found that gay men had more gay male relatives than straight men, and sisters of gay men were more likely to be lesbians than sisters of straight men.

**Fraternal Birth Order:** The **fraternal birth order effect** indicates that the probability of a boy identifying as gay increases for each older brother born to the same mother (Balthazart, 2018; Blanchard, 2001). According to Bogaret et al. “the increased incidence of homosexuality in males with older brothers results from a progressive immunization of the mother against a male-specific cell-adhesion protein that plays a key role in cell-cell interactions, specifically in the process of synapse formation,” (as cited in Balthazart, 2018, p. 234). A meta-analysis indicated that the fraternal birth order effect explains the sexual orientation of between 15% and 29% of gay men.

**Hormones:** Excess or deficient exposure to hormones during prenatal development has also been theorized as an explanation for sexual orientation. One-third of females exposed to abnormal amounts of prenatal androgens, a condition called congenital adrenal hyperplasia (CAH), identify as bisexual or lesbian (Cohen-Bendahan, van de Beek, & Berenbaum, 2005). In contrast, too little exposure to prenatal androgens may affect male sexual orientation by not masculinizing the male brain (Carlson, 2011).

**Sexual Orientation Discrimination:** The United States is **heteronormative**, meaning that society supports heterosexuality as the norm. Consider, for example, that homosexuals are often asked, “When

did you know you were gay?” but heterosexuals are rarely asked, “When did you know you were straight?” (Ryle, 2011). Living in a culture that privileges heterosexuality has a significant impact on the ways in which non-heterosexual people are able to develop and express their sexuality.

Open identification of one’s sexual orientation may be hindered by **homophobia** which encompasses a range of negative attitudes and feelings toward homosexuality or people who are identified or perceived as being lesbian, gay, bisexual, or transgender (LGBT). It can be expressed as antipathy, contempt, prejudice, aversion, or hatred; it may be based on irrational fear and is sometimes related to religious beliefs (Carroll, 2016). Homophobia is observable in critical and hostile behavior, such as discrimination and violence on the basis of sexual orientations that are non- heterosexual. Recognized types of homophobia include **institutionalized homophobia**, such as religious and state-sponsored homophobia, and **internalized homophobia** in which people with same-sex attractions internalize, or believe, society’s negative views and/or hatred of themselves.

Sexual minorities regularly experience stigma, harassment, discrimination, and violence based on their sexual orientation (Carroll, 2016). Research has shown that gay, lesbian, and bisexual teenagers are at a higher risk of depression and suicide due to exclusion from social groups, rejection from peers and family, and negative media portrayals of homosexuals (Bauermeister et al., 2010). Discrimination can occur in the workplace, in housing, at schools, and in numerous public settings. Much of this discrimination is based on stereotypes and misinformation. Major policies to prevent discrimination based on sexual orientation have only come into effect in the United States in the last few years.

The majority of empirical and clinical research on LGBT populations is done with largely white, middle-class, well-educated samples. This demographic limits our understanding of more marginalized sub-populations that are also affected by racism, classism, and other forms of oppression. In the United States, non-Caucasian LGBT individuals may find themselves in a double minority, in which they are not fully accepted or understood by Caucasian LGBT communities and are also not accepted by their own ethnic group (Tye, 2006). Many people experience racism in the dominant LGBT community where racial stereotypes merge with gender stereotypes.

Each person experiences age-related physical changes based on many factors: biological factors, such as molecular and cellular changes, and oxidative damage are called **primary aging**, while aging that occurs due to controllable factors, such as an unhealthy lifestyle including lack of physical exercise and poor diet, is called **secondary aging** (Busse, 1969). These factors are shown in Figure 8.1

Getting out of shape is not an inevitable part of aging; it is probably due to the fact that middle- aged adults become less physically active and have experienced greater stress. Smoking tobacco, drinking alcohol, poor diet, stress, physical inactivity, and chronic disease, such as diabetes or arthritis, reduce overall health. However, there are things can be done to combat many of these changes by adopting healthier lifestyles.

## Physical Changes

**Hair:** When asked to imagine someone in middle adulthood, we often picture someone with the beginnings of wrinkles and gray or thinning hair. What accounts for these physical changes?

Hair color is due to a pigment called melanin which is produced by hair follicles (Martin, 2014). With aging, the hair follicles produce less melanin, and this causes the hair to become gray. Hair color typically starts turning lighter at the temples, but eventually all the hair will become white. For many, graying begins in the 30s, but it is largely determined by your genes. Gray hair occurs earlier in white people and later in Asians.

Genes also determine how much hair remains on your head. Almost everyone has some hair loss with aging, and the rate of hair growth slows with aging. Many hair follicles stop producing new hairs and hair strands become smaller. Men begin showing signs of balding by 30 and some are nearly bald by 60. Male-pattern baldness is related to testosterone and is identified by a receding hairline followed by hair loss at the top of the head. Figure 8.2 shows tennis champion Andre Agassi's characteristic male-patterned baldness. Women can also develop female-patterned baldness as their hair becomes less dense and the scalp becomes visible (Martin, 2014). Sudden hair loss, however, can be a symptom of a health problem.

**Skin:** Skin continues to dry out and is prone to more wrinkling, particularly on the sensitive face area. Wrinkles, or creases in the skin, are a normal part of aging. As we get older, our skin dries and loses the underlying layer of fat, so our face no longer appears smooth. Loss of muscle tone and thinning skin can make the face appear flabby or drooping. Although wrinkles are a natural part of aging and genetics plays a role, frequent sun exposure and smoking will cause wrinkles to appear sooner. Dark spots and blotchy skin also occur as one ages and are due to exposure to sunlight (Moskowitz, 2014). Blood vessels become more apparent as the skin continues to dry and get thinner.

**Sarcopenia:** The loss of muscle mass and strength that occurs with aging is referred to as **sarcopenia** (Morley, Baumgartner, Roubenoff, Mayer, & Nair, 2001). Sarcopenia is thought to be a significant factor in the frailty and functional impairment that occurs when older. The decline of growth and anabolic hormones, especially testosterone, and decreased physical activity have been implicated as causes of sarcopenia (Proctor, Balagopal, & Nair, 1998). This decline in muscle mass can occur as early as 40 years of age and contributes significantly to a decrease in life quality, increase in health care costs, and early death in older adults (Karakelides & Nair, 2005). Exercise is certainly important to increase strength, aerobic capacity, and muscle protein synthesis, but unfortunately it does not reverse all the age-related changes that occur. The muscle-to-fat ratio for both men and women also changes throughout middle adulthood, with an accumulation of fat in the stomach area.

**Lungs:** The lungs serve two functions: Supply oxygen and remove carbon dioxide. Thinning of the bones with age can change the shape of the rib cage and result in a loss of lung expansion. Age-related changes in muscles, such as the weakening of the diaphragm, can also reduce lung capacity. Both of these changes will lower oxygen levels in the blood and increase the levels of carbon dioxide. Experiencing shortness of breath and feeling tired can result (NIH, 2014b). In middle adulthood, these changes and their effects are often minimal, especially in people who are non-smokers and physically active. However, in those with chronic bronchitis, or who have experienced frequent pneumonia, asthma other lung-related disorders, or who are smokers, the effects of these normal age changes can be more pronounced.

## Sensory Changes

**Vision:** A normal change of the eye due to age is **presbyopia**, which is Latin for “old vision.” It refers to a loss of elasticity in the lens of the eye that makes it harder for the eye to focus on objects that are closer to the person. When we look at something far away, the lens flattens out; when looking at nearby objects tiny muscle fibers around the lens enable the eye to bend the lens. With age these muscles weaken and can no longer accommodate the lens to focus the light. Anyone over the age of 35 is at risk for developing presbyopia. According to the National Eye Institute (NEI) (2016), signs that someone may have presbyopia include:

- Hard time reading small print
- Having to hold reading material farther than arm’s distance
- Problems seeing objects that are close
- Headaches
- Eyestrain

Another common eye problem people experience as they age are **floaters**, little spots or “cobwebs” that float around the field of vision. They are most noticeable if you are looking at the sky on a sunny day, or at a lighted blank screen. Floaters occur when the vitreous, a gel-like substance in the interior of the eye, slowly shrinks. As it shrinks, it becomes somewhat stringy, and these strands can cast tiny shadows on the retina. In most cases, floaters are harmless, more of an annoyance than a sign of eye problems. However, floaters that appear suddenly, or that darken and obscure vision can be a sign of more serious eye problems, such as retinal tearing, infection, or inflammation. People who are very nearsighted (myopic), have diabetes, or who have had cataract surgery are also more likely to have floaters (NEI, 2009).

During midlife, adults may begin to notice a drop in **scotopic sensitivity**, the ability to see in dimmer light. By age 60, the retina receives only one third as much light as it did at age 20, making working in dimmer light more difficult (Jackson & Owsley, 2000). Night vision is also affected as the pupil loses some of its ability to open and close to accommodate drastic changes in light. Eyes become more sensitive to glare from headlights and street lights making it difficult to see people and cars, and movements outside of our direct line of sight (NIH, 2016c).

Finally, some people experience **dry eye syndrome**, which occurs when the eye does not produce tears properly, or when the tears evaporate too quickly because they are not the correct consistency (NEI, 2013). While dry eye can affect people at any age, nearly 5 million Americans over the age of 50 experience dry eye. It affects women more than men, especially after menopause. Women who experienced an early menopause may be more likely to experience dry eye, which can cause surface damage to the eye.

**Hearing:** Hearing problems increase during middle adulthood. According to a recent UK study (Dawes et al., 2014), the rate of hearing problems in their sample doubled between the ages of 40 and 55 and tripled by age 64. Similar statistics are found in U.S. samples of middle-aged adults. Prior to age 40, about 5.5% of adults report hearing problems. This jumps to 19% among 40 to 69 year-olds (American Psychological Association, 2016). Middle-aged adults may experience more problems understanding speech when in noisy environments, in comparison to younger adults (Füllgrabe, Moore, & Stone, 2015; Neidleman, Wambacq, Besing, Spitzer, & Koehnke, 2015). As we age we also lose the ability to hear higher frequencies (Humes, Kewley-Port, Fogerty, & Kinney, 2010). Hearing changes are more common among men than women, but males may underestimate their hearing problems (Uchida, Nakashima, Ando, Niino, & Shimokata, 2003). For many adults, hearing loss accumulates



after years of being exposed to intense noise levels. Men are more likely to work in noisy occupations. Hearing loss is also exacerbated by cigarette smoking, high blood pressure, diabetes, and stroke. Most hearing loss could be prevented by guarding against being exposed to extremely noisy environments.

## Health Concerns

**Heart Disease:** According to the most recent National Vital Statistics Reports (Kochanek, Murphy, Xu, & Arias, 2019) heart disease continues to be the number one cause of death for Americans as it claimed 23% of those who died in 2017. It is also the number one cause of death worldwide (World Health Organization, 2018). Heart disease develops slowly over time and typically appears in midlife (Hooker & Pressman, 2016).

Heart disease can include heart defects and heart rhythm problems, as well as narrowed, blocked, or stiffened blood vessels referred to as cardiovascular disease. The blocked blood vessels prevent the body and heart from receiving adequate blood. **Atherosclerosis**, or a buildup of fatty plaque in the arteries, is the most common cause of cardiovascular disease. The plaque buildup thickens the artery walls and restricts the blood flow to organs and tissues. Cardiovascular disease can lead to a heart attack, chest pain (angina), or stroke (Mayo Clinic, 2014a). Figure 8.5 illustrates atherosclerosis.

