

**SUMMARY**

**Understanding How and Why**

1. The study of human development is a science that seeks to understand how people change or remain the same over time. As a science, it begins with questions and hypotheses and then gathers empirical data.

2. Replication confirms, modifies, or refutes conclusions, which are not considered solid until they are confirmed by several studies.

3. The universality of human development and the uniqueness of each individual's development are evident in both nature (the genes) and nurture (the environment); no person is quite like another. Nature and nurture always interact, and each human characteristic is affected by that interaction.

4. Crucial to the study of nature and nurture is the concept of differential susceptibility—that genes or experiences affect the likelihood that a person will be affected by the environment.

**The Life-Span Perspective**

5. The assumption that growth is linear and that progress is inevitable has been replaced by the idea that both continuity (sameness) and discontinuity (sudden shifts) are part of every life and that gains and losses are apparent at every age.

6. Time is a crucial variable in studying human development. A critical period is a time when something *must* occur or when an abnormality might occur. Often a particular development can occur more easily at a particular time, called a sensitive period.

7. Urie Bronfenbrenner's ecological-systems approach notes that each of us is situated within larger systems of family, school, community, and culture, as well as part of a historical cohort. Changes in the context affect all other aspects of the system.

8. Certain experiences or innovations shape people of each cohort because they share the experience of significant historical events. Socioeconomic status (SES) affects each child's opportunities, health, and education.

**KEY TERMS**

science of human development (p. 4)  
 scientific method (p. 4)  
 hypothesis (p. 4)  
 empirical evidence (p. 4)  
 replication (p. 4)  
 nature (p. 6)  
 nurture (p. 7)  
 epigenetics (p. 7)  
 differential susceptibility (p. 7)

life-span perspective (p. 8)  
 critical period (p. 9)  
 sensitive period (p. 9)  
 ecological-systems approach (p. 12)  
 cohort (p. 13)  
 socioeconomic status (SES) (p. 13)  
 culture (p. 14)  
 social construction (p. 14)

difference-equals-deficit error (p. 15)  
 ethnic group (p. 16)  
 race (p. 16)  
 plasticity (p. 19)  
 dynamic-systems approach (p. 19)  
 scientific observation (p. 22)  
 experiment (p. 23)  
 independent variable (p. 23)

dependent variable (p. 23)  
 survey (p. 24)  
 cross-sectional research (p. 25)  
 longitudinal research (p. 26)  
 cross-sequential research (p. 27)  
 correlation (p. 29)  
 quantitative research (p. 30)  
 qualitative research (p. 30)

**Cautions and Challenges from Science**

15. A correlation shows that two variables are related not that one *causes* the other: Both may be caused by a third variable.

16. Quantitative research provides numerical data. This makes it best for comparing contexts and cultures via verified statistics. By contrast, more nuanced data come from qualitative research, which reports on individual lives.

17. Ethical behavior is crucial in all of the sciences. Results must be fairly gathered, reported, and interpreted. Participants must understand and consent to their involvement.

18. The most important ethical question is whether scientists are designing, conducting, analyzing, publishing, and applying the research that is most critically needed.

**Designing Science**

13. Commonly used research methods are scientific observation, the experiment, and the survey. Each can provide insight and discover, yet each is limited.

14. Developmentalists study change over time, often with cross-sectional and longitudinal research. Ideally, results from both methods are combined in cross-sequential analysis.

9. *Culture, ethnicity, and race* are social constructions, concepts created by society. Culture includes beliefs and patterns; ethnicity refers to ancestral heritage. Race is also a social construction, not a biological one.

10. Developmentalists try to avoid the difference-equals-deficit error. Differences are alternate ways to think or act. They are not necessarily harmful.

11. Within each person, every aspect of development interacts with the others, but development can be divided into three domains—biosocial, cognitive, and psychosocial. A multidisciplinary, dynamic-systems approach is needed.

12. Throughout life, human development is plastic. Brains and behaviors may change over time. Plasticity means that change is possible, not that everything can change.

SUMMARY

What Theories Do

1. A theory provides general principles to guide research and explain observations. Each of the five major developmental theories—psychoanalytic, behaviorist, sociocultural, and evolutionary—interprets human development from a distinct perspective, providing a framework for understanding human emotions, experiences, and actions.

2. Theories are neither true nor false. They are not facts; they suggest hypotheses to be tested and interpretations of the myriad human behaviors. Good theories are practical: They aid inquiry, interpretation, and daily life.

3. A developmental theory focuses on changes that occur over time, uncovering the links between past, present, and future. Developmental theories attempt to answer the crucial questions of the life span.

Grand Theories

4. Psychoanalytic theory emphasizes that adult actions and thoughts originate from unconscious impulses and childhood conflicts. Freud theorized that sexual urges arise during three stages of childhood—oral, anal, and phallic—and continue, after latency, in the genital stage.

