# Santrock's *Essentials of Life-Span Development,* 4e
# Instructor's Manual

# Chapter 2: Biological Beginnings

## *Learning Objectives*

**Learning Objective 1: Discuss the evolutionary perspective on life-span development.**

A. Define natural selection and adaptive behavior.
B. Discuss the ideas proposed by evolutionary psychology and how they relate to studying human development.

**Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.**

A. Define and discuss genes and chromosomes.
B. Outline and summarize three genetic principles.
C. Define and describe chromosomal and gene-linked abnormalities.

**Learning Objective 3: Explain how heredity and environment interact in human development.**

A. Discuss the field of behavior genetics.
B. Describe three types of heredity-environment correlations.
C. Examine the epigenetic view and gene × environment (G × E) interaction.
D. Summarize some conclusions about heredity-environment interaction.

**Learning Objective 4: Describe prenatal development, including environmental influences.**

A. Describe the course of prenatal development.
B. Describe the types of prenatal diagnostic tests.
C. Describe the hazards to prenatal development.
D. Discuss prenatal care.

**Learning Objective 5: Describe the birth process and the postpartum period.**

A. Describe the birth process.
B. Discuss the transition from fetus to newborn.
C. Describe the causes and consequences for low birth weight and preterm infants.
D. Discuss bonding in the parent–child relationship.
E. Discuss physical, emotional, and psychological adjustments during the postpartum period.

## *Overview of Resources*

| Chapter Outline | Resources You Can Use |
|---|---|
| **The Evolutionary Perspective** | **Learning Objective 1: Discuss the evolutionary perspective on development.** |
| Natural Selection and Adaptive Behavior<br><br>Evolutionary Psychology | |
| **Genetic Foundations of Development** | **Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development**. |
| Genes and Chromosomes<br><br>Genetic Principles<br><br>Chromosome and Gene-Linked Abnormalities | Lecture Suggestion 1: Three Laws of Behavior Genetics<br>Classroom Activity 1: Principles of Genetic Transmission<br>Personal Application 1: All in the Family<br>Research Project 1: Heritability of Height<br>Research Project 2: Genetic Counseling Available to You |
| **The Interaction of Heredity and Environment: The Nature-Nurture Debate** | **Learning Objective 3: Explain how heredity and environment interact in human development.** |
| Behavior Genetics<br><br>Heredity-Environment Correlations<br><br>The Epigenetic View and Gene × Environment (G × E) Interaction<br><br>Conclusions About Heredity-Environment Interaction | Lecture Suggestion 2: Interaction Concepts<br>Classroom Activity 2: Debate on Heritability of Intelligence<br>Classroom Activity 3: Explanations for Attention Deficit Hyperactivity Disorder: Nature or Nurture?<br>Personal Application 2: I Am What I Am<br>Personal Application 3: The Same but Different |
| **Prenatal Development** | **Learning Objective 4: Describe prenatal development, including environmental influences.** |
| The Course of Prenatal Development<br><br>Prenatal Tests<br><br>Infertility and Reproductive Technology<br><br>Hazards to Prenatal Development<br><br>Prenatal Care | Lecture Suggestion 3: Prenatal Counseling<br>Lecture Suggestion 4: Technology and Images of Prenatal Development<br>Lecture Suggestion 5: Principles of Teratogenic Effects<br>Lecture Suggestion 6: Dangers of Drug Use during Pregnancy<br>Lecture Suggestion 7: Mothers' Experiences of Pregnancy<br>Classroom Activity 4: Killing Me Softly: Banning Smoking in Homes with Pregnant Women and Children<br>Classroom Activity 5: The Court's Treatment of Substance-Abusing Pregnant Women<br>Classroom Activity 6: Fetal Alcohol Syndrome Quiz |

| | |
|---|---|
| | Classroom Activity 7: Pros and Cons of Genetic Testing for Huntington's Disease<br>Personal Application 4: In a Family Way<br>Personal Application 5: Test Your Fetal Growth Knowledge Online<br>Personal Application 6: The Pitter Patter of Little Feet<br>Research Project 3: Why Do Some Pregnant Women Drink, Smoke, or Use Drugs? |
| **Birth and The Postpartum Period** | **Learning Objective 5: Describe the birth process and the postpartum period.** |
| The Birth Process<br><br>The Transition from Fetus to Newborn<br><br>Low Birth Weight and Preterm Infants<br><br>Bonding<br><br>The Postpartum Period | Lecture Suggestion 5: Increase in Cesarean Births: Is It A Good Thing?<br>Personal Application 7: Oh, the Pain!<br>Classroom Activity 8: Postpartum Depression<br>Research Project 4: Fatherhood |
| **Review** | Classroom Activity 9: Ethics<br>Classroom Activity 10: Critical-Thinking Multiple-Choice Questions and Answers<br>Classroom Activity 11: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays |

# *Resources*

## Lecture Suggestions

**Lecture Suggestion 1: Three Laws of Behavior Genetics**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal 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 2 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 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://www.ornl.gov/sci/techresources/Human_Genome/elsi/behavior.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: Interaction Concepts**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development. Learning Objective 3: Explain how heredity and environment interact in human 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.

The expression of genes in an organism can be influenced by the environment, including the external world in which the organism is located or develops, as well as the organism's internal world, which includes such factors as its hormones and metabolism. One major internal environmental influence that affects gene expression is gender, as is the case with sex-influenced and sex-limited traits. Similarly, drugs, chemicals, temperature, and light are among the external environmental factors that can determine which genes are turned on and off, thereby influencing the way an organism develops and functions.

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.
- 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.

*Source*:
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)

**Lecture Suggestion 3: Prenatal Counseling**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 4: Describe prenatal development, including environmental influences.*

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 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, physician 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 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:
    - Mental retardation
    - Neural tube defects (such as spina bifida)
    - Chromosome abnormalities (such as Down syndrome)
    - Cleft lip/palate
    - Heart defects
    - Short stature
    - Single gene defects (such as cystic fibrosis or PKU)
    - Hearing or visual impairments

        - Learning disabilities
        - Psychiatric disorders
        - Cancers
        - Multiple pregnancy losses (miscarriages, stillbirths, or infant deaths)
    - 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
    - Mother, known, or presumed carrier of a X-linked disorder such as hemophilia
    - Either parent a known carrier of a balanced chromosome abnormality
- Pregnancy Factors:
    - Maternal age 35 years or greater at delivery
    - Maternal serum screening indicating an increased risk for neural tube defects, Down syndrome, or trisomy 18
    - Abnormal prenatal diagnostic test results or abnormal prenatal ultrasound examination
    - Maternal health factors such as:
        - Schizophrenia
        - Depression
        - Seizures
        - Alcoholism
        - Diabetes
        - Thyroid disorder
        - Others in which birth defects may be associated either with the disease process or with common medications prescribed for the disease
    - Fetal or parental exposure to potentially teratogenic, mutagenic, or carcinogenic agents such as drugs, chemicals, radiation, or infection
    - Advanced paternal age at the time of conception
    - Infertility cases where either parent is suspected of having a chromosome abnormality
    - Couples requiring assisted reproductive techniques to achieve a pregnancy, or individuals donating eggs or sperm for those purposes
- 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
    - Extreme parental concern or fear of having a child with a birth defect
    - Cases of consanguinity (parents are blood relatives) or incest where a pregnancy is involved
    - Premarital or preconception counseling in couples at high risk for genetic disorders based on family or personal medical history

