
Biosocial Development: The First Two Years

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Biosocial Development: The First Two Years

Growth and Body Size

- The average North American newborn measures ~20 inches and weighs ~7 pounds.
 - Birth weight: doubles by the fourth month
triples by the end of the first year
 - Birth height: 1 inch per month for 1st year
reach ½ of adult height by age 2 (32-36”)
 - Growth continues to proceed in *cephalocaudal* (head-to-tail) and *proximodistal* (spine-to-extremities) directions.
 - Examples: newborn head = ¼ total length (1/8 in adult)
newborn legs = 1/8 total length (1/2 in adult)
feet increase 5x from newborn to adult
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Sleep

- Young infants spend most of their time sleeping (approximately 17 hours or more per day) and this is important to their development:
 - Correlates with brain maturation, learning, emotional regulation and psychological adjustment in school and family
 - More growth hormones are released during sleep than during wakeful periods
 - Between birth and 1 year, infants' sleep gradually comes closer to matching day-night activity of family
 - 80% of 1-year-olds sleep through the night
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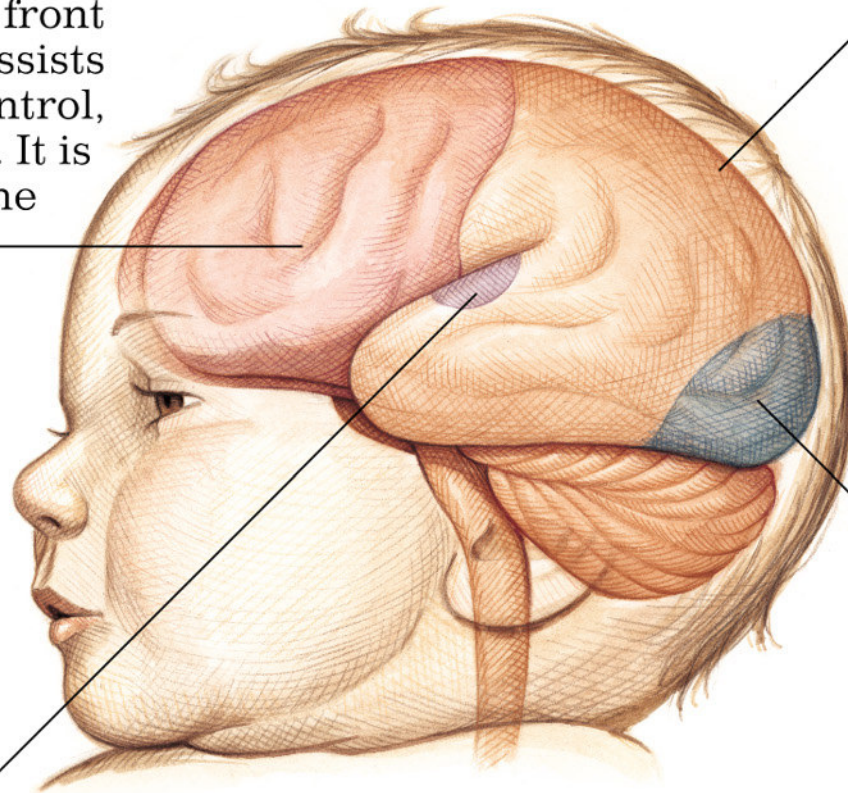
Early Brain Development

- Infancy is marked by very rapid brain growth and development, and this is the most important component of biosocial development.

Basic Brain Structures

- **Neurons** = thin nerve cells, most created before birth. In infancy, human brain has billions of neurons, about 70% in the *cortex*.
 - **Cortex** = brain's outer layer; location of most thinking, feeling, and sensing (specialization)
 - **Axons** = nerve fibers that extend from neurons that send impulses
 - **Dendrites** = nerve fibers extending from neurons that receive impulses
 - **Synapses** = intersections between axon of one neuron and dendrite of another
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Frontal cortex The front part of the cortex assists in planning, self-control, and self-regulation. It is very immature in the newborn.



