Development Through the Lifespan 7th edition Berk Solutions Manual

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CHAPTER 2
GENETIC AND ENVIRONMENTAL FOUNDATIONS

CHAPTER-AT-A-GLANCE

Chapter Outline	Instruction Ideas	Supplements
Genetic Foundations pp. 44–51 The Genetic Code • The Sex Cells • Boy or Girl? • Multiple Offspring • Patterns of Gene–Gene Interactions • Chromosomal Abnormalities	Learning Objectives 2.1–2.3 Learning Activities 2.1–2.3 Ask Yourself p. 51	Test Bank Items 1–51, 126–127 *(Please contact your Pearson sales representative for a wide range of video offerings available to adopters.)*
Reproductive Choices pp. 51–56 Genetic Counseling • Prenatal Diagnosis and Fetal Medicine • Adoption	Learning Objective 2.4 Learning Activity 2.4 Ask Yourself p. 56	Test Bank Items 52–65
Environmental Contexts for Development pp. 56–66 The Family • Socioeconomic Status and Family Functioning • Poverty • Affluence • Beyond the Family: Neighborhoods and Schools • The Cultural Context	Learning Objective 2.5 Lecture Enhancement 2.1 Learning Activities 2.5–2.7 Ask Yourself p. 66	Test Bank Items 66–99, 128–129
Understanding the Relationship Between Heredity and Environment pp. 66–72 The Question, "How Much?" • The Question, "How?"	Learning Objective 2.6 Lecture Enhancement 2.2 Learning Activities 2.2, 2.8–2.9 Ask Yourself p. 72	Test Bank Items 100–125, 130–131

BRIEF CHAPTER SUMMARY

This chapter examines the foundations of development: heredity and environment. At conception, chromosomes containing genetic information from each parent combine to determine characteristics that make us human and also contribute to individual differences in appearance and behavior. Serious developmental problems often result from inheritance of harmful recessive alleles and from chromosomal abnormalities. Genetic counseling and prenatal diagnostic methods can help people make informed decisions about the best reproductive options.

The environment in which human development takes place is a many-layered set of influences. The family is the first and longest-lasting context for development. Other important influences are socioeconomic status, neighborhoods, schools, cultural values and practices, and public policies affecting individuals at various stages of the lifespan.

Behavioral genetics examines the contributions of nature and nurture to diversity in human traits and abilities. Researchers increasingly regard heredity and environment as inseparable and focus on examining how nature and nurture work together. Heritability estimates confirm that heredity contributes to a broad array of human traits but provide no precise information on gene–environment interaction, or how children might respond to environments designed to help them develop as far as possible.

According to the concept of gene–environment correlation, our genes influence the environments to which we are exposed. Epigenesis refers to development resulting from ongoing, bidirectional exchanges between heredity and all levels of the environment. One mechanism through which these exchanges occur is methylation, a biochemical process through which environment can alter gene expression without changing the DNA sequence. Overall, development is best understood as a series of complex exchanges between nature and nurture.

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LEARNING OBJECTIVES

After reading this chapter, you should be able to answer the following:

2.1 What are genes, and how are they transmitted from one generation to the next? (pp. 44–46)

2.2 Describe various patterns of gene–gene interaction. (pp. 46–50)

2.3 Describe major chromosomal abnormalities, and explain how they occur. (pp. 50–51)

2.4 What procedures can assist prospective parents in having healthy children? (pp. 51–56)

2.5 Describe family functioning from the perspective of ecological systems theory, along with aspects of the environment that support family well-being and development. (pp. 56–66)

