

## Special Article

## Physical and Psychosocial Effects of the Changes in Adolescence Period

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### Abstract

The changes in this period, give people, a new body, a new personality and a new identity. A healthy way of passing this period will positively affect individuals' perspectives on life. Therefore, in this period knowing what the changes taking place are and a right approach will provide the successful shaping adolescents who already live a difficult period. Adolescence is a dynamic period in which individuals physical and psychosocial developments take place. The person becomes an adult with sexual, physical and psychological development and cognitive and social changes. After these changes the adolescents appear as an adult but lack the capability of thinking and acting like an adult. Particularly; adolescents try to inspire the physical changes and tries to be independent. After completion of this process the adolescent has a new body, a new character and a new identity. He has expectations from himself, family and the population. He needs to have social acceptance, independence, and has demand for love and respect from the family and the population, for self-respect, has desire for success, and a strong and beautiful body. In case of lack of meeting of these needs or failure of the adolescent to adapt to these changes may cause emergence of negative health behaviors. The negative behaviors developed in this period may cause preventable mortalities and morbidities. Among psychosocial and biological problems of youth; unhealthy and unbalanced dietary habits rank in the first few. Unsecure sexual life, alcohol and substance abuse, smoking, violence, guns, driving, unhealthy diets are important causes of morbidities. In this age group, motor vehicle accidents, injuries and suicides are important mortality causes. Passing this period in a healthy way will affect the way of perceiving future life positively. That's why knowing the possible changes in this period and behaving accordingly is essential.

**Key words:** Adolescent; Adolescent Development; Adolescent Psychology

### Changes in Adolescence

The terms adolescence means 'growing mature by developing' and refers to the transition period from childhood to adulthood (Organization, 1993). This period is dynamic process in which a rapid physical, biochemical, psychological, and social growth, development, and maturation take place. The individual becomes an adult with sexual, physical and psychological development and cognitive and social change (Büyükgebiz, 2013). This period starts with the maturation and activation of the hypothalamic-pituitary-gonadal

axis as a result of coordinated work of complex neuroendocrine mechanisms. It is affected by exposure to environmental factors, interaction between genetic variables, mental factors, nutrition and living conditions. For this reason, the age and duration of adolescence vary greatly from one child to another (Abacı, Gönül, & Büyükgebiz, 2013). The adolescence period is a process in which physical, mental, emotional, social, cultural, moral, professional, self-esteem-related and identity-related developments occur (Yılmaz, 2013) and it ends with gaining social

productivity (Adana & Kutlu, 2009; Kanbur, 2012).

Although they do not exactly coincide with each other, adolescence and ‘puberty’ are used interchangeably (Büyükgebiz, 2013). Puberty is a part of the adolescence period, in which biological variation associated with genetic features and individual differences are the most obvious and reproductive capability is obtained. This reproductive capability is observed with menarche in females and with sperm ejaculation in males. In fact, while puberty involves child’s physical and sexual development, adolescence involves child’s psychosocial development in addition to physical and sexual development. Therefore, adolescence may last longer than puberty (Bandura, 1989). The beginning of puberty may vary from one society to another and it is determined via child’s bone (carpal) age rather than his/her calendar age. Pubertal changes begin to take place when the bone age is 10 in girls, and 11 in boys. Signs of adolescence begin as early as 8 years old and as late as 13 years old for girls. The lower limit for boys is 9 years old and the upper limit is 14 years old (Abaci et al., 2013; Burt Solorzano & McCartney, 2010). Although these age limits show social differences, the sequence of changes that occur during adolescence is identical for each child. Changes that occur during adolescence begin with biological development, rapid growth in skeletal system and sexual development. The adolescent looks like an adult, however he/she does not act or think like an adult (Kanbur, 2012). Essentially, the adolescent struggles for independence, while trying to internalize physical changes (Akçan Parlaz, Tekgül, Karademirci, & Öngel, 2012). The adolescent has certain expectations from the family, self and society. These are social acceptance, independence, expecting love from family and others, self-respect, desire for success, having physical strength and beauty (Akman, Tüzün, & Ünalın, 2012; Aslan, 2008; Karadamar, Yİğİt, & Sungur, 2014). Adolescent’s failure to meet these expectations or adopt to these changes leads to negative health behaviors. Preventable morbidity and mortality cases are observed as a result of these negative health behaviors (Karakoyun & Yağcı, 2013; Yılmaz, 2013).

