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Informative significance of indicators of physical preparedness and morphofunctional state in the structure of the motor system of 9–10 years old pupils

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The article presents the results of the factor analysis of the indicators of physical preparedness, functional status and physical development of pupils of primary school age. Identified leading factors affecting the state of the motor system of children 9–10 years old, which allows to determine the direction of pedagogical influences that will improve the efficiency of the process of physical education in primary school.

Purpose: *to determine the presence and informative significance of the interrelations of indicators of physical preparedness, functional status and physical development of primary school pupils.*

Material & Methods: *the study was conducted in the secondary school No. 2 in Pereyaslav-Khmelnitsky, 115 pupils of 3–4 classes at the age of 9–10 years took part in the study. The following methods were used: theoretical analysis and synthesis of scientific and methodological literature data; pedagogical methods (observation, experiment, testing); anthropometry; physiological research methods (pulsometry, spirometry, Shtange and Gencha tests, Rufie test) methods of mathematical statistics (correlation and factor analysis).*

Results: *the informative significance of the main components in the general structure of the motor system of boys and girls 9–10 years old has been established.*

Conclusion: *revealed significant relationships between the components of physical preparedness, functional state and physical development, which have certain gender and age differences, but despite these differences in the factor structure of the motor activity of children 9 and 10 years old, it can be noted that there are general tendencies, which consist in the dynamic, heterochrony of development and the relationship of its main content components.*

Keywords: *factor analysis, physical condition, leading factors, primary school age.*

Introduction

The younger school age is a very crucial period in the development of a child. It is at this age that the foundation for further state of health and physical fitness is laid, interests and habits are actively developed, character and motivational priorities are being formed [1; 10]. It has been established that in preschool and school age, in the period of active growth and development, the effectiveness of physical training can be achieved under the condition of physical exertion, which should correspond to the peculiarities of the age development of physical abilities [2; 8; 9]. In the current socio-economic conditions of Ukraine, a significant number of schoolchildren have a low level of health and physical fitness, which is largely due to the insufficient level of physical activity, the optimization of which is one of the main tasks of the modern school physical education system [3; 7].

In the early school years, significant morphological and functional changes occur in the child's body [3; 10]. It is important that during this age period motor activity is especially necessary, it contributes to: the optimal course of the restructuring processes of the body's functional systems; physical development and the formation of physical qualities necessary in the process of adult activity [1; 11]. Until recently, there was a physical education program for students in grades 1–4, in which all physical exercises were classified by "schools". One of these "schools" is the "ball school", in which exercises with balls of various sizes and different ways of performing them are presented [6]. Since 2017, an updated program for physical culture has been in effect, in which the exercises are classified by type of activity, but this is of no fundamental importance. Some of the exercises presented in this section are elements of basketball. Such exercises cause positive emotions in children, give the opportunity to develop physical abilities in a comprehensive manner, and it is precisely in the younger school age that assimilation of elements of the game is actively taking place, but the lack of time allocated to the lesson does not allow to effectively solve educational and health problems (development of physical abilities), therefore the development of a methodology for the complex development of physical abilities of pupils of 3–4 classes in the process of teaching the techniques of basketball elements is an urgent task. Leading Ukrainian scientists T. Yu. Krutsevich, N. Ye. Pangelova, A. D. Krivchikova et al. [4] consider physical fitness more broadly, not limited to the level of development of motor skills, but understanding it as a form of manifestation of the functional capacity of the body involved in motor activity and determine its effectiveness. Consequently, the level of development of physical qualities in a certain way testifies to the psycho-physiological potential of the organism, which makes it expedient to study the interrelationships of the components

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of the human motor system. The study of the relationship of the components of the functioning of the body of students as an integrated system using the methods of mathematical analysis (correlation and factor) allows the development of a ratio of the components of pedagogical actions.

Purpose: to determine the presence and informative significance of the interrelations of indicators of physical preparedness, functional status and physical development of primary school pupils.

