

Anthropology

Psychometric Characteristics of Adolescents from Plovdiv, Aged 19-20

E. Andreenko

*University of Plovdiv "P. Hilendarski" – Faculty of Biology,
Department of Human Anatomy and Physiology*

Introduction

The problems of developing the motional habits and skills of humans have drawn various experts' attention for a long time, such as sports anthropologists, psychologists, teachers, etc.; because these problems are closely related to the functional condition and the level of working capacity of individuals during different age periods in their lives. In connection with studying the human psychomotor status, it is often applied an assortment of psycho-diagnostic approaches – attention analyses, speed of visual-motor reactions, emotional stability, mobility of the higher nervous activity, etc. Psychological research, done in this direction, show that personal characteristics, psychology and human consciousness are important factors that affect biological functions, somatic condition, health and development of individuals (1, 2, 3, 4, 5, 6).

The purpose of the present study is to research the inter-sexual differences in the psychometric characteristics of adolescents from Plovdiv, at the age of 19-20.

Key words: tremor measurement, tapping-test, speed, dexterity, attention.

Material and Methods

192 people were tested – 80 boys and 112 girls, aged 19-20, university students in their first year, from different specialities of the University of Plovdiv. The research was conducted in the period of years 2009-2010. In the present work we used a part of transversely measured data, in connection with the realization of the scientific project БФ-031 "Physical development, functional activity and psychological status of students".

We included a total of 9 directly measured psychometric indications. The common psychomotor profile of the students we surveyed represents a collective portrait of the

psychomotor, emotional and nervous-dynamic characteristics of the nervous system. Table 1 shows the main nervous characteristics of the students and the psycho-diagnostic tests used.

Table 1. Psychometric profile and tests used for psycho-diagnosis

Psycho-metric profile of the students	Tests applied
Psycho-emotional characteristics	Tremor measurement (static)
Coordination characteristics	Finger dexterity
Nervous-dynamic characteristics	Tapping-test Speed of the sensorimotor reaction
Characteristics of attention	Correction test with geometric shapes

➤ **Static tremor measurement (number of touches)** – the Polish electro-mechanical testing apparatus for psycho-physiological and technical research “Tremor-meter” was used. The person tested holds in hand, with their arm stretched, a metallic pencil in a circular aperture (d=5mm) in 10 seconds, without touching the walls of the aperture. *The number of touches (errors) was read.*

➤ **Finger dexterity (in seconds)** – a special block-board, with sockets for insertion of pins of three different sizes, was used. *We read the time that it takes to arrange all the removed pins in their places.*

➤ **Tapping-test (number of knockings)** – the apparatus “Tremor-meter” was used; you strike with a metallic pencil the top plate as quick as possible in 10 seconds. *The number of knockings on the plate of the apparatus was read.*

➤ **Speed of the sensorimotor reaction (number of correct hits)** – we used the reflex-meter “Piorkowski – I.C. – 6”. When submitting a series of simple light signals in a random order, the test subject responds as quickly as possible by pressing the appropriate button. The survey was conducted in two consecutive programmed pace of work – 75 pulses/min and 105 pulses/min. *The number of correct hits in the apparatus was read.*

➤ **Correction test with geometric symbols (for the intensity of attention)** – we used a blank-test with evenly spaced different geometric shapes (circle, square, rhombus, etc). The test subject strikes out with a vertical line only a single shape (a small circle) in 1 minute. *We read the number of correctly struck figures, the number of mistaken ones and the number of omissions.*

All data were processed using SPSS statistical package. The reliability of intersexual differences was checked through the t-criterion of Student at the level of significance $P < 0.05$.

Results and Discussion

The average values of the psychometric features in the surveyed students of both sexes are presented on Table 2 and illustrated in Figure 1 and Figure 2.

One of the important qualities of human emotions is their balance or stability. The lowered processes of active internal retention are the basis of a lesser degree of stability in the emotional sphere.

