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## Screening Diagnostics of Human's Health Using the IT-Technologies is the Base of Preventive Medicine

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## Abstract

In article the theoretical aspects of person's health, based on the principle of unity of physical, mental and spiritual components forming the holistic model that includes ecological factors of the environment and social living conditions of the person are considered. The complex of author's electronic "passports of health" of participants of educational process (for the studying schoolchildren, students of universities and colleges, athletes, recruits, teachers) allowing to provide control of physical and mental health of persons, identifications of persons with tendency to various psychosocial dependences and suicide behavior in dynamics of training is offered. In the second part of this article the results of using of electronic passports of health on the example of the morphological and functional, psychophysiological features, personal potential and tendency to dependent behavior of pedagogical university students are presented.

**Keywords:** Monitoring of health; Social and psychological adaptation; Personal potential; Morpho-functional parameters of an organism; Tendency to various dependences

Over the past 15 years, the demographic and epidemiological situation in Russia has been characterized by unfavorable trends, characterized by an increase in the number of diseases associated with the impact of negative environmental factors, unhealthy lifestyles, rising suicides, divorces, declining birth rates, etc. [1]. Among young people such risk factors as various forms of dependent behavior, the use of alcohol and drugs as a means of avoiding life's problems, and social diseases are returning to widespread use [2]. In these conditions, the main direction of the domestic policy of the state is the formation and protection of the health of children, adolescents and youth as the basis for improving the national security of the country [3].

A special role in the solution of these issues is acquired by educational organizations of various levels, where the formation and development of the individuals is taking place. Unfortunately, the modern education system cannot yet ensure the fulfillment of these tasks in an effective manner. This is evidenced by official data: up to 85% of school leavers have various psychosomatic disorders and diseases [4].

It is no accident that the President of the Russian Federation, V.V. Putin at a meeting of the State Council (March 13, 2013) said: "We are facing extremely worrying trends: at 14 years two thirds of Russia's children already have chronic diseases, half have violations in the cardiovascular and respiratory systems, up to 40% of recruits do not able to fulfill the minimum standards for the physical training of military personnel".

Therefore, the country's leadership sets the task of minimizing these demographic and social threats, especially paying attention to their systematic decision in educational institutions.

At present, there are a number of normative and legal documents that determine the compulsory assessment of the health of students and pupils in educational institutions. Thus, the Order of the Minister of Education and Science of the Russian Federation of January 12, 2007 No. 7 defined: "to organize, starting from 2007, the annual monitoring of the health of students, pupils of educational institutions". Order of the Ministry of Education and Science of the Russian Federation of December 28, 2010 No. 2106 "On the approval of federal requirements for educational institutions in terms of protecting the health of students, pupils" also emphasizes the need to assess the health of schoolchildren in the dynamics of training. In connection with the increase in the spread of psychoactive substances among young people, the Order of the Ministry of Education and Science of the Russian Federation of June 16, 2014 No. 658 "On the procedure for conducting social and psychological testing of persons studying in general education organizations and professional educational organizations, as well as in educational organizations of higher education aimed at early detection of non-medical consumption of narcotic drugs and psychotropic substances". From this perspective, it is especially important to create electronic tools to monitoring the dynamics of physical and mental health of students, identify people with a propensity for different psychosocial dependencies and suicidal behavior, which will allow timely correction and treatment of students.

On the basis of these documents, we developed e-passports for the health monitoring of participants in the educational process (the school children, students of universities and colleges, athletes, recruits, teachers) [5,6].

In the basis of the methodological approach to assessing human's health, we put the following principles: 1) A holistic approach to the body, which is based on the idea of the unity of the physical (bodily), mental and spiritual essences of a person, ensuring the integrity of the organism, its ability to satisfy its biological, spiritual and social needs. 2) The organism and its habitat are a whole, which determines mutual influences on each other. 3) The level of health can be estimated quantitatively, if taking as a basis the amount of reserve capabilities of the organism that ensures the preservation of the homeostasis of its internal medium when it adapts to the constantly changing conditions

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of the external environment (or loads). 4) The child's organism goes through stages of growth and development, therefore the parameters characterizing his health change in ontogeny. Therefore, when assessing the health of children and adolescents, it is necessary to take into account not only the presence or absence of any signs of violations, but their changes in the process of life and learning. 5) In case of the health characteristic, an integrative approach is important, taking into account the dynamics of the physical development, functional, psychoemotional state of the organism and the learning environment, which should be of a health-saving nature.

These principles formed the basis for our computer programs for monitoring the health of subjects of the educational process, which consist of 5 interconnected autonomous units that allow one to assess: 1) The physical development and functional reserves of the organism; 2) The state of the mental sphere (emotional-volitional, cognitive, intellectual); 3) Personal potential and professional route; 4) Propensity to various psycho-social dependencies; 5) The effectiveness of the health-saving environment of the educational organization.