*Source*:
http://www.lpch.org/DiseaseHealthInfo/HealthLibrary/genetics/counsel.html

**Lecture Suggestion 4: Technology and Images of Prenatal Development**
*Learning Objective 4: Describe prenatal development, including environmental influences.*
A compelling way to bring home the value of observation as a research technique and, at the same time, stress the importance of prenatal development as a pivotal period in human development, is to present and discuss images of prenatal development. Amazing images of prenatal development are available at "The Visible Embryo" website (http://www.visembryo.com/). The spiral represents the 23 stages occurring in the first trimester

of pregnancy and every two weeks of the second and third trimesters. Use the spiral to navigate through the 40 weeks of pregnancy and to preview the unique changes in each stage of human development. Images are provided for the first trimester with in-depth descriptions for all 40 weeks of pregnancy. The Endowment for Human Development website (http://www.ehd.org/prenatal-images-index.php) also has beautiful images of prenatal development and some video sequences.

The instructor could refer to http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2788813/ (2008) to give some more details on this topic.

**Lecture Suggestion 5: Principles of Teratogenic Effects**
*Learning Objective 4: Describe prenatal development, including environmental influences.*

The concept of an interaction can be elaborated with a lecture about the principles that govern the effects of teratogens on the developing embryo. These effects vary depending upon the genotype of the mother and the baby, as well as the amount and timing of exposure to the teratogen. Some of the principles of teratogenic effect are the facts that:

- The effects of a teratogen vary with the developmental stage of the embryo.
  - Systems or organs in the process of development (organogenesis) are generally affected more than are completed organs and systems. Since the various organ systems begin and end their prenatal development at different times, their sensitivity to agents varies over time.
  - The most vulnerable time for the brain is from 15 to 25 days postconception, for the eye from 24 to 40 days postconception, and the heart from 20 to 40 days postconception.
- Individual teratogens influence specific developing tissue which leads to particular patterns of developmental deviations.
  - German measles affects mainly the heart, eyes, and brain. Thalidomide, the antinausea drug from the 1960s, results in malformation of the limbs.
- Both maternal and fetal genotypes can affect the developing organism's response to teratogenic agents and may play an important role in the appearance of abnormalities in offspring.
  - Not all pregnant women who used thalidomide or had German measles during early pregnancy produced infants with abnormalities.
- The physiological or pathological status of the mother influences the action of a teratogen.
  - Not only will nutritional deficiencies themselves directly affect prenatal development, they may intensify the adverse effects on the fetus of certain drugs ingested by the mother. Other maternal factors such as obesity, high blood pressure, and liver dysfunction may increase the impact of damage by teratogens.
- The level of teratogenic agent that will produce malformations in the offspring may show only mild detrimental effects on the mother or none at all.
  - Radiation from X-rays, drugs (alcohol, thalidomide, etc.), and dietary deficiencies may have no impact on the mother but may cause gross deviations in the infant.

As you present each principle, relate it to the concept of interaction and other relevant developmental concepts. For example, the first principle is an example of an interaction in which developmental level mediates the influence of a specific experience. This idea is related to the

concepts of critical/sensitive period, fixation, and developmental readiness. The third principle provides a complicated example of heredity/environment interaction, and an example of dyadic interaction (physiological level).

*Sources*:
Hogge, A. (1990). Teratology. In I. R. Merkatz & J. E. Thompson (Eds.), *New perspectives on prenatal care*. New York: Elsevier.
Moore, K., & Persaud, T. (1993). *The developing human: Clinically oriented embryology* (5th ed.). Philadelphia: Saunders.

**Lecture Suggestion 6: Dangers of Drug Use during Pregnancy**
*Learning Objective 4: Describe prenatal development, including environmental influences.*

Information about the teratogenic effects of "everyday drug use" is very important to students who may become parents in the future. You may wish to underscore this with a lecture that explores this issue in greater depth than is possible in the text. Place special emphasis on the potential dangers of even normal everyday drug use, in particular the use of caffeine (coffee), nicotine (cigarettes), and alcohol. Some important points to address include the following:

- These teratogens have graded effects which make it risky to talk about "safe" levels of exposure. For example, having just one serving of alcohol a day increases risks for developmental disorders. Fetal alcohol syndrome can have mild, moderate, or severe effects on the developing fetus.
- Effects of drug exposure may be direct or indirect. Alcohol use may lead to organic abnormalities; nicotine use may lead to temperamental difficulties in babies which can reduce the quality of their interactions with their caregivers.
- Risks can be vitiated by discontinuing use of the drug; it is not reasonable to continue using a drug on the grounds that harm has already been done and cannot be reversed.
- Risks may be dependent on the timing of prenatal exposure (see Lecture Suggestion 1: Technology and Images of Prenatal Development).
- The drug-use habits of both parents can affect the fetus, either directly or indirectly.
    - Second-hand smoke has been found to adversely affect fetuses. Maternal exposure to environmental tobacco smoke for one hour or more per day is associated with spontaneous abortion (Windham & others, 1992).
    - The quality of care and support a husband can provide to his pregnant wife could influence the outcome of the pregnancy.
- Caffeine exposure is common in pregnancy. According to Wisborg & others (2003), pregnant women who drank eight or more cups of coffee per day during pregnancy had an increased risk of stillbirth compared with women who did not drink coffee.
- An important addition to your lecture could be an examination of how mothers (and fathers) can deal with drug use habits that may endanger their unborn baby. Classroom Activity 2: The Court's Treatment of Substance Abusing Pregnant Women addresses issues related to drug use during pregnancy and the social ramifications for the mother, father, and child.
- Antiepileptic drugs can affect the fetus in the following ways:
    - Fetal loss
    - Intrauterine growth radiation
    - Congenital malfunctions
    - Impaired postnatal development
    - Behavioral problems

The instructor could refer to the following site to help them with this lecture suggestion:
http://www.metroplexbaby.com/ParentGuides/Teratogens.htm

*Sources*:
Mills, J., et al. (1993). Moderate caffeine use and the risk of spontaneous abortion and intrauterine growth retardation. *Journal of the American Medical Association, 269*, 593–597.
Windham, G. C., Swan, S. H., & Fenster, L. (1992). Parental cigarette smoking and the risk of spontaneous abortion. *American Journal of Epidemiology, 135*, 1394–1403.
Wisborg, K., Kesmodel, U., Bech, B., Hedegaard, M., & Henriksen, T. (2003). Maternal consumption of coffee during pregnancy and stillbirth and infant death in first year of life: prospective study. *BMJ, 326*(7386):420.
http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=149440
http://www.ncbi.nlm.nih.gov/pubmed/22805351 (2012)