Table 2. Average values of the psychometric features of 19-20-year-old students

Tests		Boys N = 80		Girls N = 112		T ♂/♀
		X	SD	X	SD	
Static tremor measurement (number of touches)		5,18	6,76	5,33	6,61	
Finger dexterity (in seconds)		43,81	8,31	41,21	7,52	*
Tapping-test (number of knockings)		77,34	13,71	64,17	12,60	****
Speed of the sensor motor reaction (number of correct hits)	75 pulses/min	41,50	9,02	36,34	11,87	**
	105 pulses/min	35,40	4,33	35,61	4,30	
Correction test with geometric symbols (for the intensity of attention)	Number of correctly	67,30	14,13	67,58	12,49	
	Number of mistaken	0,039	0,19	0,050	0,26	
	Number of omissions	22,69	14,13	22,28	12,34	

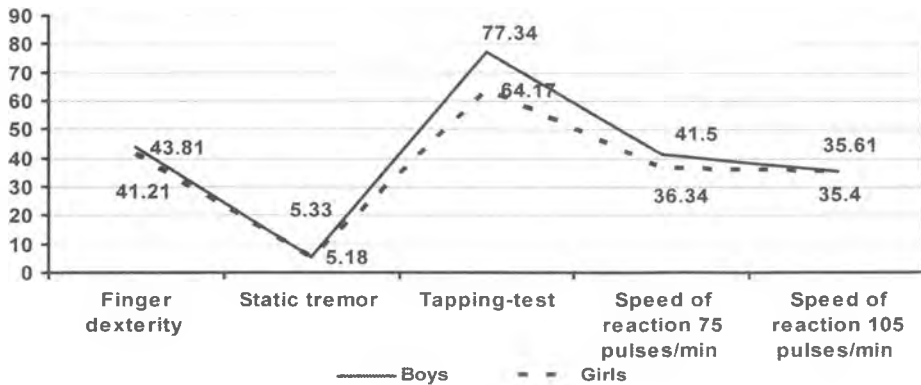


Fig. 1. Average values of the psychometric features of 19-20-year-old students

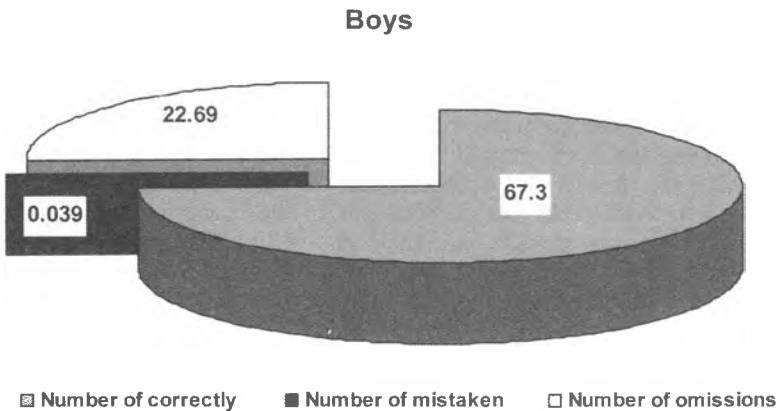


Fig. 2. Intensity of attention – Correction test with geometric symbols (Boys)

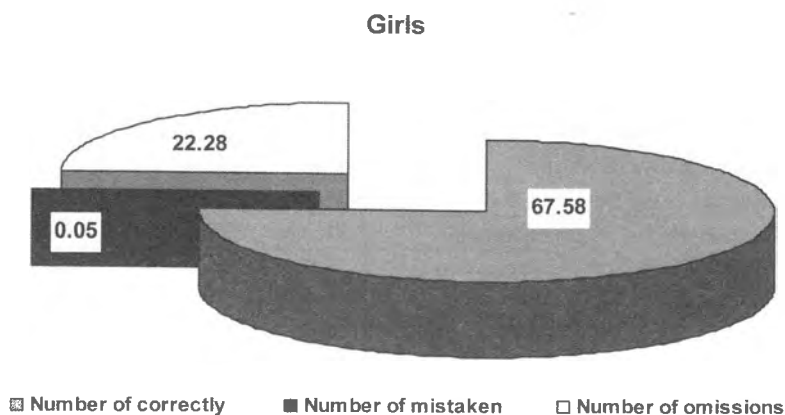


Fig. 3. Intensity of attention – Correction test with geometric symbols (Girls)

