Life Span Development 16th edition Santrock Solutions Manual

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Chapter 2: Biological Beginnings

Learning Goals

Learning Goal 1: Discuss the evolutionary perspective on life-span development.
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.
Learning Goal 4: Explain some of the ways that heredity and environment interact to produce individual differences in development.

Overview of Resources

Chapter Outline	Resources You Can Use
The Evolutionary Perspective	**Learning Goal 1: Discuss the evolutionary perspective on development.**
Natural Selection and Adaptive Behavior Evolutionary Psychology	Classroom Activity 6: Critical-Thinking Multiple-Choice Questions and Answers Classroom Activity 7: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays Classroom Activity 8: Ethics Research Project 3: Evolution and Trait Selection
Genetic Foundations of Development	**Learning Goal 2: Describe what genes are and how they influence human development.**
The Collaborative Gene Genes and Chromosomes Genetic Principles Chromosomal and Gene-Linked Abnormalities	Lecture Suggestion 1: Three Laws of Behavior Genetics Lecture Suggestion 2: Prenatal Counseling Lecture Suggestion 3: Interaction Concepts Classroom Activity 1: Principles of Genetic Transmission Classroom Activity 2: Pros and Cons of Genetic Testing for Huntington's Disease Classroom Activity 4: Debate on Heritability of Intelligence Classroom Activity 6: Critical-Thinking Multiple-Choice Questions and Answers Classroom Activity 7: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays Classroom Activity 8: Ethics Personal Application 1: All in the Family Research Project 1: Heritability of Height Research Project 2: Genetic Counseling Available to You

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	Connect Resource: NewsFlash: Can Genes Be Patented?
Reproductive Challenges and Choices	**Learning Goal 3: Identify some important reproductive challenges and choices.**
Prenatal Diagnostic Tests Infertility and Reproductive Technology Adoption	🗣Lecture Suggestion 2: Prenatal Counseling 🗲Classroom Activity 2: Pros and Cons of Genetic Testing for Huntington's Disease 🗲Classroom Activity 3: Adoption 🗲Classroom Activity 6: Critical-Thinking Multiple-Choice Questions and Answers 🗲Classroom Activity 7: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays 🗲Classroom Activity 8: Ethics 🔍 Research Project 2: Genetic Counseling Available to You
Heredity-Environment Interaction: The Nature-Nurture Debate	**Learning Goal 4: Explain some of the ways that heredity and environment interact to produce individual differences in development.**
Behavior Genetics Heredity–Environment Correlations Shared and Nonshared Environmental Experiences The Epigenetic View and Gene ×Environment (G × E) Interaction Conclusions about Heredity-Environment Interaction	🗣 Lecture Suggestion 3: Interaction Concepts 🗲Classroom Activity 4: Debate on Heritability of Intelligence 🗲Classroom Activity 5: Explanations for Attention Deficit Hyperactivity Disorder: Nature or Nurture? 🗲Classroom Activity 6: Critical-Thinking Multiple-Choice Questions and Answers 🗲Classroom Activity 7: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays 🗲Classroom Activity 8: Ethics 🧍 Personal Application 1: All in the Family 🧍 Personal Application 2: I Am What I Am 🧍 Personal Application 3: The Same but Different 🔍 Research Project 1: Heritability of Height 🔍 Research Project 2: Genetic Counseling Available to You Connect Resource: Are Antidepressants Safe During Pregnancy?
Review	🗲Classroom Activity 6: Critical-Thinking Multiple-Choice Questions and Answers 🗲Classroom Activity 7: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays 🗲Classroom Activity 8: Ethics

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Resources

Lecture Suggestions

Lecture Suggestion 1: Three Laws of Behavior Genetics
Learning Goal 2: Describe what genes are and how they influence human development.

Sir Francis Galton (1822-1911) was the first scientist to study heredity and human behavior systematically. The term "genetics" did not even appear until 1909, only two years before Galton's death. With or without a formal name, the study of heredity always has been, at its core, the study of biological variation. Human behavioral genetics, a relatively new field, seeks to understand both the genetic and environmental contributions to individual variations in human behavior.

The purpose of this lecture is to extend the discussion of behavior genetics relative to the nature–nurture debate. The traditional nature–nurture debate focused on whether genes influenced complex behavioral outcomes which, of course, they do. The current nature–nurture debate focuses on how to proceed from partitioning sources of variance to specifying concrete developmental processes. Turkheimer (2000) has synthesized three laws of behavior genetics:

First Law:	All human behavioral traits are heritable.
Second Law:	The effect of being raised in the same family is smaller than the effect of genes.
Third Law:	A substantial portion of the variation in complex human behavioral traits is not accounted for by the effects of genes or families.

If the first two laws are taken literally, the nature side of the great nature–nurture debate wins. That is, genes matter and families or environment do not. However, this is a massive oversimplification. The claim that genes are involved in all traits does not preclude environmental influences. Individual genes and their environments (including other genes) interact to influence developmental processes. Interactivity is the primary component of this process. Subsequent environments are influenced by prior states, and these interactions influence developmental trajectories of the organism which affect future expression of genes. There are no direct cause-and-effect relationships in developmental processes; rather, any individual gene or environmental event influences development only by interacting with other genes and environments.