Symptoms of cardiovascular disease differ for men and women. Males are more likely to suffer chest pain, while women are more likely to demonstrate shortness of breath, nausea, and extreme fatigue. Symptoms can also include pain in the arms, legs, neck, jaw, throat, abdomen or back (Mayo Clinic, 2014a). According to the Mayo Clinic (2014a) there are many risk factors for developing heart disease, including medical conditions, such as high blood pressure, high cholesterol, diabetes, and obesity. Other risk factors include:

- **Advanced Age**-increased risk for narrowed arteries and weakened or thickened heart muscle.
- **Sex**-males are at greater risk, but a female's risk increases after menopause.
- **Family History**-increased risk, especially if male parent or brother developed heart disease before age 55 or female parent or sister developed heart disease before age 65.
- **Smoking**-nicotine constricts blood vessels and carbon monoxide damages the inner lining.
- **Poor Diet**-a diet high in fat, salt, sugar, and cholesterol.
- **Excessive Alcohol Consumption**-alcohol can raise the level of bad fats in the blood and increase blood pressure
- **Stress**-unrelieved stress can damage arteries and worsen other risk factors.
- **Poor Hygiene**-establishing good hygiene habits can prevent viral or bacterial infections that can affect the heart. Poor dental care can also contribute to heart disease.

Complications of heart disease can include heart failure, when the heart cannot pump enough blood to meet the body's needs, and a heart attack, such as when a blood clot blocks the blood flow to the heart. This blockage can damage or destroy a part of the heart muscle, and atherosclerosis is a factor in a heart attack. Treatment for heart disease includes medication, surgery, and lifestyle changes including exercise, healthy diet, and refraining from smoking.

Sudden cardiac arrest is the unexpected loss of heart functioning, breathing, and consciousness, often caused by an arrhythmia or abnormal heartbeat. The heartbeat may be too quick, too slow, or irregular. With a healthy heart, it is unlikely for a fatal arrhythmia to develop without an outside factor, such as

an electric shock or illegal drugs. If not treated immediately, sudden cardiac arrest can be fatal and result in sudden cardiac death.

**Hypertension**, or high blood pressure, is a serious health problem that occurs when the blood flows with a greater force than normal. One in three American adults (70 million people) have hypertension and only half have it under control (Nwankwo, Yoon, Burt, & Gu, 2013). It can strain the heart, increase the risk of heart attack and stroke, or damage the kidneys (CDC, 2014a). Uncontrolled high blood pressure in early and middle adulthood can also damage the brain's white matter (axons) and may be linked to cognitive problems later in life (Maillard et al., 2012). Normal blood pressure is under 120/80 (see Table 8.1). The first number is the **systolic pressure**, which is the pressure in the blood vessels when the heartbeats. The second number is the **diastolic pressure**, which is the pressure in the blood vessels when the heart is at rest. High blood pressure is sometimes referred to as the silent killer, as most people with hypertension experience no symptoms. Making positive lifestyle changes can often reduce blood pressure.

Risk factors for high blood pressure include:

- Family history of hypertension
- A diet that is too high in sodium often found in processed foods, and too low in potassium
- Sedentary lifestyle and Obesity
- Too much alcohol consumption
- Tobacco use, as nicotine raises blood pressure (CDC, 2014b)

**Cancer:** After heart disease, cancer was the second leading cause of death for Americans in 2017 as it accounted for 21.3% of all deaths (Kochanek et al., 2016). According to the National Institutes of Health (2015), **cancer** is the name given to a collection of related diseases in which the body's cells begin to divide without stopping and spread into surrounding tissues. These extra cells can divide, and form growths called tumors, which are typically masses of tissue. Cancerous tumors are malignant, which means they can invade nearby tissues. When removed malignant tumors may grow back. Unlike malignant tumors, benign tumors do not invade nearby tissues. Benign tumors can sometimes be quite large, and when removed usually do not grow back. Although benign tumors in the body are not cancerous, benign brain tumors can be life-threatening.

Cancer cells can prompt nearby normal cells to form blood vessels that supply the tumors with oxygen and nutrients, which allows them to grow. These blood vessels also remove waste products from the tumors. Cancer cells can also hide from the immune system, a network of organs, tissues, and specialized cells that protects the body from infections and other conditions. Lastly, cancer cells can metastasize, which means they can break from where they first formed, called the primary cancer, and travel through the lymph system or blood to form new tumors in other parts of the body. This new metastatic tumor is the same type as the primary tumor (National Institutes of Health, 2015). Figure 8.6 illustrates how cancers can metastasize.

Cancer can start almost anywhere in the human body. While normal cells mature into very distinct cell types with specific functions, cancer cells do not and continue to divide without stopping. Further, cancer cells are able to ignore the signals that normally tell cells to stop dividing or to begin a process known as programmed cell death which the body uses to get rid of unneeded cells. With the growth of cancer cells, normal cells are crowded out and the body is unable to work the way it is supposed to.



For example, the cancer cells in lung cancer form tumors which interfere with the functioning of the lungs and how oxygen is transported to the rest of the body.

There are more than 100 types of cancer. The American Cancer Society assembles a list of the most common types of cancers in the United States. To qualify for the 2016 list, the estimated annual incidence had to be 40,000 cases or more. The most common type of cancer on the list is breast cancer, with more than 249,000 new cases expected in 2016. The next most common cancers are lung cancer and prostate cancer. Table 8.2 lists the estimated number of new cases and deaths for each common cancer type for 2019 (American Cancer Society, 2019).

**Cholesterol** is a waxy fatty substance carried by lipoprotein molecules in the blood. It is created by the body to create hormones and digest fatty foods and is also found in many foods. Your body needs cholesterol, but too much can cause heart disease and stroke. Two important kinds of cholesterol are low-density lipoprotein (LDL) and high-density lipoprotein (HDL). The third type of fat is called triglycerides. Your total cholesterol score is based on all three types of lipids (see Table 8.3). Total cholesterol is calculated by adding HDL plus LDL plus 20% of the Triglycerides.

LDL cholesterol makes up the majority of the body's cholesterol, however, it is often referred to as "bad" cholesterol because at high levels it can form plaque in the arteries leading to heart attack and stroke. HDL cholesterol is often referred to as "good" cholesterol, absorbs cholesterol and carries it back to the liver, where it is then flushed from the body. Higher levels of HDL can reduce the risk of heart attack and stroke. Triglycerides are a type of fat in the blood used for energy. High levels of triglycerides can also increase your risk for heart disease and stroke when coupled with high LDL and low HDL. All adults 20 or older should have their cholesterol checked. In early adulthood, doctors may check every few years if the numbers have previously been normal, and there are no other signs of heart disease. In middle adulthood, this may become part of the annual check-up (CDC, 2015).

Risk factors for high cholesterol include: A family history for high cholesterol, diabetes, a diet high in saturated fats, trans fat, and cholesterol, physical inactivity, and obesity. Almost 32% of American adults have high LDL cholesterol levels, and the majority do not have it under control, nor have they made lifestyle changes (CDC, 2015).

**Diabetes (Diabetes Mellitus)** is a disease in which the body does not control the amount of glucose in the blood. This disease occurs when the body does not make enough insulin or does not use it the way it should (NIH, 2016a). Insulin is a type of hormone that helps glucose in the blood enter cells to give them energy. In adults, 90% to 95% of all diagnosed cases of diabetes are type 2 (American Diabetes Association (ADA), 2016). Type 2 diabetes usually begins with **insulin resistance**, a disorder in which the cells in the muscles, liver, and fat tissue do not use insulin properly (CDC, 2014d). As the need for insulin increases, cells in the pancreas gradually lose the ability to produce enough insulin. In some Type 2 diabetics, pancreatic beta cells will cease functioning, and the need for insulin injections will become necessary. Some people with diabetes experience insulin resistance with only minor dysfunction of the beta-cell secretion of insulin. Other diabetics experience only slight insulin resistance, with the primary cause being a lack of insulin secretion (CDC, 2014d).

One in three adults are estimated to have prediabetes, and 9 in 10 of them do not know. According to the CDC (2014d) without intervention, 15% to 30% of those with prediabetes will develop diabetes within 5 years. In 2015, 30.2 million people (9.4% of the population) were living with diabetes in America, mostly adults age 18 and up (CDC, 2017). Table 8.4 shows the numbers in millions and

percentage of adults, by age and gender, with both diagnosed and undiagnosed diabetes. The median age of diagnosis is 54 (CDC, 2014d). During middle adulthood, the number of people with diabetes dramatically increases; with 4.3 million living with diabetes prior to age 45, to over 13 million between the ages of 45 to 64; a four-fold increase. Men are slightly more likely to experience diabetes than are women.

Diabetes also affects ethnic and racial groups differently. Non-Hispanic Whites are less likely to be diagnosed with diabetes than are Asian Americans, Hispanics, non-Hispanic Blacks, and American Indians/Alaskan Natives. However, these general figures hide the variations within these groups. For instance, the rate of diabetes was less for Central, South, and Cuban Americans than for Mexican Americans and Puerto Ricans, and less for Alaskan Natives than the American Indians of southern Arizona (CDC, 2017). Additionally, educational attainment, which is linked to one's economic level, is correlated with diabetes. Percentages includes: Less than a high school degree (21.6%), high school degree (9.5%), and more than a high school degree (7.2%).

The risk factors for diabetes include:

- Those over age 45
- Obesity
- Family history of diabetes
- History of gestational diabetes (see Chapter 2)
- Race and ethnicity
- Physical inactivity
- Diet.

Diabetes has been linked to numerous health complications. Adults with diabetes are 1.7 times more likely to have cardiovascular disease, 1.8 times more likely to experience a heart attack, and 1.5 times more likely to experience stroke than adults without diabetes. Diabetes can cause blindness and other eye problems. Between 40%-45% of Americans with diabetes have some degree of **diabetic retinopathy**, which is damage to the small blood vessels in the retina that may lead to loss of vision (NEI, 2015). More than 4% showed advanced diabetic retinopathy. Diabetes is linked as the primary cause of almost half (44%) of new cases of kidney failure each year. About 60% of non-traumatic limb amputations occur in people with diabetes. Diabetes has been linked to hearing loss, tinnitus (ringing in the ears), gum disease, and neuropathy (nerve disease) (CDC, 2014d).

Typical tests for diabetes include a fasting glucose test and the A1C (See Table 8.5). Fasting glucose levels should be under 100mg/dl (ADA, 2016). The A1C provides information about the average levels of blood glucose over the last 3 months (NIH, 2014a). The A1C should be under 5.7, where a 5.0 = 97mg/dl and a 6.0 = 126 mg/dl (ADA, 2016).

**Metabolic Syndrome** is a cluster of several cardiometabolic risk factors, including large waist circumference, high blood pressure, and elevated triglycerides, LDL, and blood glucose levels, which can lead to diabetes and heart disease (Crist et al., 2012). The prevalence of metabolic syndrome in the U.S. is approximately 34% and is especially high among Hispanics and African Americans (Ford, Li, & Zhao, 2010). Prevalence increases with age, peaking in one's 60s (Ford et al., 2010). Metabolic syndrome increases morbidity from cardiovascular disease and diabetes (Hu et al., 2004; Malik, 2004). Hu and colleagues found that even having one or two of the risk factors for metabolic syndrome

increased the risk of mortality. Crist et al. (2012) found that increasing aerobic activity and reducing weight led to a drop in many of the risk factors of metabolic syndrome, including a reduction in waist circumference and blood pressure, and an increase in HDL cholesterol.