Material and Methods of the research

The study was conducted in secondary school number 2 of Pereyaslav-Khmelnitsky, the study was attended by 115 students of 3–4 classes at the age of 9–10 years. In the process of research, the following methods were used: theoretical analysis and synthesis of data from scientific and methodological literature; pedagogical methods (observation, experiment, testing); anthropometry; physiological research methods (pulsometry, spirometry, Shtange and Gencha tests, Rufie test) methods of mathematical statistics (correlation and factor analysis). The comprehensive study program included 21 indicators. The interrelation of all components of the motor system of the students was analyzed on three correlation levels: high – r=0,7–0,99; average – r=0,31–0,69; low – r<0,3. A factor analysis was used to reduce the number of variables and to identify the structure of interrelationships between variables, which allows us to determine the directions of pedagogical measurements.

Results of the research

The conducted factor analysis of the structure of the motor system of boys for 9 years has made it possible to establish that it is determined by 8 orthogonal factors in which the sum of load variables varies from 3,72 to 1,32 and the dispersion contribution is 99,8% (Table 1). The first factor was the anthropometric indicators with the highest values (body weight – 0,94, body length – 0,76, CC – 0,61). Also in this factor included indicators of vital capacity of the lungs (0.75), which also determined the name of this factor – "morpho-functional state". It should be noted that the first factor has the greatest weight coefficient of significance (21%). In the second factor, the sum of the load variables is 2,64 and in it the most significant are the indicators of dynamometry (left – 0,90, right – 0,88), arm muscle strength (0,65). The data obtained give us reason to consider this factor as a factor of "strength abilities", and its contribution to the total variance is 15,0%. In the third factor, where the sum of the coefficients is equal to 2,52, and the weight coefficient of significance is 14,4%, the most significant are the indicators of the functional state of the respiratory system (the Shange test is – –0.92, the Gencha test is 0,86) and the coordination ability (vestibular stability – 0,57), which determined the name of the factor – "functional state of the respiratory system and vestibular stability", and there is feedback, which suggests that a low level of functional state is the limiting factor torus of physical condition. When analyzing the content of the fourth factor (13,1%), the effect of indicators of endurance (running 1,000 m – 0,86) and coordinating abilities (the ability to estimate the spatial and temporal parameters of movements – 0,73, the reaction rate – –0,60, vestibular stability – 0,41). The fourth factor has a sum of loading variables of 2,30 and received the name "endurance, coordination and speed capabilities". The fifth factor included indicators of heart rate (relative rest – 0,96, absolute rest – 0,94). The sum of loading variables is equal to 2,28,

Table 1

Factor analysis of the main components of physical development, functional status and physical fitness of boys, 9 years old, n=28