Heritability per se has few implications for scientific understanding of development. It is important to keep in mind the following point: Heritability does not have one certain consequence. Correlations among biologically related family members are not prima facie evidence of sociocultural causal mechanisms. Just because a child of a depressed mother becomes depressed does not demonstrate that being raised by depressed mothers is itself depressing. That child might have become depressed regardless of the environment due to the influence of the mother's genes.

Related to the second and third law, Plomin and Daniels (1987) asked the question: Why are children in the same family so different from one another? They proposed that children in the same family are different because nonshared environmental events are more potent causes of developmental outcomes than shared environmental factors. In other words, children's environments, their peers, and the aspects of parenting their siblings do not share all help to explain differences between siblings. The part of the family environment that siblings do not

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share appears to matter more than the part of the family environment that siblings do share. Plomin and Daniels also state that the salient environment is almost impossible to research, because it is a combination of unsystematic, idiosyncratic, or serendipitous events.

Genetic material is a more systematic source of variability in development than environment. Yet this statement is based on methodological issues rather than substantive issues. Genetic experiments (identical and fraternal twins) statistically assess this component better than social scientists' ability to assess nonsystematic and idiosyncratic events within environments. Turkheimer states that twin studies are a methodological shortcut, but that they do not demonstrate that genes are more important than environments. Turkheimer further states that human developmental social science is difficult to conduct for two major reasons: (1) human behavior develops out of complex, interactive nonlinear processes; and, (2) experimental control is impossible to implement in human developmental processes because of ethical constraints.

The instructor could discuss some of the concepts given in the following link: http://web.ornl.gov/sci/techresources/Human_Genome/index.shtml.

Sources:

Plomin, R., & Daniels, D. (1987). Why are children in the same family so different from one another? *Behavioral and Brain Sciences, 10*, 1–60.

Turkheimer, E. (2000). Three laws of behavior genetics and what they mean. *Current Directions in Psychological Science, 9,* 160–164.

Lecture Suggestion 2: Prenatal Counseling

Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.

Students often find the role of a genetics counselor difficult to understand. Invite a genetics counselor to come and discuss what he or she does to assist couples who want testing. You might ask the counselor to discuss reasons why couples come for testing (see next paragraph) and methods of testing. If you are not able to have a guest speaker attend your class, give a lecture on these ideas.

According to the National Society of Genetic Counselors' Definition Task Force (2006): "Genetic counselors are Master's-trained health care professionals who combine their knowledge of basic science, medical genetics, epidemiological principles, and counseling theory with their skills in genetic risk assessment, education, interpersonal communication and counseling to provide services to clients and their families for a diverse set of genetic or genomic indications. Genetic counselors help people '… understand and adapt to the medical, psychological and familial implications of genetic contributions to disease." The process of genetic counseling "… integrates the following: interpretation of family and medical histories to assess the chance of disease occurrence or recurrence; education about inheritance, testing, management, prevention, resources and research; counseling to promote informed choices and adaptation to the risk or condition.'"

Genetic counselors are employed in many settings, such as medical centers, physicians' offices, health maintenance organizations, advocacy organizations, governmental agencies, public health departments, and biotechnology companies. Those in clinical practice provide education and counseling in areas including reproductive genetics, infertility and preimplantation genetic

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diagnosis, pediatric genetics, newborn screening follow-up, cancer genetics, neurogenetics, and cardiovascular genetics. Many genetic counselors are actively involved in teaching and research.

The following reasons are among those listed by Packard Children's Hospital at Stanford (2001) for seeking a referral for genetic counseling and/or genetic evaluation:

- Family History Factors:
  - Previous child with, or family history of:
    - Chromosome abnormalities (such as Down syndrome)
    - Heart defects
    - Single gene defects (such as cystic fibrosis or PKU)
    - Learning disabilities
    - Psychiatric disorders
    - Cancers
  - Either parent with an autosomal dominant disorder or any disorder seen in several generations
  - Both parents carriers for an autosomal recessive disorder diagnosed either by the birth of an affected child or by carrier screening
- Pregnancy Factors:
  - Maternal age 35 years or greater at delivery
  - Abnormal prenatal diagnostic test results or abnormal prenatal ultrasound examination
- Other Factors:
  - Persons in specific ethnic groups or geographic areas with a higher incidence of certain disorders, such as Tay–Sachs disease, sickle cell disease, or thalassemias

Sources:
http://nsgc.org/p/cm/ld/fid=46
http://www.lpch.org/DiseaseHealthInfo/HealthLibrary/genetics/counsel.html

Lecture Suggestion 3: Interaction Concepts
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

The concept of interaction takes some time to master. There are numerous examples of interaction among the topics taught in a life-span development course. One of the clearest examples comes from the principles of gene expression.

An organism's genetic experession detremines its development. Both internal and external factors influence which genes are expressed and when they are expressed. Internal factors, such as hormones and metabolism, are active in the organism's internal environment. An extremely important internal factor, seen in sex-influenced and sex-limited tratits, is gender. External factors, such drugs, chemicals, temperature, and light, are found in the environment around the organism.

