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Leading factors which influence the features of the course of the psychophysiological adaptation of students of modern medical education in the dynamics of educational year, and their complex assessment

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The assessment of the peculiarities of the processes of psychophysiological adaptation of students involves the implementation of a comprehensive analysis of a number of indicators of the functional state of the organism and of the personality traits of girls and youth on the basis of the application of methods of statistical analysis, one of the main tools of which is factor analysis. The aim of the work is to determine the leading factors influencing the peculiarities of the course of psychophysiological adaptation of students of modern institutions of higher medical education in the dynamics of the academic year. Determination of the level of development of psychophysiological functions of students was carried out with the use of the licensed computer complex "Efector Studio", peculiarities of the person were evaluated on the basis of psychodiagnostic studies, statistical processing of the received materials was carried out using a package of programs of multidimensional statistical analysis "Statistica 6.1" on the basic procedures of factor analysis. It is determined that as the main factors in the analysis of the physiologically-determined correlates of the success of the processes of psychophysiological adaptation, the following factors should be noted: "peculiarities of dynamic efficiency" and "peculiarities of the balance of nervous processes", as well as at the beginning of the training time, the factor "peculiarities of mobility of nerve processes" and in the end it is a factor "the peculiarities of the mobility of the nervous processes and the speed of the visual-motor reactions". The main factors that were identified during the analysis of the mentally-determined correlates of the success of the processes of psycho-physiological adaptation are the following factors: "features of temperament and anxiety", "features of character properties", "features of the level of subjective control of personality", "peculiarities aggressive manifestations of personality", as well as "features of emotional burnout", which at the beginning of the training period was associated with a number of features of the mechanisms of psychological protection, at the end of it - with a number of features asthenic and depressive states.

Keywords: students, academic year, psychophysiological adaptation, physiologically-significant correlates, mentally-significant correlates, factor analysis.

Introduction

The study of the peculiarities of the course of psychophysiological adaptation of students who are in the institution of higher education, including in the conditions of medical institutions of higher education, involves the implementation of a comprehensive analysis of a number of indicators of the functional state of the organism and peculiarities of the personality of young men and women on

the basis of the application of methods of multidimensional statistical analysis, one of the main tools of which is the process of factor analysis [2-4, 8, 10, 12, 13, 18, 23-26, 29].

In general, factor analysis allows to quantitative assessment of the characteristics of the investigated indicators, which is directly determined on the basis of the evaluation of characteristics, the level of expression of which

is established and, therefore, makes it possible to detect a rather narrow set of properties for a significant part of the initial characteristics that characterize the relationship between the groups of these signs and certain generalized factors [1, 7, 11, 14, 20, 22, 27].

Therefore, factor analysis is attributed to statistical methods that allow us to make a completely correct statistical description of multidimensional objects, which are characterized by the presence of a plurality of quantitative attributes, and, therefore, a priori redundancy of the initial characteristics of the system under study, based on the definition of the depth indicators that actually form them and determine [1, 5, 6, 15-17, 21, 28, 30].

The purpose of the work is to determine the leading factors influencing the peculiarities of the processes of psychophysiological adaptation of students of modern institutions of higher medical education in the dynamics of the academic year, and their complex assessment based on the use of procedures of factor analysis.

Materials and methods

Scientific researchers were conducted among students of the medical faculty of the National Pirogov Memorial Medical University, Vinnytsya. 55 young women and 45 young men were assigned to the study groups.

Comprehensive assessment of the development level of the leading psychophysiological functions indicators of the students (physiologically significant correlates of the course of psychophysiological adaptation) envisaged the definition of the degree of development of characteristics that determined the features of sensorimotor reactions (the speed of simple and differentiated visual-motor response, simple audio-motor reaction), the course of the main nervous processes (mobility and balance of nerve processes), as well as the strength of the nervous system (tapping test) and the dynamics of performance in monotony conditions were carried out during academic year (at the beginning of the autumn and at the end of spring semesters) on the basis of the using computer complex "Effecton Studio", registered in the Fund of computer programs of educational purposes (registration number 1717) and has a certificate of conformity of the Institute of Information Education [9].

At the heart of determining the characteristics of the personality of students (psychologically significant correlates of psychophysiological adaptation) were psychodiagnostic techniques that provided for the establishment of individual-typological peculiarities of the person and, above all, the properties of temperament, anxiety and character, indicators of the level of subjective control, peculiarities of mental states, nature, aggressiveness, emotional burnout, mechanisms of psychological protection, etc. [19].