Indicators	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Body mass	**0,94**	0,04	0,16	0,11	0,07	0,03	0,14	–0,02
Body length	**0,76**	0,37	–0,19	–0,09	–0,11	–0,13	–0,03	–0,09
Chest circumference	**0,61**	0,10	0,33	0,30	–0,24	0,21	0,28	–0,33
Quetelet index	**0,87**	–0,08	0,26	0,16	0,12	0,07	0,17	0,01
HR relative rest	0,03	0,03	0,19	0,09	**0,94**	0,12	–0,01	–0,12
HR absolute rest	–0,03	0,05	0,17	0,02	**0,96**	–0,18	–0,01	–0,05
HR difference	–0,17	0,05	–0,06	–0,19	0,04	**–0,84**	0,02	0,18
VC	**0,75**	0,10	–0,22	–0,12	–0,05	0,04	–0,18	0,11
Stange's test	0,04	0,03	**–0,92**	0,01	–0,15	–0,09	–0,08	0,18
Gencha test	–0,07	–0,17	**–0,86**	0,06	–0,34	0,06	0,19	0,03
Rufie test	–0,02	–0,05	–0,08	–0,07	–0,13	–0,06	–0,10	**0,82**
Dynamometry, rights	0,12	**0,88**	0,19	0,07	0,20	0,08	–0,13	0,03
Dynamometer, left	0,14	**0,90**	0,04	0,03	–0,01	0,02	–0,08	–0,13
Standing long jump	–0,11	0,10	0,01	–0,08	0,01	0,06	**–0,92**	0,11
Flamingo test	0,26	0,09	**0,57**	**0,41**	–0,09	–0,02	0,16	0,38
Pulling up	–0,11	**0,65**	–0,36	–0,15	–0,07	0,08	0,41	0,29
Tilt the body forward from a standing position	–0,33	–0,46	–0,13	–0,30	0,31	0,32	–0,05	0,26
Grip a gymnastic stick that falls	0,49	0,02	0,19	**–0,60**	0,05	–0,07	0,02	–0,10
Running 30 m	0,17	–0,30	0,04	**0,42**	0,03	**–0,64**	0,07	–0,19
"Shuttle run" 4x9 m	0,11	0,33	0,16	**0,73**	–0,13	–0,07	0,28	–0,23
Running 1000 m	0,08	–0,07	0,03	**0,86**	0,23	0,05	–0,05	–0,02
Sum of loading variables	3,72	2,64	2,52	2,30	2,28	1,37	1,37	1,32
Contribution of the factor to the total variance, %	21,2	17,52	14,4	13,1	13,0	7,9	7,9	7,5

Table 2

Factor analysis of the main components of physical development, functional status and physical fitness of girls, 9 years old, n=22

Indicators	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Body mass	**0,95**	0,05	0,11	–0,15	0,09	0,01	0,08
Body length	**0,75**	0,43	0,12	–0,16	–0,01	–0,11	0,01
Chest circumference	**0,80**	–0,03	–0,13	0,22	0,12	–0,34	–0,06
Quetelet index	**0,94**	–0,04	0,11	–0,13	0,11	0,04	0,09
HR relative rest	0,24	**0,85**	0,19	–0,01	–0,04	0,14	0,24
HR absolute rest	–0,09	**0,92**	–0,09	0,05	0,12	–0,20	0,06
HR difference	–0,37	0,31	**–0,56**	0,05	0,34	–0,45	–0,19
VC	**0,52**	0,41	**0,52**	0,19	–0,12	–0,18	–0,28
Stange's test	–0,28	–0,06	–0,05	**0,87**	0,00	0,13	–0,08
Gencha test	0,01	0,10	0,00	**0,96**	0,06	0,04	0,04
Rufie test	–0,22	–0,09	–0,01	0,30	0,19	0,32	**–0,66**
Dynamometry, rights	0,35	0,37	0,48	0,38	0,36–	0,18	–0,19
Dynamometer, left	0,19	**0,60**	–0,18	**0,53**	0,05	0,40	–0,01
Standing long jump	–0,03	–0,27	**–0,55**	–0,21	**–0,56**	0,40	–0,03
Flamingo test	–0,24	0,01	–0,16	–0,01	–0,18	**0,87**	0,04
Pulling up	–0,05	–0,26	**–0,81**	0,06	0,01	–0,02	0,00
Tilt the body forward from a standing position	**–0,54**	–0,18	0,09	–0,29	0,37	0,18	–0,02
Grip a gymnastic stick that falls	0,00	0,18	0,13	0,27	0,12	0,18	**0,87**
Running 30 m	0,10	–0,24	**0,80**	–0,10	0,34	–0,18	0,14
"Shuttle run" 4x9 m	0,24	0,08	0,03	–0,18	**0,74**	–0,13	0,35
Running 1000 m	0,06	0,01	0,05	0,12	**0,96**	–0,09	0,05
Sum of loading variables	4,18	2,80	2,60	2,59	2,45	1,79	1,59
Contribution of the factor to the total variance, %	23,2	15,5	14,4	14,4	13,6	9,9	8,8