**Lecture Suggestion 7: Mothers' Experiences of Pregnancy**
*Learning Objective 4: Describe prenatal development, including environmental influences.*

Most life-span textbooks focus on prenatal development from the perspective of the developing baby as opposed to from the mother's perspective. Pregnant women have a variety of experiences ranging from changes in their body to changes in their emotions. If women do not seek support during this time, these changes may be confusing, unexpected, and even scary. There are hundreds of conditions or symptoms that can occur for women during pregnancy. Some of them include:

- *Fatigue*: from a little increased tiredness to extreme fatigue
- *Nausea*: often called "morning sickness"; some women experience nausea and/or vomiting in the morning or all day long. This symptom can last from a few weeks to the entire pregnancy
- *Frequent urination*: the urge to urinate more often
- *Breast tenderness*: increasing levels of hormones cause tender breasts
- *Headaches or dizziness*: circulatory changes in pregnancy can cause these symptoms
- *Weight gain*: women gain an average of 25 to 30 pounds during pregnancy
- *Back pain*: the joints between a woman's pelvic bones soften and loosen to prepare for the baby passing through, and the center of gravity changes as the uterus enlarges; thus, the body compensates with resulting back pain or strain
- *Lower abdominal pain*: stretching ligaments can be painful
- *Other symptoms*: leg cramps, skin changes (darkening around the nipples and navel)

Despite the many symptoms that *may* occur for some women, there are many exciting sensations and experiences that occur with pregnancy as well including feeling the baby move, experiencing special food cravings, being pampered by those around you, learning about your body, learning about your developing baby, preparing for parenthood, etc.

If you are able to, invite a pregnant woman (and her partner, if available) to share a bit about her pregnancy experience with the class. To make the visit more interactive, ask students to submit questions to you in advance; you can either select a few questions for the guest to answer, or the guest herself can select a few. If you do not know someone who might visit the class and you are in a classroom with the necessary technology, call up the following websites or refer your

students to them:

Pictures of real women's bellies at various weeks of pregnancy can be found at
http://pregnancy.about.com/od/pregnancyphotos/a/galleryguide.htm

Pregnancy-related sites can be found on ivillage.com at
http://www.ivillage.com/pregnancy-parenting

*Source*:
Johnson, R. V. (1994). *Mayo Clinic complete book of pregnancy and baby's first year*. New York: Mayo Foundation for Medical Education and Research.

**Lecture Suggestion 8: Increase in Cesarean Births: Is It A Good Thing?**
*Learning Objective 5: Describe the birth process and the postpartum period.*

Discuss the increasing use of cesarean births, and generate a discussion on the pros and cons. Here are some ideas and questions to get you started:

Until the past 10 years or so, cesarean delivery, when the baby is removed from the mother's uterus through an incision made in her abdomen, were used only in cases when the baby was in a breech position (with the baby's buttocks, rather than its head, being the first part to emerge from the vagina).

But today, more cesarean sections are performed in the United States than in any other country in the world. The cesarean delivery rate in 2012 was 32.8 percent, unchanged from 2011.

One reason for this increase may be the ability to identify babies in distress earlier in the process. Cesarean procedures are also being utilized on the increasing number of obese and seriously overweight pregnant women in this country.

Another reason includes the fact that doctors wish to avoid any chance of a malpractice claim if something goes wrong in the normal birth process. An even more controversial reason is doctors and mothers wanting to schedule the baby's birth to the hour.

Ask students how many women they know have delivered through this method. Ask if any students' mothers did deliver them that way. Ask the women if they would prefer cesarean birth to normal birth. Why?

Higher medical costs are associated with cesarean delivery. Should insurance companies pay for "elective" cesarean section?

Is it ethical to expose the mother and child to the risks of major surgery without there being a medical need?

Here is a resource to provide further background information for you and your students:

Childbirth Connection
http://www.childbirthconnection.org/article.asp?ClickedLink=274&ck=10168&area=27

Sources:
http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_05.pdf

## Classroom Activities

**Classroom Activity 1: Principles of Genetic Transmission**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal 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: Debate on Heritability of Intelligence**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human 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 3: Explanations for Attention Deficit Hyperactivity Disorder: Nature or Nurture?**

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

*Learning Objective 3: Explain how heredity and environment interact in human development.*

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.

*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 be assigned to go to the library and 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. Two weeks preceding this activity, announce to the students that during the next week they are assigned to go to the library and read the two articles on ADHD. Explain that one article 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. After a week, divide the class 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.
3. At the end of the second week, hold the informal brief debate in class, and have each group present the main points of their article. Then ask the students 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 4: Killing Me Softly: Banning Smoking in Homes with Pregnant Women and Children**

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

*Learning Objective 4: Describe prenatal development, including environmental influences.*

In March of 2002, a child custody judge in Utica, New York, ruled that a mother must quit smoking or lose visitation rights for her child. The judge said the mother could not smoke in her home or car whether the child was present or not. The ruling revolved around medical reports about the harm of passive or residual smoke to health. The ruling was intended to guarantee a smoke-free environment for the child. However, there is controversy over the ruling as it raises a civil liberties issue about the rights of the mother in her private home. This activity asks students to consider the pros and cons of the ruling and provides a real application of course material to the developing child. Discussion should extend to the role of passive smoke in the homes of pregnant women (including the effects of teratogens) and in restaurants and public buildings.

*Demonstration*:
The instructor should introduce the topic of teratogens and present the basic case, as given above, to the class. Then, ask students to discuss pros and cons for each side of this argument. The class should discuss their reasoning for their opinions and integrate course material on teratogens into the discussion.

*Procedures*:
Material on teratogens and biological hazards to developing infants and children should be covered before conducting this activity. The National Center on Birth Defects and Developmental Disabilities (http://www.cdc.gov/ncbddd/default.htm) has a useful website to visit prior to conducting this activity. It should be emphasized that cigarette smoking during pregnancy can result in low birth weight babies. Cigarette smoking has been associated with infertility, miscarriages, tubal pregnancies, infant mortality, and childhood morbidity. Additionally, cigarette smoking may cause long-term learning disabilities. Secondary smoke may also harm a mother and her developing baby. It is best, while pregnant and after the baby is born, to avoid people who are smoking according to leading scientists at the National Center on Birth Defects and Developmental Disabilities.

Instructors should present the basic case against passive smoke as stated above.

Students should be asked to list two reasons for supporting the court ruling described above, based on class material, and two reasons why they think the judge's ruling may be overturned on appeal. Then the class should discuss their reasoning for their opinions. Integrate course material on teratogens into the discussion.

*Logistics*:
- Materials: Paper and pencil.
- Approximate time: 10 to 20 minutes.

