Chapter One

I. THE LIFE-SPAN PERSPECTIVE
A. Characteristics of the Life-Span Perspective
   1. Life-Span Development
      • The traditional approach emphasizes extreme change from birth to adolescence, little or
        no change in adulthood, and decline in old age.
      • The life-span approach emphasizes that change is possible throughout the life span.
      • The human life span is 122 years and has not changed since the beginning of recorded
        history.
      • Life expectancy has changed considerably in the last century. Improvements in
        sanitation, nutrition, and medical knowledge led to this increase of 30 years.
   2. The Life-Span Perspective
      • Baltes states that the life-span perspective has several basic characteristics.
      • Development is lifelong—Individuals continue to develop and change from conception to
        death. No one age dominates development.
      • Development is multidimensional—Development consists of biological, cognitive, and
        socioemotional components.
      • Development is multidirectional—Some components of a dimension increase in growth,
        whereas others decrease.
      • Development is plastic—Plasticity involves the degree to which characteristics change or
        remain stable.
      • Developmental science is multidisciplinary—Multiple fields, including psychologists,
        sociologists, anthropologists, neuroscientists, and medical researchers, share an interest in
        studying human development across the life span.
      • Development is contextual—Individuals respond to and act on contexts, including one’s
        biological makeup; physical environment; cognitive processes; and social, historical, and
        cultural contexts.
      • Development involves growth, maintenance, and regulation of loss—The mastery of life
        often involves conflicts and competition among three goals of human development:
        growth, maintenance, and regulation.
      • Development is a co-construction of biology, culture, and the individual—who a person
        is and will become are influenced by biological factors (such as genetics), cultural factors
        (such as social norms), and the individual’s own volition.

II. DEVELOPMENTAL PROCESSES, PERIODS, AND ISSUES
A. Biological, Cognitive, and Socioemotional Processes
   ➢ Biological processes involve changes in the individual’s physical nature.
   ➢ Cognitive processes involve changes in the individual’s thought, intelligence, and language.
   ➢ Socioemotional processes involve changes in the individual’s relationships with other
     people, changes in emotions, and changes in personality.
B. Periods of Development
   ➢ A developmental period refers to a time frame in a person’s life that is characterized by
     certain features.
   ➢ The life span is commonly divided into the following periods of development:
     1. Prenatal period is the time from conception to birth.
     2. Infancy is the developmental period extending from birth to 18 or 24 months.
3. Early childhood (preschool years) extends from the end of infancy to about 5 or 6 years.
4. Middle and late childhood (elementary school years) extends from about 6 to 11 years.
5. Adolescence is the developmental period of transition from childhood to early adulthood, entered at approximately 10 to 12 years of age and ending at 18 to 22 years of age.
6. Early adulthood begins in the late teens or early twenties and lasts through the thirties.
7. Middle adulthood begins at approximately 40 years of age and extends to about 60.
8. Late adulthood is the developmental period beginning in the 60s or 70s and lasting until death.

C. The Significance of Age

- Conceptions of age:
  1. **Chronological age** is the number of years that have elapsed since a person’s birth.
  2. **Biological age** is a person’s age in terms of biological health.
  3. **Psychological age** is an individual’s adaptive capacities compared to those of other individuals of the same chronological age.
  4. **Social age** refers to social roles and expectations related to a person’s age.

D. Developmental Issues

- **Nature and Nurture**—This issue focuses on the extent to which development is mainly influenced by nature (biological inheritance) or nurture (environmental experiences).
- **Stability and Change**—This issue involves the degree to which early traits and characteristics persist through life or change.
- **Continuity and Discontinuity**—This issue focuses on the extent to which development involves gradual, cumulative change or distinct stages.
- Most developmentalists do not take extreme positions on these issues, although debates still ensue.

III. THEORIES OF DEVELOPMENT

- A **theory** is an interrelated, coherent set of ideas that helps explain and make predictions.
- **Hypotheses** are specific predictions that can be tested to determine their accuracy.
- Five theoretical orientations are discussed in this chapter and they should be viewed as complementary instead of contradictory.

A. Psychoanalytic Theories

- Emotion plays a large role in development, and development is a function of the unconscious mind.

  1. Freud’s Theory
     - Sigmund Freud, a medical doctor who specialized in neurology, developed psychoanalytic theory from working with his patients.
     - The way we resolve crises at the five stages of psychosexual development, which he named oral, anal, phallic, latency, and genital, determines our adult personality.
     - Many of today’s psychoanalytic theorists believe that Freud overemphasized sexual instincts; they place more emphasis on cultural experiences as determinants of an individual’s development.