**Rheumatoid arthritis (RA)** is an inflammatory disease that causes pain, swelling, stiffness, and loss of function in the joints (NIH, 2016b). RA occurs when the immune system attacks the membrane lining the joints (see Figure 8.8). RA is the second most common form of arthritis after osteoarthritis, which is the normal wear and tear on the joints discussed in chapter 9. Unlike osteoarthritis, RA is symmetric in its attack of the body, thus, if one shoulder is affected so is the other. In addition, those with RA may experience fatigue and fever. Below are the common features of RA (NIH, 2016b).

### **Features of Rheumatoid Arthritis**

- Tender, warm, swollen joints
- Symmetrical pattern of affected joints
- Joint inflammation often affecting the wrist and finger joints closest to the hand
- Joint inflammation sometimes affecting other joints, including the neck, shoulders, elbows, hips, knees, ankles, and feet
- Fatigue, occasional fevers, a loss of energy
- Pain and stiffness lasting for more than 30 minutes in the morning or after a long rest
- Symptoms that last for many years
- Variability of symptoms among people with the disease.

About 1.5 million people (approximately 0.6%) of Americans experience rheumatoid arthritis. It occurs across all races and age groups, although the disease often begins in middle adulthood and occurs with increased frequency in older people. Like some other forms of arthritis, rheumatoid arthritis occurs much more frequently in women than in men. About two to three times as many women as men have the disease (NIH, 2016b). The lifetime risk for RA for women is 3.6% and 1.7% for men (Crowson, et al., 2011).

Genes play a role in the development of RA. However, individual genes by themselves confer only a small risk of developing the disease, as some people who have these particular genes never develop RA. Scientists think that something must occur to trigger the disease process in people whose genetic makeup makes them susceptible to rheumatoid arthritis. For instance, some scientists also think hormonal factors may be involved. In women who experience RA, the symptoms may improve during pregnancy and flare after pregnancy. Women who use oral contraceptives may increase their likelihood of developing RA. This suggests hormones, or possibly deficiencies or changes in certain hormones, may increase the risk of developing RA in a genetically susceptible person (NIH, 2016b).

Rheumatoid arthritis can affect virtually every area of a person's life, and it can interfere with the joys and responsibilities of work and family life. Fortunately, current treatment strategies allow most people with RA to lead active and productive lives. Pain-relieving drugs and medications can slow joint damage and establishing a balance between rest and exercise can also lessen the symptoms of RA (NIH, 2016b).

**Fatty liver disease (hepatic steatosis)** refers to the accumulation of fat in the liver. The liver normally contains little fat, and anything below 5% of liver weight is considered normal. This disease is present

in 33% of American adults. In the past, the main cause of fat accumulation in the liver was due to excessive alcohol consumption, often eventually leading to cirrhosis and liver failure. Today, increased caloric intake, especially resulting in obesity, and little physical activity are the main causes. Mild to moderate levels of hepatic steatosis can be reversed through healthy lifestyle changes (Nassir, Rector, Hammoud, & Ibdah, 2015).

## **Digestive Issues**

**Heartburn**, also called acid indigestion or pyrosis, is a common digestive problem in adults and is the result of stomach acid backing up into the esophagus. Prolonged contact with the digestive juices injures the lining of the esophagus and causes discomfort. Heartburn that occurs more frequently may be due to gastroesophageal reflux disease or GERD. Normally the lower sphincter muscle in the esophagus keeps the acid in the stomach from entering the esophagus. In GERD this muscle relaxes too frequently and the stomach acid flows into the esophagus. In the U.S., 60 million people experience heartburn at least once a month, and 15 million experience it every day. Prolonged problems with heartburn can lead to more serious complications, including esophageal cancer, one of the most lethal forms of cancer in the U.S. Problems with heartburn can be linked to eating fatty or spicy foods, caffeine, smoking, and eating before bedtime (American College of Gastroenterology, 2016a).

**Gallstones** are hard particles, including fatty materials, bile pigments, and calcium deposits, that can develop in the gallbladder. Ranging in size from a grain of sand to a golf ball, they typically take years to develop, but in some people have developed over the course of a few months. About 75% of gallstones do not create any symptoms, but those that do may cause sporadic upper abdominal pain when stones block bile or pancreatic ducts. If stones become lodged in the ducts, it may necessitate surgery or other medical intervention as it could become life-threatening if left untreated (American College of Gastroenterology, 2016b).

Gallstones are present in about 20% of women and 10% of men over the age of 55 (American College of Gastroenterology, 2016b). Risk factors include a family history of gallstones, diets high in calories and refined carbohydrates (such as, white bread and rice), diabetes, metabolic syndrome, Crohn's disease, and obesity, which increases the cholesterol in the bile and thus increases the risk of developing gallstones (NIH, 2013).

## **Sleep**

According to the American Academy of Sleep Medicine (Kasper, 2015) adults require at least 7 hours of sleep per night to avoid the health risks associated with chronic sleep deprivation. Less than 6 hours and more than 10 hours is also not recommended for those in middle adulthood (National Sleep Foundation, 2015). Not surprisingly, many Americans do not receive the 7-9 hours of sleep recommended. In 2013, only 59% of U.S. adults met that standard, while in 1942, 84% did (Jones, 2013). This means 41% of Americans receive less than the recommended amount of nightly sleep. Additional results included that in 1993, 67% of Americans felt they were getting enough sleep, but in

2013 only 56% felt they received as much sleep as needed. Additionally, 43% of Americans in 2013 believed they would feel better with more sleep.

**Sleep problems:** According to the Sleep in America poll (National Sleep Foundation, 2015), 9% of Americans report being diagnosed with a sleep disorder, and of those 71% have sleep apnea and 24% suffer from insomnia. Pain is also a contributing factor in the difference between the amount of sleep Americans say they need and the amount they are getting. An average of 42 minutes of sleep debt occur for those with chronic pain, and 14 minutes for those who have suffered from acute pain in the past week. Stress and overall poor health are also key components of shorter sleep durations and worse sleep quality. Those in midlife with lower life satisfaction experienced greater delay in the onset of sleep than those with higher life satisfaction. Delayed onset of sleep could be the result of worry and anxiety during midlife, and improvements in those areas should improve sleep. Lastly, menopause can affect a woman's sleep duration and quality (National Sleep Foundation, 2016).

**Children in the home and sleep:** As expected, having children at home affects the amount of sleep one receives. According to a 2016 National Center for Health Statistics analysis (CDC, 2016) having children decreases the amount of sleep an individual receives, however, having a partner can improve the amount of sleep for both males and females. Table 8.6 illustrates the percentage of individuals not receiving seven hours of sleep per night based on parental role.

**Negative consequences of insufficient sleep:** There are many consequences of too little sleep, and they include physical, cognitive, and emotional changes. Sleep deprivation suppresses immune responses that fight off infection, and can lead to obesity, memory impairment, and hypertension (Ferrie et al., 2007; Kushida, 2005). Insufficient sleep is linked to an increased risk for colon cancer, breast cancer, heart disease and type 2 diabetes (Pattison, 2015). A lack of sleep can increase stress as cortisol (a stress hormone) remains elevated which keeps the body in a state of alertness and hyperarousal which increases blood pressure. Sleep is also associated with longevity. Dew et al. (2003) found that older adults who had better sleep patterns also lived longer. During deep sleep a growth hormone is released which stimulates protein synthesis, breaks down fat that supplies energy, and stimulates cell division. Consequently, a decrease in deep sleep contributes to less growth hormone being released and subsequent physical decline seen in aging (Pattison, 2015).

Sleep disturbances can also impair glucose functioning in middle adulthood. Caucasian, African American, and Chinese non-shift-working women aged 48–58 years who were not taking insulin-related medications, participated in the Study of Women's Health across the Nation (SWAN) Sleep Study and were subsequently examined approximately 5 years later (Taylor et al., 2016). Body mass index (BMI) and insulin resistance were measured at two-time points. Results indicated that irregular sleep schedules, including highly variable bedtimes and staying up much later than usual, are associated in midlife women with insulin resistance, which is an important indicator of metabolic health, including diabetes risk. Diabetes risk increases in midlife women, and irregular sleep schedules may be an important reason because irregular bedtime schedules expose the body to varying levels of light, which is the most important timing cue for the body's circadian clock. By disrupting circadian timing, bedtime variability may impair glucose metabolism and energy homeostasis.

## **Exercise, Nutrition, and Weight**



**The impact of exercise:** Exercise is a powerful way to combat the changes we associate with aging. Exercise builds muscle, increases metabolism, helps control blood sugar, increases bone density, and relieves stress. Unfortunately, fewer than half of midlife adults exercise and only about 20 percent exercise frequently and strenuously enough to achieve health benefits. Many stop exercising soon after they begin an exercise program, particularly those who are very overweight. The best exercise programs are those that are engaged in regularly, regardless of the activity. A well-rounded program that is easy to follow includes walking and weight training. Having a safe, enjoyable place to walk can make the difference in whether or not someone walks regularly. Weight lifting and stretching exercises at home can also be part of an effective program. Exercise is particularly helpful in reducing stress in midlife. Walking, jogging, cycling, or swimming can release the tension caused by stressors. Learning relaxation techniques can also have healthful benefits. Exercise can be thought of as preventative health care. Promoting exercise for the 78 million “baby boomers” may be one of the best ways to reduce health care costs and improve quality of life (Shure & Cahan, 1998).

According to the Office of Disease Prevention and Health Promotion (2008), the following are exercise guidelines for adults:

- Adults should avoid being inactive. Any activity will result in some health benefits.
- For substantial health benefits, adults should engage in at least 150 minutes per week of moderate-intensity exercise OR at least 75 minutes of vigorous-intensity aerobic activity. Aerobic activity should occur for at least 10 minutes and preferably spread throughout the week.
- For more extensive health benefits, adults can increase their aerobic activity to 300 minutes per week of moderate-intensity OR 150 minutes per week of vigorous-intensity aerobic activity.
- Adults should also participate in muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on two or more days per week.

**Nutritional concerns:** Aging brings about a reduction in the number of calories a person requires (see Table 8.7 for estimated caloric needs in middle-aged adults). Many Americans respond to weight gain by dieting. However, eating less does not typically mean eating right and people often suffer vitamin and mineral deficiencies as a result. All adults need to be especially cognizant of the amount of sodium, sugar, and fat they are ingesting.

**Excess Sodium:** According to dietary guidelines, adults should consume less than 2,300mg (1 teaspoon) per day of sodium. The American Heart Association (2016) reports that the average sodium intake among Americans is 3440mg per day. Processed foods are the main culprits of excess sodium. High sodium levels in the diet is correlated with increased blood pressure, and its reduction does show corresponding drops in blood pressure. Adults with high blood pressure are strongly encouraged to reduce their sodium intake to 1500mg (U.S. Department of Health and Human Services & U.S. Department of Agriculture (USHHS & USDA), 2015).

**Excess Fat:** Dietary guidelines also suggests that adults should consume less than 10 percent of calories per day from saturated fats. The American Heart Association (2016) says optimally we should aim for a dietary pattern that achieves 5% to 6% of calories from saturated fat. In a 2000 calorie diet that is about 120 calories from saturated fat. In the average American diet about 34.3% of the diet comes from fat, with 15.0% from saturated fat (Berglund et al., 1999). Diets high in fat not only contribute to weight gain, but have been linked to heart disease, stroke, and high cholesterol.

**Added Sugar:** According to the recent Dietary Guidelines for Americans (USHHS & USDA, 2015) eating healthy means adults should consume less than 10 percent of calories per day from added sugars. Yet, currently, about 15% of the calories in the American adult diet come from added sugars, or about 22 teaspoons of sugar per day (NIH, 2014c). Excess sugar not only contributes to weight gain but diabetes and other health problems.

