CHAPTER 7: PHYSICAL ACTIVITY IN INFANCY

Physical activity, defined as any bodily movement produced by skeletal muscles resulting in energy expenditure, is an important part of overall health and maintenance of a healthy body weight. Physical activity must be balanced with dietary intake; recommendations on activity have been included in the United States Dietary Guidelines since 1995. The most recent guidelines, issued in 2005, continue to emphasize the importance of activity in the maintenance of a healthy weight and the prevention of chronic diseases such as type 2 diabetes and heart disease. Physical activity in late infancy and throughout childhood has been linked to lower BMI and less body fat.[1, 2, 3, 4] The 2005 guidelines recommend that children and adolescents engage in at least 60 minutes of physical activity on most, preferably all, days of the week.[5] This chapter will discuss the development of motor skills, guidelines for physical activity, and common concerns related to activity in infancy.

Counseling points related to the information presented in this chapter are found in Chapter 8, page 177.

Developing Motor Skills

Activity for infants focuses on the development of motor skills. Gross motor skills involve the large muscle groups, such as those in the arms and legs, while fine motor skills involve smaller muscles like those in the hands and fingers. In early infancy, movement is controlled by involuntary reflexes but, as muscles develop, voluntary movements are gained. During this period, key connections are made between the brain and muscles. Early activity serves as the basis for skillful movement for activities such as sports, dance, and exercise in later childhood and adulthood. Early motor skill confidence and competence and enjoyment of physical activity may also contribute to later participation in physical activity.

Infants develop motor skills in the same order, but at different rates – each infant's rate of development is unique. See Table 3, page 150 for more information regarding the average age at which skills are acquired.

Caregivers can help their infant to develop the skills needed to be physically active. Providing a stimulating environment that encourages the infant to move and explore affects the rate of motor skill development. Similarly, the way an infant is held; how much time he spends in infant equipment such as infant seats, swings, and walkers; the amount of time an infant spends on their stomach during play; and the toys he plays with can all affect motor skill development.

Caregivers should be encouraged to:[6]

- Nurture their infant's motor skill development and encourage physical activity;
- Participate in parent-infant play groups;
- Provide toys and activities that encourage infants to move and do things for themselves in a safe environment. Place toys just out of reach and encourage the infant to move to get to them. See Appendix E, page 197 for activities appropriate for infants;
- Gently move their infant (rolling, bouncing, swaying, turning) to encourage muscle development and connections between the brain and muscles;
- Avoid rough activities and pay attention to whether their infant is distressed and cries when played with too vigorously. Infants should never be severely or violently shaken since this may cause brain damage, blindness or eye injuries, damage to the spinal cord, and delay in normal development (known as Shaken Baby Syndrome);[7]

Table 3: Motor Skill Development During Infancy

Motor Skill	Mean	Age Range
Holds head erect and steady	1.6 months	0.7–4 months
Sits with support	2.3 months	1–5 months
Lifts head, shoulders, and forearms while lying down	3.5 months	2–4.5 months
Sits momentarily without support	5.3 months	4–8 months
Reaches with one hand	5.4 months	4–8 months
Rolls over from back to front	6.4 months	4–10 months
Crawls and pulls on objects to achieve upright position	8.1 months	5–12 months
Walks and handholds ("cruises")	8.8 months	6–12 months
Stands momentarily without support	11 months	9–16 months
Walks independently	11.7 months	9–16 months

Reprinted with permission from Patrick K, Spear B, Holt K, Sofka D. Bright Futures in Practice: Physical Activity. Arlington, VA: National Center for Education in Maternal and Child Health, 2001.

- Avoid extended periods (more than 60 minutes) of inactivity for the infant, such as in an infant seat or swing, or being held excessively;[8] and
- Assist their infant's development of head and neck control by: placing the infant in their lap facing them; holding the infant's hands and encouraging the infant to stand; pulling the infant to a standing position; and gently swaying the infant side to side if the standing position can be maintained.

Guidelines for Physical Activity

The National Association for Sport and Physical Education has developed the Active Start physical activity guidelines for infants through 5 years old. They recommend that all children, birth to age 5, should engage in physical activity that promotes health-related fitness and movement skills.

The following guidelines have been developed specifically for infants[9]

- Infants should interact with parents or caregivers in daily physical activities that are dedicated to promoting the exploration of their environment.
- Infants should be placed in safe settings that facilitate physical activity and do not restrict movement for prolonged periods of time.
- Infants' physical activity should promote the development of movement skills.
- Infants should have an environment that meets or exceeds recommended safety standards for performing large muscle activities. The caregiver should closely supervise the infant's activity using a wide variety of age-appropriate and developmentally appropriate equipment. In addition, the infant should be placed on a rug or blanket at least 5' x 7' in size.
- Individuals responsible for the well-being of infants should be aware of the importance of physical activity and facilitate the child's movement skills.

Common Concerns

Use of Walkers and Other Infant Equipment

Infant walkers are associated with thousands of injuries or deaths each year, most often as a result of an infant falling down stairs in a walker. The American Academy of Pediatrics (AAP) has recommended a ban on the use and manufacture of infant walkers.[10] The misuse of other infant equipment, including infant seats, highchairs, swings, bouncers, exersaucers, and similar equipment has been associated with significant delays in motor skill development.[11,12] Caregivers should be encouraged to limit use of infant equipment and encourage their infant's movement in a safe environment.