  2. Erikson’s Theory
     - Erikson proposed eight psychosocial stages of development which unfold throughout the life span.
     - Each stage represents a crisis that must be resolved for healthy development to occur.
       - Trust vs. mistrust
       - Autonomy vs. shame and doubt
B. Cognitive Theories

- Cognitive theories emphasize thinking, reasoning, language, and other cognitive processes.

1. Piaget’s Cognitive Developmental Theory
   - Children actively construct their understanding of the world through the processes of organization and adaptation.
   - To make sense of our observations and experiences, we must organize them in some meaningful way.
   - We also adapt our thinking to include new ideas and experiences.
   - He proposed four stages of cognitive development, each of which is age-related and represents a qualitatively distinct way of thinking.
     - Sensorimotor stage
     - Preoperational stage
     - Concrete operational stage
     - Formal operational stage

2. Vygotsky’s Sociocultural Cognitive Theory
   - Like Piaget, Vygotsky believed that children actively construct their knowledge.
   - This theory emphasizes how culture and social interaction guide cognitive development.
   - Through social interaction, especially with more skilled peers and adults, children learn to use the tools that will help them adapt and be successful in their culture.

3. The Information-Processing Theory
   - Individuals develop an increasing capacity for processing information that is gradual rather than in stages.
   - Siegler, an expert on children’s information processing, emphasizes that an important aspect of development is learning good strategies for processing information.

C. Behavioral and Social Cognitive Theories

- Behaviorist theories state that development is observable behavior that can be learned through experience with the environment.

1. Skinner’s Operant Conditioning
   - Through operant conditioning, the consequences of a behavior produce changes in the probability of the behavior’s occurrence.
   - If a behavior is followed by a pleasant consequence, it is more likely to recur, but if it is followed by an unpleasant consequence, it is less likely to recur.
   - Rewards and punishments that occur in the environment actually shape development.

2. Bandura’s Social Cognitive Theory
   - Cognition, as well as the environment and behavior, shape development.
   - Observational learning occurs through observing what others do.
   - Bandura proposes a model of learning and development that involves interaction among the behavior, the person, and the environment.

D. Ethological Theory
1. Ethologists stress the timing of certain influences and the powerful roles that evolution and biological foundations play in development.
2. Lorenz’s study of **imprinting** in geese showed that innate learning within a limited **critical period** is based on attachment to the first moving object seen, usually the mother.
3. The notion of a **sensitive period**, a term reserved for humans, reflects the recent expansion of the ethological view of human development.
4. Bowlby’s theory of a secure attachment resulting in optimal development is an application of ethological theory.

E. Ecological Theory
1. Ecological theories emphasize the impact of environmental contexts on development.
2. **Bronfenbrenner’s biococological theory** consists of five interacting environmental systems ranging from direct interactions with social agents to cultural influences.
   - The **microsystem** is the setting in which the individual lives, including direct interactions with the person’s family, peers, school, and neighborhood.
   - The **mesosystem** involves relations among microsystems or connections among contexts. Relations of family experiences to school experiences, school experiences to church experiences, and family experiences to peer experiences would be included in this system.
   - The **exosystem** is involved when experiences in another social setting, in which the individual does not have an active role, influence what the individual experiences in an immediate context.
   - The **macrosystem** involves the culture in which individuals live.
   - The **chronosystem** involves the patterning of environmental events and transitions over the life course, as well as sociohistorical circumstances.

F. An Eclectic Orientation
1. An **eclectic theoretical orientation** does not follow any one theoretical approach but rather selects and uses from each theory whatever is considered the best in it.

IV. RESEARCH IN LIFE-SPAN DEVELOPMENT
A. Methods for Collecting Data
1. Observation
   - Scientific observation is highly systematic: it requires knowing what to look for, conducting observations in an unbiased manner, accurately recording and categorizing what you see, and communicating your observations.
   - Observations occur in either laboratories or naturalistic settings. A **laboratory** is a controlled setting from which many of the complex factors of the real world have been removed. In **naturalistic observations**, behavior is observed outside of a laboratory in the real world.
2. Survey and Interview
   - A way to quickly gather information about experiences, beliefs, and feelings is to ask people about them.
   - Good interviews and surveys involve clear, unbiased, and unambiguous questions.
   - Some survey questions are unstructured and open-ended, whereas others are more structured and specific.
   - One limitation of interviews and questionnaires is that people often give socially desirable answers rather than honest answers.
3. Standardized Tests
• Commercially prepared tests with uniform/standardized administration and scoring procedures that assess performance in different domains, where test scores can be compared across individuals.
• Theses tests provide information about individual differences among people.
• One criticism of standardized tests is that they assume a person’s behavior is consistent and stable.