**Metabolism and Weight Gain:** One of the common complaints of midlife adults is weight gain, especially the accumulation of fat in the abdomen, which is often referred to as the middle-aged spread (Lachman, 2004). Men tend to gain fat on their upper abdomen and back, while women tend to gain more fat on their waist and upper arms. Many adults are surprised at this weight gain because their diets have not changed, however, their metabolism has slowed during midlife. **Metabolism** is the process by which the body converts food and drink into energy. The calories consumed are combined with oxygen to release the energy needed to function (Mayo Clinic, 2014b). People who have more muscle burn more calories, even at rest, and thus have a higher metabolism.

However, as you get older, the amount of muscle decreases. Consequently, fat accounts for more of one's weight in midlife. and fat slows down the number of calories burned. To compensate, midlife adults have to increase their level of exercise, eat less, and watch their nutrition to maintain their earlier physique.

**Obesity:** As discussed in the early adulthood chapter, obesity is a significant health concern for adults throughout the world, and especially America. Obesity rates continue to increase and the current rate for those 40-59 is 42.8%, which is the highest percentage per age group (CDC, 2017). Being overweight is associated with a myriad of health conditions including diabetes, high blood pressure, and heart disease. New research is now linking obesity to Alzheimer's disease. Chang et al. (2016) found that being overweight in midlife was associated with earlier onset of Alzheimer's disease. The study looked at 1,394 men and women who were part of the Baltimore Longitudinal Study of Aging. Their average age was around 60, and they were followed for 14 years. Results indicated that people with the highest body mass index, or BMI, at age 50 were more likely to develop Alzheimer's disease. In fact, each one-point increase in BMI was associated with getting Alzheimer's six to seven months earlier. Those with the highest BMIs also had more brain changes typical of Alzheimer's, even if they did not have symptoms of the disease. Scientists speculate that fat cells may produce harmful chemicals that promote inflammation in blood vessels throughout the body, including in the brain. The conclusion of the study was that a healthy BMI at midlife may delay the onset of Alzheimer's disease.

**Concluding Thoughts:** Many of the changes that occur in midlife can be easily compensated for, such as buying glasses, exercising, and watching what one eats. However, the percentage of middle adults who have a significant health concern has increased in the past 15 years. According to the 2016 United Health Foundation's America's Health Rankings Senior Report, the next generation of seniors will be less healthy than the current seniors (United Health Foundation, 2016). The study compared the health of middle-aged Americans (50-64 years of age) in 2014 to middle-aged Americans in 1999. Results indicated that in the past 15 years the prevalence of diabetes has increased by 55% and the prevalence of obesity has increased by 25%. At the state level, Massachusetts ranked first for healthy seniors, while Louisiana ranked last. Illinois ranked 36th, while Wisconsin scored higher at 13th.

What can we conclude from this information? Lifestyle has a strong impact on the health status of midlife adults, and it becomes important for midlife adults to take preventative measures to enhance physical well-being. Those midlife adults who have a strong sense of mastery and control over their lives, who engage in challenging physical and mental activity, who engage in weight-bearing exercise,



monitor their nutrition, receive adequate sleep, and make use of social resources are most likely to enjoy a plateau of good health through these years (Lachman, 2004).

## **Climacteric**

The **climacteric**, or the midlife transition when fertility declines, is biologically based but impacted by the environment. During midlife, men may experience a reduction in their ability to reproduce. Women, however, lose their ability to reproduce once they reach menopause.

**Female Sexual and Reproductive Health: Perimenopause** refers to a period of transition in which a woman's ovaries stop releasing eggs and the level of estrogen and progesterone production decreases. **Menopause** is defined as 12 months without menstruation. The average age of menopause is approximately 51, however, many women begin experiencing symptoms in their 40s. These symptoms occur during perimenopause, which can occur 2 to 8 years before menopause (Huang, 2007). A woman may first begin to notice that her periods are more or less frequent than before. After a year without menstruation, a woman is considered menopausal and no longer capable of reproduction.

**Symptoms:** The symptoms that occur during perimenopause and menopause are typically caused by the decreased production of estrogen and progesterone (North American Menopause Society, 2016). The shifting hormones can contribute to the inability to fall asleep. Additionally, the declining levels of estrogen may make a woman more susceptible to environmental factors and stressors which disrupt sleep. A **hot flash** is a surge of adrenaline that can awaken the brain from sleep. It often produces sweat and a change of temperature that can be disruptive to sleep and comfort levels. Unfortunately, it may take time for the adrenaline to recede and allow sleep to occur again (National Sleep Foundation, 2016).

The loss of estrogen also affects vaginal lubrication which diminishes and becomes waterier and can contribute to pain during intercourse. The vaginal wall also becomes thinner, and less elastic. Estrogen is also important for bone formation and growth, and decreased estrogen can cause osteoporosis resulting in decreased bone mass. Depression, irritability, and weight gain are often associated with menopause, but they are not menopausal (Avis, Stellato & Crawford, 2001; Rossi, 2004). Weight gain can occur due to an increase in intra-abdominal fat followed by a loss of lean body mass after menopause (Morita et al., 2006). Consequently, women may need to change their lifestyle to counter any weight gain. Depression and mood swings are more common during menopause in women who have prior histories of these conditions rather than those who have not.

Additionally, the incidence of depression and mood swings is not greater among menopausal women than non-menopausal women. Figure 8.12 identifies symptoms experienced by women during menopause, however, women vary greatly in the extent to which these symptoms are experienced. Most American women go through menopause with few problems (Carroll, 2016). Overall, menopause is not seen as universally distressing (Lachman, 2004).

**Hormone Replacement Therapy:** Concerns about the effects of hormone replacement has changed the frequency with which estrogen replacement and hormone replacement therapies have been

prescribed for menopausal women. Estrogen replacement therapy was once commonly used to treat menopausal symptoms. However, more recently, hormone replacement therapy has been associated with breast cancer, stroke, and the development of blood clots (NIH,

2007). Most women do not have symptoms severe enough to warrant estrogen or hormone replacement therapy. If so, they can be treated with lower doses of estrogen and monitored with more frequent breast and pelvic exams. There are also some other ways to reduce symptoms. These include avoiding caffeine and alcohol, eating soy, remaining sexually active, practicing relaxation techniques, and using water-based lubricants during intercourse.

**Menopause and Ethnicity:** In a review of studies that mentioned menopause, symptoms varied greatly across countries, geographic regions, and even across ethnic groups within the same region (Palacios, Henderson, & Siseles, 2010). For example, the Study of Women's Health across the Nation (SWAN) examined 14,906 white, African American, Hispanic, Japanese American, and Chinese American women's menopausal experiences (Avis et al., 2001). After controlling for age, educational level, general health status, and economic stressors, white women were more likely to disclose symptoms of depression, irritability, forgetfulness, and headaches compared to women in the other racial/ethnic groups. African American women experienced more night sweats, but this varied across research sites. Finally, Chinese American and Japanese American reported fewer menopausal symptoms when compared to the women in the other groups. Overall, the Chinese and Japanese groups reported the fewest symptoms, while white women reported more mental health symptoms and African American women reported more physical symptoms.

**Cultural Differences:** Cultural influences seem to also play a role in the way menopause is experienced. Further, the prevalence of language specific to menopause is an important indicator of the occurrence of menopausal symptoms in a culture. Hmong tribal women living in Australia and Mayan women report that there is no word for "hot flashes" and both groups did not experience these symptoms (Yick-Flanagan, 2013). When asked about physical changes during menopause, the Hmong women reported lighter or no periods. They also reported no emotional symptoms and found the concept of emotional difficulties caused by menopause amusing (Thurston & Vissandjee, 2005). Similarly, a study with First Nation women in Canada found there was no single word for "menopause" in the Oji-Cree or Ojibway languages, with women referring to menopause only as "that time when periods stop" (Madden, St Pierre-Hansen & Kelly, 2010).

While some women focus on menopause as a loss of youth, womanhood, and physical attractiveness, career-oriented women tend to think of menopause as a liberating experience. Japanese women perceive menopause as a transition from motherhood to a more whole person, and they no longer feel obligated to fulfill certain expected social roles, such as the duty to be a mother (Kagawa-Singer, Wu, & Kawanishi, 2002). In India, 94% of women said they welcomed menopause. Aging women gain status and prestige and no longer have to go through self-imposed menstrual restrictions, which may contribute to Indian women's experiences (Kaur, Walia, & Singh, 2004). Overall, menopause signifies many different things to women around the world and there is no typical experience. Further, normalizing rather than pathologizing menopause is supported by research and women's experiences.

**Male Sexual and Reproductive Health:** Although males can continue to father children throughout middle adulthood, erectile dysfunction (ED) becomes more common. Erectile dysfunction refers to the inability to achieve an erection or an inconsistent ability to achieve an erection (Swierzewski, 2015). Intermittent ED affects as many as 50% of men between the ages of 40 and 70. About 30 million men

in the United States experience chronic ED and the percentages increase with age. Approximately 4% of men in their 40s, 17% of men in their 60s, and 47% of men older than 75 experience chronic ED.

Causes for ED are primarily due to medical conditions, including diabetes, kidney disease, alcoholism, and atherosclerosis (build-up of plaque in the arteries). Plaque is made up of fat, cholesterol, calcium and other substances found in the blood. Over time plaque builds up, hardens, and restricts the blood flow in the arteries (NIH, 2014d). This build-up limits the flow of oxygenated blood to organs and the penis. Overall, diseases account for 70% of chronic ED, while psychological factors, such as stress, depression, and anxiety account for 10%-20% of all cases. Many of these causes are treatable, and ED is not an inevitable result of aging.

Men during middle adulthood may also experience prostate enlargement, which can interfere with urination and deficient testosterone levels which decline throughout adulthood, but especially after age 50. If testosterone levels decline significantly, it is referred to as **andropause or late-onset hypogonadism**. Identifying whether testosterone levels are low is difficult because individual blood levels vary greatly. Low testosterone is not a concern unless it is accompanied by negative symptoms such as low sex drive, ED, fatigue, loss of muscle, loss of body hair, or breast enlargement. Low testosterone is also associated with medical conditions, such as diabetes, obesity, high blood pressure, and testicular cancer. The effectiveness of supplemental testosterone is mixed, and long term testosterone replacement therapy for men can increase the risk of prostate cancer, blood clots, heart attack, and stroke (WebMD, 2016). Most men with low testosterone do not have related problems (Berkeley Wellness, 2011).

## The Climacteric and Sexuality

Sexuality is an important part of people's lives at any age, and many older adults are very interested in staying sexually active (Dimah & Dimah, 2004). According to the National Survey of Sexual Health and Behavior (NSSHB) (Center for Sexual Health Promotion, 2010), 74% of males and 70% of females aged 40-49 engaged in vaginal intercourse during the previous year, while 58% of males and 51% of females aged 50-59 did so.

Despite these percentages indicating that middle adults are sexually active, age-related physical changes can affect sexual functioning. For women, decreased sexual desire and pain during vaginal intercourse because of menopausal changes have been identified (Schick et al., 2010). A woman may also notice less vaginal lubrication during arousal which can affect overall pleasure (Carroll, 2016). Men may require more direct stimulation for an erection and the erection may be delayed or less firm (Carroll, 2016). As previously discussed men may experience erectile dysfunction or experience medical conditions (such as diabetes or heart disease) that impact sexual functioning. Couples can continue to enjoy physical intimacy and may engage in more foreplay, oral sex, and other forms of sexual expression rather than focusing as much on sexual intercourse.

