

Original Article

Factor structure of interrelation between indices of physical condition and definition of the level of physical readiness of future specialists in higher pedagogical education to act in extreme situations

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Abstract:

Authors have presented results of the research of defining peculiarities of the structure of physical condition indices interrelation for future specialists in higher pedagogical education to act in extreme situations. The research has been done with the aim to analyze and create conditions for students' individual and differential physical workload taking into account level of their physical development, functional state, physical as well educational and applied physical readiness etc. The number of active factors has been defined and their relative intensity has been indicated; factor structure of object's features has been revealed, i.e. it has been shown which features stipulate certain factors and to what relative extent; totality of initial data has been divided into groups. The aim of the article is to define peculiarities of the structure of interrelation of physical condition indices of future specialists in higher pedagogical education to act in extreme situations for practical application in the system of physical education. Definition of peculiarities of physical condition of future specialists in higher pedagogical education to act in extreme situations for practical application in the system of physical education can solve various tasks, namely to assure high quality of special knowledge and skills, the development of which is influenced by tendencies and regularities of transition to assurance of personal security; level of formation of physical readiness of future specialists in higher pedagogical education to act in extreme situations. Authors assume this will increase physical condition and level of physical readiness of future specialists in higher pedagogical education to act in extreme situations.

Key words: interconnection, physical condition, readiness to act in extreme situations, future specialists in higher education.

Introduction

Political situation in the country calls for higher demands to a future specialist, his/her education, level of general development, and assurance of personal security of each individual and society as a whole. The tendency to increase of the number of threats, constant deterioration of general level of health and physical training of future specialists stipulates necessity to search for the ways of improvement of the quality of national higher educational system including efficient organization of classes in physical education in higher educational establishments, formation of skills in safe, health-protecting behavior, readiness to act in extreme situations.

Extreme situations are numerous and diverse. They differ in the level of suddenness, character of threats, causes and speed of development, possible consequences, range of expansion, and, respectively, demands to people's training and behavior. As a rule, extreme situation occur suddenly and rapidly develop in a dangerous direction [<http://lib.rus.ec/b/164631/read>]. Extreme situations are those that require person's maximum tension of psychological and physical strength and escaping from them [Hryshyna N.V. (2005)].

Social and economic needs of present-day society, dynamics of its development as well as demands to higher education concede application of physical education as a primary area of implementation of physical culture and an organic part of general education designed to assure development of physical, moral and will, mental abilities, as well as person's professional and applied skills [The Law of Ukraine on "Physical culture and sport" (1994)].

Primary aim of physical training is to improve and sustain specialists' physical abilities at a level needed to protect their health, professional capacity for work, and extension of professional longevity. Within the period of working cycles, improvement of body physiological reserves and improvement of physical development are achieved among executors via physical training; prior to execution – improvement of general

endurance and resistance to unfavorable factors of activity; during execution, depending on professional tasks – decrease of psychological tension, support of professionally important physical qualities, compensation for hypo- and hyperkinesias [Korolchuk M.S. (2009)].

Physical preparedness is viewed as a form of capacity manifestation of body functional systems that are involved in motor activity and define its efficiency.

At present, many researchers (V. Kashuba (2016), N. Moskalenko (2011), N. Pangelova, V. Ruban (2015), O. Sayinchuk (2013)) emphasize increase of the level of preparedness due to change of means, forms, and methods that influence on certain physical qualities and are stipulated by age, sex, motivation, and actual level of students' physical condition [Hureeva A.M. (2014), Kashuba V.O. (2016), Pangelova N. (2015), Sayinchuk O. (2013), Hryban H.P. (2013), Loshytska T.I. (2006)].

As H. Boyko, D. Mishchuk, A. Hureeva, R. Klopov, D. Dzendzelyuk, A. Pidpomoga, P. Tkachenko note, optimization of the process of physical education in educational establishments calls for creation of conditions for students' individual and differential physical workload taking into account level of their physical development, health condition, physical preparedness, morpho-functional status etc. That is, we talk about a complex of factors that influence on physical condition of the trainees. Physical condition is a broad notion, which characterizes personality, health condition, build, body's functional capabilities, physical capacity and preparedness [Hryban H.P. (2013)]. Thus, level of development of certain systems somehow proves body's physical potential.