5. Erikson described eight successive stages of development, each involving a crisis to be resolved. The early stages are crucial, with lifelong effects, but the emphasis is not only on the body and sexual needs. Instead, Erikson stressed that societies, cultures, and family shape each person's development.

6. Behaviorists, or learning theorists, believe that scientists should study observable and measurable behavior. Behaviorism emphasizes conditioning—a lifelong learning process in which an association between one stimulus and another (classical conditioning) or the consequences of reinforcement and punishment (operant conditioning) guide behavior.

7. Social learning theory recognizes that people learn by observing others, even if they themselves have not been reinforced or punished. Children are particularly susceptible to social learning, but all humans are affected by what they notice in other people.

KEY TERMS

- developmental theory (p. 37)
- psychoanalytic theory (p. 39)
- modeling (p. 45)
- social learning theory (p. 45)
- information-processing theory (p. 47)
- sociocultural theory (p. 51)
- apprenticeship in thinking (p. 52)
- guided participation (p. 52)
- zone of proximal development (p. 52)
- selective adaptation (p. 58)
- eclectic perspective (p. 62)

What Theories Contribute

13. Evolutionary theory provides explanations for many human traits, from lactose intolerance to the love of babies. Selective adaptation is the process by which genes enhance human development over thousands of years. Societies use laws and customs to protect people from some genetic impulses.

12. Evolutionary theory contends that contemporary humans inherit genetic tendencies that have fostered survival and reproduction of the human species for tens of thousands of years. Through selective adaptation, the fears, impulses, and reactions that were useful 100,000 years ago for *Homo sapiens* continue to this day.

11. Sociocultural learning is also encouraged by the examples and tools that each society provides. These are social constructions, which guide everyone but also which can change.

10. Sociocultural theory explains human development in terms of the guidance, support, and structure provided by each social group through culture and mentoring. Vygotsky described how learning occurs through social interactions in which mentors guide learners through their zone of proximal development.

Newer Theories

9. Information processing focuses on each aspect of cognition—input, processing, and output. This perspective has benefited from technology, first from understanding computer functioning and more recently by the many ways scientists monitor the brain.

8. Cognitive theorists believe that thoughts and beliefs powerfully affect attitudes, actions, and perceptions, which in turn affect behavior. Piaget proposed four age-related periods of cognition, each propelled by an active search for cognitive equilibrium.

14. Psychoanalytic, behavioral, sociocultural, and evolutionary theories have aided our understanding of human development. However, no single theory describes the full complexity and diversity of human experience. Most developmentalists are eclectic, drawing on many theories.

## SUMMARY

## The Genetic Code

1. Genes are the foundation for all development, first instructing the developing creature to form the body and brain, and then affecting thought, behavior, and health lifelong. Human conception occurs when two gametes (a sperm with 23 chromosomes and an ovum with 23 chromosomes) combine to form a single cell called a zygote.

2. A zygote usually has 46 chromosomes (half from each parent), which carry a total of about 21,000 genes. Genes and chromosomes from each parent match up to make the zygote, but the match is not always letter-perfect because of genetic variations called alleles, or polymorphisms.

3. Genetic variations occur in many ways, from the chromosomes of the parent to the epigenetic material surrounding the zygote and the microbiome of every body part. Spontaneous mutations, changing the number or sequences of base pairs, also make each person unique.

4. The most notable mismatch is in the 23rd pair of chromosomes, which is XX in females and XY in males. The sex of the embryo depends on the sperm, since only men have a Y chromosome and thus can make Y gametes.

## New Cells, New People

5. The first duplications of the one-celled zygote create stem cells, each of which could become a person if it developed. Monozygotic twins occur if those first stem cells split completely, which rarely occurs. Usually, the cluster of cells continues dividing and duplicating throughout development, creating a baby with 26 billion cells and eventually an adult with 37 trillion cells.

6. Dizygotic twins occur if two ova are fertilized by two sperm at about the same time. Genetically, they have half their genes in common, as do all full siblings.

7. In vitro fertilization (IVF) has led to millions of much-wanted babies and also to an increase in multiple births, who often are

deoxyribonucleic acid (DNA) (p. 68)  
chromosome (p. 68)  
gene (p. 68)  
genome (p. 68)  
allele (p. 69)  
epigenetics (p. 69)  
microbiome (p. 70)  
zygote (p. 70)

copy number variations (p. 70)  
genotype (p. 71)  
homozygous (p. 71)  
heterozygous (p. 71)  
23rd pair (p. 71)  
XY (p. 71)  
XX (p. 71)  
stem cells (p. 75)

in vitro fertilization (IVF) (p. 76)  
dominant–recessive pattern (p. 81)  
carrier (p. 82)  
X-linked (p. 82)  
heritability (p. 84)  
Down syndrome (p. 87)  
Fragile X syndrome (p. 89)  
genetic counseling (p. 92)  
Human Genome Project (p. 80)  
multifactorial (p. 80)  
polygenic (p. 80)  
phenotype (p. 80)  
dizygotic (DZ) twins (p. 79)  
monozygotic (MZ) twins (p. 77)

## Chromosomal and Genetic Problems

11. Often a gamete has fewer or more than 23 chromosomes, which may create a zygote with 45, 47, or 48 chromosomes. Usually such zygotes do not duplicate, implant, or grow.

