

BIO-PSYCHO-MOTOR ASPECTS OF SECONDARY SCHOOL STUDENTS

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Abstract

The human is the product of the specific interaction of natural and social factors. Periods of age were divided by specialists differently; Demeter, A. [80] divides from a functional point of view the school age of 6-18 years old into three periods, unequal in duration, namely: - the small one (ante pubertal) school period 6-11 years-old; - middle school period (puberty) 11-13 years-old in girls, 12-14 years-old in boys; -high school period (post-puberty) 14-18 years-old. This classification is based on the major criterion of the physiological and mental factors represented by puberty, bringing psychophysiological changes with deep consequences in terms of physical constitution, determining the entire somato-functional and mental development of the pupil.

Introduction

The assessment of the pupil's developmental stage must take into account the morphological aspects, but also analyze the functional level of the various organs, apparatuses and systems of the body, their capacity for effort, adaptability to the ever-changing demands of the physical and social environment, therefore to its full biological potential. The correct assessment of the unique process of development and health in a community must be based on the analysis of both components, growth and differentiation - in a dialectical relationship.

Research methods

Scientific methods such as analysis of the specialized methodological-scientific literature and the analysis of the documents related to the problems of sports training - as a social activity were employed in this study.

Research results

In the process of growth and differentiation, the pupils' body undergoes a large number of physiological, psychological and psycho-social transformations, transformations that have great influences on their physical, sports activity and exercise capacity [5, p.16]. If until the age of 11 endocrine secretions abounded in growth hormones, after this age the endocrine system is characterized by the intense secretory activity of the ovary and testicle respectively, which through sex hormones cause important functional morphological changes in the body. Authors in the field studied [2; 7; 9] consider that with puberty the secondary characters are highlighted. In boys, the development of the larynx and voice change, the appearance of axial and pubic hair, the increase of muscle mass, but in girls, the development of the mammary glands, the appearance of axial and pubic hair. The skeleton, especially the pelvis, has differences between the two sexes. In girls, the diameters are larger, so that the pelvis is adapted for parturition.

Puberty is marked by two extremely important phenomena: acceleration and neoteny.

Acceleration - is the biological phenomenon, according to which the current generation, compared to previous generations, records an increase in height and weight. Thus, in our country, compared to the period 1930-1940, there is an increase in the height of 12-14 years-old boys, and in

girls between 10-12 years-old. The explanation for this phenomenon is still quite controversial, but most authors admit the involvement of three factors: high quality diet, richer in protein, urbanization, with all the context of influences that attracts and genetic factors.

Neoteny - is the biological phenomenon of accelerating somato-sexual maturation and delaying psycho-intellectual maturation, along with delaying social maturation. Psycho-intellectual maturation, which a few decades ago ended at the age of 19-20, now continues until the age of 22-23. This maturation consists of the continuation of the process of permeabilization of the synapses in the central nervous system, which confers increased plasticity of the nervous structures. We note that research has shown that with the completion of psycho-intellectual maturation begins a process of neuronal destruction in the central nervous system, which continues until death and is even lower as the mental and physical activities are more intense.

We also mention that puberty varies in duration from individual to individual, apart from sexual characteristics and which become obvious, there are a number of changes throughout the body such as bones grow thicker, the vascular system develops, larynx in boys increases explosively, the torso grows larger than the limbs, and the two sexes become more and more differentiated.

Regarding the morphological characteristics of the other devices, the authors [8; 16; 18] unanimously mention the following elements of importance in sports practice:

The musculoskeletal system - bones develop at this age, especially due to their increase in thickness, by the deposition of mineral salts (Ca and P) and by strengthening the intimate functional structure. They become more resistant to the action of mechanical factors, pressure, traction and twisting, to the detriment of the previous elasticity.

The skeletal system, growing in length, approaches the constant appearance and size of adults, but in terms of hardness and strength, the bones lag behind, the bones of the limbs show a slow pace of growth and finalization of the ossification process. The bones of the lower limbs develop slowly, but there is ossification of the coxal, patella, tibia and phalanges according to Firea, E. [12].

At the level of the spine, the sacral canal closes, at the age of 13, when the process of synostosis of the vertebral body pedicles ends.