Present a lecture on gene expression and the influence of environment. Myers (2004) addresses this issue from the standpoint of disease prevention. He raises the following key points:

- Abnormal proteins resulting from gene mutations or different forms of alleles unquestionably can and do cause disease. However, epidemiological studies usually reveal that only a small percentage of disease cases are actually attributable to the presence of the mutated gene.

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- Inappropriate gene expression—whether or not a gene is turned on or off at the appropriate time—can be just as important to disease susceptibility.
- New research is demonstrating that low-level exposures to a variety of agents, including environmental contaminants, can alter gene expression.
- A high priority should be placed on identifying environmental agents that can disrupt gene expression.

Sources:
Myers, J. (2004). Gene expression and environmental exposures: New opportunities for disease prevention. *San Francisco Medicine*, *77*(4).
http://www.nature.com/scitable/topicpage/environmental-influences-on-gene-expression-536 (2008)

Classroom Activities

Classroom Activity 1: Principles of Genetic Transmission
Learning Goal 2: Describe what genes are and how they influence human development.

The purpose of this activity is to help students understand the principles of genetic transmission. Ask students to bring in as complete a description as possible of the hair type (straight or curly) of their siblings, parents, grandparents, and, if possible, great-grandparents. Some students will be unable to get the information, so it might be a good idea to break them into groups and have them use the data of the student with the most complete history. Using Mendel's principles of genetic transmission, have students draw genetic models that explain how they and their siblings got their hair type. Encourage the students to include their parents and grandparents in their models.

The allele for curly hair is dominant (represent it as C) and the allele for straight hair is recessive (c). Children who inherit either a homozygous pair (CC) of dominant alleles or a heterozygous pair (Cc) will have curly hair (though the Cc individuals could pass on a straight hair gene to their children, thus they are called carriers). Children who inherit a homozygous recessive pair (cc) will have straight hair.

If the father is homozygous for straight hair (cc) and the mother is heterozygous for curly hair (Cc), 50 percent of the children will be heterozygous for curly hair and 50 percent will be homozygous for straight hair.

Logistics:
- Group size: Individual or small group (5).
- Approximate time: 10 minutes.

Classroom Activity 2: Pros and Cons of Genetic Testing for Huntington's Disease
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.

A genetic diagnostic test has been developed for the 100,000 Americans with a history of Huntington's disease in their families. The test identifies which individuals have inherited the defective gene. These individuals will usually begin to show symptoms between the ages of 35 and 45. The symptoms include progressive dementia and loss of body control, irritability, depression, and symptoms that mimic "drunkenness," such as slurred speech, slowed thought

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processes, impaired memory, and diminished problem-solving ability. These individuals also exhibit uncontrolled movements. Students should discuss the disadvantages and advantages of conducting these simple blood tests, and if they would have the test and why.

Disadvantages:

- Some people may be unable to cope with the knowledge that they will inevitably suffer from an incurable disease. Some individuals diagnosed with symptoms of the disease attempt suicide.
- Some families may break up, and some people may not be able to concentrate on their jobs.
- Sibling relationships may change as one is "liberated" from the disease and another is "doomed."
- Fetal testing will cause some families to make decisions about abortions that they are uncomfortable making, or they will have to live with the belief that their children are "doomed."

Advantages:

- Some people will be relieved to know that they will not get Huntington's disease, lifting a lifetime burden from their shoulders.
- Some people who are informed that they will get the disease may prefer the knowledge and plan their lives accordingly, just as many cancer patients would rather know their fates.
- The 50 percent of family members who will not get the disease can have children without wondering whether they are passing on a serious genetic condition. The rest can be more certain about their decisions not to have children.
- This genetic screening test represents a first step in prevention and successful treatment of Huntington's disease. Somewhere down the line, potential victims may be treated with medicines or genetic surgery.

Logistics:

- Group size: Full-class discussion.
- Approximate time: 15 minutes.

Classroom Activity 3: Adoption

Learning Goal 3: Identify some important reproductive challenges and choices.

The purpose of this activity is for students to learn more about adoption.

There are a number of websites available to help students research this activity. Here are some to get them (and you) started. Students can also find answers through their own online searches:

http://www.adopt.org
http://www.adoptuskids.org/
http://international.adoption.com/
http://adoption.state.gov/
http://www.americanadoptions.com/pregnant

Assign students to look for answers to one or more of these questions as they peruse the websites and to be prepared to discuss them in class.

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1. Who is likely to seek to adopt a child?
2. How difficult is it to adopt a baby in the United States? What is the average wait time? What is the average cost?
3. How difficult is it to adopt a baby from abroad? What are the most popular countries from which to adopt children and why? What is the average wait time? What is the average cost?
4. How is adopting a baby different from adopting a foster child?
5. What are some special considerations when adopting a baby? What are some special considerations when adopting an older child?

During class, you should be able to generate an engaging discussion on this topic. In an online class, you could use this topic and a related prompt to start an online discussion.

Logistics:
- Materials: None
- Group size: Individual (outside of class), then full class.
- Approximate time: Individual (60 minutes), full-class discussion of any questions (30 minutes).

Classroom Activity 4: Debate on Heritability of Intelligence
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 4: Explain some of the ways that heredity and environment interact to produce individual differences in development.