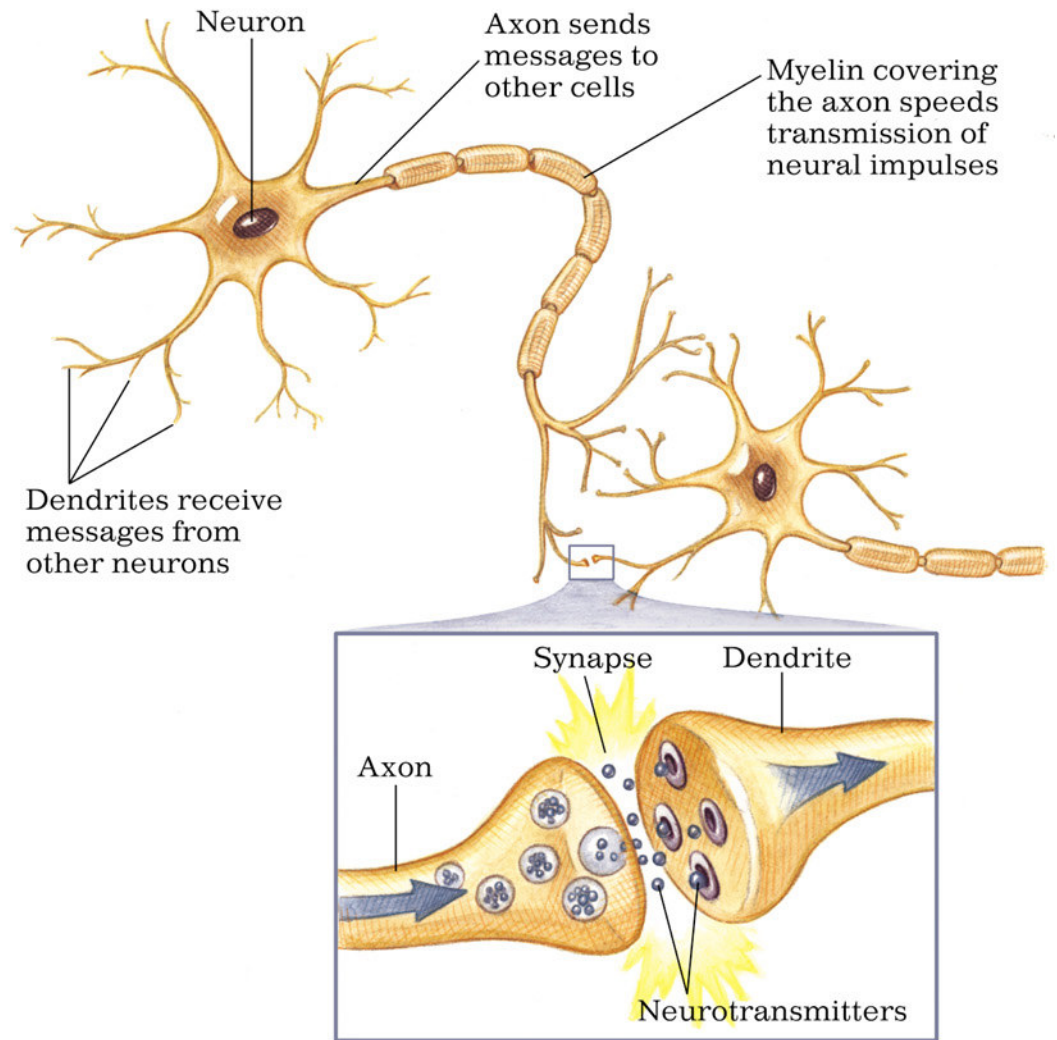
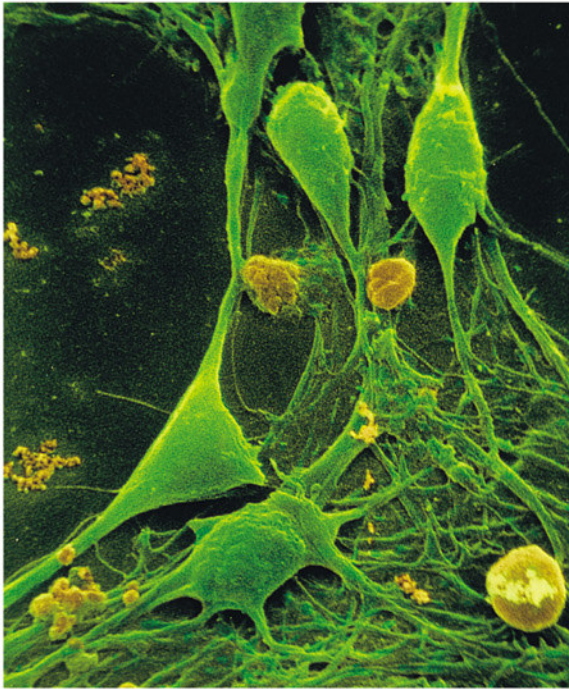
Cortex The crinkled outer layer of the brain (colored here in pink, tan, purple, and blue) is the cortex

Auditory cortex Hearing is quite acute at birth, the result of months of eaves-dropping during the fetal period.