4. Case Study
• An in-depth look at an individual to examine unique aspects of a person’s life.
• Generalizability can be a problem because each subject has a unique genetic makeup and life experiences.

5. Physiological Measures
• Physiological measures are being employed more and more in developmental research.
• Physiological measures include such things as hormone levels, functional magnetic resonance imaging (fMRI), and so on.
• Researchers must keep in mind that physiological measures are not always directly related to psychological states so these measures must be interpreted with caution.

B. Research Designs
1. Descriptive Research
• The goal of descriptive research is to observe and record behavior.
• All of the aforementioned data collection techniques are considered to be descriptive methods.
• Descriptive research cannot tell us about causation.

2. Correlational Research
• The goal of correlational research is to describe the strength of the relation between two or more events or characteristics. It is useful because the stronger the two events are correlated, the more effectively we can predict one from the other.
• A correlation coefficient is the statistical measure that is used to examine relations between variables. This number ranges from +1.00 to -1.00.
• Correlation does not imply causation.

3. Experimental Research
• An experiment allows researchers to determine the causes of behavior by carefully regulated procedures in which one or more of the factors believed to influence the behavior being studied are manipulated, and all other factors are held constant. If the behavior changes when a factor is manipulated, we say the manipulated factor causes the behavior to change.
• “Cause” is the factor being manipulated. “Effect” is the behavior that changes as a result of the manipulation.
• The independent variable is the manipulated or experimental variable.
• The dependent variable is the factor that is measured in an experiment, sometimes called the test or outcome variable.
• An experimental group consists of the individuals who experience the manipulation or the experimental variable.
• A control group is a group that is in every way like the experimental group but is not given the experimental treatment.
• Random assignment involves assigning participants to either experimental or control groups randomly, so that differences between the performance of the groups will not be caused by any preexisting differences between them.

C. Time Span of Research
• Developmentalists study the relation of age to other variables using three research strategies:
1. **Cross-Sectional Approach:** Individuals of different ages are compared at one time.
   - This time-efficient approach does not require time for individuals to age.
   - It provides no information about how individuals change or about the stability of their characteristics.
   - A major disadvantage is the **cohort effect**.

2. **Longitudinal Approach:** The same individuals are studied over time.
   - This approach provides information regarding stability and change in development and the importance of early experience for later development.
   - This approach is expensive and time consuming, but it has the advantage of eliminating the cohort effect.
   - There is potential for subjects to drop out due to sickness, loss of interest, or moving away.
   - The subjects that remain in the study could bias the results because they may be dissimilar from the ones that dropped out.

**Chapter Two**

I. **THE EVOLUTIONARY PERSPECTIVE**
   A. Natural Selection and Adaptive Behavior
      - Natural selection is the evolutionary process proposed by Charles Darwin that favors individuals of a species that are best adapted to survive and reproduce.
      - Adaptive behavior is behavior that promotes an organism’s survival in the natural habitat.
   B. Evolutionary Psychology
      - **Evolutionary psychology** emphasizes the importance of adaptation, reproduction, and “survival of the fittest” in explaining behavior.
      - The evolutionary process of natural selection favors behaviors that increase an organism’s reproductive success and its ability to pass its genes to the next generation.

II. **GENETIC FOUNDATIONS OF DEVELOPMENT**
   A. The Collaborative Gene
      - **Chromosomes** are threadlike structures that come in 23 pairs, one member of each pair coming from each parent. Chromosomes contain the genetic substance deoxyribonucleic acid (DNA).
      - **DNA** is a complex molecule that contains genetic information. The double-helix shape looks like a spiral staircase.
      - **Genes** are short segments composed of DNA. Genes act as a blueprint for cells to reproduce themselves and manufacture proteins that maintain life.
      - The activity of genes (genetic expression) is affected by their environment.
      - The human genome consists of many genes that collaborate both with each other and with nongenetic factors inside and outside the body.
   B. Genes and Chromosomes
      - **Mitosis, Meiosis, and Fertilization**
      - **Mitosis** is the process by which each chromosome in the cell’s nucleus duplicates itself.
      - **Meiosis** is the process by which cells divide into gametes (testes/sperm in males, ovaries/eggs in females), which have half the genetic material of the parent cell.
      - Human reproduction begins when a female gamete (ovum) is fertilized by a male gamete (sperm) to create a single cell called a **zygote**.
• The 23rd pair of chromosomes differs in males and females. In males, the 23rd pair is XY, whereas in females it is XX.