The purpose of this activity is to foster thinking about the contribution of life-span developmental research for setting public policy. Divide the class into two groups to debate the issue of heritability of intelligence and its effect on public policy. Should data about parents' (or grandparents') intelligence be used to determine what kinds of schooling to give to children? One group should provide evidence consistent with a strong genetic position on intelligence. The other group should argue a strong environmental position on intelligence. Students should think about how this issue would be further complicated by information about whether heritability of intelligence is high or low. Each side of the debate should generate evidence from the text that supports their side. The groups should select a couple of spokespersons.

Logistics:
- Group size: Divide class in half, and then full class for a debate.
- Approximate time: 25 minutes for evidence/argument development and 25 minutes for debate.

Classroom Activity 5: Explanations for Attention Deficit Hyperactivity Disorder: Nature or Nurture?
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

From Jarvis and Creasey, "Activities for Lifespan Developmental Psychology Courses."

Understanding the origins of attention deficit hyperactivity disorder (ADHD) has implications for treatment and educational practices for such children. However, the scientific community is somewhat divided about the origins of this disorder. This activity involves students in an informed debate about the origins of ADHD.

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Demonstration:
Students will be divided into two groups to debate the origins of ADHD after considering recently published articles about the disorder.

Time:
Fifteen minutes of one class period and approximately 30 minutes of another class period.

Materials:
All students will read the following two articles about the origins of ADHD placed on reserve by the instructor:

Joseph, J. (2000). Not in their genes: A critical view of the genetics of attention deficit hyperactivity disorder, *Developmental Review, 20*(4), 539–567.

Farone, S., & Biederman, J. (2000). Nature, nurture and attention deficit hyperactivity disorder, *Developmental Review, 20*(4), 568–581.

Procedures:
1. Ask students to read the two articles on ADHD before coming to class. Explain that one article (Joseph) refutes genetic origins of the disorder in favor of psychosocial explanations, while the other article (Farone and Biederman) rejects the arguments of the first article in favor of a more interactive view of genetics and environment in explaining ADHD.
2. In class, divide the students into two groups. This activity can accommodate larger classes by asking about five students to volunteer for each of the two groups. Assign each of the groups one of the articles to support in a class debate. For the first half of the class period, have students work in their groups to prepare for the debate (see questions below).
3. During the second half of the class period, hold the informal brief debate. Have each group present the main points of their article. Then ask each group to try to convince one another that either a genetic explanation for ADHD makes the most sense or that an interaction of genetics and environment is more critical to understanding ADHD. The following questions may be asked of the groups (and the class as a whole) by the instructor to stimulate discussion:
    - From a parent's point of view, what are the pros and cons of each author's perspective?
    - What conclusions can be drawn from this activity regarding the nature–nurture debate? What about the connections between mind and body? How might developmental psychologists differ in their positions on these issues from physicians or philosophers?
    - What implications do the authors' perspectives have on a biological explanation for behavior?
    - How might treatment approaches for ADHD differ when considering the two authors' perspectives on the origins of ADHD?

Classroom Activity 6: Critical-Thinking Multiple-Choice Questions and Answers
Learning Goal 1: Discuss the evolutionary perspective on development.
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

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Discuss the answers to the critical-thinking multiple-choice questions presented in **Handout 1**.

For question 1, be sure the class understands the evolutionary process. The question will provide a concrete example of natural selection.

The purpose of question 2 is to apply the material presented in Chapter 1. The goal is to become aware of these developmental issues, because they define the nature of developmental psychology.

The answers to these critical-thinking multiple-choice questions are presented in **Handout 2.**

*Logistic*s:
- Materials: Handout 1 (Critical-Thinking Multiple-Choice Questions) and Handout 2 (Answers).
- Group size: Small groups (5) to discuss the questions, then a full-class discussion.
- Approximate time: Small groups (10 to 15 minutes), full-class discussion of any questions (15 minutes).

Classroom Activity 7: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays
Learning Goal 1: Discuss the evolutionary perspective on development.
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

The purpose of this activity is threefold. First, answering the questions listed in **Handout 3** facilitates students' understanding of concepts in Chapter 2. Second, these types of essay questions afford the students an opportunity to apply the concepts to their own lives, which will, in turn, facilitate their retention of the material. Third, the essay format will also give students practice expressing themselves in written form. Ideas to help students answer the critical-thinking essay questions are provided in **Handout 4**.

This activity can be modified based on how much time you have. Students could be asked to answer a subset of the questions or questions could be divided up among the class. Additionally, you could add a small group component to the activity and have students answer the questions individually and then in groups before returning to the full-class discussion.

Logistics:
- Materials: Handout 3 (Essay Questions) and Handout 4 (Ideas to Help Answer).
- Group size: Individual, then full class.
- Approximate time: Varied.

Classroom Activity 8: Ethics
Learning Goal 1: Discuss the evolutionary perspective on development.
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

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From Jarvis and Creasey, "Activities for Lifespan Developmental Psychology Courses."

Ethical concerns in the conduct of research are handled in the scientific community in a variety of ways. This activity has students examine various written codes of ethics from psychology, medicine, and sociology to compare ethical considerations in science. While this activity could fit into any chapter, the area of biology in human development engenders many ethical dilemmas and considerations.

Demonstration:
Instructors will supply students working in small groups with codes of ethics from psychology, medicine, and sociology. Students will be asked to compare the various codes across the related disciplines of study for similarities and differences and for completeness in dealing with aspects of life-span study.