Visual cortex Vision is the least mature sense at birth because the fetus cannot see.

Early Brain Development (continued)

- ❑ Neurons communicate by sending electrical impulses through axons to dendrites of other neurons
 - ❑ Axons and dendrites don't actually touch at synapses; instead electrical impulses trigger brain chemicals (neurotransmitters) to carry information from the axon of the sending neuron over the *synaptic gap* to the receiving dendrite of another neuron
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In the synapse, or intersection between an axon and dendrite, neurotransmitters carry information from one neuron to another.

Experience Influences Brain Development

- The specifics of brain structure and growth depend on infant's experience
 - Underused neurons are inactivated by *pruning* process
 - Different areas of the brain mature at different times and different rates, affecting child's ability and behavior
 - Two experience-related aspects of brain development:
 - *Experience-expectant brain functions* = functions that require basic common experiences in order to develop
 - Expected experiences must and almost always do happen
 - *Experience-dependent brain functions* = functions that depend on particular and variable experiences in order to grow
 - Native language is an example
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The Senses and Motor Skills

Sensation and Perception

- ❑ Sensation = response of a sensory system when it detects a stimulus
- ❑ Perception = mental processing of the brain as it tries to make sense of stimulus (requires experience)

All senses function in the newborn, but they are imperfect:

- ❑ Limited enough to prevent overstimulation
- ❑ Functional enough to allow for creating order from chaos

Specific Sensory Systems

Audition – acute at birth. What we know:

- ❑ High frequency, sudden sounds lead to distress
 - ❑ Low frequency, repetitive rhythmic sounds soothe
 - ❑ Attend most to sounds within the range of the human voice; prefer higher end within this range
 - ❑ By 3 days: can distinguish mother's voice from others
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Specific Sensory Systems (continued)

Vision – poorly developed at birth (no practice!)

- ❑ newborn vision is 20/200-20/400; at 6 months vision = 20/100
 - ❑ Newborns focus most readily 4-30 inches away
 - ❑ Depth perception occurs by age 6 months
 - ❑ Maturation of the brain (visual cortex) improves vision to allow for better learning
 - ❑ Binocular vision appears suddenly at about 14 weeks
 - ❑ Infant visual preferences: new images, complex patterns, contrast and color density (like a face)
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Motor Skills

Motor skills begin with *reflexes*—involuntary responses to particular stimuli

- Reflexes for survival are categorized
 - Maintain oxygen supply (breathing)
 - Maintain body temperature (crying, kicking)
 - Manage feeding (rooting and sucking)

Gross Motor Skills – involve large body movements (e.g., walking, jumping)

Fine Motor Skills – involve small body movements and hand-eye coordination

- There are norms for the development of these skills, *and* there is variation in their timing from one child to the next.
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TABLE 5.2 Age Norms (in Months) for Gross Motor Skills*

Skill	When 50% of All Babies Master the Skill	When 90% of All Babies Master the Skill
Lifts head 90° when lying on stomach	2.2 months	3.2 months
Rolls over	2.8	4.7
Sits propped up (head steady)	2.9	4.2
Sits without support	5.5	7.8
Stands holding on	5.8	10.0
Walks holding on	9.2	12.7
Stands momentarily	9.8	13.0
Stands alone well	11.5	13.9
Walks well	12.1	14.3
Walks backward	14.3	21.5
Walks up steps (with help)	17.0	22.0
Kicks ball forward	20.0	24.0

Source: The Denver Developmental Screening Test (Frankenburg et al., 1981).

- *Note: These norms came from a large cross-section of infants in 1960 in the western half of the United States. Accordingly, infants born more recently or babies from other nations may have different norms.

Variations and Ethnic Differences

- ❑ Norms
 - ❑ Inherited factors
 - ❑ Activity levels
 - ❑ Rate of physical maturation
 - ❑ Genetic factors
 - ❑ Ethnic differences in cultural patterns of infant care
 - ❑ Inherited and environmental factors
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Sudden Infant Death Syndrome (SIDS)

- Risk factors?
 - Secondhand smoke
 - Laying baby on stomach to sleep
 - Limiting breast-feeding
 - Soft bedding
 - Ethnic/cultural differences
 - Babies of African descent more likely to die
 - Babies of Asian descent less likely to die
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Nutrition

