

PRACA ORYGINALNA
ORIGINAL ARTICLE

PECULIARITIES OF THE INTERACTION OF THE INDICATORS OF PSYCHOPHYSIOLOGICAL ADAPTATION OF MODERN STUDENTS IN THE CONTEXT OF THE EFFECTIVE MONITORING OF INDIVIDUAL HEALTH OF YOUNG WOMEN AND YOUNG MEN

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ABSTRACT

Introduction: Creation of modern information systems for supervision of the state of health of the population is impossible without effective monitoring of the state of individual health, the implementation of a comprehensive assessment of risk factors and the development of recommendations for the preservation of the health of individuals.

The aim: Determination of the peculiarities of the interaction between the indicators of the psychophysiological adaptation of students during the academic year and throughout the period of stay in a higher medical education institution in the context of providing effective monitoring of the individual health of young women and young men.

Materials and methods: A set of psychophysiological functions of the organism of the students was investigated by instrumental techniques and computer diagnostic complex "Effecton Studio", applying of standardized t questionnaires the characteristics of the person were determined, and the prognostic evaluation of the obtained data was carried out with factor analysis procedures.

Results: It was determined that the following factors should be noted as the main factor formations during the analysis of the physiologically-determined correlates of processes psychophysiological adaptation: peculiarities of dynamic performance, balance of nervous processes and mobility of nerve processes, and mentally-determined correlates of processes psychophysiological adaptation: peculiarities of temperament and anxiety, character properties, level of subjective control of personality, aggressive manifestations of personality and emotional burnout.

Conclusions: In the study were determined the most peculiarities of the interaction of the indicators of psychophysiological adaptation of modern students in the context of providing efficient monitoring of individual health.

KEY WORDS: students, psychophysiological adaptation, individual health, interaction, factor analysis

Wiad Lek 2019, 72, 5 cz. II, 1053-1058

INTRODUCTION

Creation of modern information systems for supervision, monitoring and controlling the health of the population of the state is completely impossible without ensuring effective monitoring of the state of individual health, the establishment and implementation of a comprehensive assessment of both external (environmental factors, social living conditions etc.) and internal (the course of processes of psychophysiological adaptation, the level of development of psychophysiological functions of the organism and personality traits etc.) risk factors, as well as the definition of adequate ways to motivate the healthy way of life, the development of individually significant recommendations for the preservation and strengthening of health of various categories of the population, especially the most vulnerable, such as pupils and students [1, 2, 3, 4].

In this context, particular importance is attached to the approaches aimed at the effective implementation of a comprehensive analysis of extremely large in its scope of information arrays, which actually have data on the functional capabilities of the organism and the state of health

of the subjects, to determine the number and nature of the primary, virtually significant factors, determinants and risk factors to be eliminated or to be influenced, act in a particular direction, modify etc [3, 5, 6, 7, 8].

It is precisely this that offers factor analysis procedures that allow a quantitative assessment of the characteristics of the investigated indicators to be directly determined on the basis of the evaluation of the characteristics, the level of expression of which is established and, therefore, provide an opportunity to identify a rather narrow set of properties for a significant part of the initial characteristics that characterize the connection between the groups of these signs and certain generalized factors. In general, factor analysis is attributed to statistical methods that allow for a completely correct statistical description of multidimensional objects that are characterized by the presence of a plurality of quantitative attributes, and, therefore, a redundancy of the initial characteristics of the system under study, based on the definition of the depth indicators that actually form them and determine [9, 10, 11].

THE AIM

The aim of the scientific research was to determine the peculiarities of the interaction between the indicators of the psychophysiological adaptation of students during the academic year and throughout the period of stay in the institution of higher medical education in the context of providing effective monitoring of the individual health of young women and young men.

MATERIALS AND METHODS

Scientific research was carried out on the basis of National Pirogov Memorial Medical University is among the students of the third course of the medical faculty during the academic year and among students of first, third and fifth courses of the medical faculty in the dynamics of the educational process at the institution of higher medical education. In total, during the observation period, there were 567 students, including 282 young women and 285 young men.

The methodological basis of the research carried out was fully consistent with the bioethical standards, the requirements of the current legislation and international standards, which was confirmed by the conclusion of the Ethics and Bioethics Committee of the National Pirogov Memorial Medical University. In particular, in the course of performing research work on the basis of the use of instrumental techniques and the use of the computer diagnostic complex "Effecton Studio", a complex of psychophysiological functions of the organism of students was subjected: indicators of functional peculiarities of higher nervous activity (latent period of simple and differentiated visual-motor reaction, mobility (MNP) and balance (BNP) of nerve processes), characteristics of attention, dynamic performance (DP) and tapping-testing), functional indicators the possibilities of the visual sensor system (the critical frequency of fusion of light blinkings) and the characteristics of the somatosensory analyzer (coordination of movements).

