

Applying to Adaptive Biofeedback to Correct the Psychological Health of University Students

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Abstract: The scientific article presents the results of a study of the psychological health of university students. The aim of the study is to compare the psychodiagnostics of personality characteristics and stress states of students with express diagnostics based on biological feedback). The objective of the study is to conduct correction of the psychological health of students using adaptive biofeedback training. The research results indicate the predisposition of students to personality neurotic disorders in the presence of latent chronic stress. According to the results of the correlation analysis, overestimated indicators of introversion, emotional lability, long-term emotional memory, sensitivity, credulity, shyness, self-doubt and an increased self-esteem turned out to be significant personal predictors of predisposition to deterioration of psychological health in the tested experimental sample. In contemporary society, the task of maintaining the psychological health of student youth is of particular importance. Conditions of latent chronic stress contribute to the development and manifestation of neurotic disorders in students. Neurotic, stress-related, and somatoform disorders detected in the subjects have a direct impact on the educational and social life of students, as well as on the sphere of their personal lives and lead to significant social maladaptation, which requires a careful approach to their diagnosis, treatment, and prevention.

1. Introduction

Currently, psychologists and educators are concerned about the deteriorating psychological health of students. On the one hand, student age is the final stage in the progressive age development of the psychophysiological capabilities of the body. On the other hand, it is characterized by intensive work on shaping your personality, developing a style of behavior. It was at this time that they were accompanied by hidden difficulties that significantly affect the psychoemotional state of students [1; 2].

Kazakh students often have a high level of psychophysiological stress associated with learning and their social life. The result of stress is the growth of neurotic, psychosomatic, and depressive disorders. The manifestation of mental stressful conditions in students are: sleep and appetite disorders; physical weakness, headaches, constant fatigue, apathy; problems with concentration, memory, speed of thought process; nervousness, fussiness, desire to control everything, inability to relax; craving for alcohol, alcohol, junk food; decreased immunity, exacerbation of diseases of internal organs. Mental health disorders occurring at a young age, having a high prevalence, remain insufficiently studied [3].

In our opinion, this is due to the lack of early psychodiagnostics of the signs of psychophysiological stress, nervous breakdowns, we observe a decrease in stress tolerance and manifestations of maladaptive behavior in students, as well as their lack of awareness of the psychological aspects of mental health deterioration.

The purpose of the study is to compare the psychodiagnostics of personality characteristics and stress state of students with express diagnostics based on biofeedback. The objective of the study is to conduct the correction of the psychological health of students using adaptive biofeedback training.

In our university, we carry out observation, psychodiagnostic, and correction of the psychological health of students by psychological methods and using adaptive biocontrol. The purpose of this article is to present the results of a study where we also used computer technology of adaptive biocontrol based on biofeedback (BFB), which made it possible to observe the studied parameters in the process of diagnosis and training.

The contemporary research in the methods to preserve and strengthen psychological health suggests that biocontrol can reduce the level of psychoemotional stress, anxiety based on voluntary control of physiological processes, and conscious regulation of the internal physiological state [1; 4].

2. Materials and Methods

The experiment was organized and conducted with students of the specialty "Psychology-Pedagogy." The age of the subjects was 17-23 years. The sample was 108 people. Studies were conducted at the Kazakh National Pedagogical University named after Abay. Biofeedback diagnostics and biofeedback training were carried out in the electrophysiological laboratory of the city clinical hospital No1 in Almaty.

We used the following methods: (1) the Symptom Questionnaire SCL-90-R Symptom Check List-90-Revised to determine the presence of stress [5]; (2) the Big Five personality questionnaire to obtain information about the personal characteristics of students [6]; (3) the Freiburg Personality Inventory - FPI for the diagnosis of states and personality traits, responsible for social adaptation and regulation of behavior [7]; (4) the Biocomputer complex RITM-6 for biofeedback diagnostics, which allows one to quickly determine the degree of tension of various functional systems of students and conduct timely correction of biofeedback training [8].

The experimental work was carried out in the following four stages. At the first stage, psychological diagnostics was applied to all students. At the second stage, adaptive biocontrol sessions in order to determine the functional state in real-time and the neurodynamic plasticity of the brain were evaluated. At the third stage, correctional work (biofeedback-training) for controlling the wave processes of the brain was carried out. In the fourth stage, a comparative analysis of the results before and after the training was carried out.