2.6 Explain the various ways heredity and environment may combine to influence complex traits. (pp. 66–72)

LECTURE OUTLINE

I. GENETIC FOUNDATIONS (pp. 44–51)

- Heredity and environment combine to create **phenotypes,** which depend in part on each individual's **genotype.**
- The *nucleus* of each cell in the human body contains **chromosomes,** which are made up of **deoxyribonucleic acid (DNA).**
- Human **genes** are segments of DNA along the length of the chromosome. They include both **protein-coding genes** and **regulator genes.**
- The **gametes,** or sex cells—the sperm and ovum—are formed through **meiosis** and contain only 23 chromosomes, half as many as regular body cells.
- When sperm and ovum unite at conception, the resulting **zygote** again contains 46 chromosomes.
- Each human cell contains 22 matching pairs of chromosomes, called **autosomes,** and one pair of **sex chromosomes:** in females, XX; in males, XY. The sex of the new organism is determined by whether an X-bearing or a Y-bearing sperm fertilizes the ovum.
- **Fraternal,** or **dizygotic, twins** result from the release and fertilization of two ova. **Identical,** or **monozygotic, twins** result when a single zygote that has started to duplicate separates into two clusters of cells.
- If alleles from each parent are alike, the child is **homozygous** and will display the inherited trait. If the alleles differ, the child is **heterozygous,** and relationships between the alleles determine the phenotype.
- In **dominant–recessive inheritance,** one allele (called *dominant*) affects the child's characteristics, while the second allele (*recessive*) has no effect.
- Heterozygous individuals with just one recessive allele are **carriers** of the recessive trait.
- Serious diseases are rarely due to dominant alleles because the affected individuals seldom live long enough to reproduce.
- **Incomplete dominance** is a pattern of inheritance in which both alleles are expressed in the phenotype, resulting in a combined trait, or one that is intermediate between the two.
- When a harmful allele is carried on the X chromosome, **X-linked inheritance** applies, and males are more likely to be affected.
- **Genomic imprinting** is a pattern of inheritance in which some alleles are *imprinted,* or chemically marked, in such a way that one pair member is activated, regardless of its makeup. Disruptions in imprinting are involved in several childhood cancers, in *Prader-Willi syndrome,* and in *fragile X syndrome.*
- Harmful genes are created through **mutation,** a sudden but permanent change in a DNA segment. *Germline mutation* takes place in the cells that give rise to gametes. *Somatic mutation,* in which normal body cells mutate, can occur at any time of life.
- **Polygenic inheritance,** in which many genes influence a characteristic, accounts for traits such as height, weight, intelligence, and personality that vary on a continuum among people.
- The most common chromosomal disorder, *Down syndrome,* results when the twenty-first pair of chromosomes fails to separate during meiosis, so the new individual receives three of these chromosomes instead of two.
- Abnormalities of the sex chromosomes often are not recognized until adolescence when, in some deviations, puberty is delayed.

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II. REPRODUCTIVE CHOICES (pp. 51–56)

- Genetic counseling and prenatal diagnosis help people make informed decisions about conceiving, carrying a pregnancy to term, or adopting a child.
- **Genetic counseling** helps couples assess their chances of giving birth to a baby with a hereditary disorder and choose the best course of action in view of risks and family goals.
- New *genomewide testing methods* enable genetic counselors to estimate risk for many genetic disorders.
- Increasing numbers of individuals are turning to alternative methods of conception, such as donor insemination, in vitro fertilization, and surrogate motherhood.
- **Prenatal diagnostic methods,** including *amniocentesis, ultrasound,* and *maternal blood analysis,* permit detection of developmental problems before birth and have led to advances in fetal medicine.
- Advances in *genetic engineering* offer hope for correcting hereditary defects.
- Because the availability of healthy babies has declined, adults in North America and Western Europe who choose adoption are increasingly adopting from other countries or accepting children who are past infancy or who have known developmental problems.
- Adopted children and adolescents tend to have more emotional and learning difficulties than other children, a difference that increases with the child's age at the time of adoption. However, most adopted children fare well.