At the same time, a complex of psychodiagnostic research envisaged the definition of such peculiarities of the personality of young women and young men as characteristics of temperament (according to *Eysenck Personality questionnaire* and Rusalov questionnaire), indicators of state (SA) and trait (TA) anxiety (according to Spielberger state-trait anxiety inventory), characteristics of character (according to Mini-mult questionnaire and Schmieschek questionnaire (*Schmieschek Fragebogen*)), the level of subjective control (LSC) according to the *Rotter's Locus of Control Scale* questionnaire), peculiarities of asthenic and depressive states (according to Malkova questionnaire and Zung self-rating depression scale), indicators of social-psychological adaptation (according to "Social-psychological adaptation" test by Rogers and Diamond), characteristics of psychological protection mechanisms (PPM) (according to Life Style Index questionnaire by Plutchik, Kellerman and Conte), peculiarities of aggressive manifestations (according to the Bassa-Darkness questionnaire), characteristics of emotional burnout (EB) (according to Boyko

questionnaire).

In order to carry out a prognostic assessment of the data obtained and, in particular, to establish the peculiarities of communication and interdependence of the characteristics of the level of development of psychophysiological functions, peculiarities of the person and indicators of the state of health of students, statistical processing of the received data was carried out using the standard package of applied programs of multidimensional statistical analysis "Statistica 6.1" (license number BXXR901E245722FA) using descriptive statistics and factor analysis procedures.

RESULTS AND DISCUSSION

Considering the results obtained, it should be noted that at the beginning of the academic year the patterns of relationships between the studied parameters and the physiologically-determined correlates of the success of the processes of psychophysiological adaptation (y) that have been established should be presented as the following relationships (1-2):

$$- \text{among young women: } y = 0,408f_1 + 0,236f_2 + 0,298f_3; \quad (1)$$

where the factor f_1 was to be defined as "peculiarities of the DP" (the fraction of dispersion – 42,27%) and, above all, united in its structure the indicators reflecting the characteristics of the DP in monotony conditions and the data on the performance of the tapping-test during all the studied ones intervals; the factor f_2 was to be defined as "the characteristics of the MNP" (the fraction of dispersion – 25,10%) and combined both the actual characteristics of the BNP and the data on the number of premature reactions and latency; the factor f_3 was to be defined as "the characteristics of the MNP" (the fraction of dispersion – 19,22%) and included in its structure only the indicators of the actual MNP;

$$- \text{among young men: } y = 0,517f_1 + 0,243f_2 + 0,192f_3; \quad (2)$$

where the factor f_1 was to be defined as "the characteristics of the DP" (the fraction of dispersion – 43,27%) and, in the first place, united in its structure the indicators reflecting the characteristics of the DP in the conditions of monotony and the data on the performance of the tapping-test during all the studied intervals apart from the last; the factor f_2 was to be defined as "the characteristics of the BNP" (the fraction of dispersion – 26,10%) and combined both the actual characteristics of the BNP and the data with respect to the amount of premature reactions and delayed reactions; the factor f_3 was to be defined as "the characteristics of the MNP" (the fraction of dispersion – 21,22%) and included in its structure the indicators of the actual MNP.

At the same time, at the end of the academic year, the regularities of the interactions between the studied indicators and the physiologically-determined correlates of the success of the processes of psychophysiological adaptation (y) that have been established should be presented in the form of such interactions (3-4):

$$- \text{among young women: } y = 0,430f_1 + 0,226f_2 + 0,200f_3; \quad (3)$$

where the factor f_1 was to be defined as "the characteristics of the DP" (the fraction of dispersion – 44,22%) and,

above all, united in its structure the indicators reflecting the characteristics of the DP in the conditions of monotony and data on the performance of the tapping-test throughout all the subjects intervals; the factor f_2 was to be defined as “the characteristics of the BNP” (the fraction of dispersion – 25,96%) and combined both the actual characteristics of the BNP and data on the number of premature reactions and latency reactions; the factor f_3 was to be defined as “the characteristics of the MNP and the speed of the visual-motor reactions” (the fraction of the dispersion – 18,98%) and included in its structure the indicators of the MNP and, unlike the initial stage of observation, characteristics of the speed of the simple and differentiated visual-motor reactions;