Applied implementation and subsequent interpretation of the results obtained using factor analysis procedures were carried out using the licensed standard application package of multidimensional statistical analysis "Statistica 6.1" (license number BXXR901E245722FA, belonging to the

National Pirogov Memorial Medical University, Vinnytsya).

Results

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

- among young women: $y = 0.408f_1 + 0.236f_2 + 0.298f_3$; (1)

where the factor f_1 was to be defined as "the features of dynamic performance" (the share of dispersion - 42,27%) and, above all, united in its structure indicators that showed the characteristics of dynamic performance in monotony conditions and data on the performance of the tapping test during all studied intervals; the factor f_2 was to be defined as "the peculiarities of the balance of nervous processes" (the proportion of dispersion - 25.10%) and combines both the actual characteristics of the equilibrium of the nervous processes and the data with respect to the amount of premature reactions and latency reactions; the factor f_3 - was to be defined as "the peculiarities of the mobility of the nerve processes" (the dispersion share was 19.22%) and included only indicators of the mobility of the nerve processes in its structure;

- among young men: $y = 0.517f_1 + 0.243f_2 + 0.192f_3$; (2)

where the factor f_1 was to be defined as "the features of dynamic performance" (the share of dispersion - 43,27%) and, above all, united in its structure indicators that depicted the characteristics of dynamic performance in monotony conditions and data on the performance of the tapping test during all the studied intervals, except for the latter; the factor f_2 was to be defined as "the peculiarities of the equilibrium of the nervous processes" (the proportion of the dispersion was 26.10%) and combining both the actual characteristics of the balance of the nervous processes and the data with respect to the number of premature reactions and delayed reactions; the factor f_3 was to be defined as "the peculiarities of the mobility of the nerve processes" (the dispersion share was 21.22%) and included only the indices of the actual mobility of the nerve processes in its structure.

At the same time, at the end of the school year, the regularities of the relationship between the studied parameters and the physiologically-determined correlates of the success of the processes of psycho-physiological adaptation (y) that have been established should be presented in the form of such relationships (3-4):

- among young women: $y = 0.430f_1 + 0.226f_2 + 0.200f_3$; (3)

where the factor f_1 was to be defined as "the features of dynamic performance" (the share of dispersion - 44.22%) and, above all, united in its structure the indicators reflecting the characteristics of dynamic performance in monotony conditions and data on the implementation of the tapping test during all studied intervals; the factor f_2 was to be defined as "the peculiarities of the balance of nervous

processes" (the proportion of dispersion was 25.96%) and combined both the actual characteristics of the balance of nervous processes and the data with regard to the amount of premature reactions and delayed reactions; the factor f3 was to be defined as "the peculiarities of the mobility of the nerve processes and the speed of the visual-motor reactions" (the proportion of the dispersion was 18.98%) and included in its structure the parameters of the mobility of the nerve processes and, unlike the initial stage of observation, characteristics of the speed of the simple and differentiated visual-motor reaction;

- among young men: $y = 0.400f_1 + 0.271f_2 + 0.203f_3$; (4)

where the factor f1 was to be defined as "the features of dynamic performance" (the share of dispersion - 40.17%) and, above all, united in its structure indicators that showed the characteristics of dynamic performance in monotony conditions and data on the implementation of the tapping test during all studied intervals; the factor f2 was to be defined as "the peculiarities of the balance of nervous processes" (the dispersion share was 25.88%) and combined both the actual characteristics of the balance of nervous processes and the data with respect to the amount of premature reactions and latency reactions; the factor f3 was to be defined as "the peculiarities of the mobility of the nerve processes and the speed of the visual-motor reactions" (the proportion of the dispersion was 17.19%) and included in its structure the parameters of the mobility of the nerve processes and, unlike the initial stage of observation, characteristics of the speed of the simple and differentiated visual-motor reaction.

At the same time, analyzing the results obtained, it should be noted that at the beginning of the school year, the patterns of relationships between the studied parameters and the psychologically determined correlates of the success of the processes of psycho-physiological adaptation (y), which were established, should be presented as the following relationship (5-6):