III. ENVIRONMENTAL CONTEXTS FOR DEVELOPMENT (pp. 56–66)

- The family is the first and longest-lasting context for development. Other environmental influences include friends, neighbors, school, workplace, and community and religious organizations.
- Environments that powerfully affect development include not only the *microsystem* but also the *macrosystem,* or broad social climate of society.
- Contemporary researchers view the family as a network of interdependent relationships in which the behaviors of each family member affect those of others through *bidirectional influences.*
- In addition to direct influences between family members, interaction between any two members is affected by *third parties.* For example, mothers and fathers who have a warm, considerate marital relationship are more likely to engage in effective **coparenting.**
- The family is a dynamic, ever-changing system of relationships, influenced by life events, the developmental status of each family member, and historical time period.
- **Socioeconomic status (SES)** is linked to timing of marriage and parenthood, to family size, and to child-rearing values and expectations.
- Poverty affects about 15 percent of Americans. Those hit hardest are parents under age 25 with young children, ethnic minorities, women, and older adults who live alone.
- Of all Western nations, the United States has the highest percentage of extremely poor children. They are more likely than others to experience lifelong poor physical health, persistent deficits in cognitive development and academic achievement, high school dropout, mental illness, and impulsivity, aggression, and antisocial behavior.
- A related problem is homelessness. Most homeless families consist of women with children under age 5, many of whom suffer from developmental delays and chronic emotional stress.
- When affluent parents fail to engage in family interaction and parenting that promote favorable development, their children are more likely than youths in general to engage in alcohol and drug use, commit delinquent acts, and report high levels of anxiety and depression.
- Strong family ties to the surrounding social context reduce stress and enhance adjustment. When community life is disrupted, family violence, child abuse and neglect, adult criminal behavior, and other social problems are especially high.
- Neighborhood resources and social ties play an important part in children's development and also affect the well-being of adults, especially older adults.
- Schools affect many aspects of development through their physical environments, educational philosophies, and social life, including opportunities for parent involvement.
- The *macrosystem,* or larger cultural context, affects all environmental contexts for development.
- In the United States, central cultural values include independence, self-reliance, and the privacy of family life—one reason the public has been slow to endorse government-supported benefits for all families.
- Within the United States, some people belong to **subcultures** with beliefs and customs, such as cooperative family values, that differ from those of the larger culture—for example, the African-American tradition of **extended-family households.**

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- Cultures can be compared on two broad sets of values: *collectivism* (which emphasizes group goals and *interdependent* qualities) versus *individualism* (which emphasizes *independence*). The United States is more individualistic than most Western European countries.
- Nations attempt to solve widespread social problems through **public policies**.
- Compared with other industrialized nations, the United States does not rank well on any key measure of children's health and well-being, in part because of cultural values of self-reliance and privacy.
- Although the U.S. aging population is financially much better off now than in the past, older adults in the United States are less well off than those in many other Western nations.
- Influential interest groups devoted to improving the well-being of children or older adults have emerged.
- Researchers are collaborating with community and government agencies to enhance the social relevance of their investigations.

IV. UNDERSTANDING THE RELATIONSHIP BETWEEN HEREDITY AND ENVIRONMENT (pp. 66–72)

- **Behavioral genetics** is a field devoted to uncovering the contributions of nature and nurture to the diversity of human traits and abilities.
- A growing consensus of investigators believes that the important question is *how nature and nurture work together.*
- **Heritability estimates,** which measure the extent to which individual differences in complex traits in a specific population are due to genetic factors, are obtained from **kinship studies,** which compare the characteristics of family members.
- Research supports a moderate role for heredity in intelligence and in personality.
- Heritability estimates tend to exaggerate the role of heredity, and they can easily be misapplied, as when high heritabilities have been used to suggest a genetic basis for ethnic differences in intelligence.
- Today, most researchers view development as the result of the dynamic interplay between heredity and environment.
- **Gene–environment interaction** means that because of their genetic makeup, individuals differ in their responsiveness to qualities of the environment.
- The concept of **gene–environment correlation** states that our genes influence the environments to which we are exposed. In *passive* correlation, parents provide their children with environments influenced by their own heredity. In *evocative* correlation, children evoke responses influenced by the child's heredity, and these responses strengthen the child's original style.
- At older ages, *active* gene–environment correlation is seen in **niche-picking**—the tendency to actively choose environments that complement our heredity.
- Accumulating evidence reveals that the relationship between heredity and environment is *bidirectional:* Genes affect people's behavior and experiences, but their experiences and behavior also affect gene expression.
- **Epigenesis** refers to development resulting from ongoing, bidirectional exchanges between heredity and all levels of the environment.
- Researchers in *epigenetics* are beginning to clarify the precise mechanisms through which environment can alter gene expression without changing the DNA sequence. One such mechanism is **methylation.**
- Findings from epigenetics remind us that development is best understood as a series of complex exchanges between nature and nurture.

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LECTURE ENHANCEMENTS

LECTURE ENHANCEMENT 2.1
Environmental Contexts for Development: What Researchers Can Learn from Studying Latino Children and Their Families (pp. 62–63)

Objective: To consider ways in which an understanding of how Latino children develop within their culture can contribute to an understanding of the cultural contexts within which all children develop.