Today, unhealthy and unbalanced diet habits and associated diseases are among the primary biological and psychosocial health problems of

young people (Kilinç & Çağdaş, 2012). Rapidly changing beauty standards of the society and the fact that excessive thinness is found attractive lead to an increase in negative health behaviors and eating disorders (Kilinç & Çağdaş, 2012; Lebow, Sim, & Kransdorf, 2015). 7 out of every 10 premature deaths are due to a disease caused by negative habits that started in adolescence (Yılmaz, 2013).

Most common causes of death in this age group are motor vehicle accidents, injuries and suicide. Unprotected sex, alcohol and other drug dependencies, especially smoking, fighting, carrying a weapon, driving, and improper diet are important morbidity causes (Kutluk, 2006).

Although these are known facts, so little is done to safeguard the health of young people. In order to protect the health of the adolescent, changes occurring due to adolescence must be distinguished from pathological cases and anomalies in physical and psychological development must be determined.

## Physical Changes

### Physical Growth and Sexual Development in Adolescence;

Growth is the increase in the body size and mass as a result of the increase in the number and size of cells. Development is the differentiation and maturation of biological functions of organs. Growth is a dynamic process and continues until the end of adolescence. Growth and development are affected by genetic and environmental (nutrition, living conditions, geographical conditions, socio-economic conditions, etc.) factors (Okyay & Ergin, 2012). Changes in this period take place very quickly. Physical changes are the increase in height and the weight, the development of secondary sex characters, the change in the amount and distribution of fat and muscle tissues and changes in circulation and respiratory system (Derman, 2013; Okyay & Ergin, 2012; Traggi & Stanhope, 2003). This period lasts 2 to 6 years. The development of secondary sex characters in boys result in growth in testes and penis, pubic, axillary and facial hair development, breaking of the voice and spermatid formation. The development of secondary sex characters in girls begins with development of breasts and continues with pubic and axillary hair development and menarche. These changes during puberty cause children of the same age look physically different. Therefore, changes

occurring in adolescence must be followed and anomalies must be determined.

### **Increase in height and weight in adolescence**

With the onset of the symptoms of puberty, a significant acceleration is observed in increase in length as a result of anabolic effect of gonadal hormones. Testosterone has a stronger anabolic effect compared to Estrogen group of hormones. Therefore, the peak height velocity (PHV) is more significant in boys (Abaci et al., 2013; Baltacı, Ersoy, Karağaoğlu, Derman, & Kanbur, 2008; Okyay & Ergin, 2012; Traggiai & Stanhope, 2003). This difference explains the taller adult height in men. The height at the beginning of adolescence, which is 80% of the adult height, reaches 99% of the adult height in 2-4 years. The period in which the growth is the fastest in adolescence is referred to as the peak height velocity (PHV). PHV is approximately 9cm/year in girls and 10.5cm/year in boys<sup>6,7</sup>. Adolescence starts 2 years earlier in girls compared to boys. Therefore, the peak height velocity in girls start earlier compared to boys. Boys catch up with and pass girls in terms of height about at the age of 14 (Derman, 2013). Average height increase per year is 8-9cm in girls and 10-11cm in boys (Büyükgebiz, 2006a). Increase in height gradually slows down towards the end of adolescence and completely stops at 16-18 in girls and 18-20 in boys (Baltacı et al., 2008; Yiğit, 2009b). However, an increase of 3-4mm is observed due to continued growth of the spine. As a result of anthropometric measurements performed in 1937, the average adult height for the 10-19 age groups in our country was found to be 152,2cm for females and 165,7cm for males. However, in a series of studies performed with university students after 1980, it was reported that the average height was 160,2-164,1cm for females and 174,0-176,4cm for males. These findings show that there has been a significant increase in the average adult height since 1937 (Kondolot, 2012). According to a study on puberty and pubertal growth between the ages of 8-18 conducted by Bundak et al., it was reported that puberty started at the age of 11,6±1,2 and the height at the beginning of puberty was 146,1±7,7cm for boys. The peak height velocity was 10,1±1,6cm/year, the total height increase in puberty was 26,4±4,3cm, the total puberty duration was 4,9±0,6 years (Rüveyde Bundak et al., 2007). It was found that puberty started at the age of 10,1±1,0 for girls. The height at this age was 141,7±7,6cm, the total

