



## **In This Chapter:**

**An Introduction to the Main Concepts 165**

**Growth 166**

Infancy 168

Childhood 168

Adolescence 169

Gender Differences in Growth and Fitness 169

Factors Affecting Growth 177

**Motor Development 179**

Infancy 179

Early to Mid-childhood 180

Late Childhood through Adolescence 182

Psychological Factors in Motor Development 183

Motivational and Emotional Factors in Motor Development 185

Sociocultural Factors in Motor Development 187

**Summary 194**



## Growth, Motor Development, and Physical Literacy

**A**fter completing this chapter you should be able to:

- explain the importance of early exposure to physical activity;
- define growth, motor development, and physical literacy and outline the stages of growth and motor development;
- describe various factors affecting optimal growth, motor development, and physical literacy across the life cycle;
- explain the necessity of physical activity for optimal growth, motor development, and physical literacy;
- demonstrate an understanding of the differences between the sexes in growth and motor development across the life cycle;
- demonstrate an understanding of individual differences in growth and motor development.

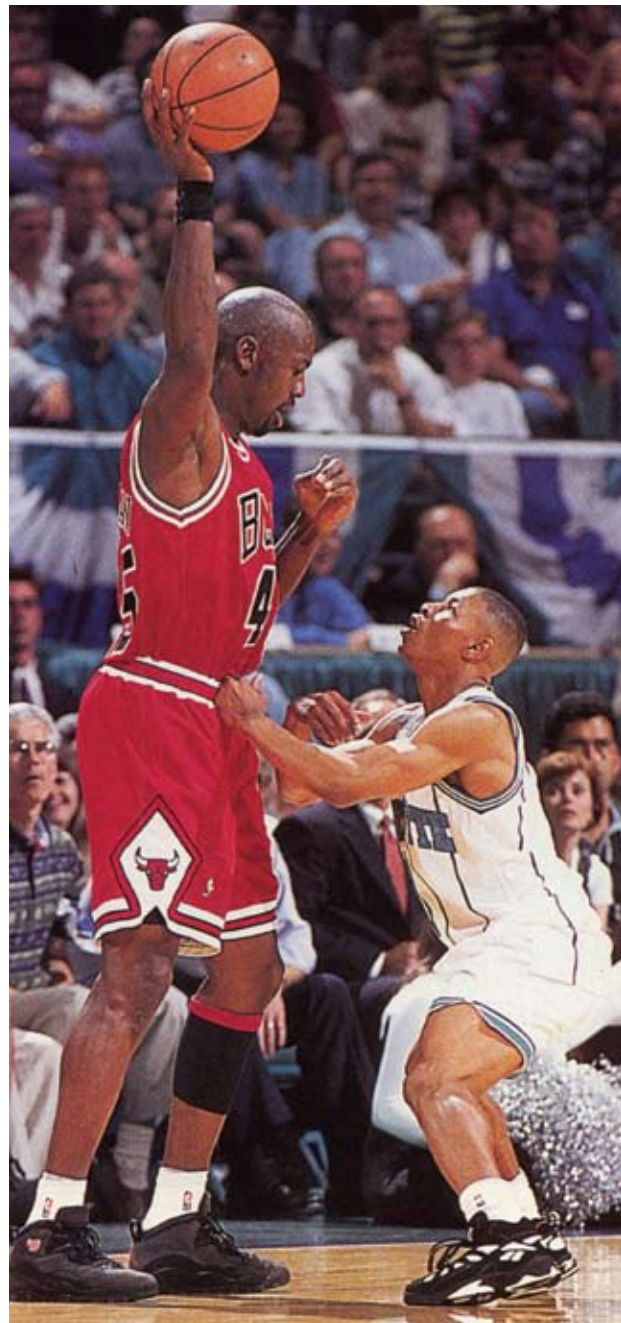


When we are born, our capabilities and experiences are minimal. With time and maturation, we soon develop into proficient beings, with an extensive capacity to perform movements and skills of varying complexity. Reaching our full potential in life requires us to consider not just our physical needs or performance but also our physical literacy. The process of growth and motor development does not simply follow a predetermined genetic blueprint; rather, it is influenced by various personal, social, and environmental factors such as culture, family, peers, and access to necessary resources. For example, as we grow and develop, factors such as nutrition, heredity, social interaction, and experience shape our physical and psychological skills. Some factors facilitate optimal human development, while others tend to inhibit it. Focusing on the positive factors may effectively allow you and those around you to get the most out of life.