$$- \text{ among young men: } y = 0,400f_1 + 0,271f_2 + 0,203f_3; \quad (4)$$

where the factor f_1 was to be defined as “peculiarities of the DP” (the fraction of dispersion – 40,17%) and united in its structure the indicators reflecting the characteristics of the DP in the conditions of monotony and the data on the performance of the tapping-test during all the studied intervals; the factor f_2 was to be defined as the “characteristics of the BNP” (the fraction of dispersion – 25,88%) and combined both the actual characteristics of the BNP and data on the number of premature reactions and latency reactions; the factor f_3 was to be defined as “the characteristics of the MNP and the speed of the visual-motor reactions” (the fraction of the dispersion – 17,19%) and included in its structure the indicators of the MNP and, unlike the initial stage of observation, characteristics of the speed of the simple and differentiated visual-motor reaction.

Consequently, regardless of the nature of the training load, the organization of daily activities and sexual characteristics, the main determinants identified were the following factors: “peculiarities of the DP” and “peculiarities of the BNP”, as well as at the beginning of the training period, the factor “peculiarities of the MNP”, which included in its structure only the indicators of the MNP, and at the end of it – the factor “peculiarities of the MNP and the speed of the visual-motor reactions”, which included in its structure as indicators of MNP, and in contrast to the initial stage of observation, the speed of a simple and differentiated visual-motor response.

At the same time, analyzing the results obtained, it should be noted that at the beginning of the academic term the regularities of the interaction between the studied indicators and the mentally-determined correlates of the success of the processes of psychophysiological adaptation (y) that have been established should be presented as the following interaction (5-6):

– among young women:

$$y = 0,567f_1 + 0,249f_2 + 0,216f_3 + 0,231f_4 + 0,146f_5; \quad (5)$$

where the factor f_1 was to be defined as “the peculiarities of the personality of the LSC” (the fraction of dispersion – 29,00%) and, above all, united in its structure the indicators reflecting the characteristics of the general internment of the LSC and LSC in the field of educational relations and relations of health and illnesses; the factor f_2 was to be defined as “the peculiarities of temperament and

anxiety” (the fraction of dispersion – 19,18%) and, first of all, combined the indicators of neuroticism, SA and TA; the factor f_3 was to be defined as “the peculiarities of the character properties” (the fraction of dispersion – 15,32%) and included in its structure, first of all, characteristics of the character properties of the hysteria (Hy), psychopathy (Pd) and hypomania (Ma); the factor f_4 was to be defined as “the peculiarities of aggressive manifestations of personality” (the fraction of dispersion – 14,38%) and united in its structure, first of all, the indicators of irritation, feeling of insult and the index of aggressiveness; factor f_5 was to be defined as “the peculiarities of EB and PPM” (the fraction of dispersion – 8,96%) and combined the leading characteristics of the EB in accordance with the phases of stress, resistance and exhaustion, and such PPM, as mechanisms of its protection on the scale regression, substitution and projection;

– among young men:

$$y = 0,449f_1 + 0,338f_2 + 0,247f_3 + 0,167f_4 + 0,101f_5; \quad (6)$$

where the factor f_1 was to be defined as “the peculiarities of the character properties” (the fraction of dispersion – 24,78%) and included in its structure, first of all, of the character properties on the scales of hypochondria (Hs), hysteria (Hy), psychopathy (Pd), paranoid (Pa), psychasthenia (Pt) and schizoid (Se); the factor f_2 was to be defined as “the peculiarities of aggressive manifestations of personality” (the fraction of dispersion – 17,30%) and united in its structure, first of all, indicators of indirect aggression, irritation, feelings of insult and indices of aggressiveness and hostility, the factor f_3 was to be defined as “the peculiarities of temperament and anxiety” (the fraction of dispersion – 16,30%) and combined the indicators of neuroticism, SA and TA; the factor f_4 was to be defined as “the peculiarities of the personality of the LSC” (the fraction of dispersion – 15,62%) and, above all, united in its structure the indicators reflecting the characteristics of the general internment of the LSC and LSC in the field of failures, educational relations and relations of health, and illnesses; the factor f_5 was to be defined as “the peculiarities of EB and PPM” (the fraction of dispersion – 9,23%) and, first of all, combined the leading characteristics of EB in accordance with the phases of stress, resistance and exhaustion, as well as such PPM, as its mechanisms on scale protection regression, substitution, negation and projection.