puberty duration was 4,9±1,2 years and the menarche age was 12,2±0,9. The peak height velocity was found to be 8,5±1cm/year and the total height increase in puberty was 16,0±3,9cm (Rüveyde Bundak et al., 2008). Girls are heavier compared to boys between the ages of 12-14. In adolescence, girls gain 16-17 kilograms on average and get 20-25 centimeters taller, while boys gain 19-20 kilograms and get 25-28 centimeters taller and reach the adult height with the closing of pineal bodies (Rüveyde Bundak et al., 2006; Ercan, 2008; Neyzi et al., 2008). There is an average height difference of 12-13 centimeters between adult men and women (Derman, 2013; “WHO | Development of a WHO growth reference for school-aged children and adolescents,” n.d.). This is because the sexual development in adolescent boys starts later than girls, they reach the peak height velocity later than girls and the increase in height during growth spurt is higher in boys (Derman, 2013; Traggiai & Stanhope, 2003). While the weight gain is largely in the form of fat storage in girls, it occurs in the form of growth in muscle and skeleton mass in boys. While subcutaneous fat tissue reduces in boys, it continues to increase in girls (Büyükgebiz, 2012; Derman, 2013; Ercan, 2008; Okyay & Ergin, 2012; Yiğit, 2009). The peak of increase in body weight and the peak of increase in height occur at the same time in boys. In girls, the increase in body weight starts 6 months later than the increase in height (Baltacı et al., 2008).

### **Bone growth in adolescence**

Bone age is an indicator of normal maturation. In the process of puberty, a rapid progress in bone age is observed, followed by the joining of pineal bodies. Estrogens play the major role in the progress of bone age and closing of pineal bodies. When the bone age reaches 15 in girls and 16 in boys and the growth rate is determined to be less than 1cm in the last year, the individual is accepted to have reached adult height. In this case, pineal bodies are closed and growth is completed with a small increase reflecting spinal growth (Aykut, 2011). Changes occur in body structures of boys and girls during this period.

During adolescence, an increase in growth rate is observed in the whole skeletal system in a particular order, except for cranium. First, hands and feet grow. This is followed by firearms and legs and then upper arms and thighs. Longitudinal growth is followed by latitudinal

growth (Erci, Avcı, Hacıaloğlu, Kılıç, & Tanrıverdi, 2009; Yiğit, 2009). Hips, breasts and shoulders enlarge. The enlargement is evident in hips in girls and in shoulders in boys. The growth of cranium reaches adult size at the age of 10, however facial bones rapidly grow during adolescence and facial appearance changes. Chin grows and thickens as a result of the growth of the mandible bone. Nose grows and profile changes. Thus, the development of face is completed in puberty. Puberty is the period in which the bone mineral density grows the fastest. This increase is related to genetic factors, height, weight, starting age of puberty, puberty stage, body mass index, calcium intake and sportive activities (Aykut, 2011). Differences in the skeletal structure become more evident in puberty depending on gender. In boys, shoulders widen and pelvis remains narrow, while the exact opposite is the case for girls. Bone mass, thickness and density grow more significantly in boys compared to girls (Erci et al., 2009).