Time:
Approximately 30 minutes.

Materials:
All students will share copies of the written ethical codes for psychology, medicine, and sociology. The ethical codes for psychology, medicine, and sociology respectively are available at:
http://www.apa.org/ethics/code/index.aspx
http://www.ama-assn.org/ama/pub/physician-resources/medical-ethics/code-medical-ethics.page?
http://www.asanet.org/images/asa/docs/pdf/CodeofEthics.pdf

Instructors may include ethical codes from other disciplines as well.

Procedures:
1. Before conducting this activity, the instructor will explain the importance of ethical guidelines in the conducting of any research with humans and nonhuman animals.
2. For this activity, divide the class into groups of 3-5.
3. Students should compare and contrast the various ethical codes for similarities and differences. Each group should elect a leader to guide discussion within the group and to report back to the class as a whole. Students should consider the following questions in evaluating the codes of ethics:
    - How comprehensive are the various ethical codes?
    - Are there discipline-specific differences between the codes, and, if so, what are they? If not, what are the differences between the codes, and why do students think such differences are there if they are not specific to that discipline?
    - Does each code contain information on resolving ethical dilemmas? If so, describe.
    - What similarities exist across the various ethical codes? What general conclusions can be drawn about ethics from evaluating ethical guidelines from several different, but related, disciplines of study?
4. After approximately 20 minutes, each group should report on what they thought about the codes in terms of the questions above. Instructors should underscore the importance of ethics in research and help students appreciate the considerations scientists take into account in working with minors and vulnerable populations in life-span development.

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Personal Applications

Personal Application 1: All in the Family
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

The purpose of this exercise is for students to recognize the varied influence of heredity and environment within a family. The power of genetics is phenomenal, and though each cell only contains 23 pairs of chromosomes, the possible manifestations of this hereditary material are nearly limitless. Sayings such as "Blood is thicker than water" indicate that we feel very close to our family members, because we share inherited traits. However, we can't ignore the fact that we grow up in the same environment. To what extent does the environment contribute to our similarities with our siblings? Or does it? The challenge of identifying the relative influences of nature and nurture is tremendous.

Instructions for Students: Describe the major traits you share with each of your siblings. What major traits are very different for you and your siblings? Which ones do you believe are biologically based, and which ones do you think are the result of your environment? How do you explain the differences, given you have the same parents and grew up in the same family? If you are an only child, compare and contrast your traits with those of each of your parents.

Use in the Classroom: Have students contribute examples of both similar and dissimilar traits shared with siblings. Make a list on the board of all traits, and discuss which ones appear to be more "nature" based and which ones seem to be more a function of "nurture." Are there discrepancies among what students believe or is there a common perception of inherited and noninherited traits? Challenge students to provide evidence, counterarguments, reasoning, or research methods that might serve to determine the answer.

Personal Application 2: I Am What I Am
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

The purpose of this exercise is for students to understand the correlation between heredity and environment from Sandra Scarr's perspective of the three major influences on development. Genetic and situational contributions to an individual's make-up are inexorably linked, and the combination of influences impacts individuals in three distinct ways. The way in which we are raised not only impacts us because of the experience itself, but because those very experiences are the result of the combination of genetic and environmental influences on our *parents*. Furthermore, it is our own genetic make-up that influences both the environmental influences that come to us and those that we particularly seek out. The combination of these three processes of confounded influence creates the person we become.

Instructions for Students: Present your profile with regard to Sandra Scarr's three ways in which heredity and environment are correlated.

- Passive: What kind of environmental experiences did your parents provide for you because of who they were?
- Evocative: What environmental experiences did you have due to your genetic make-up?

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- Active: What environmental experiences did you seek out due to aspects of your genetic make-up?

Use in the Classroom: Plan to help your students get in the frame of mind for thinking through these concepts. Provide examples from your own life—including specifics about parents and their characteristics, and particular inherited traits that obviously served to influence life experiences. This may be difficult to grasp, so you may have to have students work through it in class. If certain students feel they have good examples, have them share in order to provide as many concrete examples as possible, then have students proceed to write their full responses.

Source:
Scarr, S. (1993). Biological and cultural diversity: The legacy of Darwin for development. *Child Development*, *64,* 1333–1353.

Personal Application 3: The Same but Different
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

The purpose of this exercise is to enable students to realize that a combination of factors contributes to one's environmental experiences. We automatically assume that because we live in the same house and have the same parents, we share the same environment with our siblings. But very few siblings would admit that they share similar life experiences. The older siblings will swear that the younger ones always get their way, and that their parents are not nearly as hard on their younger brother or sister as they were on them. The younger ones believe the older siblings get to do everything, and they are treated like babies with all their restrictions. Then there are the middle children! Developmental psychologists know that it is very different to be an older brother than to have an older brother, and that despite living under the same roof, siblings' environments are not, in fact, the same.

Instructions for Students: Consider how your environment growing up was different from those of your siblings, given you were raised in the same household.

Use in the Classroom: This can be a fun way to get students talking and sharing childhood (and even current) stories. Feel free to share some of your own, and encourage students to compare their experiences with those of their siblings. How many felt they had an overall easier time than their siblings? A harder time? Were their parents' reactions to them stricter, harsher, and more unfair? Conclude by emphasizing the varying circumstantial influences experienced by people functioning in very close proximity, and how this contributes to differences in behavior.

