Physical and Cognitive Development in Adolescence

Learning Outcomes

At the end of the study topic, you will be able to:

- Explain how puberty begins.
- Describe the rapid physiological changes.
- Identify psychological effects of early and late maturation.
- Discuss the different aspects of cognitive maturation.
Adolescence

The Nature of Adolescence - 1

- Adolescence is one of the most fascinating and complex transitions in the life span.
- Its breath-taking pace of growth and change is second only to that of infancy.
- Biological processes drive many aspects of this growth and development, with the onset of puberty marking the passage from childhood to adolescence.
- Puberty is a transitional period between childhood and adulthood, during which a growth spurt occurs, secondary sexual characteristics appear, fertility is achieved, and profound psychological changes take place.
- During adolescence years, relationships with parents take a different form, moments with peers become more intimate, and dating occurs for the first time, as do sexual exploration and possibly intercourse.
- The adolescent’s thoughts are more abstract and idealistic.
- Biological changes trigger a heightened interest in body image.
- In this respect, adolescence has both continuity and discontinuity with childhood.
The Nature of Adolescence - 2

- There is a long history of worrying about how adolescents will turn out.
- In 1904, G. Stanley Hall proposed the "storm-and-stress" view that adolescence is a turbulent time charged with conflict and mood swings.
- Today’s adolescents face demands and expectations, as well as risks and temptations, that appear to be more numerous and complex than those faced by adolescents only a generation ago.
- Due to such rapid changes in all aspects of adolescence, it is no wonder that parents and teachers find it difficult to interact with them.
- Nonetheless, contrary to the popular stereotype of adolescents as highly stressed and incompetent, the vast majority of adolescents successfully negotiate the path from childhood to adulthood.
- Therefore, it is important to start this section by not having the prejudice towards adolescence as a time of rebellion, crisis, pathology, and deviance.
- A far more accurate vision of adolescence describe it as a time of evaluation, of decision-making, of commitment, and of carving out a place in the society, and the world.

Puberty - 1

- Puberty is the most important marker of the beginning of adolescence.
- What is puberty?
- It is a period of rapid physical maturation involving hormonal and bodily changes that occur primarily during early adolescence.
- There is considerable variation in the timing of adolescent growth spurts.
- In a light-hearted manner, Santrock (2013) predicted that by the year 2250, we may be able to come across a toddler displaying all features of puberty. This is because the age at which puberty arrives is getting younger.
- For instance, in Norway, menarche (a girl’s first menstruation) occurs at just over 13 years of age in the 1990s, compared with 17 years of age in the 1840s.
- However, he went on to say that we are unlikely to see pubescent toddlers, since what has happened in the past century is likely the result of a higher level of nutrition and health.
- Genetic factors are also involved in puberty. Therefore, although nutrition, health, and other factors affect puberty's timing and variations and its makeup, the basic genetic programme is wired into the nature of the species.
- Refer to textbook for more details on growth spurts in adolescence.
Puberty - 2

- Another key factor that triggers puberty is body mass.
- Menarche, for instance, occurs at a relatively consistent weight in girls.
- A body weight approximating 106 +/-3 pounds can trigger menarche and the end of the pubertal growth spurt.
- For menarche to begin and continue, fat must make up 17% of the girl’s body weight.
- Therefore, both teenage anorexics whose weight drops dramatically, and female athletes in certain sports (such as gymnastics), may not menstruate (Phillips, 2003).
- We need to keep in mind that puberty is not a single, sudden event (Archibald, Graber, & Brooks-Gunn, 2003).
- It is rather easy to know whether a young boy or girl is going through puberty, but to pinpoint puberty’s beginning and end is difficult.
- For boys, the first whisker or first wet dream is an event that could mark its appearance, but both may go unnoticed.

Reflection Questions

Turn the clock back to the time when you were turning into an adolescent. What is the first thing that comes to mind?

- Think back to the onset of your puberty. Of the striking changes that were taking place in your body, can you remember, what was the first change that occurred?
Hormonal Changes - 1

• Behind the first whisker in boys and the widening of hips in girls is a flood of hormones, powerful chemical substance secreted by the endocrine glands and carried through the body by the bloodstream.
  ➢ The role of the endocrine systems in puberty involves the interaction of the hypothalamus, the pituitary gland, and the gonads (sex glands).
  ➢ The hypothalamus is a structure in the higher portion of the brain that monitors eating, drinking, and sex.
  ➢ The pituitary gland is an important endocrine gland that controls growth and regulates other glands.
  ➢ The gonads are the sex glands – the testes in males, the ovaries in females.
• The pituitary sends a signal via gonadotropins (hormones that stimulate the testes or ovaries) to the appropriate gland to manufacture the hormone.
• Then the pituitary gland, through interaction with the hypothalamus, detects when the optimal level of hormones is reached and responds by maintaining gonadotropin secretion.