3. Results

When studying the severity of neurotic symptoms according to all factors of the SCL-90R methodology, we received a range of symptomatic experiences that, in the opinion of the tested students, seriously affect their life. The obtained average values, according to the SCL-90-R method, are shown in Table 1.

TABLE 1. AVERAGE VALUES OBTAINED BY SCL-90-R METHOD

On the SCL-90 Indicators	Average values				R
	Course 1	Course 2	Course 3	Course 4	
GSI (General Symptom Severity Index)	0.55	0.67	0.60	0.56	0.60
PST (total affirmative answers)	34.3	38.7	37	36	0.40
PSDI (Symptomatic Distress Index)	1.37	1.50	1.42	1.39	0.09
Somatization (SOM)	0.58	0.60	0.59	0.58	0.60
Obsessive-Compulsive (O-S)	0.78	0.99	0.87	0.85	0.02
Interpersonal Sensitivity (INT)	0.58	0.78	0.72	0.74	0.06
Anxiety (ANX)	0.53	0.92	0.96	0.68	0.30
Hostility (HOS)	0.68	0.81	0.79	0.62	0.70
Phobicity (PHOB)	0.32	0.43	0.45	0.42	0.10

In the study of personality characteristics in students, the following experimental results were obtained. Table 2 presents the average values of personality characteristics according to the Big Five technique.

TABLE 2. BIG-FIVE PERSONAL CHARACTERISTICS

Factors	Average values	Σ
Extroversion	26	4.2
Self-awareness	27	5.2
Cooperation	33	3.7
Emotional stability	28	5.8
Personal resources	30	3.9

Longitudinal studies [6; 7; 9] indicate the high stability of Big Five factors during life, and this means that they can be considered as personality constants. The Freiburg Personality Inventory allows one to more fully examine the state and personality traits that are of paramount importance for the process of social adaptation and behavior regulation.

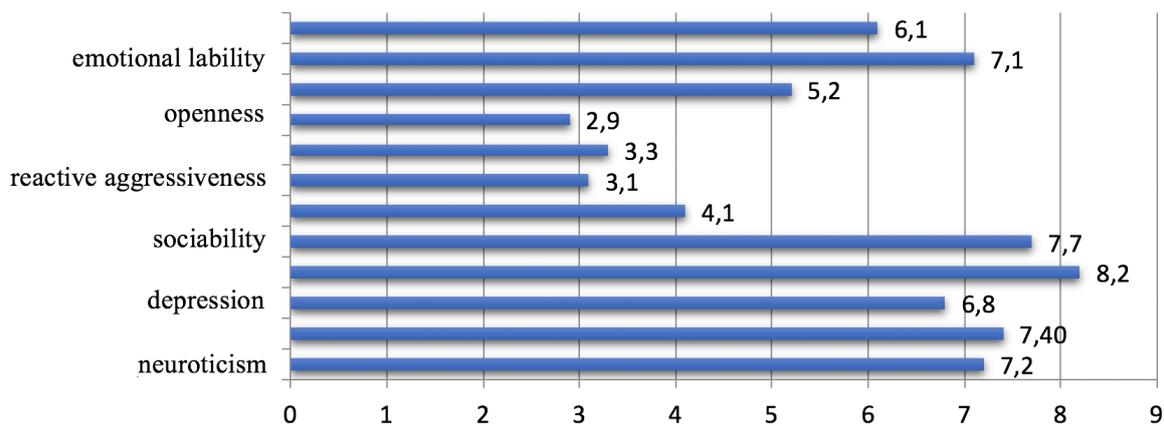


Fig. 1. Average personal characteristics according to the FPI method.

The data obtained indicate that some students are characterized by a neurotic syndrome of asthenic type with significant psychosomatic disorders, impulsive behavior, a tendency to an affective response, a pronounced need for communication, and instability of the emotional state.

Further, in order to confirm the obtained data on psychological methods, on the RITM-6 biocomputer complex, we performed biofeedback diagnostics, namely, determination of the types of adaptive plasticity of the brain, analysis of the heart rhythm by a cardiointervalogram. According to the criterion of the plasticity of neurodynamic processes, all examined students were divided into the following three groups: with high adaptability – type I (23), medium – type II (17), and low – type III (68). Our research on biofeedback diagnostics revealed a violation of psychological health.

