

Chapter 2

Puberty and Physical Development

Chapter at a Glance

<i>Detailed Chapter Outline</i>	<i>Instructor's Manual</i>	<i>Test Bank</i>	<i>PowerPoint</i>	<i>MyPsychKit</i>
The Biology of Puberty Hormones in Action Physical Development Sexual Development Menarche and the Secular Trend	DISCUSSION TOPICS 1-2			
Responses to Puberty Personal Responses to Puberty Parental Responses to Puberty Cultural Responses to Puberty				
Brain Development The Structure of the Brain The Developing Brain Behaviour and the Brain	DISCUSSION TOPIC 3			
Health Issues Puberty and Mood Body Image Sleep Needs Nutrition and Exercise	DISCUSSION TOPIC 4-5			

Learning Objectives

After studying the chapter, students should be able to answer the following questions.

- LO2.1 How does the endocrine system regulate puberty and growth?
- LO2.2 What are the physical changes of adolescence for girls and boys?
- LO2.3 What are the sexual changes of adolescence for girls and boys?
- LO2.4 What is the significance of changes in the age of menarche in recent decades?
- LO2.5 Why is puberty a source of pride for some teens and embarrassment for others?
- LO2.6 Do parents and children become more distant after puberty?
- LO2.7 What are puberty rites, and what purposes do they serve?
- LO2.8 What are the principal parts of the brain?
- LO2.9 How do synaptic pruning and myelination help make the brain more efficient?
- LO2.10 How is brain development linked to other adolescent changes?
- LO2.11 Are teens at the mercy of their “raging hormones”?
- LO2.12 What impact do pubertal changes have on body image for girls and boys?
- LO2.13 How much sleep do adolescents need and get?
- LO2.14 Do today’s adolescents get proper nutrition and exercise?

Chapter Summary

Puberty is the beginning of a process of physical and sexual development that has far reaching psychological and social effects as well. The biological changes of adolescence also raise important health issues.

Puberty is a set of interconnected biological events that affect practically every aspect of the individual, from height to lung capacity to facial and body hair.

The changes of puberty are set in motion and controlled by the system of endocrine glands that produce hormones. Particularly important are the hypothalamus, the pituitary, and the gonads— testes in males and ovaries in females. These make up the HPG axis.

Puberty begins when, signalled by the hypothalamus, the pituitary sends a message to the gonads to produce more sex hormones—estrogens and androgens. These in turn set off processes of physical and sexual development.

One dramatic aspect of puberty is the adolescent growth spurt, which begins about 2 years earlier for girls than for boys. This period of very rapid growth affects not only height and body proportions but the balance of muscle and fat and other biological systems.

Sexual development during adolescence generally follows a regular sequence, described by the Tanner stages. For girls, the earliest stage is usually breast development, followed by the growth of pubic hair and changes in the genitals. For boys, changes in the genitals are followed by the appearance of pubic hair.

The timing of puberty is affected by many factors, from social class and geographic region to nutrition and exercise. In Western societies, girls usually show the first signs of puberty around age 10, but some begin as early as 7 or 8 or as late as 13 or 14. For boys, the earliest signs generally appear around age 11, but may come as early as 9 or as late as 14 or 15.

During the 19th and 20th centuries, the average age of menarche, a girl's first menstrual period, dropped steadily in Northern Europe and North America, in what is called the secular trend. This is most likely the result of improved nutrition and living conditions.

When a child enters puberty, people notice and react. Children have personal responses to their own development and that of friends and peers. Parents respond to the changes they see in their children. In many cultures, the larger society also marks the transition, with formal or informal rituals.

For girls, breast development is usually the first sign of puberty and sets off complex feelings about movement to a new stage of life and about sexuality. The reactions of peers, especially boys, often lead to embarrassment and self-consciousness.

Menstruation is also often a source of mixed feelings, depending in part on how prepared the girl is.