The authors of "Learning from Latinos" begin with the observation that two generations ago, Latino children and their families were assumed to have uniform cultural traits and practices, which were typically seen as deficits compared with those of white, middle-class families.

Research since the 1960s has exposed the limitations of this older conception of child development, which viewed socialization only in terms of how well children fit into mainstream society. Today's researchers understand that children are socialized within a particular cultural community with its own values and practices, which may promote both cognitive and social development. From this perspective, distinct strengths of Latino families and resulting benefits for children can be identified.

"Learning from Latinos" provides context for class discussion of the text on pages 62–63, which deals with the ways in which cultural context affects how children are socialized and how they learn within everyday activities. For example, the text notes that Hispanic extended families in the United States are often characterized by a cooperative family structure in which grandparents actively collaborate with parents in child rearing. This type of collaboration—consistent with the Hispanic cultural ideal of *familism,* which emphasizes close family ties—is beneficial for all generations.

The authors note that schools and other institutions often fail to recognize the distinct social assets that characterize Latino children, such as respect for adults and a commitment to serve their family by succeeding in school. They conclude that a better understanding of how Latino children develop within their cultural context can promote our understanding of how all children and adolescents learn and develop within their own distinct cultural or socioeconomic groups.

Fuller, B., & García Coll, C. (2010). Learning from Latinos: Contexts, families, and child development in motion. *Developmental Psychology, 46*, 559–565. doi: 101037/a0019412

LECTURE ENHANCEMENT 2.2
The Role of DNA Methylation in Gene Expression: Examples and Implications (pp. 70–72)

Objective: To consider research evidence for the role of DNA methylation in gene expression, with implications for promoting health and wellness.

As described in the discussion of environmental influences on gene expression (pages 70–72), research evidence reveals a bidirectional relationship between heredity and environment. Not only do our genes affect the experiences to which we are exposed, but our experiences and behavior also influence gene expression, without actually changing the DNA sequence. One mechanism through which such effects occur is *methylation*—"a biochemical process triggered by certain experiences, in which a set of chemical compounds (called a methyl group) lands on top of a gene and changes its impact."

The Biology and Environment box on page 71 considers how methylation may have accounted for the consequences of exposure to the 1994 Tutsi genocide in Rwanda for both pregnant mothers and their children. Szyf and Bick's (2013) review paper provides additional evidence for such effects. For example, the authors note "a striking resemblance" between differences in DNA methylation associated with child abuse and those associated with low levels of maternal care in rats.

Countering the widespread belief that differences between individuals in phenotype, disease susceptibility, and behavior reflect differences in gene sequencing, these authors cite evidence that, in fact, these interindividual differences in gene sequences "do not operate alone but interact with environmental conditions to predict phenotypic outcomes." They hope that future research into the precise mechanisms involved in methylation will eventually lead to the development of strategies for altering gene expression in a way that promotes healthy outcomes.

Szyf, M., & Bick, J. (2013). DNA methylation: A mechanism for embedding early life experiences in the genome. (Special Section: Genomics) *Child Development, 84,* 49–57. doi: 10.1111/j.1467-8624.2012.01793.x

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LEARNING ACTIVITIES

LEARNING ACTIVITY 2.1
Observing Similarities and Differences in Phenotypes Among Family Members (p. 44)

Ask students to think of several children and parents whom they know well and to jot down some similarities in physical characteristics (for example, height, weight, eye and hair color) and behavior (personality, interests, hobbies) between the children and their parents. Did they find that one child shows combined features of both parents, another resembles just one parent, or another is unlike either parent?

Next, ask students to trace a visible genetic trait (phenotype), such as hair or eye color, through as many of their family members as possible, beginning with the youngest generation and working back. When the genetic family tree is complete, ask them to determine genotypes. Point out that for some dominant traits it is impossible to determine the genotype on the basis of the phenotype, so students will have to make inferences. For example, it may not be evident whether a dark-haired person is homozygous for dark hair or is heterozygous, with a genetic makeup consisting of a dominant dark-hair and a recessive light-hair allele. Ask students to explain what may be responsible for these differences between family members. Integrate the terms *phenotype, genotype,* and *meiosis* into the discussion.