- among young women: $y = 0.567f_1 + 0.249f_2 + 0.216f_3 + 0.231f_4 + 0.146f_5$; (5)

where the factor f1 was to be defined as "the features of the level of subjective control of the individual" (the share of dispersion - 29.00%) and, above all, united in its structure indicators that reflect the characteristics of the general level of subjective control level and level subjective control in the field of educational relations and health and disease; the factor f2 - was to be defined as "the features of temperament and anxiety" (the share of dispersion - 19.18%) and, first of all, combines indicators of neuroticism, situational and personality anxiety; the factor f3 was to be defined as "the features of the character properties" (the fraction of the dispersion was 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 f4 - was to be defined as "the features of aggressive manifestations of personality" (the share of dispersion - 14.38%) and united in its structure, first of all, indices of irritation, feeling of insult and index of aggressiveness; factor

f5 - was to be defined as "the features of emotional burnout and mechanisms of psychological protection" (the proportion of dispersion - 8.96%) and combines the leading characteristics of emotional burnout according to stress, resistance and exhaustion phases, as well as mechanisms of psychological protection such as mechanisms of its protection on regression, displacement and projection scales; - among young men: $y = 0.449f_1 + 0.338f_2 + 0.247f_3 + 0.167f_4 + 0.101f_5$; (6)

where the factor f1 was to be defined as "the peculiarities of the properties of nature" (the proportion of the dispersion was 24.78%) and included in its structure, first of all, characteristics of the character of the character on the scales of hypochondria (Hs), hysteria (Hy), psychopathy (Pd), paranoid (Pa), psychasthenia (Pt) and schizoid (Se); the factor f2 was to be defined as "the features of aggressive manifestations of personality" (the share of dispersion was 17.30%) and united in its structure, first of all, indicators of indirect aggression, irritation, feeling of insult and indices of aggression and hostility, the factor f3 was to be defined as "features of temperament and anxiety" (the share of dispersion - 16.30%) and combines indicators of neuroticism, situational and personality anxiety; the factor f4 was to be defined as "the peculiarities of the level of subjective control of personality" (the share of dispersion was 15.62%) and, above all, united in its structure the indicators reflecting the characteristics of the general level of subjective control and the level of sub oversight in the field of failures, learning relationships and health and disease; the factor f5 - was to be defined as "the features of emotional burnout and mechanisms of psychological protection" (the share of dispersion - 9.23%) and, first of all, combines the leading characteristics of emotional burnout according to the phases of stress, resistance and exhaustion, and also such mechanisms of psychological protection as mechanisms of its protection on regression, displacement, negation and projection scales.

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

- among young women: $y = 0.500f_1 + 0.324f_2 + 0.146f_3 + 0.215f_4 + 0.152f_5$; (7)

where the factor f1 was to be defined as "the features of emotional burnout and asthenic and depressive states" (the share of dispersion was 29.54%) and included in its structure the leading characteristics of emotional burnout according to the stresses, resistance and exhaustion phases, as well as the indicators of the degree of expression asthenic and depressive states; the factor f2 was to be defined as "the peculiarities of the level of subjective control of personality" (the share of dispersion was 17.57%) and, in the first place, united in its structure the indicators reflecting the characteristics of the general level of subjective control and the level of sub objective monitoring in the field of

achievements, educational relations and health and disease; the factor f3 was to be defined as "the peculiarities of the character properties" (the proportion of the dispersion was 16.04%) and combines, first of all, characteristics of the character of the character on the scale of the hypochondria (Hs), depression (D), hysteria (Hy), psychopathy (Pd) and hypomania (Ma); factor f5 - was to be defined as "the features of aggressive manifestations of personality" (the share of dispersion - 15.13%) and included in its structure, first of all, indicators of negativism, irritation and indices of aggressiveness and hostility; factor f5 - was to be defined as "the features of temperament and anxiety" (the share of dispersion - 9.39%) and, above all, united in its structure indicators of neuroticism, situational and personal anxiety; - among young men: $y = 0.451f1 + 0.148f2 + 0.339f3 + 0.260f4 + 0.146f5$; (8)

where the factor f1 was to be defined as "the features of emotional burnout and asthenic and depressive states" (the share of dispersion - 26.19%) and included in its structure the leading characteristics of emotional burning according to the phases of stress, resistance and exhaustion, as well as indicators of the degree of expression asthenic and depressive states; the factor f2 was to be defined as "the peculiarities of the character properties" (the proportion of the dispersion was 18.47%) and united in its structure, first of all, characteristics of the character on the scales of hypochondria (Hs), depression (D), psychopathy (Pd), psychasthenia (Pt) and hypomania (Ma); factor f3 - was to be defined as "the features of aggressive manifestations of personality" (the proportion of dispersion - 15.90%) and, above all, combined the indicators of verbal and indirect aggression, irritation and indices of aggression and hostility; the factor f4 - was to be defined as "the features of the level of subjective control of the individual" (the share of dispersion - 14.68%) and, first of all, included in its structure the indicators reflecting the characteristics of the general level of subjective control and the level of subjective control over failures, learning relationships and health and disease; factor f5 - had to be defined as "features of temperament and anxiety" (the share of dispersion - 10.17%) and, above all, united in its structure indicators of neuroticism, situational and personal anxiety.