For boys, their first ejaculation is typically the result of a nocturnal emission or masturbation and is generally experienced positively. The enlargement of the genitals, however, often leads to self-consciousness and a fear of social comparison.

When an individual child enters puberty has an impact on their well-being and social relationships.

For girls, maturing early is linked to a number of negative effects, including low self-esteem, depression, and problem behaviours. Late-maturing girls have fewer negative effects and are generally more satisfied with their bodies.

Early-maturing boys are more popular with peers and have fewer problems with parents but are more likely to get involved with sex, drugs, and alcohol. Boys who mature late suffer from anxiety and poor self-image but tend to be more intellectually curious and creative.

Timing effects may result from being noticeably different from one's peers (the deviance hypothesis), from having to enter a new stage before completing the tasks of the earlier stage (the stage termination hypothesis), from being treated differently by others because of looking more mature (the adult resemblance hypothesis), or from some combination of these factors.

Parents often react to a child entering puberty by giving the child more autonomy, which cuts down on family conflict, and by putting greater stress on acting according to traditional gender roles. They also tend to spend less time with their children.

Especially in traditional cultures, a child's entry into puberty is generally marked by special events called puberty rites. For girls, these generally include instruction on adult roles and rules, taboos, and sexual matters. Boys are often subjected to difficult and painful ordeals.

At puberty, the brain contains many billions of neurons, each linked through synapses to hundreds or thousands of others. The cerebral cortex is particularly important.

During adolescence, as many as half of the synapses are lost to synaptic pruning, making the cortex, which is deeply involved in judgment, executive control, and other complex functions, faster and more efficient. Myelination, which insulates nerve cells and makes them faster and more sensitive, spreads to the advanced areas of the prefrontal cortex.

Scholars disagree about the degree to which changes in behaviour during adolescence should be seen as the effect of changes in the brain.

The dramatic and far reaching changes of adolescence raise important health issues for young people.

Young adolescents tend to be more emotional and to undergo more rapid mood shifts than either children or older adolescents. This is often attributed to "raging hormones," but may also reflect the stresses posed by big transitions and other life events.

Physical and sexual development during puberty may lead to a distorted or negative body image, especially in girls, who tend to see themselves as overweight even when they are not.

Most adolescents get far too little sleep, and the sleep they do get often comes during the wrong part of their daily biological rhythm. One result is that many teens are sleepy through most of their hours in school.

During the adolescent growth spurt, teens need more calories and nutrients than at any other stage of life. Most, however, take in too much fat and sugar and far too little healthy fruits and vegetables, leading to an epidemic of adolescent overweight and obesity. The problems created by the typical adolescent diet are compounded by a sharp decline in healthful physical exercise, due in part to less organized physical activity in school.

Integrated Teaching Outline

1. The Biology of Puberty

- a. Hormones in Action
 - i. The Hypothalamus and Pituitary*
 - ii. The HPG Axis*
 - iii. How Puberty Begins*
- b. Physical Development
 - i. The Growth Spurt*
 - ii. The Awkward Age*
- c. Sexual Development
 - DISCUSSION TOPIC 1
 - i. Ovaries and Testes*
 - ii. Stages of Puberty*
 - iii. Timing of Puberty*
- d. Menarche and the Secular Trend
 - DISCUSSION TOPIC 2
 - i. Puberty, Heredity, and Environment*
 - ii. Menarche Around the World*
 - iii. Puberty and History*

2. Responses to Puberty

- a. Personal Responses to Puberty
 - i. Girls and Puberty*
 - ii. Boys and Puberty*
 - iii. Effects of Pubertal Timing*
- b. Parental Responses to Puberty
- c. Cultural Responses to Puberty
 - i. The What and Why of Puberty Rites*
 - ii. Puberty Rites for Girls*
 - iii. Puberty Rites for Boys*
 - iv. Decline of Puberty Rites*

3. Brain Development

- a. The Structure of the Brain
- b. The Developing Brain
 - DISCUSSION TOPIC 3
- c. Behaviour and the Brain