LEARNING ACTIVITY 2.2
Demonstrating Environmental Influences by Comparing Identical Twins (p. 46)

As discussed in the text, identical, or monozygotic, twins have the same genetic makeup. Therefore, phenotypic variation of identical twins is perhaps the best evidence of the extent to which environmental influences can modify genetic expression. To demonstrate, invite a pair of identical twins to join your class for observation and interviews. Before the visit, ask students to generate a list of questions that they would like to ask each twin. These questions should be based on attributes or abilities that are thought to have a significant genetic component—for example, IQ, personality, interests, and talents. Students should also note any physical differences between the twins, such as height, weight, or handedness.

After the visit, engage students in a discussion about similarities and differences between the twins, including ideas about how the environment may have contributed to differences.

LEARNING ACTIVITY 2.3
True or False: The Pros and Cons of Reproductive Technologies (pp. 52–53)

Present the following exercise as an in-class activity or quiz.

Directions: Read each of the following statements and determine if it is *True* (T) or *False* (F).

_____ 1. One-fourth of all couples who try to conceive discover that they are infertile.
_____ 2. The success rate for donor insemination is only 30 to 40 percent.
_____ 3. Each year, 1 percent of all children in developed countries are conceived through in vitro fertilization.
_____ 4. The overall success rate of assisted reproductive techniques is about 70 percent.
_____ 5. Most parents who have used in vitro fertilization do not tell their children about their origins.
_____ 6. In the United States, doctors are not required to keep records of donor characteristics.
_____ 7. Because surrogacy usually involves the wealthy as contractors for infants and the less economically advantaged as surrogates, it may promote the exploitation of financially needy women.
_____ 8. Most recipients of in vitro fertilization are in their fifties and sixties.
_____ 9. At present, little is known about the psychological consequences of being a product of reproductive technologies.

Answers:

1. F
2. F
3. T
4. F
5. T
6. T
7. T
8. F
9. T

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LEARNING ACTIVITY 2.4
Researching Social Indicators of the Well-Being of Children and Older Adults in the United States (pp. 64–65)

According to the text, parents who are under the age of 25 and older adults who live alone are hit hardest by the effects of poverty. Further, until the mid-twentieth century, the United States had few policies in place to protect the aging population. To supplement research in the text, ask students to visit two websites: Child Trends (*www.childtrends.org*) and the Federal Interagency Forum on Aging Related Statistics (*www.agingstats.gov*).

Child Trends: Students should position their mouse over Databank and click on Indicators by Topic Area, then choose Child Well-Being and select an article to review. Ask students to briefly summarize the article, addressing the following questions:

(1) What child or adolescent indicator was highlighted?
(2) What trends were revealed?
(3) Did the article include past research? If so, how do past and current research findings compare?
(4) Is any cultural or ethnic data reported? If so, what differences or similarities did you find between different cultural or ethnic groups?

Aging Stats: Ask students to explore the site and to list key indicators of well-being among older adults. What resources are available to older people? Ask students to compare this information to the information on children, and to share their findings with the class.

LEARNING ACTIVITY 2.5
Conducting a Survey of Attitudes Toward Government Intervention into Family Life (pp. 64–65)

Ask students to interview two or three friends, family members, or acquaintances, and ask the following questions:

(1) Should government provide money and resources to low-income families with young children? If so, should that support come from tax dollars?
(2) Should government provide support for older adults serve primarily as a safety net for those in dire need, or should universal programs such as Social Security and Medicare be maintained and even expanded?

When students return to class with their interview responses, ask them to share their findings in class and to classify each answer on the basis of whether it reflects an emphasis on *independence* or on *interdependence*. Do students agree with the views expressed by their respondents? Why or why not?

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LEARNING ACTIVITY 2.6
Matching: Understanding the Relationship Between Heredity and Environment (pp. 70–75)

Present the following exercise as an in-class activity or quiz.

Directions: Match each of the following terms with its correct description.