#### **Muscle development in adolescence**

There is not a significant difference between boys and girls in terms of muscle strength before puberty. In puberty, the increase in muscle mass and strength in boys is higher compared to girls due to the effect of androgen hormone. The increase in strength continues until late puberty. In girls, the increase in muscle tissue peaks during menarche in girls (Manager, 2009; Yiğit, 2009). The increase in muscle tissue in boys peaks during the height increase spurt. At the age of 17, muscle mass of boys is 2 times more than girls. At the end of this period, muscle mass boys becomes 2-4 times more than girls (Yiğit, 2009).

#### **Organ growth in adolescence**

Rapid growth in puberty affects organs such as heart, lungs, kidneys, and spleen. The axillary diameters of eyes grow. Nearsightedness may occur due to this growth. The brain development continues in adolescence. Despite of proliferation of cells that support and feed neurons, there is no increase in number of neurons (Abacı et al., 2013; Manager, 2009; Traggiai & Stanhope, 2003). Lymphoid tissue reaches the highest level at the age of 12 and then lymph mass is reduced. Lymphatic tissues undergo involution and lymph tissue in body is reduced. Basal metabolic rate is approximately 10% higher in boys compared to girls. Basal body starts to decline at the age of 12 in girls, while this occurs in boys a little later. Respiratory volume, vital capacity and other

physiological functions related to respiration increase. Lungs are bigger in boys due to larger ribcage and shoulders compared to girls (Traggiai & Stanhope, 2003). Blood volume is higher in boys compared to girls due to the increase in muscle cells. As a result of testosterone's stimulating effect on erythrocyte production, there is an increase in number of hemoglobin, hematocrit and red blood cells in boys, but not in girls. The number of leukocytes and sedimentation rate drop in both sexes and reach adult level (Yiğit, 2009). The number of thrombocytes increases in both sexes. Pulse and respiration numbers of both sexes reach adult level. At the end of the puberty period, levels of serum renin, aldosterone, thyroid hormones, calcium and phosphate slightly decrease and reach adult values (Bordini & Rosenfield, 2011).

#### **Psychosocial Changes**

Another change that occurs in adolescence is psychosocial development (Orhan Derman, 2008). 'Self-definition and personality development' occur during the psychosocial development (*The Oxford Handbook of Social Cognition*, 2013). Age-specific tasks and behaviors that reflect adult roles are observed in self-definition. The adolescent gradually becomes an individual who adopts social duties, tries to live his/her life on his/her own, assumes adult levels of responsibility, finds his/her own personality by establishing new relationships. The adolescent becomes selfish, demands more, complains about rules in the house, finds rights given to him/her insufficient and wants to be free. He/she wants to make his/her own decisions and choices. The center of his/her social environment shifts from the family to friends and school groups. He/she does not want to stay home, develops a greater interest in outside world and gives more importance to friendships (Kurtman, 2005). His/her interest in classes decreases, studying order is disturbed and school success decreases. He/she gives negative reactions to his/her parents. Family relationships shifts from dependence to independence (Akçan Parlaz et al., 2012; Güler, Gönener, Altay, & Gönener, 2009). Individual's drifting away from family may lead to feelings of despair, loneliness, and insecurity (Karadamar et al., 2014).

There are several concepts such as ego, identity, character, and temperament used to explain personality development in the course of psychosocial change during adolescence

