

Life-Span Development Thirteenth Edition

Chapter 2: Biological Beginnings

The Evolutionary Perspective

- Natural Selection and Adaptive Behavior
 - Natural Selection: an evolutionary process by which those individuals of a species that are best adapted are the ones that survive and reproduce
 - Adaptive Behavior: behavior that promotes an organism's survival in the natural habitat

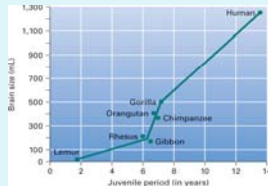
The Evolutionary Perspective

- Evolutionary Psychology
 - The importance of adaptation, reproduction, and “survival of the fittest” in shaping behavior
 - Fit: the ability to bear offspring that survive long enough to bear offspring of their own

The Evolutionary Perspective

- Evolutionary Developmental Psychology
 - Using concepts of evolutionary psychology to understand human development
 - e.g. Extended childhood period allows time to develop a large brain and learn complexity of human society

Brain Sizes of Various Primates and Humans in Relation to Length of Juvenile Period



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The Evolutionary Perspective

- Connecting Evolution and Life-Span Development
 - Why do humans live so long after reproduction?
 - Perhaps older people improve the survival rate of babies

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Genetic Foundations of Development

- The Collaborative Gene
 - Human life begins as a single cell
 - Nucleus of each cell contains chromosomes
 - Chromosomes: thread-like structures made up of DNA
 - DNA: a complex double-helix molecule that contains genetic information
 - Genes: short segments of DNA
 - Humans have approximately 20,500 genes.

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Genetic Foundations of Development



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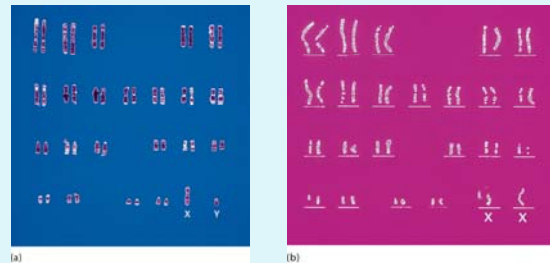
Genetic Foundations of Development

- Genes and Chromosomes
 - Mitosis, Meiosis, and Fertilization
 - Mitosis: reproduction of cells
 - Meiosis: cell division that forms sperm and eggs (gametes)
 - Fertilization: fusing of sperm and egg to create a *zygote*
 - Creates one set of paired chromosomes (23 from each parent)

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The Genetic Difference Between Males and Females



(a)

(b)

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Genetic Foundations of Development

- Genes and Chromosomes
 - Sources of Variability
 - Combining genes of both parents increases genetic variability
 - Identical (monozygotic) vs. Fraternal (dizygotic) twins
 - Susceptibility genes vs. Longevity genes
 - Genotype vs. Phenotype

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Genetic Foundations of Development

- Genetic Principles
 - Dominant-Recessive Genes Principle
 - Sex-Linked Genes
 - Genetic Imprinting
 - Polygenic Inheritance

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Genetic Foundations of Development

Chromosomal Abnormalities

Name	Description	Treatment	Incidence
Down syndrome	An extra chromosome causes mild to severe retardation and physical abnormalities.	Surgery, early intervention, infant stimulation, and special learning programs	1 in 1,300 births at age 20 1 in 300 births at age 35 1 in 30 births at age 45
Klinefelter syndrome (XXY)	An extra X chromosome causes physical abnormalities.	Hormone therapy can be effective	1 in 600 male births
Fragile X syndrome	An abnormality in the X chromosome can cause mental retardation, learning disabilities, or short attention span.	Special education, speech and language therapy	More common in males than in females
Turner syndrome (XO)	A missing X chromosome in females can cause mental retardation and sexual underdevelopment.	Hormone therapy in childhood and puberty	1 in 2,500 female births
XYY syndrome	An extra Y chromosome can cause above-average height.	No special treatment required	1 in 1,000 male births

