Chapter 4

Physical Development in Infants and Toddlers
Infants and Toddlers

Infant refers to: 0-1 years

Toddler refers to: 1-2 years

Toddle- to walk unsteadily
Prematurity- babies born earlier or smaller than average

- Full term pregnancy is 38-40 weeks
- Average weight of baby 7.5 lbs.
- Birth 2 weeks before OR after of expected date is considered full term.
Infants at Risk: Prematurity

**Preterm**: birth before 37 weeks or more than 3 weeks before EDD.
- 11% of babies
- 67% of infant deaths in U.S.
- Many go on to develop normally

**Low Birth Weight**: babies weighing less than 5 ½ lbs at birth
- 7.6 % of babies
- 13% are African American women
- U.S. ranks in 17th w/in industrialized countries
- 9.4% in 1981 to 11.6 in 2000
Infants at Risk: Prematurity

- **Very Low Birth Weight**: babies weighing less than 3 ½ lbs at birth

- **SGA: small for gestational age**: born below the 10% percentile of birth weight for gestational age

- Serious health risks
Why are babies born SGA?
Look at pg 110 of new edition

- poor prenatal nutrition
- Problems in the placenta
- Fetus had difficulty in getting nutrition
- teratogens
# Risk Factors and Effects

## Table 4.1  Risk Factors and Effects of Premature Births

<table>
<thead>
<tr>
<th>Risk Factors with Premature Birth</th>
<th>Effects of Premature Births</th>
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<tbody>
<tr>
<td>Lack of prenatal care</td>
<td>Increased risk of infant mortality</td>
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<tr>
<td>Vaginal infection</td>
<td>Increased risk of difficulties in</td>
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<tr>
<td>Short interval between birth and subsequent pregnancy (less than 3 months)</td>
<td>• respiration (e.g., respiratory distress syndrome, apnea, anoxia)</td>
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<td>Malnutrition</td>
<td>• circulation, leading to brain hemorrhage</td>
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<td>Cigarette smoking</td>
<td>• feeding, due to poor sucking ability</td>
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<td>Drug use (e.g., alcohol, cocaine)</td>
<td>• social interactions (difficult to rouse, difficult to calm, ambiguous interpersonal signals)</td>
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<td>Maternal age (especially younger than age 15)</td>
<td>• regulating sleep, awake, alert cycles</td>
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<td>Marital status (unmarried)</td>
<td>Increased longer-term risk of</td>
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<td>Maternal illness affecting blood vessels (e.g., diabetes, high blood pressure)</td>
<td>• cerebral palsy</td>
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<td>Membership in certain ethnic groups</td>
<td>• lowered academic achievement, lowered IQ</td>
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<tr>
<td>Genetic background and family history</td>
<td>• attentional problems</td>
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<td>Personal history of spontaneous abortion or preterm labor</td>
<td>• poor language development</td>
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<tr>
<td>Multiple gestations (i.e., twins, triplets, etc.)</td>
<td>• motor and perceptual difficulties</td>
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<td></td>
<td>• specific learning disabilities</td>
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</table>
Infant Mortality- deaths that occur from birth to age 1
Infant Mortality in U.S. in 2002

- **African American**
  7.0 deaths per 1,000 live births

- **Whites and Hispanics**
  5.7 per 1,000 live births
Some Causes of Infant Mortality

- poor or absent prenatal care
- teenage pregnancy
- poor nutrition
- risky behaviors during pregnancy
- high rates of prematurity and low birth weight
Prevention

- Prenatal care
  - nutritious diet
  - no smoking, alcohol, drugs
  - regular doctor visits
  - no environmental toxins
Prevention

○ Education

- increase parents’ knowledge on how the baby is developing
- what parents can do to have a healthier baby
- options for labor and delivery
- parenting classes
Prevention

- Lifestyle
  - staying active with moderate exercise
  - keeping safe
  - getting enough rest
Physical Development

- Most babies grow rapidly during the 1st year.
- Average newborn weighs 7 ½ lbs at birth, males half a lb. more than females
- Double their weight in first 5 months
Physical Development

- Average newborn is just less than 20 inches at birth

- About half their adult height by age 2
Physical Development

Babies double their birth weight by 5 months.

Toddlers reach half of their adult height by age 24 months.
Question ?????????

