### Chapter 5 WHYL Answers

### **Body Changes**

### 1. What specific facts indicate that infants grow rapidly in the first year?

Infants typically double their birthweight by the fourth month and triple it by age 1. For example, a 7-pound newborn might be 14 pounds at 4 months and 21 pounds at 1 year (from 3,250 to 6,500 to 9,750 grams).

## 2. Why is it OK for an infant to be consistently at the 20th percentile in height and weight?

The advantage of percentiles is that children can be compared not only to others the same age but also to themselves. Thus, a baby whose weight *and* height are at the 90th percentile at birth and again at 6 months is normal for that child; so is a child who is consistently at the 20th percentile.

Percentiles may alert professionals and parents that something is amiss. If a newborn is at the 50th percentile in height and weight but later is at the 40th percentile in height but the 80th percentile in weight, that infant may be getting too heavy. Neither the 40th nor the 80th percentiles are worrisome alone, but the combination and the change are warning signs.

### 3. How much do newborns usually sleep and dream?

Newborns spend most of their time sleeping, about 15 to 17 hours a day. Hours of sleep decrease rapidly with maturity: The norm per day for the first 2 months is 14<sup>1</sup>/<sub>4</sub> hours; for the next 3 months, 13<sup>1</sup>/<sub>4</sub> hours; for 6 to 17 months, 12<sup>3</sup>/<sub>4</sub> hours (Sadeh et al., 2009).

Full-term newborns dream a lot; about half their sleep is REM sleep (rapid eye movement sleep), with flickering eyes and rapid brain waves, which indicates dreaming.

### 4. What are the reasons for and against co-sleeping?

Sleeping alone may encourage a child's independence and individuality. With cosleeping, breast-feeding is easier and more common but so is sudden infant death (Gettler & McKenna, 2010; Ruys et al., 2007). Sharing a bed with a newborn is dangerous if the adult is drugged or drunk—and thus in danger of "overlying" the baby.

### Brain Development

### 5. What is the difference between the cortex and the rest of the brain?

The infant's cortex consists of four to six thin layers of tissue that cover the brain. It contains virtually all the neurons that make conscious thought possible. The cortex is crucial: most thinking, feeling, and sensing occur in the cortex, although parts of the midbrain join in (Johnson, 2011).

### 6. How does the brain change from birth to age 2?

At birth, the brain is already 25 percent of its adult weight. The neonate's body, by comparison, is about 5 percent of adult weight. The brain continues to grow very rapidly in the first years of life. By age 2, it is almost 75 percent of adult brain weight.

An estimated fivefold increase in dendrites in the cortex occurs in the 24 months after birth, with about 100 trillion synapses being present at age 2.

### 7. What factors increase the accuracy of perception in the fusiform face area?

The fusiform face area is that crucial part of the brain, both experience-expectant and experience-dependent. As infants gain experience, they anticipate faces of those they love and expectancy develops. In turn, this increases accuracy of facial recognition.

### 8. How can pruning increase brain potential?

An estimated fivefold increase in dendrites in the cortex occurs in the 24 months after birth, with about 100 trillion synapses being present at age 2 (Schwartz & Begley, 2002). This early growth is called transient exuberance, *exuberant* because it is so rapid and *transient* because some of it is temporary. The expansive growth of dendrites is followed by *pruning*, in which unused neurons and misconnected dendrites atrophy and die (Barinaga, 2003), just as a gardener might prune a rose bush by cutting away parts to enable more, or more beautiful, roses to bloom.

## 9. What is the difference between experience-expectant and experience-dependent brain function?

Expected experiences *must* happen for normal brain maturation to occur, and they almost always do. The human brain is designed to expect them and needs them for growth. For example, in deserts and in the Arctic, on isolated farms and in crowded cities, almost all babies have things to see, objects to manipulate, and people to love them. As a result, their brains develop normally.

In contrast, dependent experiences *might* happen; because of them, one brain differs from another. Particular experiences vary, such as which language babies hear, what faces they see, or how their mother reacts to frustration. *Depending* on those particulars, infants' brains are structured and connected one way or another, as some dendrites grow and some neurons thrive while others die. Consequently, all people are similar, but each person is unique because each has particular early experiences.

### 10. What is the effect of stress hormones on early brain development?

The brain might produce either too many stress hormones, making the child and then the adult hyper-vigilant (always on the alert), or too few, making the person emotionally flat (never happy, sad, or angry).

## 11. What should caregivers remember about brain development when an infant cries?

The last part of the brain to mature is the prefrontal cortex, the area for anticipation, planning, and impulse control. It is virtually inactive in early infancy but gradually

becomes more efficient over the years of childhood and adolescence (Wahlstrom et al., 2010). Thus, telling an infant to stop crying is pointless because the infant cannot decide to stop crying. Such decisions require brain functions that are not yet present.