Research Project Ideas

Research Project 1: Heritability of Height
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

The purpose of this project is to demonstrate the concept of heritability by using height as an example (**Handout 5**). Have students do a kinship study of two families (one of the families can

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be their own) to collect the necessary data. Students should record the height of all family members over 18 years of age and separate them by sex. Next, they should calculate the mean and range of heights of both sexes for both families and compare them. This exercise is intended to give them experience both with a kinship study design and with the concept of having a variable with a clear operational definition. Once data collection is completed, students should answer the questions that are listed at the end of **Handout 5**.

Use in the Classroom: Have students examine family differences for the following factors:

- Evidence for the heritability of height: The expectation is that the closer the relative is genetically, the more similar the characteristic measured will be—identical twins, fraternal twins and siblings, parents, (blood) uncles and aunts, cousins, etc.
- Environmental influences: The data from those in the older generations may be difficult to interpret because 60 or more years ago different health and nutrition standards may have influenced growth (cohort effects).
- The effect of gender: The data must be segregated by sex because humans are sexually dimorphic in height. Males are characteristically larger than females.
- Advantages of using height as a measure rather than intelligence or temperament: Height is a good measure to use, because it has an easy, uncontroversial, operational definition. Intelligence and temperament are harder to define in exact terms and are therefore more controversial.
- If you have a TA, or a small class, you could enter all of the students' data and show them the results across the class.

Research Project 2: Genetic Counseling Available to You
Learning Goal 2: Describe what genes are and how they influence human development.
Learning Goal 3: Identify some important reproductive challenges and choices.
Learning Goal 4: Characterize some of the ways that heredity and environment interact to produce individual differences in development.

Chapter 2 introduces the concept of genetic counseling and how genetic counseling can help expectant couples learn about the possibility that their infants will suffer from genetically based problems. While the focus in the text is on the process of counseling, it does not say much about how this service is delivered from community to community.

For this project, have students find out if genetic counseling services are available in your community (**Handout 6**). They will want to discuss how people can find out about these services. Form groups of up to four individuals, and divide the following tasks between individuals or pairs. Students should contact hospitals to learn whether they disseminate information about genetic counseling, and, if they do, students should obtain the pamphlets or handouts that they provide. If there are other services or organizations for expectant couples (e.g., a crisis pregnancy center), they should find out what they offer. If the students can identify individuals in the community who provide such information, they should contact them to see if they will allow the students to interview them about their services. In addition, they can go to the public library and look up books or other reference materials about genetic counseling.

Once they have determined what information is publicly available, have them write a report that answers the questions at the end of **Handout 6.**

Use in the Classroom: Have the groups report their findings to the class, and then lead a general

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discussion to summarize the findings. Are the reports consistent? Why or why not? How well do the results correspond to the material in the text? What implications do the findings have for people seeking genetic counseling in your area?

Research Project 3: Evolution and Trait Selection
Learning Goal 1: Discuss the evolutionary perspective on development.

Students often have difficulty understanding how evolution works. One way to illustrate natural selection is to have students pick a trait like sickle cell anemia or schizophrenia. First, have students do an online search (or literature review depending on course level), for information on the consequences of the trait. Then write a 1-2 paragraph description of the trait and its consequences. Next, have them generate evolutionary hypotheses for what the advantage of that trait is. In other words, how might evolution have selected for a trait that seems maladaptive? For example, sickle cell anemia has very negative consequences but also offers a protection from malaria. It is for this reason it is found predominantly in persons of African descent. So here, evolution may have selected a trait that has a strong survival value but is clearly a double-edged sword. Have them write 2-3 paragraphs describing their arguments.

Use in the Classroom: This could also be adapted for online courses as a discussion topic or in class as a group project with 4-person groups. What other traits may it be difficult to find a positive effect for? Remind students if you see a trait at any degree of frequency, evolution selected for it.

Resources Available in Connect

The following are a selection of the resources available in McGraw-Hill Education's digital learning platform, Connect.

Chapter Number	Resource Name	Resource Type	Learning Objective
2	NewsFlash: Can Genes Be Patented?	NewsFlash	LO 2.2
2	NewsFlash: Are Antidepressants Safe During Pregnancy?	NewsFlash	LO 2.4

Videos

"Bringing up Monkey " From Scientific American Frontiers

An excellent clip that looks at nature-nurture interactions. A nervous monkey is placed with a calm mother to determine if environment can override biological influences on personality. The video can be found at: https://www.youtube.com/watch?v=yI9O5C4XsxA.

"Prenatal Testing Can Mean Hard Choices" From CBS News

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A brief clip that highlights some of the issues that may arise from prenatal testing when test results indicate Down syndrome can be found at:
http://www.cbsnews.com/2100-500195_162-1975002.html and YouTube.

"How to Understand Prenatal Testing and Genetic Screening" From Howdini

A clip that covers the different types of chromosomal tests that are common in prenatal care. Covers blood tests and genetic disorders. Does not cover diagnostic tests like CVC or Amnio. Can be found at: https://www.youtube.com/watch?v=3MatKSc-Ax8.