4. Health Issues

- a. Puberty and Mood
 - DISCUSSION TOPIC 4
 - i. Mood Swings in Adolescents*
 - ii. Hormones and Life Events*
- b. Body Image
 - DISCUSSION TOPIC 5
- c. Sleep Needs
- d. Nutrition and Exercise
 - i. Nutrition*
 - ii. Exercise*

Key Terms with page references

Endocrine system (37)	Pheromones (44)
Hormones (37)	Secular trend (46)
Hypothalamus (37)	Reaction range (46)
Pituitary (38)	Spermarche (53)
Gonads (38)	Nocturnal orgasm (53)
Estrogens (38)	Deviance hypothesis (56)
Androgens (38)	Stage termination hypothesis (56)
HPG axis (38)	Adult resemblance hypothesis (56)
Adrenarche (39)	Gender intensification (57)
Menarche (39)	Distancing hypothesis (57)
Insulin-like growth factor-I (IGF-I) (40)	Puberty rites (58)
Leptin (40)	Cerebral cortex (61)
Adolescent growth spurt (40)	Synaptic pruning (61)
Peak height velocity (40)	Myelination (62)
Asynchronicity (42)	Reductionism (62)
Ovum (43)	“Raging hormones” (64)
Sperm (43)	Body image (65)
Tanner stages (44)	Metabolism (69)

Topics for Classroom Discussions

TOPIC 1

From an evolutionary standpoint, why might it be an advantage for the first menstrual cycle to be set off by a girl’s body weight and proportion of fatty tissue? Would a similar line of reasoning apply to boys as well?

TOPIC 2

Economic development is linked to earlier puberty and it is also associated with later marriage. What does the conjunction of these two trends suggest about the future of adolescence in developing countries? How do you think more traditional cultures will try to deal with such changes?

TOPIC 3

Research indicates that the prefrontal cortex, a part of the brain deeply involved in assessing risks and making complex judgments, is still developing during the adolescent years. Given that, should adolescents have the same rights and be held to the same standards of responsibility as adults? For example, should they be able to consent to sexual activity or join the armed forces? If they commit an offense, should they be tried as adults?

TOPIC 4

Can you recall an occasion during early adolescence when you found yourself wildly elated or deeply upset, only to have others, such as parents, minimize or dismiss your feelings? Looking back, to what extent do you think your mood swing was a response to particular life events or to the newness of those events? What about the idea that your emotional state was set off or magnified by factors, such as “raging hormones,” that you were not aware of?

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TOPIC 5

Recently the fashion industry in several European countries has talked of not using as models young women who are so thin that they appear to suffer from an eating disorder. Do you think measures of that sort will have an impact on the body image problems of adolescents? Do think that taking similar measures within the male fashion industry would also be effective?

Writing in the Spotlight

Free-writing — The Experience of Puberty

Introduction:

This is an exercise in what is called *free-writing*.

If you are already familiar with free-writing, you can get started right away. If not, you are probably wondering: What is that? How does it work?

You will be given a starting point — a topic, a quotation, a description, something to point you in a general direction. Whatever recollections or events that come to mind, write about them. Follow any associations that come to you, no matter how remote or silly or trivial (or personal) they may seem. The important point is to keep that pen or pencil moving.

No one is going to judge or criticize what you write. Unless you choose, no one else will even see it. This is strictly for you. It gives you a chance to explore an area of your thoughts, feelings, and memories you may not normally pay much attention to. It also helps develop the skill of putting those thoughts, feelings, and memories into written words.

Ready?

What was it like for you when you were going through puberty?

What events connected to puberty do you recall as most significant, or most embarrassing, or most upsetting?

Were you ahead of your friends, or behind, or right in synch with them?

If you saw yourself as early or late in entering puberty, what reactions did you have to that? What did you think it meant? How did it make you feel?

Were any of your friends noticeably earlier or later than you? What do you recall about their or your thoughts and feelings about that?