Analysis of native research by V. Arefiev (2010), V. Platonov (2004), T. Krutsevych (2003), N. Shamardina (2007), O. Dubohai, L. Sushchenko (2005), S. Putrov (2005), I. Hlazyrin (2003) and foreign research by K. Abels, J. Bridges (2010), A. Baker (2009), H. Palmer (2003), J. Sallis (2000) proves that efforts of many scientists are channeled to improvement of the system of physical education of future specialists in higher pedagogical education.

Content of professional training in higher educational establishments includes not only assurance of high quality of special knowledge, but also a system of certain skills, development of which is influenced by tendencies and regularities of transition to assurance of personal security. This transition requires formation of physical readiness of future teachers having sufficient level of physical condition, its level of formation to act adequately in extreme situations, which stipulates necessity for scientific rethinking of the traditional system of physical education of future specialists in establishments of higher pedagogical education.

We consider general orientation, lack of practical application of acquired skills and knowledge in future professional activity, undisclosed content, forms, and methods of special physical training of future specialists in higher pedagogical education to act in extreme situations to be essential drawbacks in physical training of future specialists in higher pedagogical education to act in extreme situations.

Researchers Yu. Skoblo and V. Shatalov note that quality of higher education of future specialists is defined meeting one of person's constant needs – its idea about “being secure from threats” within professional activity, the need to avoid or successfully resist threats, formation of skills in safe health-protection behavior, readiness to act in extreme situations [Moshkin V. N. (2000)].

We consider definition of peculiarities of the structure of interconnection between indices of physical condition and level of physical preparedness of future specialists in higher pedagogical education to act in extreme situations to be relevant.

Materials and methods.

Participants. Factor analysis was done by the method of main components with detection of Varimax orthogonal rotation, which the number of variables with high factor load was minimized with the help of Statistica 10.0 software. This method is the most frequently used as it simplifies factors interpretation. Factor analysis of physical condition of future specialists in higher pedagogical education included indices of physical development: height, weight, size of chest, waist, hips, shoulders, shoulder width; functional state: heart rate at rest, SBP at rest, DBP at rest, HR after 20 squats in 30 seconds, HR after 3-minute rest, SBP after doing squats, DBP after doing squats, breath-holding tests; indices of physical preparedness: 100-meter dash, 2000-meter sprint, push-ups, squat lifting in 1 minute, high jump, 4 x 9m suicides, forward bending in sitting position (to evaluate the level of physical preparedness formation); indices of educational and applied physical preparedness (by O. Dubogai): long jump from standing position, the number of throws of a ball in the wall in 30 seconds (1.5m distance), lie-sit from lying position in 30 seconds, maximum number of jumps through a skip rope in 1 minute, squats in 1 minute. 81 freshman-year students from Berdyansk State Pedagogical University took part in the research.

The following methods of research have been used: theoretical analysis and generalization of data from scientific and methodological references; methods of mathematical statistics (correlation analysis, factor analysis, cluster analysis).

Application of factor analysis enables to distinguish basic indices for every factor and, on the basis of factor dispersion, show which of them play key role in formation of search set of factors. Factor analysis does not require an a priori division of features into dependent and independent as all features are viewed as equal.

The aim of factor analysis is to consolidate output information by expressing a big number of given features through lower number of more capacious internal features of a phenomenon – method of main components analysis that, however, cannot be directly measured. At the same time, the most capacious features manifest themselves simultaneously and are the most essential. These generalized capacious characteristics are called factors. A factor is a linear combination of output variables. Output correlation matrix is viewed as a given one, while factor are distinguished without taking into account selection errors that are peculiar to a correlation matrix [Louli D. (1967), Bakhtin A.I. (2007)].