**Classroom Activity 5: The Court's Treatment of Substance-Abusing Pregnant Women**

*Learning Objective 4: Describe prenatal development, including environmental influences.*

In August, 1989, 23 year-old Jennifer Johnson was found guilty of delivering a controlled substance to a minor; the minor was her baby who was born a cocaine addict. She could have received a 30-year sentence, but she was sentenced to a year of house arrest in a drug rehabilitation center and 14 years of probation. In your discussion, inform students of typical effects of cocaine on offspring (babies whose mothers used cocaine during pregnancy had significantly lower cardiac output, lower stroke volume, and higher mean arterial blood pressure with a higher heart rate). Divide students into groups, and have them discuss the questions listed in **Handout 5**.

*Logistics*:
- Materials: Handout 5 (The Court's Treatment of Substance-Abusing Pregnant Women Activity).
- Group size: Small groups.
- Approximate time: Small groups (30 minutes).

*Sources*:
Roeleveld, N, Vingerhoets, E., Zielhuis, G. A., & Gabreels, F. (1992). Mental retardation associated with parental smoking and alcohol consumption before, during, and after pregnancy. *Preventive Medicine, 21,* 110–119.
Van Bel, F., Van de Bor, M., Stijnen, T., Baan, J., & Ruy, J. (1990). Decreased cardiac output in infants of mothers who abused cocaine. *Pediatrics, 85,* 30–32.
Van Pelt, D. (1990a). Smokers' offspring more prone to asthma. *Insight, 47*.
Van Pelt, D. (1990b). Sperm abnormalities among cocaine users. *Insight, 50*.
Windham, G. C., Swan, S. H., & Fenster, L. (1992). Parental cigarette smoking and the risk of spontaneous abortion. *American Journal of Epidemiology, 135,* 1394–1403.

**Classroom Activity 6: Fetal Alcohol Syndrome (FAS) Quiz**
*Learning Objective 4: Describe prenatal development, including environmental influences.*

The purpose of this activity is to increase students' understanding of fetal alcohol syndrome (FAS). Have students get into groups of two or three and complete the "Fetal Alcohol Syndrome Quiz" in **Handout 6**. After they have discussed the questions and indicated the answers they believe to be correct, discuss the correct answers as a class. The answers are given in **Handout 7** (explanations for some of the answers can be found in the website http://www.nofas.org/).

*Logistics*:
- Materials: Handout 2 (FAS Quiz) and Handout 3 (Answers).
- Group size: Small-group discussion and full-class discussion.
- Approximate time: Small groups (10 minutes) and full class (10 to 15 minutes).

*Sources*:
Kellerman, T. (2006). *Fetal Alcohol Syndrome Quiz*.
http://come-over.to/multiplechoice/fasquiz1.htm
http://www.well.com/user/woa/fsfas.htm
http://www.nofas.org/factsheets/

**Classroom Activity 7: Pros and Cons of Genetic Testing for Huntington Disease**

*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 4: Describe prenatal development, including environmental influences.*

A genetic diagnostic test has been developed for the 100,000 Americans with a history of Huntington 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 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 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 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 8: Postpartum Depression**
*Learning Objective 5: Describe the birth process and the postpartum period.*

The purpose of this activity is to increase students' understanding of psychiatric disorders that can accompany pregnancy. Pose the question: Is it possible that a mother's mental health during the postpartum period can cause her to harm herself and/or her child? Have students get into groups of two or three to discuss the well-known case of Andrea Yates as reported on the CNN.com website and discussion in the article written by attorney and psychology professor Elaine Cassel

(see link below). After they have discussed the case, lead a full-class discussion providing information on postpartum depression, including symptoms and how to help a person suffering from this disorder.

*Logistics*:
- Group size: Small-group discussion and full-class discussion.
- Approximate time: Small groups (10 minutes) and full-class (10 to 15 minutes).

*Sources*:
Cassel, E. (2002). *The Andrea Yates Verdict and Sentence: Did the Jury Do the Right Thing?*
(Ms. Cassel is an attorney, professor of psychology, and contributed to the ancillaries for this textbook, including this Instructor's Manual).
http://writ.news.findlaw.com/cassel/20020318.html
Williams, D. (2002). *Postpartum psychosis: A difficult defense*.
http://www.healthyplace.com/communities/depression/postpartum_depression.asp

**Classroom Activity 9: Ethics**
From Jarvis and Creasey, "Activities for Lifespan Developmental Psychology Courses"
*Learning Objective 1: Discuss the evolutionary perspective on development.*
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human development.*
*Learning Objective 4: Describe prenatal development, including environmental influences.*

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 more ethical dilemmas and considerations than any other area of life-span development.

*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/
http://www.ama-assn.org/ama/pub/category/2512.html
http://www.asanet.org/page.ww?section=Ethics&name=Code+of+Ethics+Table+of+Contents

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, the class can be divided into three groups if the class size is around 30, or six or even nine groups if the class is as large as 60 or 90 or more.
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.

**Classroom Activity 10: Critical-Thinking Multiple-Choice Questions and Answers**

*Learning Objective 1: Discuss the evolutionary perspective on development.*
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human development.*
*Learning Objective 4: Describe prenatal development, including environmental influences.*
*Learning Objective 5: Describe the birth process and the postpartum period.*

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.

Question 3 encourages students to review gene X environment interactions, and helps them understand the limits of what research in this area can illuminate.
Question 4 continues the theme of applying the issues from chapter 1. Review these as necessary; again, you may want to work with a few examples from topics in chapter 2.

Question 5 stresses the limitations of research involving teratogens. Some of the issues presented were not addressed in the textbook; however, these are important issues to consider. This question requires students to think about how the research is conducted and the conclusions that can be

drawn from the various methodologies employed.

Question 6 continues to provide practice in identifying inferences, assumptions, and observations. A good discussion prior to this exercise would involve asking students whether they are beginning to develop their own criteria or procedures for discriminating these different sorts of propositions. They may find the material for this question difficult, because it is largely descriptive; in fact, three of the alternatives in this question are observations. You may want to alert your students to the fact that the pattern of two inferences, two observations, and one assumption established in previous exercises has changed in this exercise.

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 (15 to 20 minutes), full-class discussion of any questions (15 minutes).

**Classroom Activity 11: Critical-Thinking Essay Questions and Suggestions for Helping Students Answer the Essays**

*Learning Objective 1: Discuss the evolutionary perspective on development.*
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human development.*
*Learning Objective 4: Describe prenatal development, including environmental influences.*
*Learning Objective 5: Describe the birth process and the postpartum period.*

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**.

*Logistics*:
- Materials: Handout 3 (Essay Questions) and Handout 4 (Ideas to Help Answer).
- Group size: Individual, then full class.
- Approximate time: Individual (60 minutes), full-class discussion of any questions (30 minutes).

## Personal Applications

**Personal Application 1: All in the Family**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human 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 Objective 3: Explain how heredity and environment interact in human 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 (called *genotype-environment correlations*)

- 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?