Programs are written in the programming languages PHP, JavaScript. For correct system operation it is necessary to provide:

- 1. A permanent connection to the Internet;
- 2. Using the recommended browsers for operation: Firefox 3.5 and above; Internet Explorer 9.0 above; Opera 17.0 above;
- 3. JavaScript should be included in the browser cookies;
- 4. Display resolution 1024x768 and above in the high/true color mode:

Provision of access to the domain: http://www://niizib.ru

The programs can be used in local option or in online while saving all the results in the database on the organization's server or on the regional server of the Ministry of Education or Health, which allows one to analyze the results in any format (by sex, age, etc.). Data protection can be provided by allocating a special channel for transmitting information and encrypting individual indicators.

Electronic passports of health are characterized by the following advantages:

- Integrative approach to health as a systemic state, including indicators of physical, mental and social levels;
- Computerization of all data, which makes it possible to create a health bank of various age-sex and professional groups;
- Quantitative expression of indicators, providing the possibility of dynamic observation and comparison of the health level of various groups, educational institutions, districts, etc.;
- Relative simplicity of examination, which does not require expensive equipment;
- Possibility to transmit survey results via the Internet;
- Involvement of the subject in the survey process, which increases his personal interest in preserving and developing health;
- The ability to predict the risk of developing deviant forms of behavior associated with a propensity for psychosocial dependence (Figures 1-3).

With the help of the developed tools, a survey of different groups of students in secondary and higher educational institutions was conducted.









Figure 2: The screenshot of the entrance to the program for the authorized users.



For a demonstration, we give sample data of the results of a survey of 1st year students (n=1000) of the Novosibirsk State Pedagogical University. Thus, when assessing the morpho-functional characteristics of students, the significant gender differences were revealed in the main indicators of physical development and functional capabilities, most of which were within the age-sexual and regional norms [5], but students of both sexes with a deficit (16.8% of girls and 10.5% of young men) and excess body weight (12.9% and 9.6%, respectively) (Table 1).

The assessment of the psychological status of the 1st year students showed a high level of social-psychological adaptation, an average level of aggression and stress resistance, with high motivation for success. The general level of anxiety in all groups was within the norm, however, the Citation: Aizman RI, Lebedev AV, Aizman NI, Rubanovich VB (2017) Screening Diagnostics of Human's Health Using the IT-Technologies is the Base of Preventive Medicine. Adv Tech Biol Med 5: 219. doi: 10.4172/2379-1764.1000219

Parameters	Girls (n=833)	Youths (n=167)	Significant differences
Body length, cm	164.1 ± 0.2	177.5 ± 0.5	***
Body weight, kg	59.5 ± 0.4	69.7 ± 0.9	***
Ketle Index, kg/m <sup>2</sup>	22.0 ± 0.1	22.1 ± 0.2	ns
Carpal index, %	43.6 ± 0.3	59.7 ± 0.9	***
Vital index, ml/kg	59.3 ± 0.6	71.3 ± 1.4	***
Double product, c.u.	92.8 ± 0.6	98.6 ± 1.4	**
PWC170, kgm/kg	11.8 ± 0.1	14.5 ± 0.2	***
Efficiency of blood circulation, c.u	68.6 ± 0.3	77.7 ± 0.7	***
The level of physical health, points	10.4 ± 0.3	10.5 ± 0.3	ns

Note: in this and the following tables, asterisks indicate significant differences between students of different sex: \*  $\leq 0.05$ ; \*\*  $\leq 0.001$ ; \*\*\*  $\leq 0.001$ , ns-not significant **Table 1:** Morphological and functional parameters of the 1st year students (M ± m).

Indicators	Girls (n=833)	Youths (n=167)	Significant differences
Adaptation	$65.5 \pm 0.4$	67.1 ± 0.8	ns
Self-acceptance	78.5 ± 0.4	78.7 ± 0.8	ns
Emotional comfort	$63.5 \pm 0.6$	66.4 ± 1.2	*
Internality	67.5 ± 0.5	71.0 ± 0.9	**
Striving for domination	61.1 ± 0.6	66.3 ± 1	***
Reactive anxiety	$24.5 \pm 0.4$	23.4 ± 0.7	ns
Personal anxiety	41.5 ± 0.4	37.4 ± 0.6	***
Hostility	10.2 ± 0.1	9.5 ± 0.2	*
Aggressiveness	15.9 ± 0.2	15.9 ± 0.3	ns
Stress resistance	40.1 ± 0.3	38.1 ± 0.5	**
Motivation for success	18.3 ± 0.2	19.1 ± 0.3	*

 Table 2: Indicators of the psychological status of 18-20 years old students.

girls had higher personal anxiety and hostility with a high level of stress resistance, while the youths were characterized by a higher motivation for success, a desire for domination, inner self-control and emotional comfort (Table 2).