Sleeping and Play Positions

Infants should always be put to sleep on their back throughout the entire first year to minimize the risk for Sudden Infant Death Syndrome (SIDS).[7,13] However, infants need to spend supervised time playing in the prone position (on their stomach), sometimes referred to as "tummy time." This position encourages development of important motor skills and head and trunk control.[13] Infants who spend minimal awake time in the prone position demonstrate significantly later gross motor development.[14] The phrase "Back to Sleep and Prone to Play" has been suggested as a way to educate caregivers about the importance of both these positions to infant safety and development.[14] Advise caregivers that "tummy time" should only occur when the infant is awake and supervised. Caregivers should consult their health care provider regarding the appropriate age to place an infant on his or her stomach.

Infant Exercise and Swimming Programs

Exercise and swimming programs designed for infants and toddlers are popular. However, these programs are not necessary for the development of motor skills in infancy. In addition, they may put an infant at greater risk for injury to

bones that are not fully developed or for risk of drowning if a false sense of security around water is fostered.

The AAP makes the following recommendations about infant exercise or swimming programs:[15, 16]

- Structured infant exercise programs should not be promoted as being therapeutically beneficial for development of healthy infants.
- Caregivers should provide a safe, nurturing, and minimally structured play environment for their infant.
- Children are generally not developmentally ready for formal swimming lessons until after their fourth birthday.
- Aquatic programs for infants and toddlers should not be promoted as a way to decrease the risk of drowning.

Media Use and Inactivity

Activities like watching television or videotapes and playing computer or video games do not promote physical activity. These activities may make up a significant part of an infant or toddlers' day. Data from the National Longitudinal Study of Youth indicates that 17 percent of infants 0–11 months old and 48 percent of toddlers 12–23 months old watched at least 1 hour of television daily.[17] Almost a quarter of the 12–23 month old toddlers watched 3 or more hours daily.

The AAP recommends the following guidelines for television viewing for infants and young children:[18]

- Television viewing is discouraged for infants and children younger than 2 years. Instead, interactive activities that stimulate brain development, such as talking, playing, singing, and reading together should be encouraged.
- For children 2 and older, total entertainment media time (television, videotapes, and videogames) should be limited to no more than 1 to 2 hours of quality programming daily.

References:

1. Wells J, Ritz P. Physical activity at 9–12 months and fatness at 2 years of age. *American Journal of Human Biology* 2001;13:384-389.
2. Trost S, Sirard JR, Dowda M, Pfeiffer K, Pate R. Physical activity in overweight and nonoverweight preschool children. *International Journal of Obesity* 2003;27:834-839.
3. Moore LL, Gao D, Bradlee ML, Cupples LA, Sundarajan-Ramamurti A, Proctor MH, et al. Does early physical activity predict body fat change throughout childhood? *Preventive Medicine* 2003;37:10-17.
4. Datar A, Sturm R. Physical education in elementary school and body mass index: evidence from the Early Childhood Longitudinal Study. *American Journal of Public Health* 2004;94(9):1501-1506.
5. U.S. Department of Health and Human Services and U.S. Department of Agriculture. Dietary Guidelines for Americans, 2005. 2005 (accessed September 10, 2007) Available at: http://www.healthierus.gov/dietaryguidelines/.
6. Patrick K, Spear B, Holt K, Sofka D. Bright Futures in Practice: Physical Activity Arlington, VA: National Center for Education in Maternal and Child Health; 2001.
7. Shelov SP, Hannemann RE. Caring for Your Baby and Young Child: Birth to Age 5. 4th ed. USA: Bantam Books; 2004.
8. Kellogg Company, National Association for Sport and Physical Education, The President's Council on Physical Fitness and Sports. Kids in Action: Fitness for Children Birth to Age Five. Battle Creek, MI: Kellogg Company; 2004.
9. National Association for Sport and Physical Education. Active Start: A Statement of Physical Activity Guidelines for Children Birth to Five Years. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance; 2002.
10. Committee on Injury and Poison Prevention, American Academy of Pediatrics. Injuries associated with infant walkers. *Pediatrics* 2001; 108(3):790-792.
11. M. G, McElroy A, Staines A. Locomotor milestones and babywalkers: cross sectional study. *British Medical Journal* 2002;324:1494.
12. Abbott A, Bartlett D. Infant motor development and equipment use in the home. *Child: Care, Health and Development* 2001;27(3):295-306.
13. Task Force on Sudden Infant Death Syndrome, American Academy of Pediatrics. The changing concept of Sudden Infant Death Syndrome: Diagnostic coding shifts, controversies regarding the sleeping environment, and new variables to consider in reducing risk. *Pediatrics* 2005;116(5):1245-1255.

14. Salls JS, Silverman LN, Gatty CM. The relationship of infant sleep and play positioning to motor milestone achievement. *American Journal of Occupational Therapy* 2002;56:577-580.

15. Committee on Sports Medicine, American Academy of Pediatrics. Infant exercise programs. *Pediatrics* 1988;82(5):800.

16. Committee on Sports Medicine and Committee on Injury and Poison Prevention, American Academy of Pediatrics. Swimming programs for infants and toddlers. *Pediatrics* 2000;105(4):868-870.

17. Certain LK, Kahn RS. Prevalence, correlates and trajectory of television viewing among infants and toddlers. *Pediatrics* 2002;109(4):634-642.

18. Committee on Public Education, American Academy of Pediatrics. Children, Adolescents, and Television. *Pediatrics*