which determined the name of this factor – "functional state of the cardiovascular system". The contribution of this factor to the total variance is 13%. The sum of the coefficients of the variables in the sixth factor is 1,37, and the contribution of the factors to the total variance is 7,9%. Here the indicators of the functional state of the cardiovascular system (–0,84) and speed (–0,64). The content of this factor allows to define it as "functional state of the cardiovascular system and speed". The seventh factor has the sum of the coefficients – 1,37, the contribution to the total variance – 7,9%. The most significant is the indicator of the test "standing long jump" (–0,92), which determined the name of the seventh factor – "speed-strength abilities". In the eighth factor, where the sum of the coefficients is equal to 1,32, and the weighting factor is 7,5%, the indicator of the Rufie test is the most significant (–0,82). Thus, this factor is interpreted as a factor of "physical working capacity". The conducted analysis of the factor structure gives us the opportunity to consider that the development of physical fitness, functional state and physical development of boys of 9 years of age is complex and is ensured by the following factors: morphofunctional state, strength abilities, functional state of the respiratory system and vestibular stability, endurance, coordination and speed abilities, functional state of the cardiovascular system, functional state of the heart cerebrovascular system and speed, speed-strength abilities, physical working capacity.

The analysis of the motor system of girls 9 years old, in contrast to boys, is determined by 7 orthogonal factors, where the sum of load variables ranges from 4,18 to 1,59, and the total dispersion contribution is 99,8% (Table 2). The first factor has the largest amount of loading variables – 4,18 and the contribution of the factor to the total variance (23,2%). It includes indicators of body mass (0,95), Quetelet index (0,94), CC (0,80), body length (0,75), which enabled us to define this factor as "physical development". The second factor contributes to the general dispersion of 15,5% and the sum of the coefficients 2,80. The largest here are indicators that characterize the functional state of the cardiovascular system (0,85 and 0,92), as well as the indicators of left hand dynamometry (0,60). Thus, the interconnection of the components gives the right to interpret this factor as "the functional state of the cardiovascular system and the strength of the muscles of the brush". The most significant indicators of the third factor (14,4%) are the strength (–0,80), speed (0,80), functional state of the respiratory system (difference of heart rate – 0,56), indicators of lung capacity (0,52) and high-power (–0,55) abilities. The sum of the coefficients of the third factor is 2,60 and is called the "physical abilities and functional status of the respiratory system." In the fourth factor, where the sum of the coefficients is equal to 2,59, and the weight coefficient of significance is 14,4%, the indicators of the Genche test (0,96) and the Stange test (0,87) are the most significant, which determined its name – "functional state respiratory system. When analyzing the fifth factor, where the sum of the coefficients is 2,45, and the dispersion contribution is 13,6%, the mutual influence of endurance (0,96), coordination (0,74) and speed-strength (–0,56) abilities is clearly seen. This made it possible to identify this factor as a factor of "physical abilities". In the analysis of the sixth factor, where the sum of the coefficients is 1,59, and the dispersion contribution is 8.8%, the most significant are the indicators of coordination abilities (0,87) and the Rufie index (–0,66). This made it possible to determine this factor as a factor of "coordination abilities and physical performance". In the seventh factor, where the sum of the coefficients is 1,79, and the weight coefficient of significance is 9,9%, the Flamingo test indicator (0,87) is the most significant, which caused its name – "vestibular stabil-

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Table 3

Factor analysis of the main components of physical development, functional state and physical fitness of boys 10 years, n=41