These diverse influences have obvious implications for how individuals grow and develop movement skills. For example, why do some children excel at some activities while others struggle to perform the same skills? The exact progression through the life stages is different for each person since each faces different challenges and has unique strengths. Understanding these differences and the unique changes that accompany various stages of growth is of great importance to physical and health education. They can help explain why individuals begin to walk at different ages, learn some activities more easily than others, possess variable levels of self-esteem, and grow to be of different height or weight. Just imagine what it would be like to live in a world with people who resembled each other in every way (Figure 8.1). It is clear that individual differences are a natural part of the world in which we live, so each person deserves to be treated as an individual.

You can probably think of someone you know who showed considerable aversion to physical education class. Unfortunately, this is not unusual. On the other hand, for many others, the high school gymnasium is a place to let loose, have fun, and improve on many skills needed to lead

a healthy, active lifestyle. When you consider that physical education may also enhance academic achievement, the benefits of early participation in physical activity often seem clear. Why is it, then, that by the time they get to high school, some young people enjoy physical activity while others dread it?



**Figure 8.1** We all come in different shapes and sizes – even professional basketball players.



### Gym Class – Love It or Hate It?

Amanda stood by the gym door waiting for her teacher to arrive. She listened to the laughter and loud chatter coming from the change rooms. For an instant, she almost wished she had the guts to join her friends in getting ready for the volleyball lesson. But she suddenly became terrified as she imagined herself standing on the court, missing the ball each time it came toward her. Her teammates would get frustrated, and the humiliation would be unbearable. She glanced at her watch and skimmed over the note her mother wrote for her that morning: “Please excuse Amanda from gym class today because she is not feeling well.” She wondered if her teacher



would once again try to persuade her to join the class anyway. Perhaps she should have asked her mom to write something about a dentist appointment instead? After all, she just could not imagine how someone as clumsy and uncoordinated as herself could be an asset to this class. As a child, her parents always discouraged her from participating in sports and physical activities, explaining to her that it was not lady-like to run around getting sweaty and dirty. So Amanda never got involved in any type of athletics, and she now despised the fact that grade nine gym was still a mandatory subject. Suddenly, the gym door opened and her teacher appeared. As Amanda stood there, once again not changed for class, the disappointment on Mrs. Spencer’s face was obvious. But as Amanda handed her the note, she did not care what her teacher thought. All she knew was that she had managed to avoid gym class again.

To address this question, it is important to understand factors that allow for smooth and continuous growth, motor development, and physical literacy. For example, one factor is choosing the most appropriate physical activities at the various maturational stages. Certainly, some activities are more suitable for infants and children, whereas others are better for adolescents and adults. To illustrate this, sports such as rugby and football tend to be rough and are complicated for children to understand. Adapting sports and activities to optimally facilitate the progression of skills at each maturational stage, while valuing the additional motor development challenges facing some individuals, is an important issue to consider. The focus of this chapter is to promote understanding about the trends and variability in how children grow, develop motor skills and fitness, and mature in physical literacy.

## An Introduction to the Main Concepts

Before we progress further, it is necessary to explain several main concepts. In this chapter,

**growth** refers to a measurable change in the size, quantity, or functioning of the body or some part of the body. This could include, for example, an increase in body size or in how the heart pumps blood through the blood vessels. **Maturation** refers to the extent a particular underlying characteristic (often less observable or measurable, such as body changes during puberty or emotional expressions) resembles a mature biological state. In other words, do a 12-year-old girl’s physiological and emotional reactions to a frightening experience typically differ from a 9-year-old boy’s?

**Motor development** is the study of how movement (motor) behavior changes over time because of influences from one’s biological (physical) system and environment. This is generally evident in the observable changes while performing or learning a particular movement. For example, infants and young children have restricted movement capabilities compared with older children and adolescents.

Growth and motor development (particularly in toddlers) tend to occur in a **cephalocaudal** (longitudinally from head to feet) and **proximodistal** (peripherally from the center of the body outward) direction. To illustrate this, younger children



tend to show more coordination and control of movements in their upper torso than in their legs or feet (cephalocaudal). They also tend to master the large (gross) muscles of the arm in a movement like drawing before they demonstrate fine control of the wrist or finger actions (proximodistal).

Integrating a variety of useful movement capacities with other important aspects (such as healthy behaviors, understandings, and attitudes) and then applying these to a long-term lifestyle reflects a person's **physical literacy**. This concept asserts that being a proficient mover is important not only for participating in sports or for being fit but also as part of one's "foundation" for overall health and well-being. As explained in Chapter 2, physical literacy has been adopted as an important feature of the mandates of organizations such as Physical and Health Education Canada and the Canadian Sport Centre's Long-Term Athlete Development Program.