12. Infants may survive if they have three chromosomes at the 21st site (Down syndrome) or extra sex chromosomes. They may have intellectual and sexual problems, but they may have a full-filling life.

13. Everyone is a carrier for genetic abnormalities. Usually these conditions are recessive, not apparent unless the mother and the father both carry the gene. Serious dominant disorders usually do not appear until midlife. Serious recessive diseases can become common if carriers have a health advantage.

14. Genetic testing and counseling can help many couples. Testing provides information about possibilities, but the final decision rests with the couple.

## From Genotype to Phenotype

8. Genes interact in many ways, sometimes additively with each gene contributing to development and sometimes in a dominant–recessive pattern. The environment interacts with the genetic instructions for every trait, making every characteristic polygenic and multifactorial.

9. Genetic makeup can make a person susceptible to many conditions. Examples include substance use disorder (especially alcohol use disorder) and poor vision (especially nearsightedness). Culture and family affect both of these conditions dramatically.

10. Knowing the impact of genes and the environment can help in several ways, including guiding parents to protect their children from potentially harmful genes.

CRISPR.

preterm and of low birthweight. Ethical concerns regarding IVF have quieted, but new dilemmas appear with stem cells and

SUMMARY

Prenatal Development

1. The first two weeks of prenatal growth are called the germinal period. Soon the single-celled zygote multiplies into many cells, becoming a *blastocyst*, with more than 100 cells that will eventually form both the placenta and the embryo. The growing organism travels down the fallopian tube and implants in the uterus. More than half the time, implantation fails.

2. The embryonic period, from the third week through the eighth week after conception, begins with the first signs of the future central nervous system. The future heart begins to beat, and the eyes, ears, nose, mouth, and brain form.

3. Hormones, including sex hormones, and genes affect development of the embryo. By the eighth week, the embryo has all of the basic organs and features, except for sex organs. At that point, the embryo becomes a fetus.

4. The fetal period extends from the ninth week until birth. In the ninth week, the sex organs develop. By the end of the third month, all of the organs and body structures have formed and can function, although the tiny fetus could not survive outside the womb.

5. At 22 weeks, when the brain can regulate basic body functions, viability is possible but unlikely. Babies born before the 26th week are at high risk of death or disability.

6. The average fetus gains approximately 4½ pounds (2,040 grams) from the sixth month to the ninth month, weighing 7½ pounds (3,400 grams) at birth. Maturation of brain, lungs, and heart ensures survival of more than 99 percent of all full-term babies.

Birth

7. Birth typically begins with contractions that push the fetus out of the uterus and then through the vagina. The Apgar scale, which rates the newborn at one minute and again at five minutes after birth, provides a quick evaluation of the infant's health.

8. Medical assistance speeds contractions, dulls pain, and saves lives. However, many aspects of medicalized birth may be unnecessary, including about half of the cesareans performed in the United States and many induced labors that occur before 37 weeks. Contemporary birthing practices are aimed at balancing the needs of baby, parents, and medical personnel.

Problems and Solutions

9. Some teratogens cause physical impairment. Others behavioral teratogens, harm the brain and therefore impair cognitive abilities and affect personality. About 20 percent of children have learning or emotional problems that could be traced to behavioral teratogens.

10. Whether a teratogen harms an embryo or fetus depends on timing, dose, and genes. Public and personal health policies can protect against prenatal complications, with some success debatable. Always, however, family members affect the fetus and woman's health.

11. Low birthweight (under 5½ pounds, or 2,500 grams) arise from early or multiple births, placental problems, illness, malnutrition, smoking, drinking, illicit drug use, and Underweight babies experience more medical difficulties. Psychological problems for many years. Babies that are born at gestational age (SGA) are especially vulnerable.

12. Every birth complication, such as unusually long or full labor that includes anoxia (a lack of oxygen to the fetus) a combination of causes. Long-term handicaps are not inevitable but careful nurturing from parents and society may be essential.

The New Family

13. Newborns are primed for social interaction. The Neonatal Behavioral Assessment Scale measures 46 newborn behaviors, 20 of which are reflexes.

14. Many women feel unhappy, incompetent, or unwell during birth, with the most vulnerable time when the baby is 3 months old. Postpartum depression gradually disappears with appropriate help.

15. Fathers can be crucial in birth events and newborn. Sometimes fathers experience symptoms of pregnancy depression. Ideally, a partner's forms to help the child develop well.

16. Kangaroo care benefits all babies, but especially are vulnerable. Mother-newborn and father-newborn factors in addition to birth circumstances.