- 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 Objective 3: Explain how heredity and environment interact in human 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.

**Personal Application 4: In a Family Way**
*Learning Objective 3: Explain how heredity and environment interact in human development.*

The purpose of this exercise is to demonstrate the significance of pregnancy from a cultural standpoint. Each culture takes its own particular view of the major stages of life: birth, childhood, puberty, parenthood, work, old age, and death. It is interesting and important to be aware of the different cross-cultural perspectives, especially in our multicultural society.

*Instructions for Students*: Describe your cultural views of pregnancy. How are pregnant women

viewed and treated by society? What beliefs are held about the biological processes occurring with regard to her body? What is the perception of the developing fetus? What preparations are made for the upcoming labor, delivery, and birth? How is impending parenthood anticipated?

*Use in the Classroom*: If you are fortunate and have an ethnically diverse group of students, make a grid on the board comparing and contrasting beliefs for each of the above categories. If you have a homogeneous class, put students in groups and assign them particular cultures to research with regard to the various aspects of pregnancy and childbirth. Each group will then present their findings to the class.

**Personal Application 5: Test Your Fetal Growth Knowledge Online**
From Jarvis and Creasey, "Activities for Lifespan Developmental Psychology Courses"
*Learning Objective 4: Describe prenatal development, including environmental influences.*

As students may think they have prenatal development and pregnancy knowledge mastered by the end of this chapter, we offer an opportunity to test their knowledge in class using an online quiz. This activity is useful at the end of material on fetal growth.

*Demonstration*:
Instructors will access an online Fetal Growth Knowledge Quiz at the iVillage website and have students complete it in class. Discussion of the correct answers should follow the quiz.

*Procedures*:
1. Fetal growth and development should be covered before conducting this activity.
2. Instructors will access an online quiz on fetal growth by simply using their favorite search engine (we use Google.com) to go to ivillage.com and then go to Lamaze.com quizzes and click on "Is It Bigger than a Bread Box: The Fetal Growth Quiz" to view the quiz for this activity.
3. The quiz has 10 items and asks about the size of the fetus at various points in development, the purpose of the notochord in the sixth week, when fingers and toes are visible, changes in the mother's body to accommodate the developing fetus, the function of vernix, responses by the baby to external stimuli, when the baby's head moves into the mother's pelvis, and how the baby breathes within the mother. It is designed for prospective parents but is interesting to students studying development and nicely summarizes some of the main points covered in the course on prenatal development.
4. Students will take the online quiz in class, and instructors should discuss correct answers after the quiz is taken with the students.
5. This website offers links to other resources about pregnancy that instructors and students may find helpful.

*Logistics*:
- Materials: Instructors will need access to the Internet to find the online 10-item Fetal Growth Quiz.
- Approximate time: 5 to 10 minutes.

Source:
http://www.ivillage.com/it-bigger-breadbox/6-q-155878

**Personal Application 6: The Pitter Patter of Little Feet**
*Learning Objective 4: Describe prenatal development, including environmental influences.*
*Learning Objective 5: Describe the birth process and the postpartum period.*

The purpose of this exercise is to prompt students to think about all that is involved in preparing to become parents. It is not just becoming a parent that is demanding and has numerous implications; planning, conceiving, and sustaining a healthy pregnancy also require a great deal of preparation as well—from both the mother and the father! The more we understand about each person's role in this delicate process, the more we can ensure a successful outcome.

*Instructions for Students*: If you are not yet a parent, think and write about the following:

- Women: Your physical condition prior to becoming pregnant—how will you take care of and prepare your body for conception? Address nutrition, physical shape, drugs, alcohol, smoking, and other environmental stressors. What might be your health-care plans (physician, midwife, etc.)? What kind of labor and delivery experience do you want (hospital versus home delivery)? Who will you want with you during this time? What postpartum situation do you anticipate? How might you prepare yourself to be an exceptional mother?
- Men: Your physical condition prior to conception—address nutrition, physical shape, drugs, alcohol, smoking, and other environmental stressors. How do you plan to support the mother during pregnancy? Labor and delivery? Postpartum? Were you surprised to read of the important role fathers play in this extensive process? How might you prepare yourself to be an exceptional father?

*Use in the Classroom*: Put together several different profiles of couples, or single women, who want to conceive or are already experiencing pregnancy. Present the profiles to students to read, then have a class discussion on the implications of the various circumstances surrounding each pregnancy and impending birth. Emphasize the dangers of poor choices, the risks of particular behaviors, and the benefits of planning, preparation, and healthy living.

**Personal Application 7: Oh, the Pain!**
*Learning Objective 5: Describe the birth process and the postpartum period.*

The purpose of this exercise is for students to recognize the various ways the human body carries out and experiences the same biological processes. Mammals giving birth is one of nature's most fundamental experiences. It involves a series of physiological stages that all members of the same species are programmed to go through. However, rarely are they experienced in the same way and to the same degree by different mothers. As we have been studying the influences of both biology and environmental factors on human behavior, it is important to recognize the varying contributions of both to such a fundamental life process.

*Instructions for Students*: Ask your mother if she can recall her experience giving birth to you and your siblings. If you are a parent, recall the experience of the birth of your child/children. What is different about each situation? What is similar? What might account for the differences? What factors might contribute to the variety of birthing experiences women have?

*Use in the Classroom*: Comparing labor and delivery stories can be very interesting and informative. If you feel comfortable, share your own stories of the birth of your children, and bring in contrasting stories from friends and family. Have students share their stories, and follow these up with a discussion of what might contribute to each mother's particular experiences. Have students then try to conclude which of those factors result from nature and which may be due to

environmental circumstances. Were there any aspects of labor and delivery that the mother may have been able to change somehow? Were there any mothers who had drastically different birthing experiences with their different children? Why might this have been?

# Research Project Ideas

**Research Project 1: Heritability of Height**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human development.*

The purpose of this project is to demonstrate the concept of heritability by using height as an example (**Handout 8**). Have students do a kinship study of two families (one of the families can 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 8**.

*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.

**Research Project 2: Genetic Counseling Available to You**
*Learning Objective 2: Describe the mechanisms of heredity in normal and abnormal human development.*
*Learning Objective 3: Explain how heredity and environment interact in human development.*
*Learning Objective 4: Describe prenatal development, including environmental influences.*

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 9**). 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 9.**

*Use in the Classroom*: Have the groups report their findings to the class, and then lead a general 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: Why Do Some Pregnant Women Drink, Smoke, or Use Drugs?**
*Learning Objective 4: Describe prenatal development.*

The dangers of drinking alcohol, smoking, and other drug use on fetal development are now well known and widely publicized. Despite this fact, many women continue to use these substances while they are pregnant. This research activity attempts to find out why (**Handout 10**).