The aim of the article is to define peculiarities of the structure of interrelation of physical condition indices of future specialists in higher pedagogical education to act in extreme situations for practical application in the system of physical education.

Objectives of the research:

1. To define the number of active factors and to show their relative intensity.
2. To reveal factor structure of object's features, i.e. to show which features stipulate certain factors and to what relative extent.
3. To divide the totality of initial data into groups.

Results.

Present-day experience proves that application of a big amount of information at elaboration of basic areas of multi-year process of physical education and sports training calls for a respective methodological approach. Such approach was named a systematic being first implemented by N. Ozolin and further specified by V. Platonov [Platonov V. N. (2004)].

Study of the development and interrelation of indices that characterize physical development, functional state, physical preparedness, as well as educational and applied physical readiness can be viewed as analysis of the structure of certain elements that create a unity. In this case, systematic approach allows conducting a complex analysis of the development of various body systems of future specialists in higher pedagogical education, and, based on it, define basic pedagogical emphases aimed at formation of physical readiness to act in extreme situations of a social character within the process of directed physical training.

With the aim to define peculiarities of the structure of interrelation of physical condition state of future specialists in higher pedagogical education and define the level of their physical readiness, we have mathematically processed data, which enables us to show indices by abbreviated number of variables while distinguishing primary and secondary structural factors.

The method of factor analysis allowed us to obtain a number of factors that take into account basic dispersion and are allocated in 28 variables. We have distinguished 4 factors, values of which are over 1 (Kreiser criterion). Total score of these factors explains 47% of general variables dispersion.

The structure of indices of physical development, functional state, physical as well as educational and applied physical readiness of students from Berdyansk State Pedagogical University, which collates 28 indices, consists of four factors as show in table 1.

Table 1

Factor structure of indices of physical development, functional state, physical as well as educational and applied physical preparedness of students from Berdyansk State Pedagogical University

No.	Indicators	Factor 1	Factor 2	Factor 3	Factor 4
1	Height, cm	0,43	0,06	0,26	0,11
2	Weight, kg	0,90	-0,10	0,12	0,10
3	Size of chest, cm	0,86	-0,04	0,13	0,02
4	Waist, cm	0,86	-0,10	-0,11	-0,12
5	Hips, cm	0,88	-0,18	0,06	-0,01
6	Shoulders, cm	0,54	0,20	0,15	0,02
7	Shoulder width, cm	0,69	0,03	-0,06	0,04
8	HR at rest, while standing (beats/min)	0,03	0,19	0,33	-0,81
9	SBP at rest (millimeters of mercury)	0,32	-0,03	0,53	0,08
10	DBP at rest (millimeters of mercury)	0,41	0,02	0,02	-0,12
11	HR after 20 squats in 30s (beats/min)	0,01	-0,10	-0,31	-0,71
12	HR after last 30 s of a 3-minute rest (beats/min)	0,07	0,05	-0,41	-0,74
13	SBP after squats (millimeters of mercury)	0,23	0,07	0,49	0,04
14	DBP after squats (millimeters of mercury)	-0,02	0,19	0,78	0,06
15	Stange test, s	-0,03	0,19	-0,64	0,13
16	Hench test, s	-0,00	0,16	-0,68	0,05

17	100-meter dash, s	-0,19	-0,59	-0,16	-0,00
18	2000-meter sprint min., s	0,14	-0,50	-0,06	0,15
19	Push-ups, times	-0,09	0,61	0,02	-0,12
20	Squat lifting in 1 min., times	0,14	0,54	-0,23	0,22
21	High jump, cm	0,13	0,64	0,17	-0,05
22	4 x 9 m suicides, s	-0,14	-0,71	-0,06	0,16
23	Forward bending in sitting position, cm	0,05	0,56	-0,23	0,04
24	Long jump from the spot, cm	-0,31	0,41	0,12	0,29
25	number of throws of a ball in the wall in 30 seconds (1.5m distance), times	0,04	0,65	0,15	-0,09
26	lie-sit from lying position in 30 seconds, times	-0,17	0,53	0,08	-0,04
27	maximum number of jumps through a skip rope in 1 minute, times	-0,09	0,49	-0,06	-0,00
28	Squats in 1 minute, times	-0,10	0,71	-0,13	0,08