## 12. What is the relationship between perception and sensation?

Sensation occurs when a sensory system detects a stimulus. Perception follows sensation, when senses are noticed by the brain.

## 13. What particular sounds and patterns do infants pay attention to?

Infants show a preference for the human voice, especially high pitched ones like that of their mother. Sudden noises startle newborns, making them cry; rhythmic sounds, such as a lullaby or a heartbeat, soothe them and put them to sleep.

## 14. How does an infant's vision change over the first year?

Almost immediately, experience combines with maturation of the visual cortex to improve the ability to see shapes and then notice details, with vision improving so rapidly that researchers are hard-pressed to describe the day-by-day improvements (Dobson et al., 2009). By 2 months, infants look intently at a human face and, tentatively and fleetingly, smile at the person. Soon visual scanning becomes organized and more efficient, centered on important points. Thus, at 3 months old, an infant looks closely at the eyes and mouth, the parts of a face that contain the most information, and they prefer photos of faces with features over photos of faces with the features blanked out. They pay attention to patterns, colors, and motion (Kellman & Arterberry, 2006). At about 14 weeks, the underlying brain mechanisms are activated, allowing binocular vision, with both eyes focused on a single object (Atkinson & Braddick, 2003).

### 15. What suggests that infants experience less pain than adults?

Procedures that would be painful to adults, like setting a broken bone, appear not to elicit the pain response in infants. Giving something as simple as a drop of sucrose water seems to act as an anesthetic which would not have the same impact on an adult perception of pain.

# 16. What is universal and what is cultural in the development of gross motor skills in infancy?

All healthy infants develop skills in the same sequence, but they vary in the age of acquisition. The age norms for gross motor skills, based on a large, representative, multiethnic sample of U.S. infants, shows that when infants are grouped by ethnicity, generally African Americans are ahead of Latinos, who are ahead of babies of European descent. Internationally, the earliest walkers are in Uganda, where well-nourished and healthy babies walk at 10 months, on average. Some of the latest walkers are in France.

## 17. Which fine motor skills are developed in infancy?

Toward the end of the first year and throughout the second, finger skills improve, as babies master the pincer movement (using thumb and forefinger to pick up tiny objects) and self-feeding (first with hands, then fingers, then utensils) (Ho, 2010).

## Surviving in Good Health

# 18. Why do public health doctors wish that all infants worldwide would get immunized?

Immunization has prevented many diseases that once killed thousands of babies each year. Also called *vaccination*, immunization primes the body's immune system to resist a specific contagious disease. Immunization is said to have had "a greater impact on human mortality reduction and population growth than any other public health intervention besides clean water" (J. P. Baker, 2000, p. 199).

# 19. What are the reasons for and against breast-feeding until a child is at least 1 year old?

Babies who are exclusively breast-fed are less often sick. This is true in infancy because breast milk provides antibodies against any disease to which the mother is immune, as well as decreases the risk of allergies and asthma. It is also true later on because breast-feeding decreases the risk of obesity and heart disease in adulthood.

The specific fats and sugars in breast milk make it more digestible, and better for an infant's brain, than any prepared formula (Drover et al., 2009; Riordan, 2005). The composition of breast milk adjusts to the age of the baby, with breast milk for premature babies distinct from breast milk for older infants. Quantity increases to meet the demand: twins and even triplets can grow strong while being exclusively breast-fed for months.

Rickets is caused by severe deficiency of vitamin D, a vitamin naturally produced by the body in response to sunshine. For light-skinned adults, even a few minutes of direct sun exposure three days a week is enough to make adequate vitamin D. Rickets was once common in children who did not often play outside; that is why vitamin D is added to milk. Although few older children now get rickets, the disease has not disappeared: today, exclusively breast-fed babies, aged 6 to 18 months, are at highest risk.

### 20. What is the relationship between malnutrition and disease?

Protein-calorie malnutrition is a condition in which a person does not consume sufficient food of any kind. This deprivation can result in several illnesses, severe weight loss, and even death.

### 21. As an indication of malnutrition, which is better, stunting or wasting? Why?

Most stunted children are also wasted. However, it is possible to be wasted without being stunted (such as when malnutrition has not gone on for years) or stunted without being wasted (such as when a short child has started to overeat; adult obesity correlates with childhood thinness).

To measure a particular child's nutritional status, compare weight and height with the norms, and consider percentiles from birth on. A child may simply be genetically short or thin, but a decline in percentile ranking during the first two years is an ominous sign—and being in the bottom 3 percent is almost always a sign of malnutrition.