Chapter Preview

Physical development during the first two years is so rapid that infants often seem to change before their parents' very eyes. Chapter 5 describes the typical patterns of growth and maturation that occur in the infant's body and nervous system and looks at how the development of sensory, perceptual, and motor abilities keeps pace with physical development. For the most part, development takes place as rapidly as a baby's genetic history allows, and the developmental sequence is the same for all healthy infants. The age at which certain skills are mastered, however, varies because development of many skills depends on the interaction of biological and environmental forces. One critical variable in development is nutrition. Although nutrition has improved in East Asia, Latin America, and central Europe, malnutrition has increased in Africa. Improvements in public health measures, including immunization, are the main reason childhood mortality has declined.

What Have You Learned?

The “What Have You Learned?” questions at the end of the text chapter are reprinted here for your convenience in checking students' understanding of the chapter contents.

1. What specific facts indicate that infants grow rapidly in the first year?
2. Why is it fine for an infant to be consistently at the 20th percentile in height and weight?
3. How much do newborns usually sleep and dream?
4. How much and where do 1-year-olds usually sleep?
5. What is the difference between the cortex and the rest of the brain?
6. How does the brain change in weight from birth to age 2?
7. What factors increase the accuracy of perception via the fusiform face area?
8. How can loss of dendrites increase brain potential?
9. What is the difference between experience-expectant and experience-dependent brain function?
10. How does the concept of plasticity apply to early brain development?
11. What should caregivers remember about brain development when an infant cries?
12. What is the relationship between perception and the five senses?
13. What particular sounds and patterns do infants pay attention to?
14. How does an infant's vision change over the first year?
15. What changes occur in the infant's senses of smell, taste, and touch over the first two years?
16. What is universal and what is cultural in the development of gross motor skills in infancy?

17. Which fine motor skills are developed in infancy and which not until later in childhood?

18. Why do public health doctors hope that all infants worldwide have been immunized?

19. What are the reasons for and against breast-feeding until a child is at least 1 year old?

20. What is the relationship between malnutrition and disease?

21. As an indication of malnutrition, which is better, stunting or wasting? Why?

Chapter Guide

- “On Your Own” Activities: Developmental Fact or Myth?, Portfolio Assignment
- Teaching Tips: Using Presentation Software Effectively; How Biology and Culture Shape Parenting
- AV: The Journey Through the Life Span, Program 2: Early Infancy; Transitions Throughout the Life Span, Program 5: Grow, Baby, Grow; The Journey Through Childhood, Program 3: Infants and Toddlers

I. Body Changes

**Instructional Objective:** To familiarize students with infants’ normal patterns of growth and overall health.

- AV: Developmental Phases Before and After Birth; The First 365 Days in the Life of a Child; A Baby’s World; In the Beginning: The Process of Infant Development; Nurturing; The Growing Infant; The First Year of Life
- Teaching Tip: The Evolutionary Perspective on Infant Growth
- Classroom Activity: Epigenetic Theory and Head-Sparing
- “On Your Own” Activity: Growth Rates During the First Two Years—On an Adult Scale

1. Infants typically double their birthweight by the fourth month and triple it by age 1.

2. By age 2, body weight has increased to almost 28 pounds (13 kilograms), a fifth of their adult weight; body length has increased to about 34 inches (51–86 centimeters), half their adult height. These norms are simply averages. To understand these norms, you also need to understand **percentiles**, points on a ranking scale of 0 to 100.

3. In the early months, most of the newborn’s weight gain is fat. **Head-sparing** is the phenomenon by which the brain continues to grow even though the body stops growing in a malnourished child.

Y Classroom Activity: The First Two Years of Sleep; Problem-Based Learning: Sleeping Patterns

4. Throughout childhood, regular and ample sleep correlates with maturation of the brain, learning, emotional regulation, academic success, and psychological adjustment in school and within the family. The average newborn sleeps about 15 to 17 hours a day.

5. During **REM sleep**, brain waves are fairly rapid. REM sleep decreases over the first weeks, as does the dozing stage called **transitional sleep**. By about 3 months, the various states of sleeping and waking become more evident.

6. (Thinking Critically) Traditionally, the children of Western parents slept separately in a crib. **Co-sleeping** is practiced in Asia, Africa, and Latin America and is becoming more popular among Western parents. Breast-feeding is more common with co-sleeping, but so is sudden infant death.

II. Brain Development

**Instructional Objective:** To familiarize students with the normal patterns of brain growth and development during infancy and the effect of experience on brain development.

- AV: Birth of a Brain; The Development of the Human Brain; The Brain; Pediatric Brain Development: The Importance of a Head Start; Pediatric Neuroscience: Rage of Innocents
- “On Your Own” Activity: BYOB: Bring Your Own Brain
1. The newborn's brain contains far more neurons than it will ever need, 70 percent of which are in the cortex. Each neuron consists of a single axon but many dendrites. Neurons communicate with one another at synapses, where the axon of one neuron meets—but does not touch—the dendrites of other neurons. As a neural impulse is generated, chemicals called neurotransmitters carry information from the axon of the sending neuron across the synaptic gap to the dendrites of the receiving neuron.

2. The dendrites show an estimated fivefold increase within the cortex from birth until age 2. The great increase in neural connections over the first two years has been called transient exuberance, exuberant because it is so rapid and transient because some of it is temporary. The expansive growth of dendrites is followed by pruning.