_____ 1. Heritability estimates
_____ 2. Kinship studies
_____ 3. Gene–environment interaction
_____ 4. Gene–environment correlation
_____ 5. Niche-picking
_____ 6. Epigenesis
_____ 7. Methylation

Descriptions:

A. The ways in which our genes influence the environments to which we are exposed
B. Measure of the extent to which individual differences in complex traits in a specific population are due to genetic factors
C. The tendency to actively choose environments that complement our heredity
D. Development resulting from ongoing, bidirectional exchanges between heredity and all levels of the environment
E. Comparison of the characteristics of family members
F. Differences resulting from individuals' genetic makeup in their responsiveness to qualities of the environment
G. A biochemical process triggered by certain experiences, in which a set of chemical compounds, called a methyl group, lands on top of a gene and changes its impact, reducing or silencing its expression

Answers:

1. B
2. E
3. F
4. A
5. C
6. D
7. G

LEARNING ACTIVITY 2.7
Exploring Epigenesis (pp. 70–72)

Ask students to review the definition and example of epigenesis on pages 70–72 of the text. Next, ask them to form small groups and consider several scenarios:

(1) A preschool child from an economically at-risk family has received intensive early intervention services, including academic, health, and social support.
(2) A child is born to a mother who, during her pregnancy in 2015, experienced extreme hardship and danger as a migrant fleeing the Syrian conflict and attempting to reach Europe. The mother and baby have now lived in a refugee camp for over a year.
(3) A child is born to a mother who experienced physical and psychological abuse during her pregnancy. She left the abusive relationship when the child was a toddler and subsequently formed a mutually supportive, sustained relationship with a new partner.

For each scenario, ask students to discuss the likely effects of environmental factors on gene expression.

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ASK YOURSELF . . .

CONNECT: Referring to ecological systems theory (Chapter 1, pages 23–26), explain why parents of children with genetic disorders often experience increased stress. What factors, within and beyond the family, can help these parents support their children's development? (p. 50)

Ecological systems theory views the individual as developing within a complex system of relationships affected by multiple levels of the surrounding environment. Caring for a disabled child can be expensive, exhausting, and stressful for parents. For example, infants with Down syndrome are more difficult to care for than typically developing infants. They smile less readily, show poorer eye-to-eye contact, have weaker muscle tone, and explore objects less persistently than typical children. From the viewpoint of ecological systems theory, factors in the *mesosystem*—for example, the availability of specialized infant and preschool intervention programs—can help these parents support their children's development, both by providing experiences that promote the child's physical and cognitive development and by relieving the parents of the sole burden of caring for the child.

APPLY: Gilbert's genetic makeup is homozygous for dark hair. Jan's is homozygous for blond hair. What proportion of their children are likely to be dark-haired? Explain. (p. 46)

Homozygous individuals inherit similar alleles from both parents, so they will always display the inherited trait. Because Gilbert can pass on only the dominant dark-hair allele, all of Gilbert and Jan's children will have dark hair. However, because their children will also receive the recessive blond-hair allele from Jan, all of them will be *heterozygous*—carriers of the allele for blond hair, which they can pass on to their own children.

REFLECT: Provide illustrations from our discussion, and from people you know with genetic disorders, of environmental influences on development. (pp. 50–51)

This is an open-ended question with no right or wrong answer.

CONNECT: How does research on adoption reveal resilience? Which factor related to resilience (see Chapter 1, pages 10–11) is central in positive outcomes for adoptees? (pp. 55–56)

Research shows that adopted children and adolescents tend to have more learning and emotional difficulties than other children, a difference that increases with the child's age at time of adoption. Children adopted after infancy often have a preadoptive history of conflict-ridden family relationships, lack of parental affection, neglect and abuse, or deprived institutional rearing. But despite these risks, most adopted children fare well, and those with preexisting problems who experience sensitive parenting usually make rapid progress. And children with troubled family histories who are adopted at older ages generally improve in feelings of trust and affection for their adoptive parents as they come to feel loved and supported.

By adolescence, adoptees' lives are often complicated by unresolved curiosity about their roots. They may face a challenging process of defining themselves as they try to integrate aspects of their birth family and their adoptive family into their emerging identity. But when parents have been warm, open, and supportive in their communication about adoption, their children typically forge a positive sense of self. And as long as their parents took steps to help them learn about their heritage in childhood, young people adopted into a different ethnic group or culture generally develop identities that are healthy blends of their birth and rearing backgrounds. In general, a warm parental relationship, which is a key ingredient of resilience, contributes to favorable outcomes for adoptees.