Breast Is Best

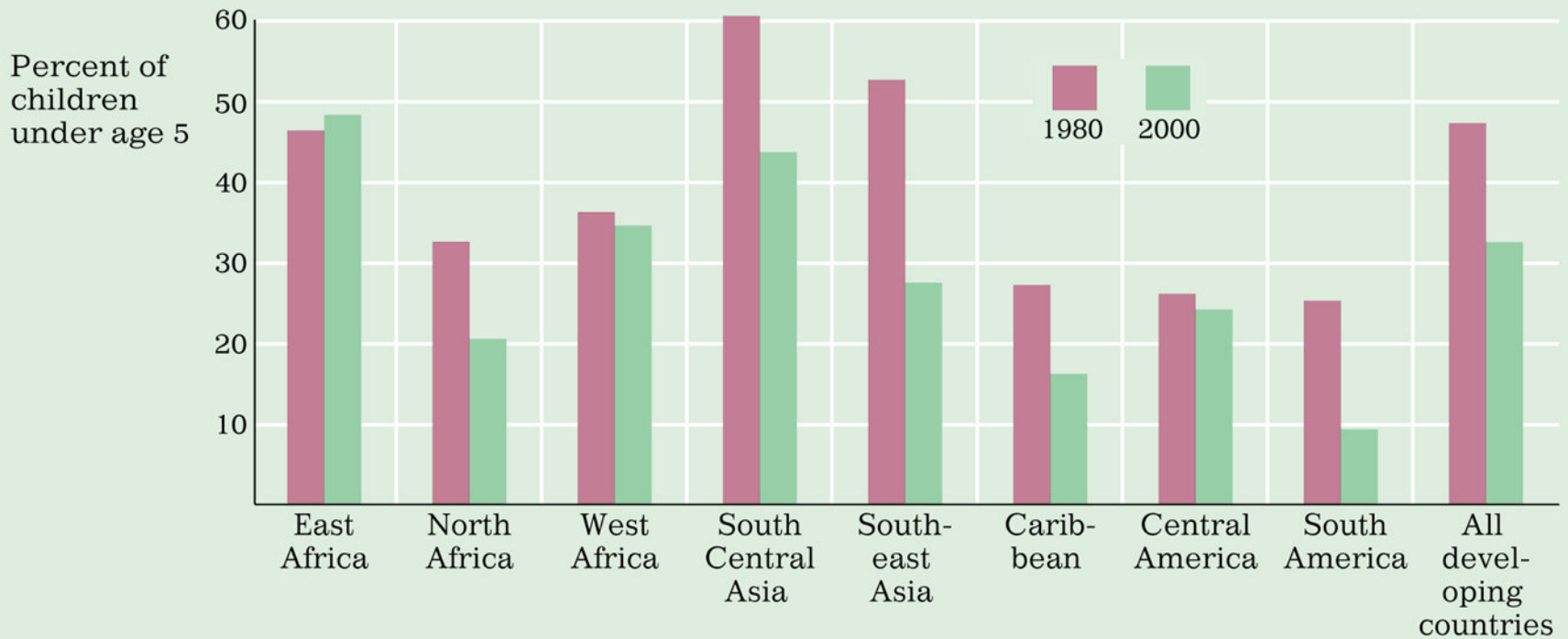
- Breast milk:
 - ❑ Begins with colostrum—thick, high-calorie fluid
 - ❑ By 3 days, less concentrated, prevents virtually all illness and allergy
 - ❑ Always sterile
 - ❑ Always at body temperature
 - ❑ Always available
 - ❑ Contains more iron, Vitamins C and A and other nourishing substances than cow's or goat's milk
 - ❑ Provides antibodies against any diseases mother has been immunized against
 - ❑ Easily digestible
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World Health Organization recommends exclusive breastfeeding for the first 4-6 months, and continued breastfeeding (along with other appropriate foods) until 2 years of age.

Malnutrition

- Severe malnutrition
 - ❑ Brain does not have enough nutrition to develop normally
 - ❑ No body reserves to protect from disease
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Rates of Chronic Malnutrition Among Children Under Age 5 in Developing Regions: 1980 and 2000



Source: de Onis et al., 2000.

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- ❑ Diseases caused by severe protein-calorie malnutrition are direct result
 - Marasmus in first year: Growth stops and body tissue wastes away
 - ❑ Death results
 - Kwashiorkor in toddlerhood: Swelling and bloating
 - ❑ Leaves child vulnerable to other diseases
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- **Undernutrition**

- Inadequate nutrition can affect norms and is more common than malnutrition
 - Primarily problem in developing nations
 - Is caused by a complex interaction of political, economic, and familial problems
 - Can result in less breast-feeding and more health problems for children
 - Parents do not always know what is best nutrition for children