Golu, P., Zlate, M., Verza, E. [13, p.72], state that due to the elasticity, the spine can change, but the curves of the spine have already formed, but not enough stability have.

The development of the thorax, in the first part of puberty, is slow (the age of the narrow thorax) followed by a more pronounced development.

The humeral body is welded with the rest of the epiphysis between 13-16 years-old in girls and between 14-17 years-old in boys, the humeral trachea ossifies through a double center, which appears in girls at 11 years-old and in boys at 13 years-old.

The joints are poorly developed and the ligaments do not provide sufficient tensile and torsional strength.

Muscles develop mainly by lengthening the fibers and not in thickness. Because of this, their surface area of physiological section is smaller and, consequently, their strength becomes smaller too. The length of the muscle fibers also has an advantage, it determines the increase of the value of the mechanical work, with the obligation that there is no difficulty over the global force of the muscle.

The muscular system is unevenly developed; the long muscles of the upper and lower limbs progress faster than the short muscles of the hand, which explains why it is easier to perform wide, broad movements (walking, throwing, hitting) than precision movements (drawing, crocheting,

etc.). The muscles are underdeveloped, especially those in the anterior part of the rib cage and those in the spine (posterior) [17, p. 55].

The relative force (the force reported to the body weight) at this stage, not only stagnates, but even shows a considerable regression at both the flexors and the extensors. However, the rate of increase of the absolute and relative force of the extensors is slightly higher than that of the flexors. Therefore, at this age, there is a need to use strength exercises to a greater extent, especially for the flexor muscles, preventing the decrease of global motor activity, the tendency accentuated in girls towards the end of puberty.

The revision of old concepts, which contraindicated the use of force exercises in pupils at puberty age, invoking functional arguments, is absolutely necessary.

Maximum force exertion and high neuromuscular strain are contraindicated, which presents the danger of overuse of the musculoskeletal system. On the other hand, well-measured strength exercises, based on working with small barbells and dumbbells, with the gradual increase of the intensity, according to the principle of gradual increase of the effort, are not contraindicated at all.

Pure strength training should be avoided.

- at 9-10 years old, dynamic strength development exercises will be used, avoiding static ones;
- up to the age of 11-12, both girls and boys, there is a similar evolution of strength indices; this remains valid only until this age - between 10 and 14-15 years old you can use exercises in which the load is your own body or weights about 1-2 kg; up to the age of 14, the force-speed torque can be developed without restrictions; - between 11 and 13 years old, the weights that can be worked with are of maximum 30% of the body weight; over the age of 14, you can even use exercises with loads that exceed the students' body weight [4].

The speed of reaction and repetition is developed, but strength and endurance are far behind the adult. That is why training is not allowed in order to obtain performance in strength and endurance efforts; any improper use of means that develop strength and endurance has negative consequences for growth.

The nervous system - develops rapidly and practically ends the maturation of the cortical area of the motor analyzer. The function of analysis and synthesis of the cerebral cortex develops, and the process of internal inhibition increases. On this basis, the speed of the differences increases, and the formed conditioned reflexes are extinguished more slowly. The function of the second signaling system dominates the first system.

Baciu, C. [9, p. 20] considers that the nervous system is characterized by the fact that it continues to develop, especially by permeabilizing the synapses. There is a balance between excitation and inhibition, between irradiation and concentration, the nervous system approaches the optimal functional capacity, being receptive and capable of creative analysis.

At puberty, the insufficiency of conditioned inhibition processes to the power of arousal processes still persists to some extent. Due to this, the children's movements are sudden, with low accuracy.

Excitability and high mobility of the nervous system during puberty explain the rapidity of motor reactions in general, but as the balance of nervous processes is unstable, coordination does not benefit from favorable conditions for development.

The cardiovascular system - the heart is bulky compared to the chest. The mechanisms of circulation setting are frequently disturbed (predominantly sympathetic) and are set by effort. Functional murmurs, arrhythmias, and hypertension are common in the heart.

According to Rosca, Al., Chircev, A. [17], the cardiovascular system works from the intrapartum with a heart rate of 130-140 beats/min. The heart muscle works well, its activity is

facilitated by reduced blood pressure because the blood vessels are relatively wide and the blood circulates easily.