Why do newborns lose a little bit of weight during the first few days of birth?
Answer

- Spend a lot of time sleeping
- Adjusting to the process of feeding
- Mother’s production of milk is low in the first few days
Question

- What is the main benefit of first breast feeding?
Pass on antibodies from mother’s milk to the baby in order to prevent infection and illness.

For first few days, *colostrum* is produced – yellowish substance containing antibodies which protect newborn from illnesses.
Feeding

- Breast milk provides all the:
  - nutrients
  - calories
  - protein
  - fat
  - easy for babies to digest

IT IS THE BEST FORM OF NUTRITION FOR THE INFANT
Feeding

- Breast fed babies are at lower risk for many diseases
  - diarrhea
  - respiratory infections
  - ear infections
  - diabetes
  - lymphoma
    - cancer in the lymphatic system
      - lymphatic system is body’s immune system
  - SIDS sudden infant death syndrome
Feeding

- Breastfeeding healthy for mom too
  - faster recovery of the uterus
  - less blood loss after delivery
  - earlier return to pre-pregnancy weight
  - reduced risks of ovarian and breast cancer
  - delay in the next ovulation
When to breastfeed

- ASAP after birth, first hour
- During the first 6 months
- Should continue till 12 months

What can working mothers do in order to make sure that their babies get breast milk?
Recent Studies found…

- young mothers and African American mothers are less likely to breastfeed
- Likely to breastfeed:
  - married,
  - educated,
  - higher income
  - supporting partners
Feeding

- Breastfeeding is not encouraged when:
  - mother has HIV
  - mothers with tuberculosis, hepatitis B, chickenpox consult a doctor
Feeding

- Mother is taking medication for
  - high blood pressure
  - cancer
  - anxiety or depression
  - migraine headaches
- Baby has certain metabolic disorders
- PCB in the environment- chemicals
  - Non breast fed babies should have iron enriched infant formula
The Brain

Brain + spinal cord = central nervous system
The Brain

- **Spinal cord** – information is passed between brain and body
  “BODY’S INFORMATION SUPERHIGHWAY”
- **Brain stem** – controls automatic functions (breathing and heart rate) and regulates level of alertness in brain
- **Cerebellum** – controls posture, body orientation, complex movement
The Brain

- **Cerebral cortex** - thoughts, perceptions, emotions and memories
- **Gray matter/ top portion of the brain**
- **4 major lobes**
  1. frontal
  2. temporal
  3. parietal
  4. occipital
Brain

Specialized areas within cortex control

- **motor area**
  - voluntary muscle movement
  - raising eyebrows
  - wiggling toes
  - **somatosensory area**
  - registers sensory input from all areas of body
    - **Wernicks & Broca’s area**
      - process speech input
      - articulation for speech output
    - **visual area**
      - vision
- **frontal lobe**
  - organizing
  - planning
Communication in the brain

Neurons – specialized cells that process information and allow communication in the nervous system

Electrical impulses travel through neurons and are transmitted from one neuron to the next
Class Work

- Go to page 133 in the book
- Find neuron worksheet in the packet
- Follow along
Neurons
Neurons

- **Dendrites** – receive input
- **Cell body** – governs function of neuron
- **Axon** – carries message to other cells
- **Myelin sheath** – insulation for axon, speeds transmission
- **Terminal buttons** – end of axon branches
- **Synapses** – open space between terminal buttons on one neuron and dendrites of next neuron
Neurons
Neurons begin to form prenatally

4 weeks after conception
- embryo develops neural tube
- Neural tube later dev. into brain & spinal cord

7 weeks after conception
- Neurons have formed in the neural tube

10 weeks after conception
- Some neurons move to the top of the tube where they form the top of the cerebral cortex

Cerebral cortex will eventually have 6 layers of neurons

20 weeks after conception
- approximately 80 billion neurons have formed

23 weeks after conception
first synapses are forming but most will form after birth
Growth & connection among neurons

- **Synaptogenesis** - one form of neuron maturation in which dendrites & axons branch out to form an enormously large number of connections w/ neighboring neurons

- Synaptogenesis accelerates in late pregnancy
Growth & connection among neurons

**Myelination** - growth of the myelin sheath around the axon.

- begins before birth but is not complete for several years
- Myelin sheath insulates the axon which triples the speed of impulse and communication with other neurons
• motor and sensory areas in the cortex are still forming myelin until about 4 months after birth
• Not until after 4 months that babies are able to accomplish coordinated motor actions
  - sitting
  - reaching
  - standing
Did you know????