APPLY: Imagine that you must counsel a couple considering in vitro fertilization using donor ova to overcome infertility. What medical and ethical risks would you raise? (pp. 52–53)

The couple should be told that in vitro fertilization poses greater risks than natural conception to infant survival and healthy development. About 26 percent of in vitro procedures result in multiple births. Most are twins, but 3 percent are triplets or higher-order multiples. Consequently, among in vitro babies, the rate of low birth weight is nearly four times as high as in the general population. In response, doctors have reduced the number of fertilized ova injected into a woman's uterus, typically to no more than two. Risk of pregnancy complications, miscarriage, and major birth defects also rises, due to the biological effects of in vitro techniques and the older age of many people seeking treatment. Further, in many countries, including the United States, doctors are not required to keep records of donor characteristics, though information about the child's genetic background might be critical in the case of serious illness. The couple should also be made aware of the serious ethical concerns surrounding the in vitro "sex sorter" method, which enables parental sex selection, thereby eroding the moral value that boys and girls are equally precious.

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REFLECT: Suppose you are a carrier of fragile X syndrome and want to have children. Would you choose pregnancy, adoption, or surrogacy? If you became pregnant, would you opt for prenatal diagnosis? Explain your decisions. (pp. 51–56)

This is an open-ended question with no right or wrong answer.

CONNECT: Links between family and community foster development throughout the lifespan. Provide examples and research findings that support this idea. (pp. 60–61)

Connections between family and community are vital for psychological well-being throughout the lifespan. For example, in poverty-stricken areas, community life is usually disrupted. Families move often, parks and playgrounds are in disarray, and community centers providing organized leisure-time activities do not exist. In such neighborhoods, family violence, child abuse and neglect, child and youth internalizing and externalizing difficulties, adult criminal behavior, and depression and declines in cognitive functioning in older adults are especially high. In contrast, strong family ties to the surrounding social context—as indicated by frequent contact with friends and relatives and regular church, synagogue, or mosque attendance—reduce stress and enhance adjustment.

Neighborhoods offer resources and social ties that play an important part in children's development, especially for economically disadvantaged young people, whose families depend on their immediate surroundings for social support. In low-income neighborhoods, in-school and after-school programs that provide art, music, sports, and other enrichment activities are associated with improved academic performance and a reduction in emotional and behavioral problems in elementary and middle school. And neighborhood organizations, such as religious youth groups and special interest clubs, contribute to increased self-confidence, school achievement, and educational aspirations in adolescence.

During late adulthood, neighborhoods become increasingly important because people spend more time at home. Especially in the absence of nearby family members, older adults mention neighbors and nearby friends as resources they rely on most for physical and social support.

APPLY: Check your local newspaper or one or two national news websites to see how often articles appear on the condition of children, families, and older adults. Why is it important for researchers to communicate with the public about the well-being of these sectors of the population? (pp. 64–66)

When widespread social problems arise, such as poverty, homelessness, hunger, and disease, nations attempt to solve them through devising *public policies*—laws and government programs designed to improve current conditions. For example, when poverty increases and families become homeless, a country might decide to build more low-cost housing, raise the minimum wage, and increase welfare benefits. When older adults have difficulty making ends meet because of inflation, a nation might increase its social security benefits. Growing awareness of the gap between what we know and what we do to better people's lives has led experts in developmental science to join with concerned citizens as advocates for more effective policies.

Besides strong advocacy, public policies that enhance development depend on research that documents needs and evaluates programs to spark improvements. By collaborating with community and government agencies, researchers can enhance the social relevance of their investigations. And by disseminating their findings to the public in easily understandable, compelling ways—through reports to government officials, websites aimed at increasing public understanding, and collaborations with the media to ensure accurate and effective reporting—researchers can help create the sense of immediacy about the condition of children, families, and older adults that is necessary to spur a society into action.

REFLECT: Do you agree with the widespread American sentiment that government should not become involved in family life? Explain. (p. 64)

This is an open-ended question with no right or wrong answer.

CONNECT: Explain how each of the following concepts supports the conclusion that genetic influences on human characteristics are not constant but change over time: somatic mutation (page 49), niche-picking (page 69), and epigenesis (page 70).