Have students ask a number of female friends who smoke or drink to talk to them about whether they will do these things when they are pregnant. Then have them ask their friends whether they know that smoking and drinking endanger prenatal development and about what they know in detail. Have them talk about the dangers, and then ask again whether their friends will drink and smoke. You may want to suggest that students prepare an interview schedule of questions to ask. Be sure to instruct the students to avoid judgmental statements and to interview the women individually so their answers will be confidential.

Discuss the findings in class. Do different people give different reasons? Or are there common reasons among many? Discuss whether the women suggested ways that the message about the dangers of drinking and smoking for prenatal development can be made more convincing to prospective parents.

*Source*:
Salkind, N. (1990). *Child development*. Fort Worth: Holt, Rinehart, & Winston.

**Research Project 4: Fatherhood**
*Learning Objective 5: Describe the birth process and the postpartum period.*

How actively are fathers participating in the births of their children? Have students find out by carrying out the interview project described in **Handout 11**. They should identify two first-time, expectant fathers and two fathers of children under the age of 2, and then interview these men using the questions provided.

Instruct students to write a brief report summarizing their findings. They should describe their sample and how they interviewed the fathers and soon-to-be fathers, and then summarize similarities and differences between the two pairs of men. Finally, they should relate what they learned to material on fathers' participation in childbirth from the text.

Have students form groups of three or four to discuss and compare their findings. Have each group report to the class to identify any trends and generalizations that seem warranted by their findings.

*Source*:
Salkind, N. (1990). *Child development*. Fort Worth: Holt, Rinehart, & Winston.

## Feature Film

In this section of the Instructor's Manual, we suggest films that are widely available on sites like amazon.com, documentary wire, 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 waiting for the young girl to do the right thing.

***Mask* (1985)**

Starring: Cher, Sam Elliott, Eric Stoltz, Dennis Burkley, Laura Dern, Estelle Getty
Directed by Peter Bogdanovich

A boy with a massive facial skull deformity attempts to live a normal life. He is extremely intelligent, has a wonderful personality, and is an emotionally warm child. His mother lives a wild lifestyle but is determined that her son be given the same chances and happiness that everyone else takes for granted.

## 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

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

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

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

Apgar Scoring
http://kidshealth.org/parent/pregnancy_center/q_a/apgar.html

A Primer on Preemies
http://kidshealth.org/parent/growth/growing/preemies.html

Postpartum Depression
http://www.psycom.net/depression.central.post-partum.html

Pregnant Bellies by Week of Pregnancy
http://pregnancy.about.com/od/pregnancyphotos/a/galleryguide.htm

Teratology Society: Birth Defects Research | Education | Prevention
http://www.teratology.org/

The Endowment for Human Development
http://www.ehd.org/prenatal-images-index.php

The Visible Embryo
http://www.visembryo.com/

## Handout 1 (CA 10)

### 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

3. One specific gene X environment interaction that has been studied by researchers is the interaction of the 5-HTTLPR gene with particular life events in the prediction of mental health. Which of the following is an accurate description of this research? Circle the letter of the best answer, and explain why it is the best answer and why other answers are not so good.

    a. The combination of having the short version of the 5-HTTLPR gene and experiencing stressful life events predicted increased risk of developing depression.
    b. Knowing what version of the 5-HTTLPR gene an individual has is a good indicator of their risk of developing depression.
    c. This research highlights which life events are perceived as most stressful and allows people to avoid them if possible, reducing their risk of depression.
    d. All participants who had both the short version of 5-HTTLPR and had experienced significant life stress were clinically depressed.

4. Which of the following topics taken from chapter 2 correctly illustrates the chapter 1 topic paired with it? 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. germinal, embryonic, and fetal periods: stability
    b. transition to parenthood: microsystem
    c. teratology: biological determinants and influences
    d. miscarriage/abortion: discontinuity
    e. what to expect when you are expecting: cognitive processes

5. Teratology is the field that investigates the causes of birth defects. Research has found that certain agents influence the development of birth defects. Which of the following is *not* a concern regarding the research methodology involved in teratology? 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. exposure to many teratogens
   b. long-term effects
   c. animal research
   d. correlational research
   e. potential effects

6. During the past two decades, parents, researchers, and physicians have reacted against the so-called standard childbirth, once very widely practiced in American hospitals. Most have begun to favor a variety of prepared or natural forms of childbirth. Which of the following statements represents a basic assumption of standard childbirth practice that critics have rejected? 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. Important individuals were excluded from the birth process.
   b. The mother was separated from her infant in the first minutes and hours after birth.
   c. Giving birth was like a disease.
   d. Babies were slapped or spanked.
   e. Babies were scared by the bright lights.

## Handout 2 (CA 10)

### 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. There is no discussion of prenatal or postnatal change as gradual or stage-like in this chapter.
    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. Stability versus change is not the best answer. The sections on prenatal developmental detail the changes in the developing embryo or fetus over time, but the core issue of stability versus change is not a focus of that section.
    d. Periods of development is not the best answer. While the discussion of perenatal development is organized around three separate periods, it is not a pervasive theme of Chapter 2.

3. One specific gene X environment interaction that has been studied by researchers is the interaction of the 5-HTTLPR gene with particular life events in the prediction of mental health. Which of the following is an accurate description of this research? Circle the letter of the best answer, and explain why it is the best answer and why other answers are not so good.

    a. The combination of having the short version of the 5-HTTLPR gene and experiencing stressful life events predicted increased risk of developing depression. This is the correct answer. The researchers were able to determine that this combination of genes and

environment was the best predictor of depression.

b. Knowing what version of the 5-HTTLPR gene an individual has is a good indicator of their risk of developing depression. This is not the best answer. The 5-HTTLPR gene on its own was not a good predictor of depression risk, only the gene in combination with certain environmental influences.
c. This research highlights which life events are perceived as most stressful and allows people to avoid them if possible, reducing their risk of depression. This is not the best answer. Stressful life events on their own were not the best predictor of depression risk. Only in combination with the specific variant of the gene was life stress a good predictor of depression.
d. All participants who had both the short version of 5-HTTLPR and had experienced significant life stress were clinically depressed. This is not the best answer. This particular gene X environment interaction predicted a greater risk of depression; it did not indicate that individuals who had this combination were destined to be depressed.

4. Which of the following topics taken from chapter 2 correctly illustrates the chapter 1 topic paired with it? 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. Germinal, embryonic, and fetal periods do not illustrate the concept of stability. Prenatal development involves rapid and radical change, not stability. These phases better illustrate periods of development.
b. The transition to parenthood illustrates the concept of the microsystem. The microsystem, according to Bronfenbrenner, refers to the developing person's most immediate and influential contexts. As a couple transitions into parenthood, they experience enormous changes in their family and home life with the addition of the new baby. Teratology does not illustrate the concept of biological determinants and influences. Teratogens are not biological determinants, rather they are environmental influences on development.
c. Miscarriage/abortion do not illustrate the concept of discontinuity. The concept of discontinuity is that development produces qualitatively new and different features, often in what appears to be a progression of stages. These events represent an end to development.
d. What to expect when you are expecting does not illustrate the concept of cognitive processes. Cultural beliefs live in the minds of people, but their practical influence on the developing fetus is social—shaping the parental practices that dictate the fetus's environment and the parents' relationships with the unborn child.