At the same time, at the end of the academic year, the regularities of the interactions between the studied indicators and the mentally-determined correlates of the success of the processes of psychophysiological adaptation (y) that have been established should be presented in the form of such interactions (7-8):

– among young women:

$$y = 0,500f_1 + 0,324f_2 + 0,146f_3 + 0,215f_4 + 0,152f_5; \quad (7)$$

where the factor f_1 was to be defined as “the peculiarities of EB and asthenic and depressive states” (the fraction of dispersion – 29,54%) and included in its structure the leading characteristics of EB in accordance with the phases of stress, resistance and exhaustion, as well as indicators of the degree of expression of asthenic and depressive states; the

factor f_2 was to be defined as the “peculiarities of the personality of the LSC” (the fraction of dispersion – 17,57%) and, above all, united in its structure the indicators reflecting the characteristics of the general internment of the LSC and LSC in the field of achievements, educational relation and relations of health and illnesses; the factor f_3 was to be defined as “the peculiarities of the character properties” (the fraction of dispersion – 16,04%) and combines, first of all, of the character properties on the scale of the hypochondria (Hs), depression (D), hysteria (Hy), psychopathy (Pd) and hypomania (Ma); factor f_4 was to be defined as “the peculiarities of aggressive manifestations of personality” (the fraction of dispersion – 15,13%) and included in its structure, first of all, indicators of negativism, irritation and indices of aggressiveness and hostility; factor f_5 was to be defined as “the peculiarities of temperament and anxiety” (the fraction of dispersion – 9,39%) and, above all, united in its structure indicators of neuroticism, SA and TA;

– among young men:

$$y = 0,451f_1 + 0,148f_2 + 0,339f_3 + 0,260f_4 + 0,146f_5; \quad (8)$$

where the factor f_1 was to be defined as “the peculiarities of EB and asthenic and depressive states” (the fraction of dispersion – 26,19%) and included in its structure the leading characteristics of EB in accordance with the phases of stress, resistance and exhaustion, as well as indicators of the degree of expression of asthenic and depressive states; the factor f_2 was to be defined as “the peculiarities of the character properties” (fraction of dispersion – 18,47%) and united in its structure, first of all, of the character properties on the scales of hypochondria (Hs), depression (D), psychopathy (Pd), psychasthenia (Pt) and hypomania (Ma); factor f_3 was to be defined as “the peculiarities of aggressive manifestations of personality” (fraction of dispersion – 15,90%) and, above all, combined the indicators of verbal and indirect aggression, irritation and indices of aggression and hostility; the factor f_4 was to be defined as “the peculiarities of the personality of the LSC” (the fraction of dispersion – 14,68%) and, first of all, included in its structure the indicators reflecting the characteristics of the general internment of the LSC and LSC in the field of failures, educational relations and relations of health and illnesses; factor f_5 was to be defined as “the peculiarities of temperament and anxiety” (fraction of dispersion – 10,17%) and, above all, united in its structure indicators of neuroticism, SA and TA.

Thus, regardless of the period of study, the nature of the training load, the organization of daily activities and sexual characteristics as the main factor entities that were identified, the following factors were noted: “peculiarities of temperament and anxiety”, “peculiarities of character properties”, “peculiarities of the personality of the LSC”, “peculiarities of aggressive manifestations of personality”, as well as “peculiarities of the EB”, which at the beginning of the educational period was closely and inseparably linked with a number of peculiarities of the PPM, at the end of it – with the indicators ac tense and depressive states.

However, the application of factor analysis procedures to carry out a psychophysiological assessment of the patterns

of interdependence between the characteristics of the state of health and indicators of the development of personality characteristics of young women and young men who were at different stages of obtaining higher medical education showed an extremely stable picture of the interaction between the investigated indicators, as well as the presence of peculiar “migrating” components of factors that have been established. Thus, among the young women and young men, the most significant influence on the leading characteristics of the level of health during the entire training period was made by factors that, above all, should be interpreted as: “peculiarities of social-psychological adaptation” (the fraction of dispersion – 19,00-27,65% for young women and 19,00-29,87% for young men), “peculiarities of the level of EB” (the fraction of dispersion – 19,00-22,02% for young women and 18,78-29,87% for young men), “peculiarities of aggressive manifestations of personality” (the fraction of dispersion – 8,86-17,52% for young women and 8,86-17,56% for young men), “peculiarities of anxiety and character” (the fraction of dispersion – 9,17-20,06% for young women and 4,69-8,86% for young men), “peculiarities of temperament and LSC” (the fraction of dispersion – 4,29-8,56% in young women and 4,69-4,89% in young men).