### What Is Physical Literacy?

Individuals who are physically literate consistently develop the motivation and ability to understand, communicate, apply, and analyze different forms of movement. They are able to demonstrate a variety of movements confidently, competently, creatively, and strategically across a wide range of health-related physical activities. These skills enable individuals to make healthy, active choices throughout their life span that are both beneficial to and respectful of their whole self, others, and their environment.

*Physical and Health Education Canada*

**Critical periods** in the growth of a child, also known as **sensitive periods**, are times of particular sensitivity to environmental stimuli. If a child is exposed to the appropriate stimuli during this period, a particular human behavior is likely to emerge or at least be facilitated. If the appropriate stimuli are not present at this time, the potential for optimal development is lost. It is of course still possible to master a given skill at a later time, but the possibility for *optimal* development may have been lost.

The critical period for the acquisition of many psychomotor and cognitive skills appears to be very early in a child's life. The difficulty, however, is determining just how early the child should be introduced to physical activity. This is where early introduction to quality physical education programs in school may be helpful. Early experience and learning give children a strong foundation and allow them to develop a repertoire of skills for the future.

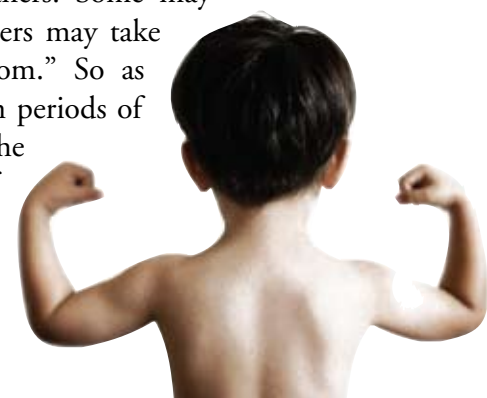
**Readiness** implies that the individual is prepared to acquire a particular behavior or skill. In other words, sufficient information must be accumulated and the necessary physical abilities and characteristics must be attained for certain movements or skills to be performed (Figure 8.2). Readiness requires that the child want to perform the task; without such internal motivation, readiness has no foundation. Indeed, instruction in a particular physical activity that does not take into account readiness may even prove detrimental.

Although each individual is unique, several stages of change can be identified that generally describe how humans grow and mature. For example, as we age, grow, and mature, our motor capacities and repertoire of skills tend to develop and can significantly affect physical literacy.

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## Growth

The stages of the life cycle, from infancy to adulthood, are marked by numerous physical and psychological changes. Although the general sequence of growth tends to be the same, there is considerable variation among individuals during each growth period. We all pass from infancy through childhood and adolescence to adulthood. But not everyone grows as fast, as much, or in the same way as others. Some may mature early, while others may take a little longer to "bloom." So as you read this section on periods of growth, keep in mind the central importance of individual variability.





### Joe Montana

Football's all-time greatest quarterback

"I got Joe started in sports," said his father, Joseph Sr. "I put a ball in his hands when the kid was big enough to walk and told him to throw it. Once he got started, he was always waiting at the door with a ball when I came home from work. What I really wanted to do was to make it fun for him. And I wanted to make sure he got the right fundamentals. I read books, [and] we worked on techniques, sprint out, run right, run left, pivot, and throw the ball."



### Wayne Gretzky

Hockey's all-time greatest player

If Wayne wasn't born to be a star, he was certainly raised in this direction. His father, Walter, iced down the backyard of their home for three-year-old Wayne. He strung lights so young Wayne could practice longer through the cold evenings. All through Wayne's childhood, the rink was a passion for both of them. In the daytime, Wayne would skate on it and play hockey with the sticks Walter used to shave down for him. In the evenings, they would work together on the drills Walter had worked out. The father placed tin cans, then pylons, on the ice for the son to swirl between. He dropped sticks for the boy to hop over as he received passes; he made targets smaller so Wayne's shots became more and more accurate.

### Tiger Woods

The world's greatest golfer

From the start, Tiger Woods' life was dotted with feats of genius. At 10 months of age, having spent his infancy watching his dad hit golf balls in the family garage, Tiger picked up one of Earl's clubs and smacked a ball into the practice net left-handed. Father Earl taught one-year-old Tiger to putt; he won a putting contest at two; by three he had developed a fearsome swing; and by six Tiger was playing and beating 18-year-olds.