Feature Film

In this section of the Instructor's Manual, we suggest films that are widely available on sites like Amazon.com, DocumentaryWIRE, Hulu, Netflix.com, PBS video, etc.

***Immediate Family* (1989)**

Starring: Glenn Close, James Woods, Mary Stuart Masterson, Kevin Dillon
Directed by Jonathan Kaplan

Married 10 years, an infertile couple turns to adoption. Through an agency, they meet a teenage single mother. They spend time together, eventually creating a bond, and she agrees to sign away custody to the couple. But things don't go exactly as planned, and they are all emotionally tested while waiting for the young girl to do the right thing.

Dr. Richard Dawkins and Dr. Steven Pinker, "The Genius of Charles Darwin"

Dr. Richard Dawkins has done interviews with several prominent evolutionary psychologists. His interview with Dr. Steven Pinker, "The Genius of Charles Darwin," can be found on YouTube.

Dr. Richard Dawkins and Dr. David Buss, "Evolutionary Psychology"

Dr. Richard Dawkins has done interviews with several prominent evolutionary psychologists. His interview with Dr. David Buss on evolution can be found on YouTube.

Website Suggestions

At the time of publication, all sites were current and active; however, please be advised that you may occasionally encounter a dead link.

The Evolutionary Psychology FAQ
http://www.anth.ucsb.edu/projects/human/evpsychfaq.html

Dr. David Buss
http://www.david-buss.com

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Evolutionary Psychology Lab
http://www.toddkshackelford.com/

Behavior Genetics Association
http://www.bga.org/

Children's Disability Information
http://www.childrensdisabilities.info/

Holt International Children's Services: Adoptions
http://www.holtintl.org/

National Down Syndrome Society
http://www.ndss.org/

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Handout 1 (CA 6)

Critical-Thinking Multiple-Choice Questions

1. At one time, there were both tall and short giraffes. The short giraffes could only feed from the sides of the trees since they were unable to reach the tops of the trees. There are no short giraffes today. What concept described in Chapter 2 best explains the disappearance of short giraffes? Circle the letter of the best answer, and explain why it is the best answer and why the other answers are not as good.

   a. genetic imprinting
   b. genetic foundations of development
   c. meiosis
   d. natural selection
   e. bidirectional view

2. Chapter l describes several important issues in developmental psychology. Which of these issues receives the greatest emphasis in Chapter 2? Circle the letter of the best answer, and explain why it is the best answer and why the other answers are not as good.

   a. biological, cognitive, and social processes
   b. continuity versus discontinuity
   c. nature versus nurture
   d. stability versus change
   e. periods of development

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Handout 2 (CA 6)

Answers for Critical-Thinking Multiple-Choice Questions

1. At one time, there were both tall and short giraffes. The short giraffes could only feed from the sides of the trees since they were unable to reach the tops of the trees. There are no short giraffes today. What concept described in Chapter 2 best explains the disappearance of short giraffes? Circle the letter of the best answer, and explain why it is the best answer and why the other answers are not as good.

   a. Genetic imprinting is not the best answer. It refers to the differing effects genes can have when they are inherited either from the mother or the father.
   b. Genetic foundations of development is not the best answer. It focuses specifically on genes, and how they transmit the characteristics of a species from one generation to another.
   c. Meiosis is not the best answer. It describes a specialized form of cell division.
   d. Natural selection is the best answer as it refers to the evolutionary process by which the best adapted within a species survive and reproduce.
   e. Bidirectional view is not the best answer. It refers to human evolution, and how environmental and biological conditions influence each other.

2. Chapter l describes several important issues in developmental psychology. Which of these issues receives the greatest emphasis in Chapter 2? Circle the letter of the best answer, and explain why it is the best answer and why the other answers are not as good.

   a. Biological, cognitive, and social processes in development is not the best answer. These processes are simply not uniformly discussed in the chapter. The focus of the chapter is on one aspect of biological processes: genetic determination.
   b. Continuity versus discontinuity is not the best answer. The course of development—either prenatally or postnatally—is not described.
   c. Nature versus nurture is the best answer. This is a continuing theme of the chapter, throughout which the point is made that environments interact with genotypes in the course of development. For example, natural selection determines which genotypes survive. In the discussion of genetic principles, it is clear that genetic expression is a function, in varying degrees, of environmental influence. Research on intelligence is driven by the question of how much of the variation in each individual is determined by heredity and how much is determined by environment.
   d. Stability versus change is not the best answer. There is material on this issue in the discussion of intelligence, but the issue is not as pervasive as the nature–nurture issue.
   e. Periods of development is not the best answer. These simply receive no treatment in this chapter. The discussion of the biological bases of development is not organized around separate developmental periods.

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Handout 3 (CA 7)

Critical-Thinking Essay Questions

Your answers to these kinds of questions demonstrate an ability to comprehend and apply ideas discussed in this chapter.

1. Explain the concepts of natural selection and evolutionary psychology.

2. Explain the relationship between genes, chromosomes, and DNA. Indicate how these entities function in reproduction.

3. In your own words, what is a genotype and what is a phenotype? Explain how these concepts relate to the concepts of dominant and recessive genes.

