

## **Physical Growth, Adolescent**

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Adolescents experience a period of substantial growth between puberty and adulthood. This growth spurt typically occurs between ages 12 and 18, and is associated with various physical changes due to fluctuations in hormones. These changes are manifested in an individual's height, weight, and sexual characteristics, and there is considerable variation between each individual for when these changes occur.

Physical growth in adolescence is caused by a variety of factors. First, hereditary factors play a role in the timeline of when maturation begins to occur in adolescents. Other factors, including exercise and diet, have been shown to influence the timing of physical maturation in individuals as well. Perhaps the most significant contributor to physical growth in adolescents; however, are hormones. In adolescence, the adrenal and gonadal glands mature and begin to secrete higher levels of testosterone, responsible for male sexual characteristics, and estradiol, responsible for female sexual characteristics. Signals sent by the pituitary gland causes these changes in hormone levels, as it orders the adrenal and gonadal glands to secrete a surge of hormones into the bloodstream. Other hormones released during puberty that contribute to an individual's physical growth include androgen, growth hormones, and thyroid hormones. Androgen is a precursor to puberty and is associated with an increase in adrenal production, which aids in physical maturation. Further, growth hormones help regulate the process of adolescent physical growth, and thyroid hormones are responsible for supporting the activity of the growth hormone.

While the onset of puberty varies greatly between every individual, girls typically experience pubertal changes earlier than their male peers. Females tend to begin puberty at age 10 or 11, and finish by age 15 or 17. During this time, many physical changes to the body occur including the distribution of fat. Females experience a greater increase in body fat than males, and also develop breasts, their hips broaden, and they begin to develop hair under their arms and in their pubic area. Females also experience a growth spurt, growing approximately three to four inches taller, reaching their adult height at the end of puberty.

Male physical growth typically occurs two years later than females, and males see an increase in height and mass, specifically an increase in shoulder size as well as muscle growth. The production of male hormones leads to an increase in strength, which is expressed in a greater degree than females of the same age. Physical growth in leg length compared to trunk length is common, and is the result of a longer prepubescent period of growth. Another area of physical growth includes the forearm, which grows at a different rate compared to females due to differences in length that have been present since birth. Further, males see an increase in heart and lung size during adolescence.

Puberty in adolescent males is first seen in the sexual organs of the scrotum and testes growing in size. Like females, physical growth in sexual organs coincides with the growth of hair under their arms and in pubic areas. Males also see a growth in the larynx during puberty which subsequently causes the deepening of voice. Finally, fat accumulation in males is proportional to the relationship of the growth spurt, and when males reach their peak height, the proportional fat accumulation is lowered.

Due to the variability in rates of puberty between each individual, adolescent physical growth is commonly associated with different social and psychological outcomes. For example,

males who experience puberty early tend to be taller and stronger than their less-developed peers, which can lead to heightened self-confidence or popularity. Furthermore, females who experience puberty earlier than others may be more likely to be teased by peers or even sexually harassed. This can lead to a variety of negative psychological correlates such as decreased self-esteem, and increased risk for anxiety, depression, eating disorders, and substance use.

Alternatively, males and females who experience later physical development are more likely to be self-conscious and at an increased risk for depression.

Adolescence is a period of growth influenced by both biological and environmental factors, separately and in interaction. Consequently, adolescent males and females experience physical changes as a result. Height, weight, and muscle changes are common between both sexes, as well as the development of sexual characteristics. While there are several commonalities in physical growth between sexes, there are also differences.

Sex differences are responsible for the development of differing secondary sexual characteristics, as well as different rates of growth in the physical characteristics. Some differences are the result of tracks seen at birth, while others are the response to sex hormones. Each area of growth is individualized and contains an arena of variability between groups and within. These changes in growth and secondary sexual characteristics interacts with social and environmental contexts, ultimately resulting in psychological changes and can contribute to the development of psychopathology.

**Further Reading:**

Tanner, J. M. (1981), Growth and Maturation during Adolescence. *Nutrition Reviews*, 39: 43–