The risk of pregnancy continues until a woman has been without menstruation for at least 12 months, however, and couples should continue to use contraception. People continue to be at risk of contracting sexually transmitted infections, such as genital herpes, chlamydia, and genital warts. In 2014, 16.7% of the country's new HIV diagnoses (7,391 of 44,071) were among people 50 and older, according to the Centers for Disease Control and Prevention (2014e). This was an increase from 15.4% in 2005. Practicing safe sex is important at any age, but unfortunately, adults over the age of 40 have the lowest

rates of condom use (Center for Sexual Health Promotion, 2010). This low rate of condom use suggests the need to enhance education efforts for older individuals regarding STI risks and prevention. Hopefully, when partners understand how aging affects sexual expression, they will be less likely to misinterpret these changes as a lack of sexual interest or displeasure in the partner and more able to continue to have satisfying and safe sexual relationships.

## **Brain Functioning**

The brain at midlife has been shown to not only maintain many of the abilities of young adults but also gain new ones. Some individuals in middle age actually have improved cognitive functioning (Phillips, 2011). The brain continues to demonstrate plasticity and rewires itself in middle age based on experiences. Research has demonstrated that older adults use more of their brains than younger adults. In fact, older adults who perform the best on tasks are more likely to demonstrate bilateralization than those who perform worst. Additionally, the amount of white matter in the brain, which is responsible for forming connections among neurons, increases into the 50s before it declines.

Emotionally, the middle-aged brain is calmer, less neurotic, more capable of managing emotions, and better able to negotiate social situations (Phillips, 2011). Older adults tend to focus more on positive information and less on negative information than those younger. In fact, they also remember positive images better than those younger. Additionally, the older adult's amygdala responds less to negative stimuli. Lastly, adults in middle adulthood make better financial decisions, which seems to peak at age 53, and show better economic understanding. Although greater cognitive variability occurs among middle adults when compared to those both younger and older, those in midlife with cognitive improvements tend to be more physically, cognitively, and socially active.

## **QUESTIONS**

1. Describe statistics, possible causes, and consequences of obesity
2. Explain how early adulthood is a healthy, yet risky time of life.
3. Identify the risk factors for substance use.
4. Describe the changes in brain maturation.
5. Describe gender in adulthood, including gender minorities and stress.
6. Define sexuality and explain the female and male reproductive systems.
7. Describe the brain areas and hormones responsible for sexual behavior.
8. Identify sexually transmitted infections.

9. Describe cultural views related to sexuality.
10. Describe research on sexual orientation.
11. Explain the difference between primary and secondary aging.
12. Describe sensory changes that occur during middle adulthood.
13. Identify health concerns in middle adulthood.
14. Explain what occurs during the climacteric for females and males.
15. Describe sexuality during middle adulthood.
16. Explain the importance of sleep and consequences of sleep deprivation.
17. Describe the importance of exercise and nutrition for optimal health.
18. Describe brain functioning in middle adulthood.

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**SCHOOL OF SCIENCE AND HUMANITIES  
DEPARTMENT OF PSYCHOLOGY**

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**UNIT – V -LATE ADULTHOOD - LIFE SPAN DEVELOPMENT–SPYA1302**



## Introduction

**Why do we age?** There are many theories that attempt to explain how we age, however, researchers still do not fully understand what factors contribute to the human lifespan (Jin, 2010). Research on aging is constantly evolving and includes a variety of studies involving genetics, biochemistry, animal models, and human longitudinal studies (NIA, 2011a). According to Jin (2010), modern biological theories of human aging involve two categories. The first is **Programmed Theories** *that follow a biological timetable, possibly a continuation of childhood development*. This timetable would depend on “changes in gene expression that affect the systems responsible for maintenance, repair, and defense responses,” (p. 72). The second category includes **Damage or Error Theories** *which emphasize environmental factors that cause cumulative damage in organisms*. Examples from each of these categories will be discussed.

**Genetics:** One’s genetic make-up certainly plays a role in longevity, but scientists are still attempting to identify which genes are responsible. Based on animal models, some genes promote longer life, while other genes limit longevity. Specifically, longevity may be due to genes that better equip someone to survive a disease. For others, some genes may accelerate the rate of aging, while others decrease the rate. To help determine which genes promote longevity and how they operate, researchers scan the entire genome and compare genetic variants in those who live longer with those who have an average or shorter lifespan. For example, a National Institutes of Health study identified genes possibly associated with blood fat levels and cholesterol, both risk factors for coronary disease and early death (NIA, 2011a).

Researchers believe that it is most likely a combination of many genes that affect the rate of aging.

**Evolutionary Theory:** Evolutionary psychology emphasizes the importance of natural selection; that is, those genes that allow one to survive and reproduce will be more likely to be transmitted to offspring. Genes associated with aging, such as Alzheimer’s Disease, do not appear until after the individual has passed their main reproductive years. Consequently, natural selection has not eliminated these damaging disorders from the gene pool. If these detrimental disorders occurred earlier in the development cycle, they may have been eliminated already (Gems, 2014).

**Cellular Clock Theory:** This theory suggests that biological aging is due to the fact that normal cells cannot divide indefinitely. This is known as the Hayflick limit and is evidenced in cells studied in test tubes, which divide about 40-60 times before they stop (Bartlett, 2014). But what is the mechanism behind this cellular senescence? *At the end of each chromosomal strand is a sequence of DNA that does not code for any particular protein, but protects the rest of the chromosome, which is called a telomere*. With each replication, the telomere gets shorter. Once it becomes too short the cell does one of three things. *It can stop replicating by turning itself off, called cellular senescence. It can stop replicating by dying, called apoptosis*. Or, as in the development of cancer, it can continue to divide and become abnormal. Senescent cells can also create problems. While they may be turned off, they are not dead, thus they still interact with other cells in the body and can lead to an increased risk of disease. When we are young, senescent cells may reduce our risk of serious diseases such as cancer, but as we age they increase our risk of such problems (NIA, 2011a). Understanding why cellular senescence changes from being beneficial to being detrimental are still under investigation. The answer may lead to some important clues about the aging process.

**DNA Damage:** Over time DNA, which contains the genetic code for all organisms, accumulates damage. This is usually not a concern as our cells are capable of repairing damage throughout our life. Further, some damage is harmless. However, some damage cannot be repaired and remains in our DNA. Scientists believe that this damage, and the body’s inability to fix itself, is an important part of aging (NIA, 2011a). As DNA



damage accumulates with increasing age, it can cause cells to deteriorate and malfunction (Jin, 2010). Factors that can damage DNA include ultraviolet radiation, cigarette smoking, and exposure to hydrocarbons, such as auto exhaust and coal (Dollemore, 2006).

**Mitochondrial Damage:** Damage to mitochondrial DNA can lead to a decaying of the **mitochondria**, *which is a cell organelle that uses oxygen to produce energy from food*. The mitochondria convert oxygen to adenosine triphosphate (ATP) which provides the energy for the cell. When damaged, mitochondria become less efficient and generate less energy for the cell and can lead to cellular death (NIA, 2011a).

**Free Radicals:** When the mitochondria use oxygen to produce energy, they also produce potentially harmful byproducts called oxygen free radicals (NIA, 2011a). The **free radicals** *are missing an electron and create instability in surrounding molecules by taking electrons from them*.

There is a snowball effect (A takes from B and then B takes from C, etc.) that creates more free radicals that disrupt the cell and causes it to behave abnormally (See Figure 9.11). Some free radicals are helpful as they can destroy bacteria and other harmful organisms, but for the most part, they cause damage in our cells and tissue. Free radicals are identified with disorders seen in those of advanced age, including cancer, atherosclerosis, cataracts, and neurodegeneration. Some research has supported adding antioxidants to our diets to counter the effects of free radical damage because the antioxidants can donate an electron that can neutralize damaged molecules. However, the research on the effectiveness of antioxidants is not conclusive (Harvard School of Public Health, 2016).

**Immune and Hormonal Stress Theories:** Ever notice how quickly U.S. presidents seem to age? Before and after photos reveal how stress can play a role in the aging process.

To understand how this stress affects aging, researchers note that both problems with the innate and adaptive immune system play a key role. The **innate immune system** *is made up of the skin, mucous membranes, cough reflex, stomach acid, and specialized cells that alert the body of an impending threat*. With age these cells lose their ability to communicate as effectively, making it harder for the body to mobilize its defenses. The **adaptive immune system** *includes the tonsils, spleen, bone marrow, thymus, circulatory system and the lymphatic system that work to produce and transport T cells*. T-cells, or lymphocytes, fight bacteria, viruses, and other foreign threats to the body. T-cells are in a “naïve” state before they are programmed to fight an invader and become “memory cells”. These cells now remember how to fight a certain infection should the body ever come across this invader again. Memory cells can remain in your body for many decades, and why the measles vaccine you received as a child is still protecting you from this virus today. As older adults produce fewer new T-cells to be programmed, they are less able to fight off new threats and new vaccines work less effectively. The reason why the shingles vaccine works well with older adults is that they already have some existing memory cells against the varicella virus. The shingles vaccine is acting as a booster (NIA, 2011a).

**Hormonal Stress Theory**, also known as **Neuroendocrine Theory of Aging**, *suggests that as we age the ability of the hypothalamus to regulate hormones in the body begins to decline to lead to metabolic problems* (American Federation of Aging Research (AFAR) 2011). This decline is linked to an excess of the stress hormone cortisol. While many of the body’s hormones decrease with age, cortisol does not (NIH, 2014a). The more stress we experience, the more cortisol released, and the more hypothalamic damage that occurs. Changes in hormones have been linked to several metabolic and hormone-related problems that increase with age, such as diabetes (AFAR, 2011), thyroid problems (NIH, 2013), osteoporosis, and orthostatic hypotension (NIH, 2014a).

## Physical Changes of Aging

The Baltimore Longitudinal Study on Aging (BLSA) (NIA, 2011b) began in 1958 and has traced the aging process in 1,400 people from age 20 to 90. Researchers from the BLSA have found that the aging process varies significantly from individual to individual and from one organ system to another. However, some key generalization can be made including:

- Heart muscles thicken with age
- Arteries become less flexible
- Lung capacity diminishes
- Kidneys become less efficient in removing waste from the blood
- Bladder loses its ability to store urine
- Brain cells also lose some functioning, but new neurons can also be produced.

Many of these changes are determined by genetics, lifestyle, and disease. Other changes in late adulthood include:

**Body Changes:** Everyone's body shape changes naturally as they age. According to the National Library of Medicine (2014) after age 30 people tend to lose lean tissue, and some of the cells of the muscles, liver, kidney, and other organs are lost. Tissue loss reduces the amount of water in your body and bones may lose some of their minerals and become less dense (a condition called osteopenia in the early stages and osteoporosis in the later stages). The amount of body fat goes up steadily after age 30, and older individuals may have almost one third more fat compared to when they were younger. Fat tissue builds up toward the center of the body, including around the internal organs.

**Skin, Hair and Nails:** With age skin becomes thinner, less elastic, lose fat, and no longer looks plump and smooth. Veins and bones can be seen easier, and scratches, cuts, and bumps can take longer to heal. Years exposed to the sun may lead to wrinkles, dryness, age spots, and cancer. Older people may bruise more easily, and it can take longer for these bruises to heal. Some medicines or illnesses may also cause bruising. Gravity can cause the skin to sag and wrinkle, and smoking can wrinkle the skin. Also, seen in older adults are age spots, previously called "liver spots". They look like flat, brown spots and are often caused by years in the sun. Skin tags are small, usually flesh-colored growths of skin that have a raised surface. They become common as people age, especially for women, but both age spots and skin tags are harmless (NIA, 2015f).