- Humans lose ½ of their neurons before they are born.
- Programmed cell death - process by which many neurons die during periods of migration and heavy synaptogenesis.
- Neurons that are most useful and active will survive.
Sensory Capabilities

- **Vision**
  - see 20/20 by 6 to 12 months
  - color vision is present by 3rd month

- **Auditory**
  - fetus can hear several weeks before birth
  - by 6 months can respond to a range of sounds
  - infants are sensitive to high frequencies of sound
  - locate sounds in the environment by moving head
  - Child directed speech
Sensory Capabilities

- **Smell**
  - 3 to 4 day old infants prefer the smell of breast milk over formula
  - newborns prefer the smell of their own amniotic fluid over that of other infants
  - at 2 weeks breastfed babies turned heads toward the smell of their mothers
  - bottle fed babies did not turn their heads to the smell of their mothers
Sensory Capabilities

- **Taste**
  - sweet solution--- infants smiled and made sucking movements
  - sour taste--- infants purse their lips and wrinkle their noses
  - bitter taste ------ spit up make faces
  - salty taste------- dev. after 4 months
Motor Development - Reflexes

**Reflexes** - are involuntary movements in response to stimuli from environment such as sound, light, touch, and body position

**Primitive** – present at birth, disappear around 4 months
- rooting, sucking, Moro (startle), grasping

**Postural** – emerge at 2 to 4 months, disappear by 12 months
- head up, maintain balance, roll head in direction of body, parachute

**Locomotor** – emerge at 1 month, disappear at 4 months
- crawling, stepping, swimming
Gross Motor Development

Gross motor development - coordinating large muscle movement – head, neck, body, arms, legs and torso

**Cephalocaudal pattern** – top down

- holding head upright (1 month)
- rolling over (3 months)
- sitting w/out support (6 months)
- crawling & standing w/support (7 months)
- walking (12 -15 months)
Fine Motor Development

- Fine motor development - coordinating small muscle movement – fingers
- Proximodistal pattern – near to far – from body’s midline
  - reaching w/arms
  - grasping w/ hands and fingers
Fine Motor Development

4 to 5 months
*Palmer grasp*- wrapping 4 fingers and thumb around an object

10 months
*Pincer grasp*- using thumb and opposite forefinger

15 months
hold writing implement w/palmer grasp, but will use large muscles in upper arm
Coordinated movements emerge from:
1. Complex relationships of individual muscles
2. Nerve pathways
3. Physical growth
4. Learning
5. Motivation
Ester Thelen
Dynamic System Theory

1. Neurological development: gives infants the ability to exert voluntary control over their muscles
2. Parental Encouragement and interesting objects in the environment motivates infants to raise their heads, turn their bodies, crawl, and take their first steps
3. Opportunities to exercise give babies the muscle strength they need to lift and control their growing bodies
4. Maturation of cognitive system helps babies to remember where interesting objects are located and figure out how to coordinate their movements to get them.
Dynamic System Theory

brain + body + environment
work together to drive the child toward increased strength and coordination.

Nature + Nurture
Arnold Gesell
1880-1961

Maturational theory states that the chief principle of developmental change is maturation, which means physiological "ripening," especially of the nervous system.

- growing child's behavior seems to follow a set developmental pattern. He described in detail the ways in which behavior changes with age.
- Gesell believed that differences among people result more from heredity than from environment.
Culture

- Babies in some cultures receive more vigorous stimulation than babies in other cultures.

Mali

Mothers dangle babies by their arms or legs. Encourages babies to sit and stand at an earlier age.
South American mothers limit babies’ movement cause damage to the legs and spine lag behind w/North American babies in terms of sitting up and reaching for objects
1. Why do many families become pressure to start toilet training by age 2?
2. What are common causes of resistance to potty training?
3. According to the text, what is required for potty training?
4. Are boys or girls faster at potty training?
Toilet Training

Requires:

- Physical readiness – muscle control for bladder and bowel, ability to walk
- Cognitive readiness – awareness of wetness, ability to follow instructions
- Emotional readiness – willingness to cooperate, interest in process

Girls train two months faster than boys