4. Describe the methods used by behavior geneticists to study heredity's influence on behavior.

5. Indicate and explain at least three examples of abnormalities in genes and chromosomes.

6. Assume that you have received a number of tests to assess fetal abnormalities. Identify and explain each procedure, and what you would learn from it.

7. What is infertility? What causes infertility? Explain what an infertile couple can do to have a baby.

8. Indicate how you would explain to a friend that heredity and environment interact in various ways to produce developments. Also, provide an example of each of the three types of interaction and shared and nonshared environmental influences that you would use to help your friend understand this concept.

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Handout 4 (CA 7)

Ideas to Help You Answer Critical-Thinking Essay Questions

1. These concepts are inherently connected to specific examples of the phenomena of this aspect of development. Read the examples presented in the text, then come up with your own example(s). Use this to launch your explanation of natural selection and evolutionary psychology and their tenets.

2. A visual representation will be helpful when approaching this essay. Create a careful drawing of genes, chromosomes, and DNA, as there is a building block structure to these. Establishing their physical relationship to one another will provide a clearer context in which to explain their roles in reproduction.

3. The best way to describe something in your own words is either to teach someone else about it or to pretend to teach it to someone else. When you imagine approaching an audience who knows nothing about the subject matter, you are forced to explain things in a number of different ways, anticipate questions regarding the topic, and provide explicit examples to demonstrate the concepts. Do this as you write about genotypes, phenotypes, and dominant and recessive genes.

4. Begin by describing the bigger issue of trying to assess the relative influences of biology and the environment on behavior. This will provide the context to better explain and understand the methods used to study the specific contributions of heredity.

5. For a more complete learning experience, combine your efforts on this question and the next. Create a grid delineating genetic and chromosomal abnormalities on one axis. On the other, list the tests used to assess fetal abnormalities. In the resulting intersecting squares, describe the characteristics and causes of the abnormalities, and the procedures and results of the testing methods relating to them.

6. Look at the suggestion for question 5 above for help on this question.

7. Pretend you are providing counseling to couples having difficulty conceiving a child. Your job is to inform them about the nature of infertility, what may contribute to it, and their options to overcome it.

8. Begin with either a brief story about your life and a description of the person you have become, or have a friend provide one. Make a list of what you believe are genetic-based traits and a list of traits you have acquired from experience. This will demonstrate the difficulty in knowing for certain the contributions of nature and nurture in an individual's development. It will also provide a preface for your presentation of examples for each of the three types of interaction and shared and nonshared environmental influences.

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Handout 5 (RP 1)

Heritability of Height

The purpose of this project is to demonstrate the concept of heritability by using height. You will do a kinship study of two families (one of the families can be your own) to collect the necessary data. Record the height of all family members over 18 years of age and separate them by sex. Calculate the mean and range of heights of both sexes for both families and compare them. This exercise is intended to give you experience both with a kinship study design and with the concept of heritability for a variable with a clear operational definition. Use the following data sheet to record heights. Then answer the questions below:

Person/Sex	Family 1	Family 2	Data	Family 1	Family 2
Self			Average Female		
Mother			Average Male		
Father			Tallest Female		
Grandmother 1			Tallest Male		
Grandmother 2			Shortest Female		
Grandfather 1			Shortest Male		
Grandfather 2					
Sibling					
Sibling					
Sibling					
Aunt					
Aunt					
Aunt					
Uncle					
Uncle					
Uncle					
Cousin					
Cousin					
Cousin					
Cousin					
Other					
Other					
Other					

Questions:

- Which family in your sample is on average taller (for both males and females)?
- Of the taller family, how many females are taller than the females in the shorter family? How many of the males are taller than the males in the shorter family?
- From your data, does it appear that height is an inherited trait?
- What is the advantage of examining the heritability of a variable like height rather than a variable such as temperament or intelligence?

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Handout 6 (RP 2)

Genetic Counseling Available to You

Chapter 2 introduces the concept of genetic counseling and how genetic counseling can help expectant couples learn about the possibility that their infants will suffer from genetically based problems. While the focus in the text is on the process of counseling, it does not say much about how this service is delivered from community to community.

For this project, you will find out and report if genetic counseling services are made available in your community. You will want to discuss where one can go for these services in your community, as well as how people can find out about genetic counseling services. Form groups of up to four individuals, and divide the following tasks between individuals or pairs. Contact hospitals to learn whether they disseminate information about genetic counseling, and, if they do, obtain the pamphlets or handouts that they provide. If there are other services or organizations for expectant couples (e.g., Planned Parenthood or divisions of social service agencies), find out what they offer. If you can identify individuals in the community who provide such information, contact them to see if they will allow you to interview them about their services. Go to the public library and look up books or other reference materials about genetic counseling.

Once you have determined what information is publicly available, write a report that summarizes the information that you obtained. In addition, address the following questions:

- How current is the information?
- What source of information is most easily and inexpensively available?
- What attitude does the material seem to take toward genetic counseling?
- Are couples able to make their own decisions about their infants' chances of suffering a genetic defect with the information they obtain from genetic counselors in your community?
- What options or alternatives are available in your community?
- Are any alternatives discouraged by the genetic counselors?
- Are the services uniformly available to all community members?
- Are there significant controversies about their use?
- What political/ethical/legal issues did you discover?

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