Note: Boundary value of factor load is viewed at the level higher than $\geq 0,32$

In our case, the first factor explains 16% of dispersion, the second one – 14%, the third one - 9%, the fourth one – 8%. Overall, they explain 47% of dispersion, i.e. almost half of all data. This means that factorization is not complete. There exist other factors, less valuable but also rather important. Personal values of correlation matrix are show in table 2.

Table 2

Individual values of correlation matrix

Factors	Peculiar numbers	Their respective dispersions	Share of overall dispersion in %
1	5,31	0,16	16
2	4,48	0,14	14
3	3,11	0,09	9
4	2,60	0,08	8

Thus, the structure of the first factor includes: height (0,43); weight (0,90); size of the chest (0,86); waist (0,86); hips (0,88); shoulders (0,54); shoulder width (0,69), SBP at rest (0,32), and DBP pressure at rest (0,41). This factor can be interpreted as a factor of “physical development” that enables to assess the level of physical development and build peculiarities of the students from Berdyansk State Pedagogical University, which, in its turn, can serve as a criterion of health-improving efficiency of physical training as well as a criterion of readiness to execute various-character workload. The first factor is the most important one explaining 16% of total dispersion.

The second factor includes: 100-meter dash (0,59), 2000-meter sprint (0,50), push-ups (0,61), squat lifting in 1 minute (0,54), high jump (0,64), 4 x 9m suicides (0,71), forward bending in sitting position (0,56); the number of throws of a ball in the wall in 30 seconds (1.5m distance) (0,65), lie-sit from lying position in 30 seconds (0,53), maximum number of jumps through a skip rope in 1 minute (0,49), squats in 1 minute (0,71). That is, the second factor comprises indices of physical as well as educational and applied physical preparedness. Based on this, the factor can be called “factor of physical preparedness”. This factor collates 14% of general dispersion. Different values in 100-meter dash and 2000-meter sprint proves direct interrelation. For instance, increase of leg muscles strength results in improvement of the result in 100-meter dash.

The third factor is interpreted as “physical capacity” since it ideally points out such variables as SBP at rest (0,53), SBP after squats (0,49), DBP after squats (0,78), Stange test (-0,64), Hench test (-0,68). This means that the third factor is composed of indices that characterize trainees’ physical capacity, namely functional state of cardiovascular and respiratory systems, ability of a body to control respiration. This factor contributes to overall dispersion at 9%.

The fourth factor proves influence of functional state of cardiovascular system on students’ physical condition as four indices have been distinguished here: HR at rest, while standing (-0,81), HR after 20 squats (-0,71), HR after a 3-minute rest (-0,74). HR is one of the basic indices of a body’s functional capabilities. It plays an important role in body adaptation to physical workload. This means that the fourth factor reflects HR dynamics prior to and after measured physical workload. Load of the fourth factor constitutes 8% of overall dispersion.

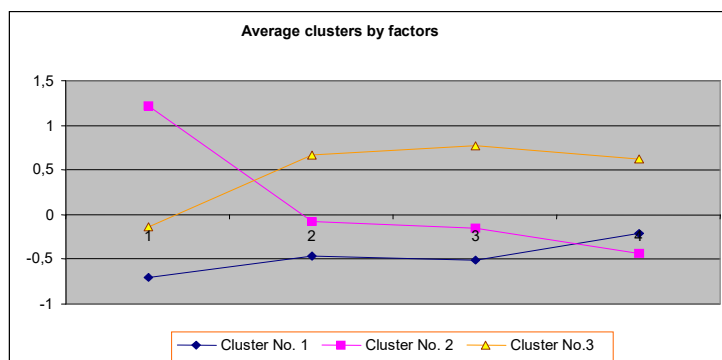
Clustering has been done in order to classify objects into homogeneous groups. The set of all analyzed objects is divided into subclasses that are called clusters. Primary aim of clustering is to divide the totality of initial data into such subsets, groups, so that objects within each group were similar, while objects from different groups – not similar.