Hormonal Change - 2

• The concentration of testosterone (a hormone associated in boys with the development of genitals, an increase in height, and a change in voice), and estradiol (a hormone associated in girls with breast, uterine, and skeletal development) increase dramatically during adolescence.
• Note that both testosterone and estradiol are present in the hormonal makeup of both boys and girls; but that testosterone dominates in male pubertal development, and estradiol in female pubertal development.
• The same influx of hormones that puts hair on a male’s chest and imparts curvature to a female’s breast may contribute to psychological development in adolescence (Susman & Dorn, 2009).
• However, hormonal effects by themselves do not account for adolescent development (Rowe & others, 2004).
• For example, in one study, social factors accounted for 2 to 4 times as much variance as did hormonal factors in young adolescent girls' depression and anger (Brook-Gunn & Warren, 1989).
• Behaviour and moods, stress, eating patterns, exercise, sexual activity, tension, and depression can activate or suppress various aspects of the hormonal system.
• In sum, the hormone-behaviour link is complex (Susman & Rogol, 2004).
Height, Weight, and Sexual Maturation

- Among the most noticeable physical changes during puberty are increases in height and weight, as well as sexual maturation.
- The mean age at the beginning of the growth spurt in girls is 9 years of age; for boys, it is 11 years.
- The peak rate of pubertal change occurs at 11½ years for girls and 13½ for boys.
- During their growth spurt, girls increase in height about 3½ inches per year, boys about 4 inches.
- At the beginning of the adolescent period, girls tend to be as tall as or taller than boys of their age, but by the end of the lower secondary school years most boys have caught up or, in many cases, even surpass girls in height.

Male and Female Pubertal Characteristics

Male and female pubertal characteristics develop in this order:

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>increase in penis and testicle size</td>
<td>either the breasts enlarge or pubic hair appears</td>
</tr>
<tr>
<td>appearance of straight pubic hair</td>
<td>hair appear in armpits</td>
</tr>
<tr>
<td>minor voice change</td>
<td>grow in height</td>
</tr>
<tr>
<td>first ejaculation (which usually occurs through masturbation or a wet dream)</td>
<td>hips become wider than shoulders</td>
</tr>
<tr>
<td>appearance of kinky pubic hair</td>
<td>first menstruation, initially irregular — for the first several years, may not ovulate every menstrual cycle.</td>
</tr>
<tr>
<td>onset of maximum growth</td>
<td>by the end of puberty, breasts become more fully rounded</td>
</tr>
<tr>
<td>growth of hair in armpits</td>
<td></td>
</tr>
</tbody>
</table>
Body Image

- The rapid physical changes in adolescence do carry with them the psychological aspects as well.
- Preoccupation with one’s body image is strong throughout adolescence, but it is especially acute during puberty, a time when adolescents are more dissatisfied with their bodies than in late adolescence (Mueller, 2009).
- In general, girls tend to be less happy with their bodies and have more negative body image, compared with boys’ feelings about their bodies (Bearman & others, 2006).
- As pubertal change proceeds, girls often become more dissatisfied with their bodies, probably because their body fat increases; whereas boys become more satisfied as they move through puberty, probably because their muscle mass increases.

Early and Late Maturation - Reflective Questions

- Can you remember at what age you experienced puberty?
- Can you remember any significant psychological effects puberty had on you?
Early and Late Maturation

• In the Berkeley longitudinal study, early-maturing boys perceived themselves more positively and had more successful peer relations than did their late-maturing counterparts (Jones, 1965).
• However, when the late-maturing boys were in their thirties, they had developed a stronger sense of identity than the early-maturing boys (Peskin, 1967).
• Possibly this occurred because the late-maturing boys had more time to explore life’s options or because the early-maturing boys continued to focus on their advantageous physical status instead of on career development and achievement.
• For girls, research findings suggest that early-maturing girls experience more problems in school but also enjoy more independence and popularity with boys.
• For instance, in the sixth grade, early-maturing girls show greater satisfaction with their figures than late-maturing girls, but by the tenth grade late-maturing girls are more satisfied (Simmons & Blyth, 1987). Refer to Figure 11.3 in your text for a pictorial representation of these results.
• One possible reason for this is that in late adolescence, early-maturing girls are shorter and stockier, whereas late-maturing girls are taller and thinner.