5. Teratology is the field that investigates the causes of birth defects. Research has found that certain agents influence the development of birth defects. Which of the following is *not* a concern regarding the research methodology involved in teratology? 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. Exposure to many teratogens is not the best answer. Given that every fetus is exposed to teratogens, it is difficult to determine which one influenced the birth defect; thus, exposure to many teratogens is a methodological issue.
b. Long-term effects is not the best answer. Given that some of the effects of teratogens are not evident until later in development (about half are evident at birth), long-term effects are a methodological concern.

c. Animal research is not the best answer. Much of teratology research is conducted on animals, and there are questions as to the generalizability to human prenatal development of the animal research findings.
d. Correlational research is not the best answer. Given that experiments involving exposure to teratogens cannot ethically be conducted on humans, cause-and-effect statements should not be made.
e. Potential effects is the best answer. Given the correlational nature of teratogen studies, one avoids methodological issues if potential effects are discussed rather than stating cause-and-effect relationships.

6. During the past two decades, parents, researchers, and physicians have reacted against the so-called standard childbirth, once very widely practiced in American hospitals. Most have begun to favor a variety of prepared or natural forms of childbirth. Which of the following statements represents a basic assumption of standard childbirth practice that critics have rejected? 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. Important individuals were excluded from the birth process is an observation. It is a straightforward statement about who was allowed to be present at a birth.
b. The mother was separated from her infant in the first minutes and hours after birth is an observation.
c. Giving birth was like a disease is an assumption and thus the best answer. The statement does not describe any specific practice, but rather expresses the guiding analogy that directed medical procedures for assisting a birth.
d. Babies were slapped or spanked is an observation. It is a practice that Lamaze vehemently rejected.
e. Babies were scared by the bright lights is an inference. It states the presumed (but not directly known) effect of bright lights on newborn infants.

## Handout 3 (CA 11)

## 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. Indicate how you would explain to a friend that heredity and environment interact in various ways to produce developmental changes. Also, provide an example of each of the three types of gene-environment correlations to help your friend understand this concept.

8. Describe development during the germinal, embryological, and fetal periods. Also, explain what factors might contribute to complications at specific times during gestation.

9. What is organogenesis, and why is this concept important to the process of development?

10. What is viability? At what point is a fetus viable?
11. Define *teratogen*, and give at least two examples of teratogens and their specific effects.

12. Compare and contrast the risks to expectant mothers who are teenagers, twenty-somethings, or thirty-somethings.

13. Choose three legal or illegal substances and describe the risks they pose to a developing embryo or fetus.

14. Describe the stages of birth, and also explain the role of midwives and doulas in the birth process. .

15. Imagine that you are about to give birth. What questions about cesarean sections and the use of drugs during delivery would be important to you? What reasons would lead you to accept or reject a cesarean section and drugs such as tranquilizers, sedatives, and analgesics during delivery?

16. Describe three nonmedicated options for childbirth.

17. Describe some best practices for nurturing preterm and low-birth-weight babies.

18. How do preterm and low-birthweight infants differ?

19. What would you learn about your newborn from the Apgar Scales?

20. Describe postpartum depression. What are some of the risk factors for PPD? How is PPD treated?

## Handout 4 (CA 11)

### 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. Begin by briefly describing Scarr's theory of genotype-environment correlations. Then think about ways of illustrating the three types of correlations by focusing on the key "player" in each correlation (e.g., parents for passive effects).

8. First, think about the most important "task" or goal of the developing organism at each stage of prenatal development. This will give you an idea of what to focus on. Then, think about the greatest threats to the organism's ability to reach those goals.

9. Define organogenesis. In defining it, it should become clear why this is an important process in development.

10. Define what it means for a fetus to be viable. In terms of the "age of viability," what is necessary to reach this point?

11. Do this in your own words. Read the description in the text, and then proceed to expand on it, including a presentation and discussion about examples and their particular effects.

12. Create a chart with all the possible risks, both physiologically and environmentally based, for

the varying age groups of pregnant women. Color code each maternal age group, then indicate the particular groups associated with each risk. This will provide a concrete illustration of maternal age and the associated risks of pregnancy shared by, and different for, each group.

13. A chart would be helpful here, too. List three substances in one column, and their possible effects on development in another.

14. Imagine you are teaching a childbirth class, and your job is to inform expectant parents of the stages of birth. Anticipate their particular questions and concerns to create a more complete presentation of the information.

15. Begin by rereading the relevant sections of the text, imagining that either you are pregnant or your wife is about to give birth. As you bring this personal perspective to your consideration of the information, you should easily begin to develop questions as you would if you were actually facing these circumstances yourself.

16. If you are an expectant parent, you will approach pregnancy, prenatal development, and childbirth in very practical terms. For this question, think about what you would want to hear from a doctor about your options for medications. What benefits and risks does each option carry?

17. Think about the specific challenges of preterm or low-birth-weight newborns. What kinds of care or treatment might best address those challenges?

18. Preterm infants always experience low birth weight, but low birth weight infants are not always preterm. Explain why that is, and what leads to each.

19. Present this information as if you were a pediatrician explaining this assessment to new parents. Remember, the parents are most likely to have no working knowledge of developmental psychology.

20. It might help to imagine that you are designing a brochure about PPD to place in doctors' offices. How would you help women identify possible PPD in themselves? What options for treatment would you want them to know about?

## Handout 5 (CA 5)

### The Court's Treatment of Substance-Abusing Pregnant Women Activity

1. Do you think that mothers who use drugs during pregnancy should face criminal prosecution?

2. Might this policy keep some pregnant women from getting prenatal care and having a hospital delivery?

3. How far should the prosecution go?

4. What alternative solutions can you suggest?

5. Is fetal abuse equivalent to child abuse?

6. Should fathers who use drugs during their partner's pregnancy face criminal prosecution? [According to Windham & others (1992), maternal exposure to environmental tobacco smoke for one hour or more per day is associated with spontaneous abortion. According to Roeleveld & others (1992), paternal smoking is related to mental retardation in offspring.]

7. Do you think a wife should be able to sue her husband for infertility problems caused by use of cocaine? (Cocaine usage lowers sperm count, increases abnormally shaped sperm, and decreases sperm mobility. Infertility problems may last more than two years after a man quits using cocaine.)

8. Research suggests that mothers who smoke tobacco during pregnancy and up to the time their children are 5 years old increase the risk of their offspring getting asthma. Should smoking mothers be prosecuted?