The most acceptable design of average factor values is seen at division into three clusters. Average factor values by three clusters are given in table 3 and are shown on a respective diagram (fig. 1).

Average values of factors at division into three clusters

Factors	Cluster No.1	Cluster No.2	Cluster No.3
1	-0,70	1,22	-0,14
2	-0,47	-0,08	0,67
3	-0,51	-0,15	0,78
4	-0,21	-0,43	0,63

Analysis of the obtained indices allowed to define three levels of readiness of future specialists in higher pedagogical education to act in extreme situations: high, average, low. It enables us to elaborate differential methods of physical training to act in extreme situations for each cluster.



Thus, cluster No.1 is nominally distinguished by bigger values of “physical development”, “physical capacity”, and “CVS functional state” factors as well as average values of “physical preparedness” factor. Cluster No. 2 is clearly distinguished by smaller values of “physical development” factor and average values of “physical capacity”, “CVS functional state”, and “physical preparedness” factors. Third cluster features average values of “physical development” factor, bigger values of “physical preparedness” factor, and smaller values of “physical capacity” and “CVS functional state” factors.

Based on indices of factors average values by three clusters, the first one includes students who have low height, deficit of weight, and broad chest, which corresponds to disharmonic development. The index of stature in frontal plane ranges within norm. HR index at rest shows average level of training, BP indices range within norm, HR after measured physical workload proves low level of adaptation of female students’ bodies to workload, BP after squats has normotonic type of reaction of cardiovascular system to measured physical workload. Stange test index is lagging. The most lagging indices of physical preparedness are tests in speed, speed-and-power qualities, and agility, while the ones of educational and applied physical preparedness – tests in accuracy and speed-and-power qualities.

The second cluster includes students having average height, insignificant overweight, a much broader chest, which indicates on disharmonic development. The index of stature in frontal plane shows a slight disorder of stature. HR index at rest, while standing proves that the level of training is below average, BP indices range within norm, HR after measured physical workload proves low adaptation of female students’ bodies to workload. BP after squats has normotonic type of reaction of cardiovascular system to measured physical workload. Stange test index is lagging. The most lagging indices of physical preparedness are tests in speed, speed-and-power qualities, while the ones of educational and applied physical preparedness – tests in accuracy, speed-and-power qualities, and agility.

Students from the third cluster have height above average, deficit of weight, and broad chest, which shows disharmonic development. The index of stature in frontal plane shows significant disorder of stature. HR index at rest, while standing shows average level of training, BP indices range within norm, HR after measured physical workload proves low adaptation of female students’ bodies to workload, BP after squats has hypertonic type of reaction of cardiovascular system to measured physical workload. Stange and Hench tests indices are lagging. The most lagging indices of physical preparedness are tests in speed and speed-and-power qualities. At the same time, tests that require display of endurance, flexibility, arm strength, were done at an above-average level, which oversteps results of the two previous clusters. The most lagging index of educational and applied physical preparedness is a test in accuracy. However, tests that require display of leg muscles strength and endurance were done at an above-average level.

Thus, there is a need to elaborate methods, ways, technologies aimed at development and improvement of physical readiness to act in extreme situations.

Discussion.

Improvement of all links of education of young people is one of the main tasks of pedagogical science and practice. Since there is a tendency to increase of the number of various threats, it stipulates the need to train future specialists not only for effective professional activity, but to form skills of safe health-protecting behavior, readiness to act in extreme situations [Moshkin V. N. (2000)].

Only some 10 years ago. American scientists proved that the level of physical preparedness stipulates the level of professional activity reliability in extreme conditions [Korolchuk M.S. (2009)].