Genetic Foundations of Development

Gene-Linked Abnormalities

Name	Description	Treatment	Incidence
Cystic fibrosis	Glandular dysfunction that interferes with mucus production, breathing and digestion are hampered, resulting in a shortened life span.	Physical and oxygen therapy, synthetic enzymes, and antibiotics, most individuals live to middle age.	1 in 2,000 births
Diabetes	Body does not produce enough insulin, which causes abnormal metabolism of sugar.	Early onset can be fatal unless treated with insulin.	1 in 2,500 births
Hemophilia	Delayed blood clotting causes internal and external bleeding.	Blood transfusions/infusions can reduce or prevent damage due to internal bleeding.	1 in 10,000 males
Huntington disease	Central nervous system deterioration, producing problems in muscle coordination and mental deterioration.	Does not usually appear until age 35 or older; death likely 10 to 20 years after symptoms appear.	1 in 20,000 births
Phenylketonuria (PKU)	Metabolic disorder that, left untreated, causes mental retardation.	Special diet can result in average intelligence and normal life span.	1 in 10,000 to 1 in 20,000 births
Sickle-cell anemia	Blood disorder that limits the body's oxygen supply; it can cause joint swelling, as well as heart and kidney failure.	Painkillers, medication for pain, antibiotics, and blood transfusions.	1 in 400 African American children (lower among other groups)
Spina bifida	Neural tube disorder that causes brain and spine abnormalities.	Corrective surgery at birth, orthopedic devices, and physical therapy.	2 in 1,000 births
Tay-Sachs disease	Deterioration of mental and physical development caused by an accumulation of lipids in the nervous system.	Medication and special diet are used, but death is likely by 5 years of age.	One in 30 American Jews in a center.

Genetic Foundations of Development

- Dealing with Genetic Abnormalities
 - Every individual carries DNA variations, but most do not display a disorder
 - Today, many genetic diseases can be detected prior to and immediately after birth
 - However, knowledge of genetic flaws leads to difficult choices about how to manage such information
 - Genetic counselors help people make reproductive decisions

Reproductive Challenges and Choices

- Prenatal Diagnostic Tests
 - Ultrasound Sonography
 - Fetal MRI
 - Chorionic Villus Sampling
 - Amniocentesis
 - Maternal Blood Screening
 - Noninvasive Prenatal Diagnosis (NIPD)

Reproductive Challenges and Choices

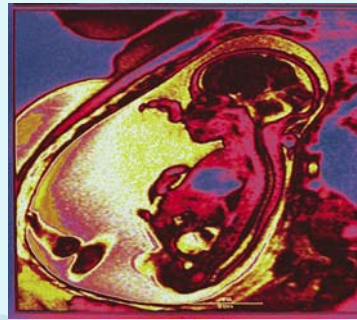
- Infertility and Reproductive Technology
 - Infertility: the inability to conceive a child after 12 months of attempting
 - In Vitro Fertilization (IVF): egg and sperm are combined in a laboratory dish; fertilized egg is transferred to woman's uterus
 - Success depends on woman's age
 - Increases risk of multiple births

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Reproductive Challenges and Choices

Infertility and Reproductive Technology

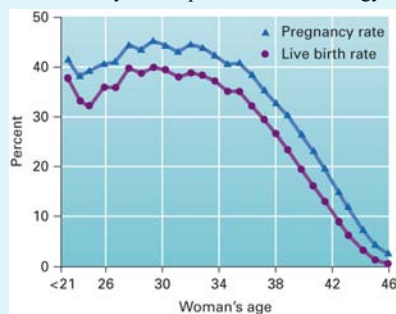


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Reproductive Challenges and Choices

Infertility and Reproductive Technology



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Reproductive Challenges and Choices

- Infertility and Reproductive Technology
 - Adoption: a parent-child relationship established between persons unrelated at birth
 - Increased diversity of adoptive children and adoptive parents
 - More likely to experience psychological and school-related problems than non-adoptive children
 - Adoptive children fare much better than children in long-term foster care or institutions

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Heredity and Environmental Interaction: The Nature-Nurture Debate

- ▶ Behavior Genetics: seeks to discover the influence of heredity and environment on individual differences in human traits and development
 - *Heredity – Environment Correlations*

Heredity-Environment Correlation	Description	Examples
Passive	Children inherit genetic tendencies from their parents, and parents also provide an environment that matches their own genetic tendencies.	Musically inclined parents usually have musically inclined children and they are likely to provide an environment rich in music for their children.
Evocative	The child's genetic tendencies elicit stimulation from the environment that supports a particular trait. Thus genes evoke environmental support.	A happy, outgoing child elicits smiles and friendly responses from others.
Active (niche picking)	Children actively seek out "niches" in their environment that reflect their own interests and talents and are thus in accord with their genotype.	Libraries, sports fields, and a store with musical instruments are examples of environmental niches. Children might seek out if they have intellectual interests in books, talent in sports, or musical talents, respectively.

Heredity and Environmental Interaction: The Nature-Nurture Debate

- ▶ Behavior Genetics
 - *Twin vs. Adoption studies*
 - *Shared vs. Non-Shared Environmental Experiences*
 - *The Epigenetic View*