Nearly everyone has hair loss as they age, and the rate of hair growth slows down as many hair follicles stop producing new hairs (U.S. National Library of Medicine, 2019). The loss of pigment and subsequent graying begun in middle adulthood continues in late adulthood. The body and face also lose hair. Facial hair may grow coarser. For women, this often occurs around the chin and above the upper lip. For men, the hair of the eyebrows, ears, and nose may grow longer. Nails, particularly toenails, may become hard and thick.

Lengthwise ridges may develop in the fingernails and toenails. However, pits, lines, changes in shape or color should be checked by a healthcare provider as they can be related to nutritional deficiencies or kidney disease (U.S. National Library of Medicine).

**Height and Weight:** The tendency to become shorter as one age occurs among all races and both sexes. Height loss is related to aging changes in the bones, muscles, and joints. People typically lose almost one-half inch every 10 years after age 40, and height loss is even more rapid after age 70. A total of 1 to 3 inches in height is lost with aging. Changes in body weight vary for men and women. Men often gain weight until about age 55, and then begin to lose weight later in life, possibly related to a drop in the male sex hormone testosterone. Women usually gain weight until age 65, and then begin to lose weight. Weight loss later in life occurs partly because fat replaces lean muscle tissue, and fat weighs less than muscle. Diet and exercise are important factors in weight changes in late adulthood (National Library of Medicine, 2014).

**Sarcopenia** is the loss of muscle tissue as a natural part of aging. Sarcopenia is most noticeable in men, and physically inactive people can lose as much as 3% to 5% of their muscle mass each decade after age 30, but even when active muscle loss still occurs (Webmd, 2016). Symptoms include a loss of stamina and weakness, which can decrease physical activity and subsequently further shrink muscles. Sarcopenia typically happens faster around age 75, but it may also speed up as early as 65 or as late as 80. Factors involved in sarcopenia include a reduction in nerve cells responsible for sending signals to the muscles from the brain to begin moving, a decrease in the ability to turn protein into energy, and not receiving enough calories or protein to sustain adequate muscle mass. Any loss of muscle is important because it lessens strength and mobility, and sarcopenia is a factor in frailty and the likelihood of falls and fractures in older adults. Maintaining strong leg and heart muscles are important for independence. Weight-lifting, walking, swimming, or engaging in other cardiovascular exercises can help strengthen the muscles and prevent atrophy.

## Sensory Changes in Late Adulthood

**Vision:** In late adulthood, all the senses show signs of decline, especially among the oldest-old. In the last chapter, you read about the visual changes that were beginning in middle adulthood, such as presbyopia, dry eyes, and problems seeing in dimmer light. By later adulthood, these changes are much more common. Three serious eye diseases are more common in older adults: Cataracts, macular degeneration, and glaucoma. Only the first can be effectively cured in most people.

**Cataracts** are a clouding of the lens of the eye. The lens of the eye is made up of mostly water and protein. The protein is precisely arranged to keep the lens clear, but with age, some of the protein starts to clump. As more of the protein clumps together the clarity of the lens is reduced. While some adults in middle adulthood may show signs of cloudiness in the lens, the area affected is usually small enough to not interfere with vision. More people have problems with cataracts after age 60 (NIH, 2014b) and by age 75, 70% of adults will have problems with cataracts (Boyd, 2014). Cataracts also cause a discoloration of the lens, tinting it more yellow and then brown, which can interfere with the ability to distinguish colors such as black, brown, dark blue, or dark purple.

Risk factors besides age include certain health problems such as diabetes, high blood pressure, and obesity, behavioral factors such as smoking, other environmental factors such as prolonged exposure to ultraviolet sunlight, previous trauma to the eye, long-term use of steroid medication, and a family history of cataracts (NEI, 2016a; Boyd, 2014). Cataracts are treated by removing and replacing the lens of the eye with a synthetic lens. In developed countries, such as the United States, cataracts can be easily treated with surgery. However, in developing countries, access to such operations are limited, making cataracts the leading cause of blindness in late adulthood in the least developed countries (Resnikoff, Pascolini, Mariotti & Pokharel, 2004). As shown in Figure 9.16, areas of the world with limited medical treatment for cataracts often results in people living more years with a serious disability. For example, of those living in the darkest red color on the map, more than 990 out of 100,00 people have a shortened lifespan due to the disability caused by cataracts.

Older adults are also more likely to develop **age-related macular degeneration**, which is the loss of clarity in the center field of vision, due to the deterioration of the macula, the center of the retina. Macular degeneration does not usually cause total vision loss, but the loss of the central field of vision can greatly impair day-to-day functioning. There are two types of macular degeneration: dry and wet. The dry type is the most common form and occurs when tiny pieces of a fatty protein called drusen form beneath the retina. Eventually the macula becomes thinner and stops working properly (Boyd, 2016). About 10% of people with macular degeneration have the wet type, which causes more damage to their central field of vision than the dry form. This form is caused by abnormal development of blood vessels beneath the retina. These vessels may leak fluid or blood causing more rapid loss of vision than the dry form.

The risk factors for macular degeneration include smoking, which doubles your risk (NIH, 2015a); race, as it is more common among Caucasians than African Americans or Hispanics/Latinos; high cholesterol; and a family history of macular degeneration (Boyd, 2016). At least 20 different genes have been related to this eye disease, but there is no simple genetic test to determine your risk, despite claims by some genetic testing companies (NIH, 2015a). At present, there is no effective treatment for the dry type of macular degeneration. Some research suggests that certain patients may benefit from a cocktail of certain antioxidant vitamins and minerals, but the results are mixed at best. They are not a cure for the disease nor will they restore the vision that has been lost. This “cocktail” can slow the progression of visual loss in some people (Boyd, 2016; NIH, 2015a). For the wet type medications that slow the growth of abnormal blood vessels, and surgery, such as laser treatment to destroy the abnormal blood vessels may be used. Only 25% of those with the wet version may see improvement with these procedures (Boyd, 2016).

A third vision problem that increases with age is **glaucoma**, which *is the loss of peripheral vision, frequently due to a buildup of fluid in the eye that damages the optic nerve*. As you age the pressure in the eye may increase causing damage to the optic nerve. The exterior of the optic nerve receives input from retinal cells on the periphery, and as glaucoma progresses more and more of the peripheral visual field deteriorates toward the central field of vision. In the advanced stages of glaucoma, a person can lose their sight. Fortunately, glaucoma tends to progress slowly (NEI, 2016b). Glaucoma is the most common cause of blindness in the U.S. (NEI, 2016b). African Americans over age 40 and everyone else over age 60 has a higher risk for glaucoma.

Those with diabetes, and with a family history of glaucoma also have a higher risk (Owsley et al., 2015). There is no cure for glaucoma, but its rate of progression can be slowed, especially with early diagnosis. Routine eye exams to measure eye pressure and examination of the optic nerve can detect both the risk and presence of glaucoma (NEI, 2016b). Those with elevated eye pressure are given medicated eye drops. Reducing eye pressure lowers the risk of developing glaucoma or slow its progression in those who already have it.

**Hearing:** As you read in Chapter 8, our hearing declines both in terms of the frequencies of sound we can detect, and the intensity of sound needed to hear as we age. These changes continue in late adulthood. Almost 1 in 4 adults aged 65 to 74 and 1 in 2 aged 75 and older have disabling hearing loss (NIH, 2016). Table 9.4 lists some common signs of hearing loss.

**Presbycusis** is a *common form of hearing loss in late adulthood that results in a gradual loss of hearing*. It runs in families and affects hearing in both ears (NIA, 2015c). Older adults may also notice **tinnitus**, *a ringing, hissing, or roaring sound in the ears*. The exact cause of tinnitus is unknown, although it can be related to hypertension and allergies. It may come and go or persist and get worse over time (NIA, 2015c). The incidence of both presbycusis and tinnitus increase with age and males have higher rates of both around the world (McCormak, Edmondson-Jones, Somerset, & Hall, 2016).

Your auditory system has two jobs: To help you to hear, and to help you maintain balance. Your balance is controlled by the brain receiving information from the shifting of hair cells in the inner ear about the position and orientation of the body. With age this function of the inner ear declines which can lead to problems with balance when sitting, standing, or moving (Martin, 2014).

**Taste and Smell:** Our sense of taste and smell are part of our *chemical sensing system*. Our sense of taste, or gustation, appears to age well. Normal taste occurs when molecules that are released by chewing food stimulate taste buds along with the tongue, the roof of the mouth, and in the lining of the throat. These cells send messages to the brain, where specific tastes are identified. After age 50 we start to lose some of these sensory cells. Most people do not notice any changes in taste until one’s 60s (NIH: Senior Health, 2016b). Given that the loss of taste buds is very gradual, even in late adulthood, many people are often surprised that their loss of taste is most likely the result of a loss of smell.

Our sense of smell, or olfaction, decreases more with age, and problems with the sense of smell are more common in men than in women. Almost 1 in 4 males in their 60s have a disorder with the sense of smell, while only 1 in 10 women do (NIH: Senior Health, 2016b). This *loss of smell due to aging* is called **presbyopia**. Olfactory cells are located in a small area high in the nasal cavity. These cells are stimulated by two pathways; when we inhale through the nose, or via the connection between the nose and the throat when we chew and digest food. It is a problem with this second pathway that explains why some foods such as chocolate or coffee seem tasteless when we have a head cold. There are several types of loss of smell. *Total loss of smell*, or **anosmia**, is extremely rare.

Problems with our chemical senses can be linked to other serious medical conditions such as Parkinson's, Alzheimer's, or multiple sclerosis (NIH: Senior Health, 2016a). Any sudden change should be checked out. Loss of smell can change a person's diet, with either a loss of enjoyment of food and eating too little for balanced nutrition or adding sugar and salt to foods that are becoming blander to the palette.

**Touch:** Research has found that with age, people may experience reduced or changed sensations of vibration, cold, heat, pressure, or pain (Martin, 2014). Many of these changes are also aligned with a number of medical conditions that are more common among the elderly, such as diabetes. However, there are changes in the touch sensations among healthy older adults. The ability to detect changes in pressure have been shown to decline with age, with it being more pronounced by the 6th decade and diminishing further with advanced age (Bowden & McNulty, 2013). Yet, there is considerable variability, with almost 40% showing sensitivity that is comparable to younger adults (Thornbury & Mistretta, 1981). However, the ability to detect the roughness/smoothness or hardness/softness of an object shows no appreciable change with age (Bowden & McNulty, 2013). Those who show increasing insensitivity to pressure, temperature, or pain are at risk for injury (Martin, 2014).

**Pain:** According to Molton and Terrill (2014), approximately 60%-75% of people over the age of 65 reports at least some chronic pain, and this rate is even higher for those individuals living in nursing homes. Although the presence of pain increases with age, older adults are less sensitive to pain than younger adults (Harkins, Price, & Martinelli, 1986). Farrell (2012) looked at research studies that included neuroimaging techniques involving older people who were healthy and those who experienced a painful disorder. Results indicated that there were age-related decreases in brain volume in those structures involved in pain. Especially noteworthy were changes in the prefrontal cortex, brainstem, and hippocampus. Women are more likely to identify feeling pain than men (Tsang et al., 2008). Women have fewer opioid receptors in the brain, and women also receive less relief from opiate drugs (Garrett, 2015).

Because pain serves as an important indicator that there is something wrong, a decreased sensitivity to pain in older adults is a concern because it can conceal illnesses or injuries requiring medical attention.