Indicators	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Body mass	0,21	**0,60**	**0,58**	–0,12	0,15	–0,21	–0,02
Body length	–0,08	0,30	**0,84**	–0,09	–0,08	0,01	–0,13
Chest circumference	0,10	**0,88**	0,13	0,00	–0,08	–0,09	0,07
Quetelet index	0,41	**0,54**	0,14	0,11	0,05	–0,32	–0,17
HR relative rest	–0,21	0,06	–0,15	**0,89**	–0,06	0,01	0,12
HR absolute rest	–0,12	0,07	0,06	**0,89**	0,12	–0,09	–0,22
HR difference	0,22	0,03	0,45	0,08	0,34	–0,14	**–0,69**
VC	–0,23	0,32	0,47	–0,09	–0,48	0,15	0,17
Stange's test	0,11	0,15	**0,67**	0,28	0,11	0,03	0,26
Gencha test	0,11	0,21	**0,44**	**0,60**	–0,11	0,22	0,01
Rufie test	–0,23	0,15	0,31	0,32	–0,13	**–0,55**	–0,17
Dynamometry, rights	–0,17	**0,87**	0,15	0,12	0,03	0,13	–0,07
Dynamometer, left	–0,12	**0,82**	0,05	0,18	–0,11	0,00	–0,17
Standing long jump	–0,29	0,01	0,11	0,15	–0,03	**0,83**	–0,19
Flamingo test	–0,36	0,31	**–0,47**	0,00	0,10	0,18	0,05
Pulling up	**–0,90**	0,02	–0,04	–0,04	0,13	0,03	0,03
Tilt the body forward from a standing position	0,09	–0,01	0,03	–0,02	**0,92**	0,06	0,06
Grip a gymnastic stick that falls	0,12	–0,19	0,28	–0,04	0,19	–0,19	**0,76**
Running 30 m	**0,91**	0,04	0,04	–0,,17	0,18	0,00	0,10
"Shuttle run" 4x9 m	**0,90**	–0,18	0,10	–0,07	0,12	0,04	–0,01
Running 1000 m	**0,76**	0,19	–0,04	–0,21	0,18	–0,30	–0,03
Sum of loading variables	3,78	3,34	2,62	2,32	1,44	1,42	1,38
Contribution of the factor to the total variance, %	23,1	20,5	16,0	14,2	8,8	8,7	8,5

ity". The analysis of the factor structure allows us to consider that the development of physical fitness, functional state and physical development of girls of 9 years is ensured by the following factors: physical development, functional state of the cardiovascular system and the strength of the muscle of the brush, physical abilities and functional state of the respiratory system, functional state respiratory system, physical abilities, coordination abilities and physical working capacity, vestibular stability .

Summarizing the results of factor analysis of the motor system of boys and girls of 9 years of age, one can state that reliable relationships have been identified between the components of physical fitness, physical development and functional state of children. Boys have identified 8 orthogonal factors, and girls have 7, which is due to the fact that boys of this age are experiencing intense growth (this is the so-called period of "second extraction"). According to A. A. Markosyan's theory, the greater the number of factors determines the functioning system, the less stable it is. Such trends are observed in such periods of age development, which are called "critical" (intensive growth, quantitative and qualitative changes occur in the body.)

In boys of 10 years, the structure of motor activity is determined by 7 orthogonal factors with a sum of variables from 5,34 to 1,38 and a total dispersion contribution of 99,8% (Table 3). The first factor (23,1%) included indicators of physical abilities (speed – 0,91; coordination abilities – 0,90; endurance – 0,76; strength of the arm muscles – 0,66). The sum of indicators of this factor is 3,78 and it is defined by us as "physical abilities". In the second factor, which has a coefficient of significance (20,5%) and a sum of coefficients of 3,34, the indicators of dynamometry (right – 0,87, left – 0,82) and physical development (CC – 0,88, body weight – 0,60, Quetelet index – 0,54), which makes it possible to determine this factor as a factor of "physical development and muscle strength of the hands". When analyzing the third factor (16,0%), it was revealed that the functional state of the respiratory system (the Shange test – 0,67 and the Gencha test – 0,44) and the Flamingo test (–0,47) have the highest values. The sum of the coefficients of the third factor is 2,62 and is called the "functional state of the respiratory system and coordination abilities". The most significant in the fourth factor are the indicators of the functional state of the cardiovascular system (0,89 and 0,89) and the Gencha test (0,60). The contribution of the factor to the general dispersion is 14,2%, and the sum of the coefficients is 2,32. The fourth factor is interpreted as a "functional state of the cardiorespiratory system". In the fifth factor, where the sum of the coefficients is 1,44, and the weight coefficient of significance is 8,8%, the most significant is the index of the "torso inclination forward in the standing position" (0,92), which was determined by its name – "flexibility". In the analysis of the sixth factor, where the sum of the coefficients is 1,42, and the dispersion contribution is 8,7%, the most significant are indicators of speed-strength abilities (0,83) and the Rufie index (–0,55). This made it possible to determine this factor as a factor of "speed-strength abilities and physical performance". In the seventh factor, where the sum of the coefficients is equal to 1.38, and the weight coefficient of significance is 8,5%, the most significant are the indicators of the reaction rate (0,76) and the functional state of the cardiovascular system (–0,69), which determined the name the seventh factor "the functional state of the cardiovascular system and the reaction rate". The conducted analysis of the factor structure of boys for 10 years allows us to as-