C. Genetic Principles
1. **Dominant-recessive genes principle:** If one gene of a pair is dominant and one is recessive, the dominant gene exerts its effect, overriding the potential influence of the recessive gene. A recessive gene exerts its influence only if the two genes of a pair are both recessive.

D. Chromosome and Gene-Linked Abnormalities
1. Chromosome Abnormalities
   • Chromosome abnormalities occur when chromosomes do not divide evenly.
   • **Down Syndrome:** A chromosomally transmitted form of mental retardation caused by the presence of an extra chromosome (approximately 1 out of 700 live births). An individual with Down syndrome typically has a round face, a flattened skull, an extra fold of skin over the eyelids, a protruding tongue, short limbs, and retardation of motor and mental abilities. **Maternal age** may contribute to this syndrome.

   • **Sex-linked chromosome abnormalities** occur when there is a deviation from the typical XX or XY combination of sex chromosomes. Sex-linked chromosomal disorders include:
     — **Klinefelter syndrome** is a genetic disorder in which males have an extra X chromosome, making them XXY instead of XY (approximately 1 in 800 live births). Males with this disorder have undeveloped testes, enlarged breasts, and are tall. Boys also display impairment in language, academic, attentional, and motor abilities.
     — **Fragile X syndrome** is a genetic disorder that results from abnormality in the X chromosome (becomes constricted and breaks). Mental deficiency is the primary outcome including cognitive deficits in inhibition, memory, and planning. It is more common in males than in females.
     — **Turner syndrome** is a chromosome disorder in which females are missing an X chromosome, making them XO instead of XX. These females (1 in 2,500 live births) are short in stature and have webbed necks. They may be infertile and have difficulty in mathematics, while their verbal ability is often quite good.
     — The **XYY syndrome** is a disorder in which the male has an extra Y chromosome. Despite assumptions, XYY males are no more likely to commit crimes than are XY males.

2. **Gene-Linked Abnormalities**
   • More than 7,000 genetic disorders are caused by harmful genes, although most are rare.
   • **Phenylketonuria (PKU)** is an easily detected genetic disorder in which the individual cannot properly metabolize an amino acid. If left untreated, mental retardation and hyperactivity result. It occurs about once in every 10,000 to 20,000 live births.
   • **Sickle-cell anemia**, which occurs in 1 of 400 African Americans, is a genetic disorder affecting the red blood cells and results in early death.
   • Other genetic disorders include cystic fibrosis, diabetes, hemophilia, Huntington disease, spina bifida, and Tay-Sachs disease.

III. PRENATAL DEVELOPMENT
A. The Course of Prenatal Development
1. The **germinal period** takes place in the first 2 weeks after conception, which begins with the creation of the zygote and ends with implantation, or the attachment of the zygote to the uterine wall.
2. The **embryonic period** occurs from 2 to 8 weeks after conception. Rate of cell differentiation intensifies and layers develop. The inner layer of cells, called *endoderm*, will develop into the digestive and respiratory systems. The outer layer of cell contains the *ectoderm*, which will become the nervous system, sensory receptors, and skin; and the *mesoderm*, which will become the circulatory system, bones, muscles, and excretory and reproductive systems.
   - *Organogenesis*, the formation of organs, occurs during this period (and this process often begins before most women even know they are pregnant).
3. The **fetal period** begins 2 months after conception and lasts for 7 months. Growth and development continue, and organ systems mature to the point at which life can be sustained outside of the womb.

**B. Hazards to Prenatal Development**

1. **General Principles**
   - A *teratogen* is any agent that causes a birth defect.
   - A particular organ is most vulnerable to teratogenic effects during the period of its development or *organogenesis*. The probability of structural damage is greatest during the embryonic period and, therefore, timing is a critical factor.
   - The severity and type of defect that results from teratogens can be a function of *dose*, *genetic susceptibility*, and *time of exposure*.

2. **Prescription and Nonprescription Drugs**
   - Prescription drugs, such as antibiotics, some antidepressants, estrogen, and Accutane have teratogenic effects.
   - Nonprescription drugs such as aspirin and diet pills can have teratogenic effects.