3. Following neural growth, neurons in some areas of the brain wither from disuse or underuse in the process called pruning.

4. The importance of experience in early brain growth is seen in reactions to stress. If too many stress hormones are produced early on, the developing brain becomes incapable of normal stress responses.

5. Brain functions that require basic common experiences to grow are called experience-expectant brain functions; those that depend on particular, variable experiences in order to grow are called experience-dependent brain functions.

6. The last part of the brain to mature is the prefrontal cortex, which plays an important role in anticipation, planning, and impulse control. Shaken baby syndrome, a life-threatening condition, occurs when an infant is violently shaken back and forth, rupturing blood vessels in the brain and breaking neural connections.

7. There are several important implications of brain development for caregivers, including that early brain growth is rapid and reflects experience and that each part of the brain has its own sequence for growth. The inborn drive to remedy any deficit that may occur in development is called self-righting.

8. (text and A View from Science) Neuroscientists once believed that brains were influenced solely by genes and prenatal events. Social scientists thought that only environment mattered. Today, most scientists, especially developmentalists, are multidisciplinary and believe in plasticity. Even so, there are sensitive periods in development when specific kinds of growth are primed to occur. Marion Diamond, William Greenough, and colleagues discovered that the brains of rats raised in stimulating environments were better developed, with more dendrites, than the brains of rats raised in barren environments.

9. (A View from Science) Orphaned Romanian children were overburdened with stress without any social reassurance or love to buffer it. Placed in healthier environments, these children improved; however, emotional damage and persistent deficits in these children remained.

III. Sensation and Movement

Instructional Objective: To provide students with a sense of the newborn's sensory and perceptual capacities, and their early development, and to familiarize students with the normal patterns of motor-skill development during infancy.

- AV: The Discovery Year; Discovering the Outside World; The Newborn: Development and Discovery; Seeing Infants with New Eyes; Helping Babies Learn; Simple Beginnings?
- Classroom Activities: Incorporating a Comparative Perspective into Developmental Psychology; The Development of Visual Perception; Facial Expression Processing: Neurobehavioral Maturation or Cognitive Scaffolding?
- Observational Activity: Time Sampling of Newborn Behavior
- “On Your Own” Activity: Infants' Shape Preferences

1. At birth, sensation (detection of a stimulus) is apparent. Perception (making sense of that stimulus) comes a bit later because it requires experience. Newborns can see, hear, smell, taste, and respond to touch. Cognition follows perception.

2. Hearing in the newborn is quite acute. Young infants are particularly attentive to the human voice. With time, they can also distinguish patterns of sounds and syllables.
3. Vision is the least mature sense at birth. Newborns focus most readily on objects between 4 and 30 inches (10–75 centimeters) away.

4. With increasing maturation of the visual cortex, focusing improves and scanning is more organized, efficient, and centered on important points.

5. Binocular vision develops at about 14 weeks.

6. Taste, smell, and touch also function at birth.

7. The infant’s early sensory abilities seem organized for two goals: social interaction and comfort.

8. The most visible and dramatic body changes of infancy involve motor skills.

9. Developmentalists distinguish between gross motor skills, such as walking, and fine motor skills, such as grasping and holding a toy. Between 8 and 10 months, most infants are crawling on “all fours” (sometimes called creeping). Some children can step while holding on at 9 months, stand alone momentarily at 10 months, and walk well, unassisted, at 12 months. The factors that combine to allow toddlers to walk are muscle strength, brain maturation within the motor cortex, and practice.

11. By 6 months of age, most babies can reach for, grab at, and hold onto almost any object of the right size.

12. Although the sequence at which motor skills are mastered is the same in all healthy infants, the age at which skills are acquired varies greatly.

13. Motor-skill acquisition in identical twins is more similar than in fraternal twins, and it varies by ethnic group, suggesting that genes play an important role. Cultural patterns of child rearing can also affect motor-skill development.

IV. Surviving in Good Health

**Instructional Objective:** To give students a sense of why the infant mortality rate decreased during the twentieth century, and to help them understand the causes and consequences of infant malnutrition and undernutrition.

1. Between 1950 and 2010, about 2 billion children died before age 5. In the healthiest nations, 99.9 percent of children who survive the first month live to age 15.

2. Two preventive care measures that reduce the childhood death rate are oral rehydration therapy and providing bed nets treated with insect repellent in malaria-prone areas.

3. A key factor in reducing the childhood death rate was the development of immunization. Although many parents have concerns about the potential side effects of vaccinations, the risks of diseases far outweigh the risks from immunization.

4. Breast milk is the ideal food for most babies, beginning with thick, high-calorie colostrum. It is sterile and at body temperature; it contains more iron, vitamins, and other nutrients than cow’s milk; it is more digestible; it provides the infant with immunity to any disease the mother has already had or been inoculated against; and it decreases the risk of diseases that appear in childhood and adulthood, including asthma, obesity, and heart disease.

5. In infancy, protein-calorie malnutrition occurs when the baby is not getting enough food of any kind.
6. **Stunting** is the failure of children to grow to a normal height for their age due to severe and chronic malnutrition.

7. When a child is severely underweight for his or her age as a result of malnutrition, **wasting** has occurred.

8. Chronically malnourished infants suffer in three ways: Their brains may not develop normally, they may have no body reserves to protect them against common diseases, and they may develop the diseases **marasmus** or **kwashiorkor**.