Implications for Early and/or Late Maturation

• Studies have shown that early-maturation increases girls’ vulnerability to a number of problems; such as smoke, drink, depression, having eating disorder, requesting early independence from their parents, and have older friends.
• Also, their bodies are likely to elicit responses from males that lead to earlier dating and earlier sexual experiences (Wiesner & Ittel, 2002).
• Puberty seems to affect some adolescents more strongly than others; and some behaviour more strongly than others. Body image, dating interest, and sexual behaviour are affected by pubertal change.
• In thinking about puberty’s effects, it is important to keep in mind that an adolescent’s world involves cognitive and socioemotional changes, as well as physical changes.
• As with all periods of development, these processes work in concert to produce who we are in adolescence.
Adolescent Sexuality

- Adolescence is a time of sexual exploration and experimentation, of sexual fantasies and realities, of incorporating sexuality into one’s identity.
- The majority of adolescents eventually manage to develop a mature sexual identity, but most experience times of vulnerability and confusion along life’s sexual journey.
- Every society gives some attention to adolescent sexuality.

Adolescent Sexuality and Culture & Society

In some societies, adults clamp down and protect adolescent females from males by chaperoning them. Other societies promote very early marriage.

What about your own culture and society?

©2013 SIM UNIVERSITY. All rights reserved.
Sexuality is part of Adolescent Development

- An important point to keep in mind is that sexual development and interest in sex are normal aspects of adolescent development and that the majority of adolescents have healthy sexual attitudes and engage in sexual practices that will not compromise their development.
- Mastering emerging sexual feelings and forming a sense of sexual identity is multifaceted.
- It involves learning to manage sexual feelings (such as sexual arousal and attraction), developing new forms of intimacy, and learning the skills to regulate sexual behaviour to avoid undesirable consequences (Diamond & Savin-Williams, 2009).

Adolescent Sexual Behaviour

- Sexual identities emerge in the context of physical factors, social factors, and cultural factors, with most societies placing constraints on the sexual behaviour of adolescents.
- According to DeLamater & MacCorquodale (1979) adolescents engage in a rather consistent progression of sexual behaviour.
  - Necking usually comes first, followed by petting.
  - Next comes intercourse, or, in some cases, oral sex, which has increased substantially in adolescence in recent years.
  - Male adolescents reported engaging in these sexual behaviours approximately one year earlier than female adolescents.
Early Sex Experiences and its Consequences

- Research in the US has found that adolescents who engage in sex at early ages and experience a number of partners are the least effective users of contraception and are at risk for early, unintended pregnancy and for sexually transmitted infections (Cavanaugh, 2004).
- They are also more prone to other risky problems such as excessive drinking, drug use, delinquency, and school-related problems (Dryfoos & Barkin, 2006).
- Two other important factors in sexual risk taking are self-regulation (the ability to regulate one’s emotions and behaviour) and parent-adolescent relationships.

Adolescent Pregnancy

- In cross-cultural comparisons, the US continues to have one of the highest adolescent pregnancy and childbearing rates in the industrialised world, despite a considerable decline in the 1990s.
- Adolescent pregnancy is a cause for great concern because it creates health risks for both baby and the mother.
- One longitudinal study found that children of women who had their first birth during their teens had lower achievement test scores and more behavioural problems than did children whose mothers had their first birth as adults (Hofferth & Reid, 2002).
- One possible reason is that these adolescent mothers are more likely to come from a low-income background.
- Serious, extensive efforts are needed to help pregnant adolescents and young mothers enhance their educational and occupational opportunities.
- Adolescent mothers also need help in obtaining competent child care and in planning for the future.
Sexuality and Adolescent Development

- Find out more from the local context on this issue and see if the challenges are similar to those of the US.

**Sexual arousal** emerges as a new phenomenon in adolescence and it is important to view sexuality as a normal aspect of adolescent development (Shirley Feldman, Contemporary Psychologist, Stanford University)

---

The Brain

- One of the most fascinating recent discoveries about the adolescent’s brain focuses on developmental changes in the area of the brain that involve emotion and higher-level cognitive functioning.
- The amygdalae is a region of the brain that handles the processing of information about emotion; the prefrontal cortex is especially important in higher-level cognitive functioning (LeDoux, 2002).
Study on Development of the Brain

- In one study, researchers used functional magnetic resonance imaging (fMRI) to discover if the brain activity of adolescents (10- to 18-year-olds) differed from that of adults (20- to 40-year-olds).
- When adolescents (especially the younger ones) processed emotional information, brain activity in the amygdala was more pronounced than in the prefrontal cortex, but the reverse occurred in adults.
- Researchers interpreted these findings to suggest that adolescents might be more likely to respond with “gut” reactions to emotional stimuli, whereas adults might be more likely to respond with rational, reasoned responses.
- The explanation for these results focused on the prefrontal cortex maturing later than the amygdalae. Thus, researchers are finding that the very last part of the brain to mature is the prefrontal cortex, where planning, setting priorities, suppressing impulses, and weighing the consequences of one’s actions take place.

©2013 SIM UNIVERSITY. All rights reserved.