Table 4

Factor analysis of the main components of physical development, functional status and physical fitness of girls, 10 years old, n=24

Indicators	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Body mass	0,19	0,17	**0,68**	**–0,56**	0,16	0,22	–0,07
Body length	0,13	0,14	**0,81**	–0,08	0,07	0,25	–0,21
Chest circumference	**0,62**	0,13	0,01	–0,24	–0,17	**0,55**	0,15
Quetelet index	0,19	0,17	**0,52**	**–0,62**	0,29	–0,10	0,02
HR relative rest	**–0,85**	–0,26	–0,16	0,03	0,13	–0,05	0,02
HR absolute rest	**–0,79**	–0,06	–0,24	–0,04	0,15	0,22	–0,07
HR difference	0,23	0,27	0,07	0,45	**0,67**	0,02	–0,09
VC	0,08	–0,21	**0,91**	0,04	–0,01	–0,06	–0,02
Stange's test	0,00	0,26	0,03	0,23	0,00	–0,20	**0,83**
Gencha test	0,14	0,31	**0,72**	0,07	–0,26	0,11	0,39
Rufie test	**–0,83**	0,26	–0,11	–0,12	–0,21	–0,12	0,19
Dynamometry, rights	0,00	–0,30	–0,03	**–0,79**	–0,06	0,36	–0,19
Dynamometer, left	0,08	–0,07	0,01	**–0,85**	–0,05	–0,20	–0,15
Standing long jump	0,09	–0,40	–0,18	0,08	0,21	0,28	**0,71**
Flamingo test	–0,15	**–0,52**	–0,10	0,08	**0,52**	0,03	–0,07
Pulling up	–0,18	–0,09	0,24	0,08	0,07	**0,87**	–0,05
Tilt the body forward from a standing position	**–0,75**	–0,07	0,03	0,21	–0,04	0,15	–0,11
Grip a gymnastic stick that falls	–0,14	0,00	0,04	–0,21	**0,81**	0,01	0,18
Running 30 m	0,08	**0,92**	–0,11	0,07	0,09	0,06	0,04
"Shuttle run" 4x9 m	–0,06	**0,87**	0,22	0,04	0,01	0,08	0,05
Running 1000 m	0,13	**0,74**	0,00	0,11	0,00	–0,22	–0,04
Sum of loading variables	3,27	3,20	3,00	2,51	1,74	1,63	1,57
Contribution of the factor to the total variance, %	19,4	18,9	17,8	14,9	10,0	9,7	9,3

sert that the functioning of the motor system is ensured by the following factors: physical abilities, physical working capacity and muscle strength, functional state of the respiratory system and coordination abilities, functional state of the cardiorespiratory system, flexibility, physical working capacity and speed-strength abilities, functional state of the cardiovascular system and the reaction rate.