**Figure 8.2** There are many well-known child prodigies who developed their skills very early in life.

## Knowledge Check



### True or False?

1. At birth, boys are significantly heavier and longer than girls.  True  False
2. The adolescent growth spurt occurs approximately two years earlier in girls than in boys.  True  False
3. There is a significant difference between the female and male physique prior to puberty.  True  False
4. It is recommended that children sample sports before they specialize in them.  True  False
5. Within each of the life stages, there is variability in growth and development among individuals.  True  False
6. Boys achieve world-class status in swimming and gymnastics earlier than girls.  True  False
7. Movement has little if any relationship to mental development in children.  True  False

(Answers: 1. F, 2. T, 3. F, 4. T, 5. T, 6. F, 7. F)

## Infancy

**Infancy** begins at birth and ends at the age of one (Figure 8.3). This period is marked by extremely rapid growth: a child may triple in birth weight (e.g., from 7 pounds to 21 pounds, or from 3.3 kg to 10 kg) and may increase in length by as much as 50 percent (e.g., from 20 inches to 30 inches, or from 50 cm to 75 cm). Although there are not many obvious differences between male and female babies, males are usually slightly heavier and longer than females at birth.

## Childhood

The **childhood** period begins when an infant is 1 year old and lasts until age 13. During **early childhood**, which lasts until age 6, there is a gradual loss of baby fat. Girls lose less fat than boys, so in the first year after early childhood, girls tend to have more body fat than boys of similar age. Early childhood is a time of rapid growth, although the rate of growth is slower than it is during infancy.



**Figure 8.3** Infancy starts at birth and ends at age one.

If you have ever watched young children play, you may have noticed that they are quite flexible. Since they usually cannot sit still for any extended periods of time, their muscles develop readily as they run around and enjoy life.



Children between the ages of 6 and 10 are said to be in their **mid-childhood**. Growth tends to be slower and more constant during this time so the body has a chance to improve in coordination and motor functioning. But during **late childhood**, 10 through 13 years, the rate of growth increases once again. Many children put on excess fat just before the adolescent growth spurt, which usually begins between the ages of 10 and 11 in girls and between 12 and 13 in boys. As a result of the earlier onset of the growth spurt, 10- and 11-year-old girls are usually taller and heavier than boys for about two years, until the boys catch up. **Puberty** is marked by rapid physical changes and occurs at different times for different individuals. Along with the height spurt, puberty involves the maturation of the reproductive system, the appearance of secondary sex characteristics such as breasts and pubic hair, and the redistribution of body weight. While boys show an increase in muscle tissue and a decrease in body fat, girls show a slight increase in body fat during this period.

Although the rate of growth and development is quite variable, the average age range of puberty for boys is between 13 and 14, while for girls it is between 12 and 13 years of age. Perhaps the earlier onset of maturation in females accounts for the fact that young girls are able to achieve world-class status across many sports (such as swimming, diving, gymnastics, and figure skating), while males usually begin to succeed in sports at a somewhat older age (Figure 8.4).

An example of this difference can be seen in figure skating. In 1997, Tara Lipinski became the youngest ever U.S. ladies' figure skating champion at 14. She proceeded to capture the World Figure Skating Championship a few short months later and the gold medal at the 1998 Olympic Games in Nagano. Males, on the other hand, rarely excel at sports at such a young age, and must anticipate the emergence

of their athletic potential for many years.

## Adolescence

**Adolescence** is the period following puberty. It begins at about age 14 and ends around age 20. During adolescence, the various body types (**somatotypes**) become more evident: **ectomorph**, **mesomorph**, and **endomorph**.

In general, the ectomorph has a linear shape with a delicate bone structure, little fat, and long limbs in relation to the body. The mesomorph is well muscled, has little fat, and tends to have broad shoulders with a narrow waist. The endomorph has a rounded appearance and heavy bone structure, with little bone and muscle definition. While most of us are a combination of the different body types, we are all aware of the pressures placed on us by a variety of sources to obtain the body shape deemed as *ideal* in our society.

The eating disorders that are so common in young women and men are frequently associated with the tremendous pressure to “look good.” Undoubtedly, the many physical, hormonal, and psychological changes that accompany adolescence make this life stage a challenging and often frustrating period for many young people.

Adolescence ends with the onset of adulthood. Although we continue to develop in different ways into our late adulthood, obvious differences in physical growth cease once adolescence ends.

## Gender Differences in Growth and Fitness

Do most males and females have certain physical characteristics? Do they have equal physiological potential? Do you consider yourself fit? Many assume that a lean individual must be fit. But there is more to fitness than meets the eye.