Other authors who have studied the field [5; 10; 14] consider that the cardiovascular system develops slowly during puberty. The arteries are proportionally larger than in adults, and the veins and lymphatic system are well represented. At the beginning of puberty, the heart rate is 90-100 beats per minute, and at the end of puberty - 82-88 beats per minute.

The systolic volume increases from 30 ml, reaching values of 40-45 ml at 13 years old, and 45-60 ml at 14 years old. Cardiac output also increases. However, short-term and intense cardio-respiratory efforts are not indicated, requiring too much heart.

Therefore, the cardiovascular system is more difficult to adapt to intense exertion, as evidenced by the fact that the maximum oxygen pulse, obtained in absolute values or per kg body weight, is lower and systolic volume and cardiac output are far from adult values, boys recording higher values than girls [9].

The respiratory system develops intensely during puberty. The nose takes on a final shape, the larynx descends taking the topography from the adult, the trachea and bronchi grow, the lungs increase masked in weight and volume, their anatomical capacity increases by over 50%, the number of elastic fibers in the lungs increases considerably.

Respiratory function is markedly improved. Increases the range of respiratory movements (from 230 ml current volume - at 11 years old, to 350 ml - at 15 years old), decreases respiratory rate (on average, from 22 to 18 respiratory movements per minute), increases vital capacity, and tissue respiration - estimated after maximum oxygen consumption per minute - increases considerably.

The respiratory system is quite well developed. Respiratory rate increases during exertion to 40-45 resp / min. Another peculiarity of the respiratory system specific to this age is the narrowing of the upper respiratory tract [17].

Although the cardiovascular system is much more demanding due to the rapid increase in body weight, physical exertion is not contraindicated except in the case of organic injuries. Experience has shown that functional disorders disappear through the rational practice of sport.

The most striking difference from a young school age is the intense development of the endocrine glands, especially the glands, which become functional. Sexual maturation leads to the appearance of libido and the ability to procreate - elements that will influence the whole behavior of the young person. The upper nervous system undergoes significant changes. The pituitary gland, especially the anterior lobe, intensifies its activity, T.S.H. secretion increases, A.C.T.H. increases thyroid and adrenal activity, causing hyperactivity of the nervous system and a marked instability or neurovegetative lability.

Epuran, M. [11 p. 467] considers that the mental balance of the adolescent is a constant of the positive influence exerted by the school, family, society, coach, it has a positive impact on the training process, resulting in shaping the personality of the young person and his integration in society.

Endocrine, nervous and neuropsychic changes accentuate the discrepancy between physical development and the actual functional capacity of the body, which is manifested by unsafe movements, clumsy ones, or even motor neuro-vegetative disorders (tendency to sweat, redness of the face), irascibility, emotion, with some states of excessive shyness, explosive attitudes, the tendency towards noisy competitive games.

However, at this age, there is the nervous and locomotor substrate necessary for learning complex motor skills (perfecting the technique) and for speed efforts. However, taking into account

the fact that each child has his or her own puberty, special care must be taken to individualize the effort.

A series of authors [1; 4; 9; 16] considers that the differences between the genders are large during this period. Girls initially outnumber boys in terms of height and weight gain. The development of the pelvis, the specific deposits of adipose tissue, the development of the breasts, etc. appear.

Due to the somatic and vegetative differences between the two genders, it is necessary to develop separate programs and work individually.

During this period of age, the following are allowed in the physical education programs: speed running, jumping, throwing with appropriate sports equipment (Oina balls, small weights), alternating sports games with relatively long rest breaks. Sports that require high endurance requirements – middle distance running, speed skating, road cycling - may be included in the training program as long as is done gradually, under medical supervision, strictly limiting the effort according to the physical development level and functional capacity of the children's body at this age.

Some authors [16; 17; 19; 202] do not recommend the use of maximum effort, with high straining of the musculoskeletal system. In training children at this age, a large number of physical exercises with different structures of movements and varied neuromuscular efforts can be used. They contribute to the formation of dynamic stereotypes, to obtaining rich baggage and to the development of functional body capacities.

Conclusion

At puberty, physical training methods should be applied differently, depending on the nature of the effort and the specific requirements of each sport. The fact that the chronological age is not identical to the biological age additionally requires the removal of the rigid application of the indications shown above.

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