Somatic mutation occurs when normal body cells mutate, as happens in many cancers and other diseases. Unlike germline mutation, which takes place only in the cells that give rise to gametes, somatic mutation can occur at any time of life. It may reflect a genetic susceptibility in some individuals that causes certain body cells to mutate easily in the presence of triggering events. Somatic mutation provides evidence that individuals do not have a single, permanent genotype; rather, the genetic makeup of each cell can change over time.

Niche-picking is the tendency to actively choose environments that complement our heredity. Infants and young children cannot do much niche-picking because adults select environments for them. In contrast, older children, adolescents, and adults,

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who are increasingly in charge of their environments, can express their preferences through niche-picking. This helps explain why pairs of identical twins reared apart during childhood and later reunited may find, to their surprise, that they have similar hobbies, food preferences, and vocations.

Epigenesis means development resulting from ongoing, bidirectional exchanges between heredity and all levels of the environment. One mechanism through which environment can alter gene expression without changing the DNA sequence is *methylation*—a biochemical process triggered by certain experiences, in which a set of chemical compounds (called a methyl group) lands on top of a gene and changes its impact, reducing or silencing its expression. Methylation levels can be measured, and they help explain why identical twins, though precisely the same in DNA sequencing, sometimes display strikingly different phenotypes with age.

APPLY: Bianca's parents are accomplished musicians. At age 4, Bianca began taking piano lessons. By age 10, she was accompanying the school choir. At age 14, she asked to attend a special music high school. Explain how gene–environment correlation promoted Bianca's talent. (pp. 68–69)

According to the concept of *gene–environment correlation,* our genes influence the environments to which we are exposed. Early in her development, Bianca probably experienced *passive* correlation when her parents, because of their own musical backgrounds, exposed her to musical activities, such as attending concerts and listening to classical music. Bianca's parents also provided her first piano lessons and opportunities for other music-related experiences. Because Bianca was receptive to this abundance of musical stimulation, she undoubtedly evoked positive responses from her parents, who continued to promote her musical development—an example of *evocative* gene–environment correlation.

As Bianca grew older, she became more active in choosing her own environments. She decided to accompany the school choir and later asked to attend a special music high school. Bianca's inherited musical talent led her to engage in *niche-picking*—choosing activities and environments that complemented her genetic strengths. In these ways, heredity and environment worked together to advance Bianca's musical endeavors.

REFLECT: What aspects of your own development—for example, interests, hobbies, college major, or vocational choice—are probably due to niche-picking? Explain. (p. 69)

This is an open-ended question with no right or wrong answer.

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MEDIA MATERIALS

For details on individual video segments that accompany the DVD for *Development Through the Lifespan,* Seventh Edition, please see the DVD Guide for *Explorations in Lifespan Development*. The DVD and DVD Guide are available through your Pearson sales representative.

Additional DVDs and streaming videos that may be useful in your class are listed below. They are not available through your Pearson sales representative, but you can order them directly from the distributors. (See contact information at the end of this manual.)

Epigenetics: The Hidden Life of Our Genes (2009, Films Media Group, 53 min.). An exploration of the emerging field of epigenetics.

Heredity & Environment: Beginnings of Life (2011, Learning Seed, 38 min.). An overview of heredity and environment, including genetic disorders and the role of prenatal counseling.

Secret Life of Twins (2015, Films Media Group/BBC, 52 min.). Stories of several pairs of identical twins, from childhood to adulthood, revealing similarities and differences between them.

Sperm Donor Anonymous (2015, Films Media Group, 58 min.). The efforts of donor-conceived adults to learn about their genetic heritage.

Two of a Kind (2014), Films Media Group, 89 min.). Insights into epigenetics from research exploring differences between identical twins.

Unlocking the Code: Genetics and Medicine (2011, Films Media Group/Open University, 50 min.). How genetic breakthroughs have improved health-care technology. Part of the series *The Gene Code.*

Waiting on the World to Change: Poverty in Camden, New Jersey (2007, Films Media Group, 42 min.). The lives of three young residents of Camden, New Jersey. An *ABC News* program.

What Poor Child Is This? Poverty and America's Children (2011, Films Media Group, 86 min.). Child poverty in the United States—its causes, its agents, and its impact. Part of the series *Poverty in America.*

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