The factor structure of the motor system of girls 10 years is also determined by 7 orthogonal factors, where the sum of load variables varies from 3,27 to 1,57. The total dispersion fee is 100% (Table 4). In the analysis of the first factor, where the sum of the coefficients is 3,27, and the dispersion contribution is 19,4%, the interaction of the components of the functional state of the cardiovascular system (–0,85; –0,79) and physical working capacity (–0,83) is clearly traced. This makes it possible to determine this factor as a factor of the "functional state of the cardiovascular system and physical performance". The second factor contributes to the total variance of 18,9% and the sum of the coefficients is 3,20. The largest here are indicators of physical qualities (speed – 0,92; coordination abilities – –0,52 and 0,87; endurance – 0,74; speed-strength abilities – –0,40). Thus, the interrelation of these components gives the right to interpret this factor as "physical abilities". The third factor has the sum of variables – 3,0, the contribution to the total variance – 17,8%. It contains the highest lung capacity (0.91) and Gencha samples (0,72) with the highest values. Also, this factor included anthropometric indicators (body length – 0,81, body weight – 0,68, Quetelet index – 0,52), which determined the name of this factor – "morphofunctional state". The most significant indicators of the fourth factor (14,.9%) are indicators of the strength of the hand muscles (–0,79 and –0,85), Quetelet index (–0,62), body mass (–0,56). The sum of the coefficients of the fourth factor 2,51 and received the name "physical development". In the fifth factor, where the sum of the coefficients is 1,74, and the weight coefficient of significance is 10,0%, the most significant are the indicators of the reaction rate (0,81) and the Flamingo test (0,52), which determined the name of this factor – "speed and coordination abilities". The sum of the coefficients of the variables in the sixth factor is 1,63, and the contribution of the factor to the total variance is 9,7%. Here, the highest value is given to the strength index (0,87) and CC (0,55), which makes it possible to determine the name of this factor – "power abilities". In the seventh factor, where the sum of the coefficients is 1,57, and the weight coefficient of significance is 9,3%, the most significant is the indicator of the Stange test (0,83) and speed-strength abilities (0,71) which led to his name – "functional state of the respiratory system and speed-power abilities". The analysis of the factor structure of girls for 10 years is provided by the following factors: functional state of the cardiovascular system and physical fitness, physical abilities, morphofunctional state, physical development, speed and coordination abilities, strength abilities, functional state of the respiratory system and speed-strength abilities.

So, the factor analysis of the main components of the motor activity of boys and girls of 10 years of age indicates the presence of interconnections between physical abilities and morphofunctional state. Interpretation of these data in the pedagogical aspect suggests that in primary school age it is advisable to carry out the integrated development of physical abilities.

Conclusions / Discussion

The use of factor analysis in research allowed us to establish

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the information significance of factors in the overall structure of the motor system of children of primary school age, and also to identify their main components. In girls of 9 years of age, 7 orthogonal factors are determined, and in boys, 8, and in boys and girls of 10 years of age, 7 orthogonal factors.

Summarizing the results of factor analysis of motor activity of junior schoolboys (boys and girls), it can be stated that reliable relationships have been identified between the components of physical fitness, functional state and physical development, which have certain gender-age differences. But despite certain differences in the factor structure of the motor activity of children 9 and 10 years, one can note the existence of general tendencies that consist in the dynamics, heterochronous development and interconnection of its main content components. Thus, it was established that the anthropometric and functional indicators in all sex and age groups are located in the most influential factors - I and II, in combination with the indicators of motor tests, allows us to realize the ratio of physical exercises of different orientations in the process of teaching and non-teaching physical training.

Our data confirm the results of studies by other scientists on the structure of the motor system of junior schoolchildren [5; 6]. In particular, in children of 9 years of age, there is a difference between the number of orthogonal factors in girls and boys (7 and 8 respectively), which is explained by the different rates of sex and age development during this period, and already at 10 years of age, the number of orthogonal factors is the same, both boys and girls.

Prospects for further research are to substantiate and develop methods for the integrated development of physical abilities of students in grades 3–4 in the process of teaching basketball elements.

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