3. **Psychoactive Drugs**
   - *Psychoactive drugs* act on the nervous system to alter states of consciousness, modify perceptions, and change moods.
   - *Caffeine* causes a small increase in the risks for spontaneous abortion and low birth weight for women who consume more than 150 milligrams of caffeine per day. Women who consume more than 300 milligrams of caffeine a day have an increased risk of fetal death.
   - Alcohol taken during pregnancy can result in **fetal alcohol spectrum disorders (FASD)**, a cluster of abnormalities that appear in the offspring. The abnormalities include facial deformities, defective limbs and heart, and mild to moderate mental retardation.
   - Even if FASD does not develop, moderate and heavy drinking during pregnancy is linked to having learning disabilities and memory impairment.
   - *Nicotine* can cause increased risk of preterm births, fetal and neonatal death, low birth weight, nicotine withdrawal, ADHD, respiratory problems, and SIDS.

4. **Incompatible Blood Types**
   - A woman is at risk during pregnancy when the Rh factor in her blood is negative, and the Rh factor in her partner’s blood is positive.
   - When the fetus has Rh positive blood and the mother has Rh negative blood, the mother’s blood may develop antibodies that may attack the fetus.
   - A vaccine may be given to the mother that will prevent her body from making antibodies against Rh negative blood.

5. **Maternal Diseases**
   - Diseases and infections can cause birth defects by crossing the placental barrier or causing damage during birth.
   - Rubella, syphilis, genital herpes, and HIV are all diseases that can produce birth defects and/or damage during birth.
6. Maternal Diet and Nutrition
   - Malnourishment is a risk factor for a baby to be born malformed.
   - Obesity is a risk factor for stillbirth, neonatal death, and defects in the central nervous system.
   - Neural tube defects are linked with a deficit of folic acid consumption.
   - Mercury in fish is toxic to the developing brain and nervous system and may lead to miscarriage, preterm birth, and lower intelligence in the child.

7. Emotional States and Stress
   - Intense fears, anxieties, and stress produce adrenaline and corticotrophin-releasing hormone (CRH), linked to preterm delivery.
   - Adrenaline can reduce blood flow to the baby and deprive him or her of oxygen.
   - High levels of stress during pregnancy is a risk factor for having a child with emotional or cognitive problems, ADHD, and language delay.

8. Maternal Age
   - The mortality rate of infants born to adolescent mothers is double that of infants born to mothers in their 20s.
   - The risk of Down syndrome increases with age, beginning at age 35.
   - The risk for low birth weight, preterm birth, and fetal death increases for women over 35 years of age.
   - If women remain active, exercise regularly, and are careful about nutrition, their reproductive systems may remain healthier at older ages than was thought possible in the past.

9. Paternal Factors
   - Men’s exposure to environmental toxins may cause abnormalities in sperm that lead to miscarriage or diseases such as childhood cancer.
   - There is an increased risk of birth defects and cancer if the father does not ingest adequate amounts of vitamin C.
   - Cocaine may attach itself to sperm leading to birth defects. Cocaine also lowers sperm count.
   - Smoking may decrease birth weight and increase early-term miscarriages.
   - The risk of Down’s syndrome, dwarfism, Marfan’s syndrome, and miscarriages increases with paternal age.

10. Environmental Hazards
    - Radiation, pollutants, and toxic wastes are all potential hazards.

C. Applications in Life-Span Development: A Healthy Pregnancy
1. Couples should begin preparing for pregnancy before becoming pregnant.
   - A physician can tell women which prescription and nonprescription drugs are not safe during pregnancy.
   - Smoking and alcohol usage should stop before becoming pregnant. Caffeine consumption should be limited or discontinued all together.
   - Women should start taking a multivitamin with iron and folic acid.
   - Women should avoid eating fish with high levels of mercury.
   - A healthy diet and moderate regular exercise decreases discomfort during pregnancy and increases a sense of well-being.
   - Once pregnant, begin early prenatal care and discuss prenatal tests with the physician.

D. Prenatal Care
1. Prenatal care is important for numerous reasons.
   - Prenatal care educates the mother about teratogens and other prenatal hazards.
Prenatal care provides health care for the baby and mother. Prenatal care can provide information about educational, social, and nutritional services available in the community. No receiving prenatal care increases the risk of low birth weight, preterm birth, infant mortality, and a number of other physical problems. The United States has a high infant mortality rate and low birth weight in comparison to many other countries. An innovative program that is rapidly expanding in the U.S. is CenteringPregnancy. This relationship-centered program provides complete prenatal care in a group setting.