Discussion

In the course of the conducted researches, using factor analysis procedures, the leading factors that exert a pronounced influence on the peculiarities of the processes of adaptation transformation processes and the established connections 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 are revealed. It was determined that regardless of the nature of the training load, organization of daily activities and sexual characteristics, as the main factor formations that were identified during the analysis of the physiologically-determined correlates of the progress of the processes of psycho-physiological

adaptation, it was noted the following factors: "features of dynamic performance" and "peculiarities of the balance of nervous processes", as well as at the beginning of the training period, the factor "peculiarities of the mobility of nerve processes", which included in its structure only oscillation the actual mobility of the neural processes, and in the end it is the factor of "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 visually-motor reaction.

At the same time, it should be noted that regardless of the period of study, the nature of training loads, organization of daily activities and sexual characteristics, as the main factor education, identified during the analysis of the mentally determined correlates of the success of the processes of psychophysiological adaptation, the following factors were noted: "features temperament and anxiety", "features of character properties", "peculiarities of the level of subjective control of personality", "peculiarities of aggressive manifestations of personality" and features emotional burnout" that at the beginning of training time was closely and inextricably linked with a number of features of psychological defense mechanisms, at the end of it - with those asthenic and depressive states.

It should be noted that the peculiarities of the psychophysiological adaptation of students undergoing higher education institutions during the academic year established according to the data of factor analysis are of considerable prognostic value and need to be taken into account during the creation of a preventive environment in modern higher education institutions [4, 10, 17, 21, 23, 24, 26].

Moreover, the revealed patterns must be taken into account in the application of healthcare technologies in educational institutions of different levels and profiles, the conceptual principles of effective use of which are considered: regime-adaptive, psychophysiological, personal and integrative-functional principles with relevant content which have a favorable overall impact on the processes of the formation of the health and functional state of the body of young women and men and provide high level of training preparedness of modern students [25].

The obtained results are marked by significant significance from the point of view of determining the peculiarities of the formation of the adaptive resources of the student body in higher educational establishments of the medical profile, and the formation of effective approaches to the formation of the optimal working dynamic stereotype of young women and men who are studying [10, 23]. Moreover, the presence of certain dynamic changes on the content of individual factor groups requires careful analysis during the effective training of future medical professionals [12, 13, 25, 29].

Considering the prospects for further use of the obtained data, it should be noted several of their leading aspects, namely: diagnostic, which is based on taking into account the results obtained in the development of methods for assessing

the level of expression of academic stress among students of higher education institutions, and preventive, which involves taking into account the factors that make unfavorable influence on the processes of psychophysiological adaptation of young women and men, during developing measures for their correction and improvement.

Conclusions

In the course of the conducted researches, the leading factors influencing the peculiarities of the psychophysiological adaptation of students of modern institutions of higher medical education in the dynamics of the academic year are determined, and their complex assessments are carried out on the basis of the use of factor analysis procedures. Such an approach made it possible, during the analysis of physiologically-determined correlates of the success of the processes of psycho-physiological adaptation, such as the following factors: "features of dynamic performance" and "peculiarities of the balance of nervous processes", as well as at the beginning of the training time, the factor

"peculiarities of mobility of nerve processes", which included in its structure only the indices of the actual 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 nerve processes and, unlike the initial stage of observations, the characteristics of the speed of a simple and differentiated visual-motor response. However, during the analysis of the mentally determined correlates of the success of the processes of psycho-physiological adaptation, such as the following factors: "features of temperament and anxiety", "features of the nature of the character", "features of the level of subjective control of personality", "the features of aggressive manifestations of personality" as well as "features of emotional burnout", which at the beginning of the training period was closely and inextricably linked with a number of features of the mechanisms of psychological protection, at the end of it - with the indicators of asthenic and depressive states.