Chronic health problems, including arthritis, cancer, diabetes, joint pain, sciatica, and shingles are responsible for most of the pain felt by older adults (Molton & Terrill, 2014). Cancer is a special concern, especially "breakthrough pain" which is a severe pain that comes on quickly while a patient is already medicated with a long-acting painkiller. It can be very upsetting, and after one attack many people worry it will happen again. Some older individuals worry about developing an addiction to pain medication, but if the medicine is taken exactly as prescribed, addiction should not be a concern (NIH, 2015b). Lastly, side effects from pain medicine including constipation, dry mouth, and drowsiness may occur that can adversely affect the elder's life.

Some older individuals put off going to the doctor because they think pain is just part of aging and nothing can help. Of course, this is not true. Managing pain is crucial to ensure feelings of well-being for older adults. When chronic pain is not managed, the individual will restrict their movements for fear of feeling pain or injuring themselves further. This lack of activity will result in more restrictions, further decreased participation, and greater disability (Jensen, Moore, Bockow, Ehde, & Engel, 2011). A decline in physical

activity because of pain is also associated with weight gain and obesity in adults (Strine, Hootman, Chapman, Okoro, & Balluz, 2005). Additionally, sleep and mood disorders, such as depression, can also occur (Moton & Terrill, 2014). Learning to cope effectively with pain is an important consideration in late adulthood and working with one's primary physician or a pain specialist is recommended (NIH, 2015b).

For those 65 and older, 35% have a disability of some type. Figure 9.19 identifies the percentage of those who have a disability based on the type.

## Nutrition

A healthy diet is necessary for older adults to increase mental acuteness, resistance to illness and disease, boost energy levels, improve immune system strength, recuperation speed, and have greater effectiveness in the management of chronic health problems (Mayer, 2016). The new MyPlate for Older Adults, a website from Tufts University, suggests that older adults should strive for 50% of their diet is fruits and vegetables; 25% grains, many of which should be whole grains; and 25% protein-rich foods, such as nuts, beans, fish, lean meat, poultry, and fat-free and low-fat dairy products such as milk, cheeses, and yogurts. Unfortunately, changes in sensory functions, such as smell and taste, along with loss of teeth, can derail an older adult's ability to eat right.

Older adults are likely to use salt and sugar to flavor foods that no longer taste the way they once did. Several government websites provide older adults with alternatives to the salt shaker to make foods more palatable.

## Chronic Conditions

**Chronic illnesses** are illnesses that are ongoing, generally incurable conditions that require continuous medical attention and affect daily life. As individuals live longer, diseases that affect older individuals will become more prevalent, and the burden of chronic illness grows with age. Less than 50% of adults 50-64 have a chronic condition, 90% aged 75 and up do (Cohen, 2011). Almost 80% have at least one chronic disease, and 77% have at least two (National Council on Aging, 2019). Older women are more likely to have a chronic condition than are older men (83% vs. 88%) (CDC, 2009). Table 9.6 lists the percentage of older adults who have certain chronic illnesses based on the National Health Survey conducted in 2014. Other studies place the figure of diabetes in older adults at 26% (CDC, 2014).

**Cancer and Major Cardiovascular Disease:** As discussed in chapter 8, cancer and cardiovascular disease are the overall leading causes of death, and they are especially high reasons for death in middle and late adults. Table 9.7 identifies the percentages of deaths due to cancer and cardiovascular disease for selected age groups in 2016; the most recent year for data (Heron, 2018).

**Cancer:** Advancing age is a significant risk factor for cancer, with persons over 65 accounting for 60% of newly diagnosed cancer and 70% of all cancer deaths (Berger et al., 2006). Additionally, more than 70% of the mortality associated including prostate, bladder, colon, uterus, pancreas, stomach, rectum and lung occurs in patients 65 and older. Other conditions that affect the elderly can occur with cancer, including anemia, coronary artery diseases, congestive heart failure, chronic obstructive pulmonary diseases, renal insufficiency, cerebrovascular diseases, neurovascular complications of diabetes mellitus, and arthritis that restricts mobility (Balducci & Extermann, 2000). Comorbidity will complicate treatment.

Balducci and Extermann (2000) examined several concerns about cancer treatment in the elderly. With aging, there is a decline in multiple organ systems that can adversely affect the ability of medications to treat cancer. Chemotherapy has been found to compromise the cognitive function of those being treated for cancer, and it may further exacerbate dementia and elderly cognitive declines. Frail individuals, defined as

having limited life expectancy and near-to- exhausted functional reserves, are also not considered candidates for more toxic forms of chemotherapy. With cancer, the prevalence and risk of malnutrition are higher and diminished visual and hearing function makes elderly cancer patients more susceptible to environmental injury. Screening for depression is also recommended because depression is associated with weight loss, failure to thrive, and may reduce the motivation to receive treatment. Consequently, depression has been associated with decreased survival rates in the elderly. Due to the projected increase in the total number of older patients with cancer, it is recommended that physicians and caretakers have expertise in both oncology and geriatrics (Berger et al., 2006).

**Heart Disease:** There are changes to the heart that happen with age, and some may increase a person's risk of heart disease. These include stiffening blood vessels and valves, which may result in leaks or problems pumping blood out of the heart (NIA, 2012). As previously stated, heart disease is the leading cause of death for those in late adulthood (CDC, 2016b). There are different types of heart disease, and as already discussed in chapter 8, the most common is atherosclerosis, the buildup of fatty deposits or plaques in the walls of arteries. As plaque builds up, blood is unable to flow normally and bring oxygen throughout the body, including to the heart. Depending on where the buildup is, atherosclerosis can cause a heart attack, leg pain, or a stroke. However, Atherosclerosis is not part of normal aging. Many of the problems older people have with their heart and blood vessels are caused by disease and not by aging. For example, an older heart can normally pump blood as strong as a younger heart, while less ability to pump blood is caused by disease. Therefore, leading a heart-healthy lifestyle is most important to keeping one's heart strong in late adulthood.

**Arthritis:** Arthritis and other rheumatic conditions are the most common cause of disability among US adults and have been the most common cause of disability among US adults for the past 15 years (NIH: National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2014). According to the NIH, approximately 62% of adults with arthritis are 65 years old and up. Almost 1 in 2 older adults with arthritis have some degree of mobility limitations, such as climbing stairs, walking, and grasping objects. The pain and other limitations of arthritis can also increase the risk of depression and other forms of mental distress. Osteoarthritis is the most common type of arthritis. "When the cartilage, the slick, cushioning surface on the ends of bones wears away, bone rubs against bone, causing pain, swelling, and stiffness. Over time, joints can lose strength and pain may become chronic" (Arthritis Foundation, 2017, para 3). Common risk factors for osteoarthritis include genetics, obesity, age, previous injury, and other medical conditions.

**Osteoporosis and Kyphosis:** *Osteoporosis is a disease that thins and weakens bones to the point that they become fragile and break easily.* After age 50, 1 in 2 women and 1 in 4 men will experience an osteoporosis-related fracture in their lifetime, often leading to hip, spine, and wrist fractures (Dailey & Cravedi, 2006). Broken hips are a very serious problem as we age. They greatly increase the risk of death, especially during the year after they break (NIH Senior Health, 2015). In the U.S., more than 53 million adults either already have osteoporosis or at high risk due to low bone mass (NIH Senior Health, 2015). *As bones weaken in the spine, adults gradually lose height and their posture becomes hunched over, which is called Kyphosis.* Over time a bent spine can make it hard to walk or even sit up. Adults can prevent the loss of bone mass by eating a healthy diet with enough calcium and vitamin D, regularly exercising, limiting alcohol, and not smoking (National Osteoporosis Foundation, 2016).

**Chronic obstructive pulmonary disease (COPD)** *is a progressive lung disease in which the airways become damaged making it difficult to breathe.* COPD includes problems such as emphysema and chronic bronchitis (NIH Senior Health, 2013). COPD kills more than 120,000 people every year, making it one of the leading causes of death. COPD was once considered a "man's disease". However, since 2000, 58% of those with COPD are women and they comprise 8% of all women (American Lung Association, 2019). Research has indicated that women may be more susceptible to the effects of cigarette smoke due to having smaller lungs and estrogen worsening the effects.



Figure 9.22 compares healthy to damaged lungs due to COPD. As COPD develops slowly, people may not notice the early signs and may attribute the shortness of breath to age or lack of physical exercise. Most people are not diagnosed until midlife or late adulthood. There is no cure as the damage cannot be reversed. Treatments aim at slowing further damage. Cigarette smoking is the leading cause of COPD, but other types of tobacco smoking, such as a pipe or cigar, can cause COPD, especially if the smoke is inhaled. Heavy or long-term exposure to second-hand smoke can also lead to COPD (NIH Senior Health, 2013). COPD can also occur in people who have long term exposure to other environmental irritants, such as chemical fumes, and dust from the environment and workplace.

About 1 in every 1,600 to 5,000 people have a risk for COPD because of a recessive genetic condition known as alpha-1 antitrypsin (AAT) deficiency (NIH, 2011). AAT is a protein made in the liver that protects organs, especially the lungs, from the effects of other harmful proteins. In those with the genetic defect, the AAT protein created is the wrong shape and cannot leave the liver. This can lead to a heightened risk for lung disease, and even liver disease, as the excess of the AAT protein can lead to **cirrhosis**, *which is a disease in which the liver becomes scarred and does not function properly*. While some people with AAT deficiency are not affected and live a normal life, COPD is more likely to occur in such individuals if their lungs are exposed to environmental irritants.

**Shingles:** According to the National Institute on Aging (2015e), the **shingle** *is a disease that affects your nerves*. Shingles are caused by the same virus as chickenpox, the varicella-zoster virus (VZV). After you recover from chickenpox, the virus continues to live in some of your nerve cells. It is usually inactive, and most adults live with VZV in their bodies and never get shingles. However, the virus will become active in one in three adults. Instead of causing chickenpox again, it produces shingles. *A risk factor for shingles includes advanced age as people have a harder time fighting off infections as they get older*. About half of all shingles cases are in adults age 60 or older, and the chance of getting shingles becomes much greater by age 70. Other factors that weaken an individual's ability to fight infections, such as cancer, HIV infections, or other medical conditions, can put one at a greater risk for developing shingles.

Shingles result in pain, burning, tingling, or itching in the affected area, as well as a rash and blisters. Typically, shingles develop only on one side of the body or face and in a small area rather than all over. Most cases of shingles last 3 to 5 weeks. After the shingles rash goes away, some people may be left with ongoing pain, called post-herpetic neuralgia (PHN) in the area where the rash had been (NIA, 2015e). The older one is when getting shingles, the greater the chance of developing PHN. Some people with PHN find it hard to go about their daily activities, like dressing, cooking and eating. They can also suffer from depression, anxiety, and sleeplessness. Medicines can help with pain and usually, PHN will disappear. Unfortunately, the blisters from shingles may become infected or leave a scar. Blisters near or in the eye can cause lasting eye damage or blindness. A brief paralysis of the face, hearing loss, and very rarely, swelling of the brain (encephalitis) can also occur. There is a shingles vaccine that is recommended for those aged 50 and older. Shingles are not contagious, but one can catch chickenpox from someone with shingles.