(Kurtman, 2005). Personality development is a process that begins at birth and continues until death. It is a very complex and dynamic process showing parallelisms with other areas of development (Yiğit, 2009). Personality is described as a dynamic integration of individual's social, moral, mental and physical properties, whether known or unknown, demonstrated or not (Kurtman, 2005). Ego is a multidimensional concept and is thought to be individual's perceptions, emotions and attitudes regarding himself/herself. According to Rogers, the concept of ego constitutes the core of personality development. It is the statement of how the individual perceives himself/herself. The concept of ego affects individual's relationship both with himself/herself and his/her environment and shapes his/her behavior (Büyükgebiz, 2012; Prime Ministry Directorate General of Family and Social, 2010). In childhood, the concept of ego starts to develop by perceiving the environment. The child sees and perceives his/her mother's face before his/her own face. The concept of ego, which is established with influences from environment in this process, then becomes an element that guides how environment is perceived (Ergün & Conk, 2011). The concept of ego has several dimensions such as physical, social, cognitive and academic (Ergün & Conk, 2011). An important part of the concept of ego, the body image, involves conscious and unconscious emotions, thoughts and perceptions. Body image is a dynamic concept that starts to developed in infancy, becomes more important during adolescence, keeps developing and changing throughout life and involves individual's subjective perception of his/her body (Abacı et al., 2013; Büyükgebiz, 2012, 2006a, 2006b; Ercan, 2008; Özen Y & Gülaçtı F, 2010). Therefore, it is very important that ego is reinforced positively.

Identity can be described as a mix of individual's past and present experiences and definition of self differently from others consistently. In adolescence, identity emerges with the question "Who am I?". Identity exists in adolescence with family ties, friends, relationships, career choices, position in society, goals, worldview and lifestyle. In other words, the individual thinks of himself/herself both as a unique individual and an individual with meaningful bonds with others. Three basic elements of identity development are gender identity, social identity and professional

identity (Öztürk O., 1994). It is difficult for sexual identity to develop without physical changes. Cultural attitudes, gender-specific behaviors, expectations and present role models are important in development of sexual identity (Kılıç, 2013; Yiğit, 2009). Social identity is the recognition of adolescent's roles and place in his/her own groups and society. This process is the period in which the adolescent tries to understand how he/she is perceived and assessed by others (Kılıç, 2013; Özen Y & Gülaçtı F, 2010; Öztürk O., 1994; Yiğit, 2009). Professional identity is being occupied with professional endeavors and having training and preparing to have a profession. Adolescent's experiences during this period help him/her reach his/her self-identity (Kılıç ZE, 2006; Öztürk O., 1994). An important indicator of healthy identity development is that the congruence of intrinsic sameness and continuity felt by the adolescent with perceived sameness and continuity perceived by others (Derman, 2013). A person without integrity and continuity has no sense of identity. The adolescent in this process needs more attention, support and tolerance compared to previous stages. As with every stage, democratic and tolerant adult attitudes play an important role to overcome identity crisis in this stage (Kurtman, 2005; Öztürk O., 1994). Once the sense of identity is established, individual perceives himself/herself as an independent individual and feels adopted and accepted by others. Attitudes of family and friends are quite important in overcoming adolescence crisis. Family's support for adolescent, consistent attitudes and performance of protective roles make it possible to overcome this period successfully. At the end of this process, the adolescent calms down and better understands the value of family and becomes able to assume adult responsibilities (Güler et al., 2009). Not all of these instances apply to each and every adolescent. Some adolescents remain dependent on their family or friends and cannot assume adult responsibilities (Akçan Parlaz et al., 2012). Because adolescence is a period in which adaptation difficulties and psychological problems are frequently experienced, coping abilities must be gained in this period (Akçan Parlaz et al., 2012).

Changes and developments in body and sexual organs, intrinsic enthusiasm and developmental issues in adolescence affect the development of sense of identity (Yiğit, 2009). Identity

development and self-acceptance are among the most important features of this period. Identity development varies depending on physical, cognitive and social elements (Atak, 2011). Sexual identity is defined as the process during which the adolescent perceives himself/herself as a male or female and internalize social gender roles with the influence of environmental attitudes (Prime Ministry Directorate General of Family and Social, 2010). Physical changes occur during the process in which sexual identity develops. Since these changes influence adolescent's self-perception of his/her body and sexuality, new mental features and behaviors emerge (Öztürk O., 1994).

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