In the USA, PE programs include such key notions as “education through movement” [Abels K.W., Bridges J.M (2010)], “cognition of personal body capability” [Baker A. Body awareness. N. Y.: Samuel French, 2009.], “sense of space, time, strength” [Palmer H. C.(2003)], “relations with surrounding world” [Sallis J. F. (2000)].

High level of psychological tension can be stipulated by influence of various factors, the most peculiar of which are: strong social responsibility for the job done, deficit of time and information (or an overwhelming flow of information) for making decisions and further acting, hindrance of various modality, influence of harmful factors of vital activity, interpersonal incompatibility, social and psychological as well as sensor isolation [Korolchuk M.S. (2009)].

Nowadays, social threats are most widespread, namely the ones related to psychological effect on a human (blackmail, fraud, robbery etc.); threats related to physical violence (wars, armed conflicts, mass disorder, brigandage, banditry, terrorism, hostage taking etc); threats related to abuse of substances that have negative impact on psychological and physical condition of a person (drug addition, alcoholism, smoking); threats that are related to mass illnesses (AIDS, venereal diseases, infectious diseases etc); suicide threats.

The results of our research are proved by data given by M.S. Korolchuk who notes that psychological tension accompanies any complicated activity and significantly depends on the specialist’s level of preparedness. Psychophysiological disorders of emotional origin become less prominent if a specialist is well trained, professionally experienced, physically fit and is ready to overcome difficulties. The mechanism of increasing emotional stability in this case lies in the fact that when repeating dangerous situations many times, a process of psychophysiological stability is developed. This process promotes correct evaluation and restrained behavior [Korolchuk M.S. (2009)].

Topicality of the formation of physical readiness of future specialists in higher pedagogical education to act in extreme situations is stipulated by the fact that ability to make the right decision in extreme situations is very important for a teacher as within the process of professional activity he/she is responsible not only for personal safety, but for the safety of students. That is why the level of professional training of future teachers to work by trade must be directed to training of a healthy, capable of working, psychologically and emotionally stable, physically developed, and ready to act in extreme situations teacher who must be competent not only in assurance of high quality of special knowledge, but in skills to use obtained knowledge and skills in extreme situations. In its turn, this proves data of research by V. Hafner who states that the more complicated conditions for activity are the bigger value of readiness specialization to its specific features is. The less successful it is, the more probability is that at extreme situations its drawbacks will be compensated by non-specific manifestations: increased stress, overstrain, anger etc [Hafner V. (2002)].

The research done by us show insufficient level of physical condition and level of readiness formation of future specialists in higher pedagogical education to act adequately in extreme situations.

The results of our research prove scientific data of a small encyclopedia of physical culture and sport, which reveals the content of applied physical training and emphasizes importance of the development of physical qualities (strength, endurance, speed), coordination qualities (sleight of hand, balance, and accurate motion analysis), applied skills needed for extreme situations: vestibular stability, reaction speed and orientation in space, skills in moving across various hurdles, safety and personal safety skills etc, improvement of psychological processes (memory, concentration, thinking, perception etc) [Ponomariov N.I. (1982)].

We also stick to the idea that formation of physical readiness of future specialists in pedagogical education to act in extreme situations is related to development of physical abilities that correspond to a specific activity; improvement of skills needed in professional activity, and to increase of body’s functional stability under unusual or extreme conditions. This proves the idea of V.H. Arefiyev who states that mastering motions that have practical value for vital activity, ability to rationally and completely display personal physical abilities, cognition of personal body motions regularities, extension of personal fund of vitally important skills allows to form readiness to act in potentially dangerous situations [Arefiyev V. H. (2010)]. Motion skills and physical abilities are interrelated. Thus, person’s skills in a certain motion activity depend on successful realization of appropriate physical abilities [Shamardina H.M. (2004)].