**Beliefs about Health:** Despite the fact that the majority of older adults have at least one chronic illness, most rate their overall health positively (Graham, 2019). Based on the results of the CDC's 2017 National Health Interview Survey, 82% of those aged 65-74 and 73% of those 75 and older rated their health as excellent, very good or good. Because older adults focus more on emotional well-being, positive social relationships, remaining active, and overall life satisfaction, poor physical functioning is not considered as important. Older adults often look to those who are worse off than themselves, including those having died or are in a nursing home, and consequently feel more positive about themselves. This perspective is in contrast to those younger who believe that there should not be anything wrong with them, and consequently experience negative feelings when they have an illness. Older adults expect there will be some deterioration in their health and are able to adapt to it. Similarly, most older adults identify positive mental health in conjunction with their physical health.

## Brain Functioning

Research has demonstrated that the brain loses 5% to 10% of its weight between 20 and 90 years of age (Fjell & Walhovd, 2010). This decrease in brain volume appears to be due to the shrinkage of neurons, lower number of synapses, and shorter length of axons. According to Garrett (2015), the normal decline in cognitive ability throughout the lifespan has been associated with brain changes, including the reduced activity of genes involved in memory storage, synaptic pruning, plasticity, and glutamate and GABA (neurotransmitters) receptors. There is also a loss in white matter connections between brain areas. Without myelin, neurons demonstrate slower conduction and impede each other's actions. A loss of synapses occurs in specific brain areas, including the hippocampus (involved in memory) and the basal forebrain region. Older individuals also activate larger regions of their attentional and executive networks, located in the parietal and prefrontal cortex, when they perform complex tasks. This increased activation correlates with reduced performance on both executive tasks and tests of working memory when compared to those younger (Kolb & Whishaw, 2011).

**Continued Neurogenesis:** Researchers at the University of Chicago found that new neurons continued to form into old age. Tobin et al. (2019) examined the post-mortem brain tissue of individuals between the ages of 79 and 99 (average age 90.6) and found evidence of neurogenesis in the hippocampus. Approximately 2000 neural progenitor cells and 150,000 developing neurons were found per brain, although the number of developing neurons was lower in people with cognitive impairments or Alzheimer's disease. Tobin et al. hypothesized that the lower levels of neurogenesis in the hippocampus were associated with symptoms of cognitive decline and reduced synaptic plasticity.

The brain in late adulthood also exhibits considerable plasticity, and through practice and training, the brain can be modified to compensate for any age-related changes (Erber & Szuchman, 2015). Park and Reuter-Lorenz (2009) proposed the **Scaffolding Theory of Aging and Cognition** *which states that the brain adapts to neural atrophy (dying of brain cells) by building alternative connections, referred to as scaffolding*. This scaffolding allows older brains to retain high levels of performance. Brain compensation is especially noted in the additional neural effort demonstrated by those individuals who are aging well. For example, older adults who performed just as well as younger adults on a memory task used both prefrontal areas, while only the right prefrontal cortex was used in younger participants (Cabeza, Anderson, Locantore, & McIntosh, 2002). Consequently, this decrease in brain lateralization appears to assist older adults with their cognitive skills.

**Healthy Brain Functioning:** Cheng (2016) found that physical activity and stimulating cognitive activity resulted in significant reductions in the risk of neurocognitive disorders in longitudinal studies. Physical activity, especially aerobic exercise, is associated with less age-related gray and white matter loss, as well as diminished neurotoxins in the brain. Overall, physical activity preserves the integrity of neurons and brain volume. Cognitive training improves the efficiency of the prefrontal cortex and executive functions, such as working memory, and strengthens the plasticity of neural circuits. Both activities support **cognitive reserve**, or *"the structural and dynamic capacities of the brain that buffer against atrophies and lesions"* (p. 85). Although it is optimal to begin physical and cognitive activities earlier in life, it is not too late to start these programs in late adulthood to improve one's cognitive health.

**Can we improve brain functioning?** Many training programs have been created to improve brain functioning. ACTIVE (Advanced Cognitive Training for Independent and Vital Elderly), a study conducted between 1999 and 2001 in which 2,802 individuals age 65 to 94, suggests that the answer is "yes". These racially diverse participants received 10 group training sessions and 4 follow up sessions to work on tasks of memory, reasoning, and speed of processing. These mental workouts improved cognitive functioning even 5 years later. Many of the participants believed that this improvement could be seen in everyday tasks as well (Tennstedt et al., 2006). However, programs for the elderly on memory, reading, and processing speed

training demonstrate that there is an improvement in the specific tasks trained, but there is no generalization to other abilities (Jarrett, 2015). Further, these programs have not been shown to delay or slow the progression of Alzheimer's disease. Although these programs are not harmful, "physical exercise, learning new skills, and socializing remain the most effective ways to train your brain" (p. 207). These activities appear to build a reserve to minimize the effects of primary aging of the brain.

**Parkinson's disease** is characterized by motor tremors, loss of balance, poor coordination, rigidity, and difficulty moving (Garrett, 2015). Parkinson's affects approximately 1% of those over the age of 60, and it appears more frequently in family members in a little less than 10% of cases. Twenty-eight chromosomal areas have been implicated in Parkinson's disease, but environmental factors have also been identified and include brain injury. Being knocked unconscious once increases the risk by 32% and being knocked out several times increases the risk by 174% (Garrett, 2015). Other environmental influences include toxins, industrial chemicals, carbon monoxide, herbicides and pesticides (Olanow & Tatton, 1999). The symptoms are due to the deterioration of the substantia nigra, an area in the midbrain whose neurons send dopamine-releasing axons to the basal ganglia which affect motor activity. Treatment typically includes the medication levodopa (L-dopa), which crosses the blood-brain barrier and is converted into dopamine in the brain. Deep brain stimulation, which involves inserting an electrode into the brain that provides electrical stimulation, has resulted in improved motor functioning (Garrett, 2015).

## Sleep

Similar to other adults, older adults need between 7 to 9 hours of sleep per night, *but they tend to go to sleep earlier and get up earlier than those younger. This pattern is called **advanced sleep phase syndrome** and is based on changes in circadian rhythms* (National Sleep Foundation, 2009). There are sleep problems in older adults, and insomnia is the most common problem in those 60 and older (NIA, 2016). People with **insomnia** *have trouble falling asleep and staying asleep*. There are many reasons why older people may have insomnia, including certain medications, being in pain, having a medical or psychiatric condition, and even worrying before bedtime about not being able to sleep. Using over the counter sleep aids or medication may only work when used for a short time. Consequently, sleep problems should be discussed with a health care professional.

Also, common in older adults are sleep disorders, including sleep apnea, restless legs syndrome, periodic limb movement disorder, and rapid eye movement sleep behavior disorder (NIA, 2016). **Sleep apnea** *refers to repeated short pauses in breathing, while an individual sleeps, which can lead to reduced oxygen in the blood*. Snoring is a common symptom of sleep apnea and it often worsens with age. Untreated sleep apnea can lead to impaired daytime functioning, high blood pressure, headaches, stroke, and memory loss. **Restless legs syndrome** *feels like there is tingling, crawling, or pins and needles in one or both legs, and this feeling is worse at night*.

**Periodic limb movement disorder** *causes people to jerk and kick their legs every 20 to 40 seconds during sleep*. **Rapid eye movement sleep behavior disorder** *occurs when one's muscles can move during REM sleep and sleep is disrupted*.

According to the National Sleep Foundation (2009), there are many medical conditions that affect sleep and include gastroesophageal reflux disease, diabetes mellitus, renal failure, respiratory diseases such as asthma, and immune disorders. Diseases such as Parkinson's disease and multiple sclerosis also commonly cause problems sleeping. Lastly, Alzheimer's disease can interfere with sleeping patterns. Individuals may wake up many times during the night, wander when up, and yell which can alter the amount of time they sleep. Both minor and major sleep problems in older adults can lead to increased risk of accidents, falls, chronic fatigue, decreased quality of life, cognitive decline, reduced immune function, and depression (Buman, 2013).

## Sexuality

Because of sleep problems experienced by those in late adulthood, research has looked into whether exercise can improve their quality of sleep. Results show that 150 minutes per week of exercise can improve sleep quality (Buman, 2013). This amount of exercise is also recommended to improve other health areas including lowering the risk for heart disease, diabetes, and some cancers. Aerobic activity, weight training, and balance programs are all recommended. For those who live in assisted living facilities even light exercise, such as stretching and short walks, can improve sleep. High-intensity activity is not necessary to see improvements. Overall, the effects of exercise on sleep may actually be even larger for older adults since their sleep quality may not be ideal to start.

According to Kane (2008), older men and women are often viewed as genderless and asexual. There is a stereotype that elderly individuals no longer engage in sexual activity and when they do, they are perceived to have committed some kind of offense. These ageist myths can become internalized, and older people have a more difficult time accepting their sexuality (Gosney, 2011). Additionally, some older women indicate that they no longer worry about sexual concerns anymore once they are past the childbearing years.

In reality, many older couples find greater satisfaction in their sex life than they did when they were younger. They have fewer distractions, more time and privacy, no worries about getting pregnant, and greater intimacy with a lifelong partner (NIA, 2013). Results from the National Social Life Health, and Aging Project indicated that 72% of men and 45.5% of women aged 52 to 72 reported being sexually active (Karraker, DeLamater, & Schwarz, 2011). Additionally, the National Survey of Sexual Health data indicated that 20%-30% of individuals remain sexually active well into their 80s (Schick et al., 2010). However, there are issues that occur in older adults that can adversely affect their enjoyment of healthy sexual relationships.

**Causes of Sexual Problems:** According to the National Institute on Aging (2013), chronic illnesses including arthritis (joint pain), diabetes (erectile dysfunction), heart disease (difficulty achieving orgasm for both sexes), stroke (paralysis), and dementia (inappropriate sexual behavior) can all adversely affect sexual functioning. Hormonal changes, physical disabilities, surgeries, and medicines can also affect a senior's ability to participate in and enjoy sex. How one feels about sex can also affect performance. For example, a woman who is unhappy about her appearance as she ages may think her partner will no longer find her attractive. A focus on youthful physical beauty for women may get in the way of her enjoyment of sex. Likewise, most men have a problem with erectile dysfunction (ED) once in a while, and some may fear that ED will become a more common problem as they age. If there is a decline in sexual activity for a heterosexual couple, it is typically due to a decline in the male's physical health (Erber & Szuchman, 2015).

Overall, the best way to experience a healthy sex life in later life is to keep sexually active while aging. However, the lack of an available partner can affect heterosexual women's participation in a sexual relationship. Beginning at age 40 there are more women than men in the population, and the ratio becomes 2 to 1 at age 85 (Karraker et al., 2011). Because older men tend to pair with younger women when they become widowed or divorced, this also decreases the pool of available men for older women (Erber & Szuchman, 2015). In fact, a change in marital status does not result in a decline in the sexual behavior of men aged 57 to 85 years old, but it does result in a decline for similar-aged women (Karraker et al., 2011).

**Concluding Thoughts:** Key players in improving the quality of life among older adults will be those adults themselves. By exercising, reducing stress, stopping smoking, limiting the use of alcohol, and consuming more fruits and vegetables, older adults can expect to live longer and more active lives (He et al., 2005). Stress reduction, both in late adulthood and earlier in life, is also crucial. The reduction of societal stressors can promote active life expectancy. In the last 40 years, smoking rates have decreased, but obesity has increased, and physical activity has only modestly increased.

## QUESTIONS

1. Describe the changes in physical appearance in late adulthood
2. Describe the sensory changes in late adulthood
3. Describe chronic health conditions during late adulthood
4. Describe the importance of nutrition and exercise in late adulthood
5. Describe the physical and functional changes in the brain during late adulthood
6. Explain what happens in Parkinson's disease
7. Explain how sleep patterns change in late adulthood
8. Explain how sexuality changes in late adulthood

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