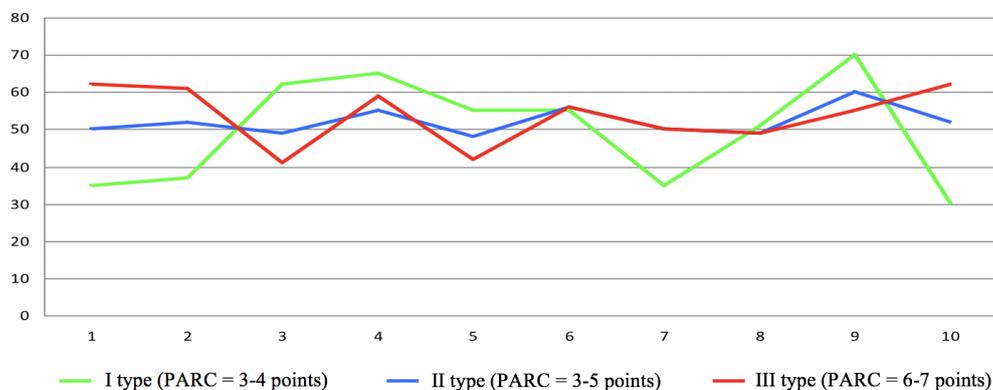


Fig. 2. Indicators of the psychoemotional state of students of biofeedback diagnostics.

Six biofeedback sessions were conducted, not more than one session daily; moreover, each session was repeated twice. The total biofeedback time for one session is 12 minutes; session duration 22 min, not

counting preparatory measures for measuring blood pressure, psychological testing, and recording the effect of aftereffect. The total biofeedback time for six sessions was 72 minutes. Training on this modification of the method takes little time and allows one to achieve a sustainable biofeedback skill in 6 days.

4. Discussion

Diagnostic results show that after passing the biofeedback-training, the level of anxiety decreases, indicators of energy and vigor increase. When assessing the psychophysiological state during the course of the biofeedback training, significant changes in the improvement of well-being, activity, and mood expressed in the middle- and low-adaptive individuals were observed. At high rates, highly adaptive students and mid-adaptive individuals significantly improved well-being ($5.2 \pm 0.3^*$ conventional units) and activity ($5.3 \pm 0.2^{**}$ conventional units). In low-adaptive students, there is also an improvement in the values ($4.9 \pm 0.2^{**}$ conventional units; $5.1 \pm 0.4^*$ conventional units and $5.2 \pm 0.2^*$ conventional units), and a significant improvement integral biorhythmological indicator, i.e., feelings of individual time (IM - $55.7 \pm 0.2^*$).

The study showed that the adaptation of students to the educational process, and in general to changing life circumstances, proceeds with difficulties, with manifestations of distress. As a result, there is a threat to the formation of neurotic disorders, through the existence of a system of relationships between personality characteristics and susceptibility to maladaptation and chronic stress in students. The relationship between personality characteristics and predisposition to stress turned out to be significant. A generalized psychological portrait of a student with a predisposition to stress is as follows: introversion with a predominance of avoiding guilty feelings and impressions; emphasis on self-control and a high level of responsibility in business; passivity, avoiding open dialogue, a tendency to attachment to other people; high level of forethought and anxiety; high level of tension and self-criticism; high level of emotional lability; manifestation of resentment, depression, nervousness, a tendency to increase biased anxiety, aggravation of feelings of loneliness relative to other students.

5. Conclusion

The study suggests the need to introduce methods for early detection and subsequent correction of psychophysiological disorders in the educational process. In the framework of the present study, a technology for strengthening the psychological health of schoolchildren through psychoself-regulation of the adaptive capabilities of the student's body using adaptive biocontrol with biofeedback was proposed. Adaptive biocontrol with biofeedback may be available to students and can achieve significant results in enhancing psychological health. The biofeedback method is useful for teaching the self-correction of the psychoemotional state of university students. As a result of diagnostics using adaptive biocontrol with biofeedback based on brain plasticity, three types of degrees of brain adaptability were distinguished: highly adaptive, medium adaptive, and low adaptive. In the course of biofeedback-training, the number of low adaptive students sharply decreased. The use of alpha-biofeedback-training (range 8-12 Hz) helps to improve well-being, reduce anxiety.

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