According to V. Moshkin, V.M. Platonov, A. T. Puni, the role of educational establishments lies in formation of readiness to act in extreme situations based on the following statements: to implement during PE classes a combined method of pedagogical actions aimed at formation of physical and psychological abilities while taking into account individual peculiarities of body development, control and evaluation of pedagogical activity efficiency; educational activity must be based on physical and psychological modeling of real activity

conditions and include tasks that develop cognizant, regulatory, and communicative psychic function; to form not only automated action, but also psychophysiological mechanisms that promote activation of psychic properties; to combine various and repeat complex tasks and conditions for their completion; part of future activity that is distinguished for independent studies must be composed of actions that, by their psychological structure, are similar to actions done in real situations [Moshkin V. (1999); Moshkin V. (2000)]. We adhere to the belief of scientists who think that educational establishments are able not only to provide manufacturing organizations with qualified personnel, but also to offer them future teachers of a new generation having sufficient level of physical condition, level of its formation to act adequately in extreme situations.

Our data prove the research by V.S. Kuanetsov and H.A. Kolodnytskyi who state that improvement of the existing system due to rethinking of traditional system of physical educations in the direction of body's increased functional stability in unusual or extreme situations allows to improve quality of training of future specialists in higher pedagogical education, improve their physical condition, and increase the level of physical readiness to act in extreme situations [Kuznetsov V. S. (2003)].

Conclusions.

The number of active factors has been defined; their relative intensity has been indicated. The structure of physical development indices, functional state, physical as well as educational and applied preparedness of 81 students from Berdyansk State Pedagogical University comprises 28 indices and is composed of four factors. Primarily, it is physical development, physical preparedness, physical capability, and functional indices of cardiovascular system respectively. The first factor explains 16% of overall dispersion and is the most important one. The second one explains 14% of dispersion, the third one – 9%, the fourth one – 8%. Overall, they describe 47% of dispersion, i.e. almost half of data. This means that factorization is not complete; there still exist other factors, less valuable but also rather important.

Factor structure of object's features has been revealed. It has been shown what features stipulate actions of certain factors and to what extent. Analysis of the obtained data proves that the structure of the first factor comprises: height (0,43); weight (0,90); size of chest (0,86); waist (0,86); hips (0,88); shoulders (0,54); shoulder width (0,69), SBP at rest (0,32) and DBP pressure at rest (0,41). This factor can be interpreted as "physical development" factor. The second factor comprises: 100-meter dash (0,59); 2000-meter sprint (0,50); push-ups (0,61); squat lifting in 1 minute (0,54); high jump (0,64); 4 x 9 m suicides (0,71); forward bending in sitting position (0,56); long jump from the spot (0,41); the number of throws of a ball in the wall in 30 seconds (1.5m distance) (0,65); lie-sit from lying position in 30 seconds (0,53), maximum number of jumps through a skip rope in 1 minute (0,49), squats in 1 minute (0,71). That is, the second factor is called "physical preparedness". The third factor is interpreted as "physical capacity" as it distinguishes such variables as: SBP at rest (0,53); SBP after squats (0,49); DBP after squats (0,78); Stange test (-0,64); Hench test (-0,68). The fourth factor proves influence of functional state of cardiovascular system on students' physical condition as it distinguishes four indices: HR at rest, while standing (-0,81), HR after 20 squats (-0,71), HR after 3-minute rest (-0,74).

Totality of initial data has been divided into groups, based on which three levels of readiness of future specialists in higher pedagogical education to act in extreme situations have been defined: high, average, low. Cluster No.1 is distinguished by a big value of "physical development", "physical capacity", and "CVS functional state" factors as well as by average values of "physical preparedness" factor. Cluster No.2 is clearly distinguished by smaller value of "physical development" factor and average values of "physical capacity", "CVS functional state", and "physical preparedness" factors. The third cluster features average values of "physical development" factor, bigger values of "physical preparedness" factor, and smaller values of "physical capacity" and "CVS functional state" factors. The obtained data are relevant for their practical application in the system of physical education in order to elaborate differential methods of physical training to act in extreme situations for each cluster.

Conflicts of interest. The authors report no conflicts of interest.

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