One should pay attention to the presence of such a component of the factors that have been identified as “migratory peculiarities” of the PPM, joining the various stages of higher medical education to other factor groups. Thus, among the students, who studied at the first year, the mentioned component joined the factor “peculiarities of anxiety and character” forming the factor “peculiarities of anxiety, character and PPM”; among students, who studied at the third year, – to the factor “peculiarities of social-psychological adaptation”, forming the factor “peculiarities of social-psychological adaptation and PPM”; among students who studied at the fifth year – to the factor “peculiarities of the level of EB”, forming the factor “peculiarities EB level t and PPM”.

In addition, attention and changes in the content of the factor grouping “peculiarities of the PPM”. Thus, among first-year students its structure included indicators such as regression, negation, and projection, among third-year students its structure consisted of indicators of such an PPM as compensation and rationalization, which are considered to be the most constructive, among graduate students its structure the indicators of such PPM as displacement and projection, which considered the least constructive.

CONCLUSIONS

1. Application of the leading procedures of multidimensional statistical analysis, which include factor analysis procedures, allowed to determine the most significant and extremely important in the context of providing effective monitoring of the individual health of young women and young men the interaction between the characteristics of the psychophysiological adaptation of student youth during the academic year and throughout the period of stay in a higher medical education institution.

2. During the use of factor analysis procedures, the leading factors that exert a pronounced influence on the peculiarities of the processes of adaptation transformation processes and the interactions established between a number of nominal indicators of the level of development of psychophysiological functions and the formation of the peculiarities of the student's personality and the level of psychophysiological adaptation during the academic year are revealed. It was determined that regardless of the nature of the training load, the organization of daily activities and sexual peculiarities, as the main factor formations that were identified during the analysis of the physiologically-determined correlates of the progress of the processes of psychophysiological adaptation, it was noted the following factors: "the peculiarities of dynamic performance, peculiarities of the balance of the nervous processes", as well as at the beginning of the training period, the factor "peculiarities of the mobility of the nerve processes", which included in its structure only oscillation the mobility of the nervous processes, and in the end it is a factor "the peculiarities of the mobility of the nerve processes and the speed of the visual-motor reactions", which included in its structure as indicators of the mobility of the nerve processes and, unlike the initial stage of observation, characteristics of the speed of a simple and differentiated visual-motor reaction. At the same time, it should be noted that regardless of the period of study, the nature of the training load, organization of daily activities and sexual peculiarities, as the main factor entities identified during the analysis of the mentally-determined correlates of the success of the processes of psychophysiological adaptation, the following factors were noted: "peculiarities temperament and anxiety", "peculiarities of character properties", "peculiarities of the level of subjective control of personality", "peculiarities of aggressive manifestations of personality" and "peculiarities emotional burnout" that at the beginning of training time was closely and inextricably linked with a number of psychological defense mechanisms, at the end of it – with those asthenic and depressive states.
3. The use of factor analysis procedures to carry out a psychophysiological assessment of the patterns of interdependence between the characteristics of the state of health and the indicators of the development of the peculiarities of the personality of young women and young men who were at different stages of obtaining higher medical education showed an extremely stable and stable picture of the interaction between the investigated indicators and the presence peculiar "migrating" components of the factors that have been established. Thus, in young women and young men, the most significant influence on the leading characteristics of the level of health throughout the entire period of time was made by factors that, first of all, should be interpreted as: "peculiarities of social-psychological adaptation", "peculiarities of the level of emotional burnout", "peculiarities of aggressive manifestations

of personality", "peculiarities of anxiety and character", "peculiarities of temperament and level of subjective control". One should pay attention to the presence of such a component of the factors that were identified as "peculiarities of the mechanisms of psychological protection" that "migrated", joining the various stages of obtaining higher medical education in other factor groups.

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The article was carried out within the framework of the research work: “Study of psychohygienic foundations for the formation, preservation and strengthening of health, optimization of educational and extra-curricular activity, professional orientation of children, adolescents and youth in modern conditions” (State registration number 0101U006938) and “Development of modern methods of assessment and forecasting the health of children, adolescents and young women and men and the scientific substantiation of the psychophysiological and psychohygienic correction of the functional state, personality traits, adaptive capacity and professional suitability of pupils and students” (State registration number 0116U000038).

Authors’ contributions:

According to the order of the Authorship

Conflict of interest:

The Authors declare no conflict of interest

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Received: 27.03.2019

Accepted: 02.05.2019