**Handout 6 (CA 6)**

**Fetal Alcohol Syndrome (FAS) Quiz**

1. Which set of definitions best matches these terms: fetal alcohol syndrome (FAS), fetal alcohol effect (FAE), fetal alcohol spectrum disorders (FASD)?

    a. FAS is an umbrella term for all of the effects from alcohol consumption in pregnancy; FAE refers to a diagnosis given by doctors for the combination of mental retardation, stunted growth, and facial abnormalities in an infant, caused by alcohol consumption by the mother in pregnancy; FASD refers to those effects of alcohol consumption in pregnancy that are not part of the classic set of effects in a diagnosis of FAE.
    b. FAS refers to a diagnosis given by doctors for the combination of mental retardation, stunted growth, and facial abnormalities in an infant, caused by alcohol consumption by the mother in pregnancy; FAE is an umbrella term for all of the effects from alcohol consumption in pregnancy; FASD refers to those effects of alcohol consumption in pregnancy that are not part of the classic set of effects in a diagnosis of FAS.
    c. FAS refers to a diagnosis given by doctors for the combination of mental retardation, stunted growth, and facial abnormalities in an infant, caused by alcohol consumption by the mother in pregnancy; FAE refers to those effects of alcohol consumption in pregnancy that are not part of the classic set of effects in a diagnosis of FAS; FASD is an umbrella term for all of the effects from alcohol consumption in pregnancy.

2. What is the leading known cause of mental retardation in Western civilization today?

    a. Down syndrome
    b. prenatal exposure to alcohol
    c. prenatal exposure to illicit drugs
    d. folic acid deficiency
    e. prematurity

3. What percentage of women of child-bearing who could become pregnant are drinking alcohol (many before realizing they are pregnant)?

    a. 10%
    b. 25%
    c. 35%
    d. 55%
    e. 75%

4. What is the cause of fetal alcohol syndrome?

    a. Alcohol in the pregnant woman's bloodstream contracts her blood vessels and prevents her from providing the fetus with adequate nutrition.
    b. Alcohol in the pregnant woman's bloodstream crosses the placenta into the unborn fetus's system and disrupts its ability to get enough oxygen for normal growth and development.
    c. Alcohol in the pregnant woman's bloodstream makes her reckless and more likely to fall or otherwise cause injury to the fetus.
    d. Alcohol in the pregnant woman's bloodstream makes her irritable and irrational, and her bad temper affects the fetus's development.
    e. Alcohol in the pregnant woman's bloodstream upsets her hormonal balances and prevents

her from delivering the right amounts of testosterone to a male fetus or estrogen to a female fetus.

5. What is the incidence rate of FAS in the United States? Estimates vary but most are in the range of:

   a. 0 to 20 per 1,000 live births
   b. 10 to 15 per 1,000 live births
   c. 3 to 7.5 per 1,000 live births
   d. 0.33 to 1.0 per 1,000 live births
   e. 0.2 to 0.5 per 1,000 live births

6. How much does it cost U.S. taxpayers each year to treat infants, children and adults with full FAS?

   a. $250,000 each year
   b. $1,900,000 each year
   c. $2,800,000 each year
   d. $5,400,000,000 each year
   e. almost nothing, as expenses are incurred by private insurance

7. Which of the following groups of women are at high risk for drinking during pregnancy?

   a. women with a college education
   b. unmarried women
   c. female students
   d. women in households with greater than $50,000 annual income
   e. all of these

8. In which of the following ways does alcohol affect a man's ability to father healthy children?

   a. lowered levels of testosterone that interfere with sexual performance
   b. reduced mobility of healthy sperm at time of conception
   c. increased risk of inherited tendency toward alcoholism
   d. possible adverse effects on DNA in sperm before conception
   e. all of these

*Sources*:
Questions 3, 6, 7, and 8 are from http://come-over.to/multiplechoice/fasquiz1.htm
http://www.nofas.org/factsheets/
http://www.well.com/user/woa/fsfas.htm

## Handout 7 (CA 6)

### Answers to the Fetal Alcohol Syndrome (FAS) Quiz

1. (c) FAS refers to a diagnosis given by doctors for the combination of mental retardation, stunted growth, and facial abnormalities in an infant, caused by alcohol consumption by the mother in pregnancy; FAE refers to those effects of alcohol consumption in pregnancy that are not part of the classic set of effects in a diagnosis of FAS; FASD is an umbrella term for all of the effects from alcohol consumption in pregnancy.

2. (b) prenatal exposure to alcohol

3. (d) 55% (the actual figure is 54.9%)

4. (b) Alcohol in the pregnant woman's bloodstream crosses the placenta into the unborn fetus's system and disrupts its ability to get enough oxygen for normal growth and development

5. (d) 0.33 to 1.0 per 1,000 live births

6. (d) $5,400,000,000 each year

7. (e) all of these

8. (e) all of these

See the explanation of these answers on the following Web sites:
Answers 3, 6, 7, and 8: http://come-over.to/multiplechoice/testexplain.htm
http://www.nofas.org/factsheets/
http://www.well.com/user/woa/fsfas.htm

## Handout 8 (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?

## Handout 9 (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?

## Handout 10 (RP 3)

### Why Do Some Pregnant Women Drink, Smoke, or Use Drugs?

The dangers of drinking alcohol, smoking, and other drug use on fetal development are now well known and widely publicized. Despite this fact, many women continue to use these substances while they are pregnant. This research activity attempts to find out why.

Ask a number of female friends who smoke and/or drink to talk to you about how a future pregnancy may affect these behaviors. Determine what your friends know about the effects of smoking and drinking on prenatal development. Then talk about the dangers, and ask again whether your friends will smoke and/or drink during pregnancy. You may want to prepare an interview schedule of questions to ask before meeting with your friends. You will want to come up with a list of about 10 questions to ask. Be sure to avoid judgmental statements/questions. You will want to interview the women individually so their answers will be confidential.

## Handout 11 (RP 4)

## Fatherhood

How actively are fathers participating in the births of their children these days? Find out by carrying out an interview project. Identify two first-time, expectant fathers and two fathers of children under the age of 2. Interview these men using the following sets of questions:

Expectant Fathers:

- What are your feelings about becoming a father?
- How have you been involved in your partner's pregnancy?
- What part will you play in your child's birth? What part would you like to play?
- What do you think being a "good father" means?
- How will having a child change your life?

Fathers:

- What part did you play in the birth(s) of your child (children)? What were your feelings about this experience?
- What are the three biggest challenges you face as a father?
- What do you think a "good father" is?
- How has having a child changed your life?
- What advice would you give a new father?

Write a brief report indicating what you were trying to find out, describe your sample and how you interviewed the fathers and soon-to-be fathers, and then summarize similarities and differences between the two pairs of men. Relate what you learn to material on fathers' participation in childbirth from the text.

# A Selection of the Resources Available in Connect Santrock's *Essentials of Lifespan Development,* 4e

## Chapter 2: Biological Beginnings

| Title | Activity Type | Page # in Text | Learning Objective |
|---|---|---|---|
| Prenatal Development | Interactive Activity | 48 | **2.4**: Describe prenatal development, including environmental influences. |
| Midwifery | Video | 61 | **2.5**: Describe the birth process. |