



Encyclopedia of School Psychology

Puberty

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Book Title: Encyclopedia of School Psychology

Chapter Title: "Puberty"

Pub. Date: 2005

Access Date: December 11, 2015

Publishing Company: SAGE Publications, Inc.

City: Thousand Oaks

Print ISBN: 9780761930808

Online ISBN: 9781412952491

DOI: <http://dx.doi.org/10.4135/9781412952491.n230>

Print pages: 424-425

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Puberty represents the process of moving from reproductive immaturity to maturity (Alsaker, 1996). Changes occur with respect to overall body stature and composition, hormone levels, and the development of primary and secondary sex characteristics. This process can take two to six years to complete; four years is considered average. Whereas puberty is considered one of the true universals of human development, one of its hallmarks is the tremendous variability that exists between and within individual adolescents. Furthermore, although puberty is seen as a predominantly biological event, the changes it brings interact in a variety of ways with aspects of the adolescent's environment, and can significantly impact other aspects of development and functioning (Alsaker, 1996; Dubas & colleagues, 1991).

Slap (1986) provides a comprehensive accounting of the physical and physiological changes females and males experience during puberty. In females, the onset of puberty is typically marked by the appearance of breast buds and the beginning of the height spurt. The average age for these events is 10 years, with a typical age range of 8 to 13 years for both. Breast development is typically completed by 14 years and adult stature is achieved by an average age of 13 years, with a normal range for both of 10 to 16 years. Pubic hair begins to appear around 10.5 years on average, with a range of 8 to 14 years, and is typically completed by 14.5 years, with a range of 14 to 15 years. The average age of menarche is 12.5 years, with a range of 10.5 to 15.5 years.

In males, the testes begin to enlarge at an average age of 11.5 years, with a range of 9.5 to 13.5 years. Enlargement of the penis and the appearance of pubic hair begin at an average age of 12 years, with a range of 10 to 15 years; penile growth is completed at an average age of 14.5 years, with a range of 12.5 to 16 years, and pubic hair growth is completed at 15.5 years, with a range of 14 to 17 years. First ejaculation (semenarche or spermarche), usually in the context of a nocturnal emission ("wet dream"), occurs at an average age of 13 years, with a range of 12 to 16 years. The average age for the beginning of the height spurt is 12.5 years, with a range of 10.5 to 16 years; adult stature is reached at an average age of 15.5 years, with a range of 13.5 to 17.5 years. The appearance of facial hair and deepening of the voice begin at an average age of 14 years, with a range of 12.5 to 15.5 years.

Multiple factors must be appreciated when trying to understand adolescents' reactions to puberty. Boys generally feel more positive about their changes than girls do; girls tend to be more ambivalent, experiencing a mix of anxiety, excitement, and pride. The amount of information about and preparation for the respective changes is an important predictor of positive adjustment. Girls who are not prepared for menarche and boys who are not prepared for semenarche often experience undue anxiety and shame. Cultural standards of physical attractiveness for males versus females and the fact that adolescents' pubertal body changes are said to have "social stimulus value" (meaning that others notice the changes and react to them) also come into play. For example, puberty brings an increase in lean body mass (i.e., muscle) for males, but a decrease in lean body mass (and an increase in body fat) for females. Depending on the degree to which these normal changes in body shape and composition occur for boys versus girls, the adolescent's body image and overall self-esteem may be enhanced or diminished.

It is important to distinguish between pubertal status versus timing. Pubertal status is an objective measure; it refers to how far along an adolescent is with respect to the

physical and/or biological changes. Pubertal timing is a normative measure, characterizing the adolescent's development as either early, on time, or late as compared to a specific peer cohort. Adolescents who are early (or late) would be the first (or last) 20% of their cohort. Research has shown that adolescents' perceptions of their pubertal timing are powerful predictors of their adjustment to the changes (Dubas & colleagues, 1991). However, their perceptions are not always accurate, especially in early adolescence. Generally speaking, adolescents who believe they are developing at about the same time and rate as the majority of their peers are most positive about their experiences.

Developing early has been associated with certain risk factors for girls; because their changes may begin as early as seven years of age, these girls are typically ill-prepared for them. Early maturing girls are often subjected to teasing, and they tend to associate with older peers and begin dating earlier. Late-maturing girls often report dissatisfaction with what they feel is a lack of attention from boys. However, being a late-developing female is a welcomed set of circumstances in competitive sports that favor a prepubescent body shape (e.g., gymnastics, ice-skating). Early maturing boys seem to enjoy some advantages over their on-time or late-developing peers, as they tend to be taller and stronger; they often excel in athletics and are treated by others (including adults) as more mature. This often serves to increase self-esteem, but can also increase stress, as others (including adults, peers, and parents) may have very high expectations for the early developing male and his behavior based only on his physical appearance. Late-maturing males are often unhappy with their physical development; their smaller stature tends to be a disadvantage socially and athletically, and looking more "childlike," they may be treated as such by others. Some cope by developing very strong interpersonal skills; as a result, by late adolescence and early adulthood, these young men may fare better than their peers who developed early (Peskin, 1972).

What triggers puberty? Heredity and genetics certainly play a role, but so do environmental factors like nutrition and stress. Essentially, puberty results from a reactivation of the intense hormonal activity that was begun during the prenatal period. The major influences in this reactivation are the hypothalamus, the pituitary and adrenal glands, and the gonads (i.e., ovaries, testes), which produce sex hormones in abundance, at least in contrast to childhood when their concentration was minimal. The characterization of puberty as a time of "raging hormones" is not wholly inappropriate, but the status of hormones as a direct cause of behavioral and/or mood disruptions is not a given. For example, extreme (high or low) concentrations of testosterone and estrogen are associated with unstable mood, but moderate concentrations are associated with more positive moods. Estrogen increases as a result of stress; early adolescence brings with it many stressors other than adjusting to a changing body, like school transitions and changes in relationships with parents.

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<http://dx.doi.org/10.4135/9781412952491.n230>

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