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ПРОВІДНІ ФАКТОРИ, ЯКІ ВПЛИВАЮТЬ НА ОСОБЛИВОСТІ ПЕРЕБІГУ ПРОЦЕСІВ ПСИХОФІЗІОЛОГІЧНОЇ АДАПТАЦІЇ СТУДЕНТІВ СУЧАСНИХ ЗАКЛАДІВ ВИЩОЇ МЕДИЧНОЇ ОСВІТИ В ДИНАМІЦІ НАВЧАЛЬНОГО РОКУ, ТА ЇХ КОМПЛЕКСНА ОЦІНКА

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Оцінка особливостей перебігу процесів психофізіологічної адаптації студентів передбачає здійснення комплексного аналізу цілого ряду показників функціонального стану організму та особливостей особистості дівчат і юнаків на підставі застосування методів статистичного аналізу, одним із основних інструментів якого є факторний аналіз. Метою роботи є визначення провідних факторів, які впливають на особливості перебігу процесів психофізіологічної адаптації студентів сучасних закладів вищої медичної освіти в динаміці навчального року. Визначення рівня розвитку психофізіологічних функцій студентів проводилось із застосуванням ліцензованого комп'ютерного комплексу "Effecton Studio", особливості особистості оцінювались на підставі психодіагностичних досліджень, статистична обробка отриманих матеріалів здійснювалось із використанням пакету програм багатовимірного статистичного аналізу "Statistica 6.1" на основі процедур факторного аналізу. Визначено, що як основні фактори під час аналізу фізіологічно-обумовлених корелят успішності перебігу процесів психофізіологічної адаптації, слід відзначити наступні фактори: "особливості динамічної працездатності" і "особливості рівноваженості нервових процесів", а також на початку часу навчання фактор "особливості рухливості нервових процесів" та наприкінці його - фактор "особливості рухливості нервових процесів і швидкості зорово-моторних реакцій". Як основні фактори, що були визначені під час аналізу психічно-обумовлених корелят успішності перебігу процесів психофізіологічної адаптації, слід відзначити такі фактори: "особливості темпераменту і тривожності", "особливості властивостей характеру", "особливості рівня суб'єктивного контролю особистості", "особливості агресивних проявів особистості", а також "особливості емоційного вигорання", який на початку часу навчання був пов'язаний з особливостями механізмів психологічного захисту, наприкінці його - з показниками астеничного і депресивного станів.

Ключові слова: студенти, навчальний рік, психофізіологічна адаптація, фізіологічно-значущі кореляти, психічно-значущі кореляти, факторний аналіз.

ВЕДУЩИЕ ФАКТОРЫ, ОКАЗЫВАЮЩИЕ ВОЗДЕЙСТВИЕ НА ОСОБЕННОСТИ ТЕЧЕНИЯ ПРОЦЕССОВ ПСИХОФИЗИОЛОГИЧЕСКОЙ АДАПТАЦИИ СТУДЕНТОВ СОВРЕМЕННЫХ ЗАВЕДЕНИЙ ВЫСШЕГО МЕДИЦИНСКОГО ОБРАЗОВАНИЯ В ДИНАМИКЕ УЧЕБНОГО ГОДА, И ИХ КОМПЛЕКСНАЯ ОЦЕНКА

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Оценка особенностей течения процессов психофизиологической адаптации студентов предусматривает осуществление комплексного анализа целого ряда показателей функционального состояния организма и личностных особенностей девушек и юношей на основе применения методов статистического анализа, одним из основных инструментов которого является факторный анализ. Целью работы является определение ведущих факторов, оказывающих воздействие на особенности течения процессов психофизиологической адаптации студентов современных учреждений высшего медицинского образования в динамике учебного года. Определение уровня развития психофизиологических функций студентов проводилось с использованием лицензированного компьютерного комплекса "Effecton Studio", личностные особенности оценивались на основании психодиагностических исследований, статистическая обработка полученных материалов осуществлялась с использованием пакета программ многомерного статистического анализа "Statistica 6.1" на основе процедур факторного анализа. Определено, что в качестве основных факторов в ходе анализа физиологически-обусловленных коррелят успешности течения процессов психофизиологической адаптации, следует отметить следующие факторы: "особенности динамической работоспособности" и "особенности уравновешенности нервных процессов", а также в начале времени обучения фактор "особенности подвижности нервных процессов" и в конце его - фактор "особенности подвижности нервных процессов и скорости зрительно-моторных реакций". В качестве основных факторов, которые были определены в ходе анализа психически-обусловленных коррелят успешности течения процессов психофизиологической адаптации, следует отметить следующие факторы: "особенности темперамента и тревожности", "особенности свойств характера", "особенности уровня субъективного контроля личности", "особенности агрессивных проявлений личности", а также "особенности эмоционального выгорания", который в начале учебного года был связан с рядом особенностей механизмов психологической защиты, в конце его - с показателями астенического и депрессивного состояний.

Ключевые слова: студенты, учебный год, психофизиологическая адаптация, физиологически-значимые корреляты, психически-значимые корреляты, факторный анализ.