Analysis of the psychophysiological parameters of students, which determine their cognitive abilities, showed, at normative values, the predominance of indicators of figurative memory, the speed of attention switching and the speed of sensorimotor reactions in young men (Table 3). Probably, in males the tendency to more rapid assimilation of the material is better expressed.

An important role in the successful social-psychological adaptation of students and the realization of their life goals has a personal potential [7]. The students of the 1<sup>st</sup> course had an average level of viability, more pronounced in young men, a rather high level of life satisfaction and adequate life values, although different in importance for youths and girls. However, up to 50% of the 1<sup>st</sup> year students had a low social maturity, which can manifest themselves in their immature patterns of behavior (Table 4).

The spread of various psychosocial dependencies in the youth environment, including psychoactive substances [8], dictated the inclusion of this indicator in the testing program. The results showed that among first-year students the level of propensity to dependent forms of behavior was at the middle and below average levels (Table 5). Low level of propensity is revealed to such factors as alcoholic, tobacco, television, game, religious, medicinal, average to food and labor activity.

The revealed gender differences in the propensity to dependency must be taken into account in educational and preventive work with students.

Indicators	Girls (n=833)	Youths (n=167)	Significant differences
The volume of figurative memory, points	8.3 ± 0.1	8.6 ± 0.1	*
Speed of switching attention, sec	54.8 ± 0.9	50.5 ± 0.9	**
The rate of a simple visual-motor reaction, msec	242.1 ± 2.9	217.6 ± 3.1	***

Table 3: Some psycho-physiological indicators of the 1st year students.

Indicators	Girls (n=833)	Youths (n=167)	Significant differences
Life-sustaining	113.02 ± 1	117.2 ± 1.6	*
Satisfaction with life	24.0 ± 0.2	23.2 ± 0.4	ns

Table 4: Indicators of personal potential of students of 18-20 years.

Indicators	Girls (n=833)	Youths (n=167)	Significant differences
Alcoholic	9.8 ± 0.2	10.1 ± 0.3	ns
Television	10.0 ± 0.2	12.2 ± 0.2	**
Love	18.4 ± 0.2	16.5 ± 0.3	***
Gaming	7.2 ± 0.1	8.9 ± 0.2	***
Sexual	9.7 ± 0.2	13.5 ± 0.3	***
Foodstuffs	14.0 ± 0.2	13.6 ± 0.3	ns
Religious	7.9 ± 0.1	7.0 ± 0.2	**
Labor	11.7 ± 0.1	11.7 ± 0.2	ns
Medicinal	8.6 ± 0.2	7.3 ± 0.2	***
Computer	9.8 ± 0.1	10.4 ± 0.3	*
Tobacco	7.0 ± 0.1	8.1 ± 0.3	**
For a healthy lifestyle	11.0 ± 0.2	10.4 ± 0.3	ns
Narcotic	6.3 ± 0.1	8.1 ± 0.3	***
The general propensity to dependent behavior	12.0 ± 0.1	12.1 ± 0.3	ns

Norms: 5-11 points-low tendency; 12-18 points-average; 19-25 points-high [8] **Table 5:** Indicators of propensity to addiction of 18-20 years old girls and youths.

Age: 21					
Indicators	Level of physical health				
	Low	Below The Average	Average	Above The Average	Higl
Weight index		/			
Lung capacity index			()+++L		
Index of wrist force					>
The indicator of The effectiveness of blood circulation					~
PWC 170					
Double work					
Raising your legs in the vise					$\geq$
Jumping in the longest place	<				
Flexibility			<del>North Con</del>		
Pull-ups					~~
Running 2000 meters					
Running 100 meters					>
Integral assessment of The level of physical readiness					
Integral assessment of The level of physical health					

Figure 4a: The electronic passport includes the final result of physical health assessment of student in the graphic format.

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		Test Test,	21 years		
	Physical development	oment	Physical fitness and functional state		
	Body length:	181	Hand index:	84.51	
	Body weight:	71	Vital index:	58	
	Thorax circle:	92	Lifting of legs in hanging on a crossbeam (times):	22	
	Quetelet's index:	21,67	Pullings up (times):	20	
	Steniya index:	0,77			
	Bearing:	correct	Long jumps:	209	
	Foot:	normal	Inclinations forward:	11	
	Visual acuity (R):	1	Pup of 2000 metars:	10.2	
	Visual acuity (L):	1	Run of 2000 meters.	10,2	
	Group of health:	1	Run of 100 meters:	12	
	Frequency of catarrhal	Kerdo's index:			
	diseases for a year (time):		Double work:	72,8	
	missed by diseases:	10	PWC 170:	17,7	
			of blood circulation:	91	
	Level of physical health:	18	Level of physical fitness:	20	
L				Print	

Thus, the computer tool allows to evaluate various components of the health of young people, on the basis of which to form an electronic passport (Figures 4a and 4b), which can be used for individualization of the educational process and prompt correction of health and behavioral disorders.

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