IV. BIRTH
A. The Birth Process
1. Stages of Birth
   - The first stage lasts about 6 to 12 hours for a woman having her first child. The cervix dilates to about 4 centimeters as a result of uterine contractions.
   - The second stage begins when a baby’s head moves through the cervix until the baby’s body emerges completely, about 90 minutes for a woman having her first child.
   - The third stage is called afterbirth, at which time the placenta, umbilical cord, and other membranes are detached and expelled. This takes a few minutes.
2. Methods of Childbirth
   - Medication: Analgesics, anesthesia, and oxytocics are used for labor. Predicting how a drug will affect an individual woman and her fetus is difficult.
   - Natural and prepared childbirth: Reduce mother’s pain by decreasing fear through education in the use of breathing and relaxation techniques.
   - Other nonmedicated techniques to reduce pain include waterbirth, massage, acupuncture, hypnosis, and music therapy.
   - Caesarean delivery: The baby is removed from the mother’s uterus through an incision made in her abdomen. This is usually done when the baby is having difficulty emerging through the birth canal because of its size, position, or other problem. Critics note that too many babies are delivered by c-section (31%) – although supporters note that the rate may be so high because of our increasing ability to detect distress in the baby.
3. Transition from Fetus to Newborn
   - Anoxia, which can cause brain damage, occurs when the fetus has an insufficient supply of oxygen because the placenta and umbilical cord are compressed during uterine contractions.
   - Hormones, adrenaline, and nonadrenalin are secreted to protect the fetus against stress.
   - At the time of birth, the baby is covered with the vernix caseosa, a protective skin grease, thought to help prevent heat loss before and during birth.
   - The umbilical cord is cut immediately after birth.
C. Assessing the Newborn
   - Apgar scale: used to assess infants’ heart rate, respiratory effort, muscle tone, body color, and reflex irritability on a 10-point scale (0–2 for each item) 1 and 5 minutes after birth.
D. Low-Birth-Weight and Preterm Infants
   - Preterm and low-birth-weight infants are considered high risk.
• **Preterm** infants are those born 35 or fewer weeks after conception. One out of every eight U.S. births is now preterm, possibly due to advanced maternal age, increased stress, increased substance use, and increased multiple birth rates.

• **Low birthweight** infants weight less than 5 1/2 pounds, but are born after 38 weeks.
  • **Very low birth weight** newborns weigh under three pounds.
  • **Extremely low birth weight** newborns weigh under two pounds.

• **Small for date** infants are those whose birth weight is below normal when considering the length of pregnancy.

1. Incidences and Causes of Low Birth Weight
   • Low birth weight rates vary across countries. The U.S. has a considerably higher rate than most other developed countries.
   • The U.S. low birth weight rate is 8.1 percent and has been rising the last two decades.
   • In developing countries, low birth weight stems from the mother’s poor health, nutrition, or exposure to diseases such as diarrhea and malaria.
   • In developed countries, low birth weight stems from cigarette smoking during pregnancy (number one cause).
   • Progesterone seems to lower the risk of preterm birth.

2. Consequences of Low Birth Weight
   • These babies have a higher risk for developmental problems.
   • The number and severity of problems increases as birth weight decreases (brain damage, cerebral palsy, lung or liver disease, learning disability, attention deficit disorder, asthma).
   • Approximately 50 percent of all low-birth-weight children are enrolled in special education programs, although disadvantaged environments are also a contributing factor.
   • Recent research indicates that the earlier preterm infants are born the more likely they will drop out of school.

2. Nurturing Preterm Infants
   • Intensive enrichment programs that provide medical and educational services for both the parents and the children can improve outcomes for low birth weight children.
   • **Kangaroo care** is a way of holding a preterm infant so that there is skin-to-skin contact, two to three hours per day, over an extended time in early infancy.

3. Research in Life-Span Development: Tiffany Field’s Research on Massage Therapy
   • Preterm infants were massaged and showed lower stress than preterm infants not massaged.
   • Full-term infants that were massaged gained more weight, performed better or the orientation scale of the Brazelton, were less excitable and less depressed, and were less agitated during sleep than infants not massaged.
   • Preterm infants exposed to cocaine in the womb benefited from infant massage (e.g., less stress, improved emotionality, sociability, and soothability) compared to those not massaged.
   • Reviewing research indicates that preterm infant massage is consistently correlated with increased weight gain and earlier discharge from the hospital.