The tremor measurement makes possible to assess the functional status and emotional instability of the nervous system; it has a clearly-expressed individual nature. The results of this study show similar physiological type of tremor in both sexes. The average value of this feature for boys was 5.33 touches, while for girls they are 5.18. The recorded fluctuations in the psycho-emotional stability between the sexes do not reach statistical value ($p > 0.05$). The boys and girls tested have similar processes of controlled micro-movements in carrying out the task.

Finger dexterity is a psychometric feature that refers to the speed parameters of the nervous activity. Besides speed, the major components of this test are also the coordinated movements of the fingers and the quickness of mind. The average time to arrange the pins for boys was 43.81 sec, and for girls – 41.21 sec. The difference in averages between the sexes was significant ($p < 0.05$) and it showed that the girls solved the task 2.6 sec faster than boys.

Tapping-test appears to be a simple and effective practice for individual or group diagnostics of the functional status and the degree of activation of the nervous system. It aims to determine the power of neural processes and it is based on the changes in the time of the maximum rate of wrist movement. The results show that the number of movements with a maximum frequency is higher in boys (77.34 taps) than in girls (64.17 taps). In 10 seconds the boys made an average of 14 taps more than girls. The gender differences were statistically significant ($p < 0.05$). Therefore, in boys, it is recorded a higher functional mobility and speed of the neural processes.

Speed of reaction is an integral indication of the speed of implementation of excitation in reflex arc. It very much depends on the functional condition of the central nervous system as well as on the peculiarities of the higher nervous activity. In the survey we used two programmed pace of work – 75 pulses/min and 105 pulses/min. When comparing the data for speed of reaction at the lower frequency (75 pulses/min), we had better results for boys. For them there is a statistically significant greater amount of correct responses (correct hits 41.50) than girls (36.34 correct hits) – ($p < 0.05$). This shows a better level of functional status of CNS in boys.

With regard to the higher pulse frequency (105 pulses/min), significant differences between the sexes were not observed ($p > 0.05$). The girls equaled their speed of response (correct hits 35.61) to that of boys (35.40 correct hits).

Intensity of attention represents a focused or intent consciousness, suggesting an increased level of the sensory, intellectual or physical activity of individuals. The most common group of research methods of attention is the blank methods grouped under the general title “Correction tests”. In the present study we used the widely popular “Correction test with geometric symbols”. The amount of the basic mark (a small circle), which must be struck out according to the instructions, is 90. The test gives the opportunity to assess the speed of information processing in the central nervous system. The results show the same averages with regard to the quantity of properly struck geometric shapes in both sexes. Boys struck out properly 67.30 symbols, and girls – 67.58 symbols ($p < 0.05$). In terms of numbers of the wrong strikes and omitted geometric symbols, gender differences also were statistically insignificant ($p < 0.05$). The boys gave average 0.039 wrong answers and 22.69 omissions, while the girls respectively – 0.05 errors and 22.28 omissions. The resulting data show a similarity in the quality of attention. Obviously, solving the mental task of the correction test runs in both sexes at an equal degree of attention expression.

Summarizing the data from this study, we can conclude that students’ nervous-dynamic and coordination characteristics play a better demarcating role in their psychometric profile in comparison with their psycho-emotional characteristics and features of attention. Some results from the psycho-diagnostic tests allow us to get to the following

Conclusions

- For students of both sexes there is a similar physiological tremor, and therefore similar levels of emotional stability.
 - Boys show a higher speed of response and they make more movements in a short time, while girls are more skillful and quick-witted.
 - Both sexes maintain a high level of concentration and have a similar level of attention expression.

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