Adolescent Problems and Health - Substance Abuse

- In addition to the sexual problems discussed earlier, other common problems that can develop during adolescence are substance abuse and eating disorders.
- Substance use and abuse includes drugs, alcohol, and cigarette smoking.
- In the US context, most adolescents become drug users at some point in their development, whether limited to alcohol, caffeine, and cigarettes or extended to marijuana, cocaine, and hard drugs.
- A special concern involves adolescents using drugs as a way of coping with stress, which can interfere with the development of competent coping skills and responsible decision making.
- Parents, peers, and social support play important roles in preventing adolescent drug abuse.
- Positive relationships with parents and others are found to be important in reducing adolescents’ drug use.

©2013 SIM UNIVERSITY. All rights reserved.
Adolescent Problems and Health - Eating Disorders

- Besides the problem of substance abuse, eating disorders have become increasingly common in adolescence (Gowers & Bryant-Waugh, 2004).
- The following are some research findings involving adolescent eating disorder:
  - Girls who felt negatively about their bodies in early adolescence were more likely to develop eating disorders, two years later, than their counterparts who did not feel negatively about their bodies (Attie & Brooks-Gunn, 1989).
  - Negative parent-adolescent relationships were linked with increased dieting by girls over a one-year period (Archibald, Graber, & Brooks-Gunn, 1999).
  - Girls who were sexually active with their boyfriends and in pubertal transition were the most likely to be dieting or engaging in disordered eating patterns (Cauffman, 1994).
  - Girls who were highly motivated to look like same-sex figures in the media were more likely than their peers to become very concerned about their weight (Field & others, 2001).
  - Adolescent girls who watched four hours of television or more per day were more likely to be overweight than those who watched less than four hours a day (Dowda & others, 2001).
In order to understand adolescents’ cognitive development, we will study Jean Piaget’s stage of formal operational thought.

At this stage, adolescents are no longer limited to actual, concrete experiences as anchors for thought. In contrast, they can conjure up make-believe situations, events that are purely hypothetical possibilities or strictly abstract propositions, and can try to reason logically about them.

The abstract quality of the adolescent’s thought at the formal operational level is evident in their verbal problem-solving ability.

Whereas the concrete operational thinker needs to see the concrete elements of A, B, and C to be able to make the logical inference that, if A = B and B = C, then A = C, the formal operational thinker can solve this problem merely through verbal presentation.

Another indication of the abstract quality of adolescents’ thought is their increased tendency to think about thought itself.

Accompanying the abstract nature of formal operational thought is thought full of idealism and possibilities. Adolescents begin to engage in extended speculation about ideal characteristics – qualities they desire in themselves and in others. Such thought often lead them to compare themselves with others in regard to such ideal standards.

It is not unusual for the adolescent to become impatient with these newfound ideal standards and to become perplexed over which of many ideal standards to adopt.

At the same time, adolescents also begin to think more logically, as a scientist thinks, devising plans to solve problems and systematically testing solutions; which is called “hypothetical-deductive reasoning.”

This kind of reasoning is Piaget’s formal operational concept that adolescents have the cognitive ability to develop hypotheses, or best guesses, about ways to solve problems, such as algebraic equation.

By contrast, children are more likely to solve problem in a trial-and-error fashion.
Adolescent Cognition - 3

- There may be much more individual variation in formal operational thought than Piaget envisioned. Only about one in three young adolescents is a formal operational thinker.
- Education in the logic of science and mathematics is an important cultural experience that promotes the development of formal operational thinking.
- Also, for adolescents who become formal operational thinkers, assimilation (incorporating new information into existing knowledge) dominates the initial development of formal operational thought, and the world is perceived subjectively and idealistically.
- Later in adolescence, as intellectual balance is restored, these individuals accommodate (adjust to new information) to the cognitive upheaval that has occurred.
Information Processing
Tabs - 3 Tabs (Including Introduction)
Last Modified: Sep 03, 2014 at 02:11 PM

Properties
Show Interaction In Frames: Multiple Images
Allow User to Leave Interaction: At anytime

Reflective Questions
Changes in Adolescents
Up to this point you have learnt that adolescents are going through a lot of changes (particularly physical and cognitive) in their lives. As they progress from primary to secondary school, they bring along all these changes.

Properties
Show Interaction In Frames: Multiple Images
Allow user to leave interaction: At anytime

©2013 SIM UNIVERSITY. All rights reserved.
Summary

In this topic, you learnt that:

- About the nature and characteristics of adolescents, particularly their physical changes such as puberty and sexuality.
- As different individuals grow at different rates, there is an implication for early- and late-maturing boys and girls.
- Adolescents experience heightened awareness of themselves, which manifests in a form of egocentrism.
- From Piagetian cognitive development perspective, adolescents are at the stage of formal operations, where abstract thinking begins to emerge and are fine-tuned.
- Adolescents are more capable of higher order decision-making and problem-solving.
References and Additional Learning Resources

• Note: All references not listed here are based on the text in Santrock (2013).