

ASSESSMENT OF FUNCTIONAL, COORDINATION AND POWER FITNESS OF 7-8 FORM BOYS

Ivashchenko O.V., Yermakova T.S.

H.S. Skovoroda Kharkiv National Pedagogical University

Abstract. *Purpose:* determination of informative indicators of 7-8 form boys' motor and functional fitness. *Material:* in the research 24 pupils of 7th form and 35 pupils of 8th form participated. For assessment of functional and motor fitness test of Shtange, Genchi, Serkin and motor tests were conducted. *Results:* Analysis witnesses that the results of testing between boys of 7th and 8th form there are statistically confident differences by most of indicators ($p < 0.05; 0.001$). By functioning of respiratory and blood circulation systems 7-8 form boy pupils were assessed as healthy-not trained. *Conclusions:* structural coefficients of canonic discriminant function witness that the function is connected to the largest extent with variables. So, substantial difference between 7th form pupils and 8th form pupils was observed in condition of motor abilities: speed-power, coordination of movements and strength itself.

Key words: boys, functional, coordination, fitness, strength, motor abilities.

Introduction

Health of nation is an integral indicator of social-economic and spiritual condition of society. As it is known human health is formed in children's and adolescent's age. This process is influenced by many factors: genetic factors, way of life, social economical and ecological conditions. As per scientific data schoolchildren's health has significantly worsened recent years [1, 2, 5, 6, 26]. In target complex program "Physical education – health of nation" it is noted that situation with health, especially health of children and adolescents is extremely unsatisfactory in Ukraine. Nearly 90% of pupils have health disorders; above 50% have insufficient physical fitness.

One of conditions of improvement of schoolchildren's motor fitness is organization of pedagogic control at physical culture lessons [3, 4, 11, 13], and in conditions of sport training [9, 10, 13-16]. Procedure of pedagogic control is classification of current state of motor and functional fitness, on which taking decisions in controlling of children's and adolescents' physical education depends.

So, classification of motor fitness is of practical importance for taking decisions in controlling of children's and adolescents' physical education. Classification is also important for working out of effective programs of children's and adolescents' physical training.

In researches of O.M. Khudolii and S.S. Iermakov (2011), O.M. Khudolii and O.V. Ivashchenko (2013) there were worked out conceptual approaches to simulation of motor abilities' training in children and adolescents. Also models of motor skills' training, which can be used for current and summarizing control of children and adolescents' fitness, are regarded. By the data of different [4, 12, 20-22] current control over children's and adolescents' motor fitness can be realized on the base of discriminant analysis.

However, in available scientific literature there is paid insufficient attention to application of simulation method for classification of motor and functional fitness of children and adolescents.

That is why, solution of problem of assessment and detection of secondary form pupils' functional and motor fitness is rather urgent.

Purpose, tasks of the work, material and methods

The purpose of the research: is determination of informative indicators of 7-8 form boy-pupils' motor and functional fitness.

The methods of the research: the following methods were used – analysis of scientific-methodic literature, pedagogic testing and methods of mathematical statistic.

For assessment of 7-8 form pupils' functional and motor fitness we registered results of tests of Shtange, Genchi, Serkin and motor tests. In the research 24 pupils of 7th form and 35 pupils of 8th form participated.

Results of the research

Results of the research are given in tables 1-5.

Table 1

Results of analysis of motor and functional fitness of 7th and 8th forms

№	Test	7 th form (n=24)		8 th form (n=35)		t	P
		x	s	X	s		
1	Jumps with (additions), times	4.16	,87	2.80	,93	5.683	< 0.001
2	Assessment of time parameters of movement, mistake, sec.	1.08	,83	,78	,57	1.681	> 0.098
3	Assessment of power parameters of arms' movements, mistake, %	12.13	1.68	14.71	1.86	-5.471	< 0.001
4	Shuttle run 4×9 m, sec.	12.74	,72	10.93	,81	8.811	< 0.001
5	Pressing up in lying position, times	24.00	4.11	15.86	3.26	8.469	< 0.001
6	Chin ups, times	11.04	1.27	6.26	2.39	8.955	< 0.001
7	Hanging on bent arms, sec.	27.00	4.00	39.17	13.29	-4.341	< 0.001
8	Long jump from the spot, cm.	163.25	434	185.89	11.74	-9.015	< 0.001
9	Shtange's test, sec.	39.92	3.19	40.86	10.79	-,414	<0.001
10	Genchi's test, sec.	23.96	2.59	32.26	7.16	-5.430	<0.001
11	Serkin's test, sec.	17.83	3.03	23.80	5.65	-4.720	<0.008

Analysis witnesses, that by testing results there are statistically confident differences between boys of seventh and eighth forms by most of indicators ($p < 0.05:0.001$). By functional state of respiratory and blood circulation system 7-8 form pupils are assessed as healthy but not trained.

Statistically confident differences are also observed between 7-8 form pupils in tests, which characterize coordination fitness and strength itself ($p < 0.001$). Boys from 7th form have better fitness by results of tests 1, 5 and 6 ($p < 0.001$). Boys from 8th form have better indicators of speed power, static power, coordination and functional state of respiratory and blood circulation systems.

In tables 2-5 we present results of discriminant analysis, which permit to classify 7-8 form pupils by their functional state and motor fitness.

In table 2 we can see normalized coefficients of canonic discriminant function, which permit to determine correlation of variables' contribution in result of function. With the greatest contribution variables 10, 6, 11 and 8 enter canonic function: the higher values of these variables are, the bigger is value of the function. The above said witnesses about possibility of classification of seventh and eighth forms boys' age distinctions on the base of testing of functional, coordination and power fitness.

In table 5 we give coordinates of centroids for first (7th form) and second (8th form) groups. They permit to interpret canonic function in respect to its role in classification. At negative pole there is centroid for 8th form; at positive pole – for 7th form. It witnesses about substantial difference in fitness of seventh and eighth forms' pupils.

Table 2

Normalized coefficients of canonic discriminant function

№ of test (variables)	Description of test	Function
1	Jumps with (additions), times	,268
2	Assessment of time parameters of movement, mistake, sec.	,281
3	Assessment of power parameters of arms' movements, mistake, %	-,509
4	Shuttle run 4×9 m, sec.	,413
5	Pressing up in lying position, times	,319
6	Chin ups, times	,624
7	Hanging on bent arms, sec.	-,171
8	Long jump from the spot, cm.	-,512
9	Shtange's test, sec.	-,077
10	Genchi's test, sec.	-,628
11	Serkin's test, sec.	,563

Table 3

Structural coefficients of canonic discriminant function

Rank	№ of test	Description of test	Function
1	8	Jumps with (additions), times	-,394
2	6	Assessment of time parameters of movement, mistake, sec.	,392
3	4	Assessment of power parameters of arms' movements, mistake, %	,386
4	5	Shuttle run 4×9 m, sec.	,371
5	1	Pressing up in lying position, times	,249
6	3	Chin ups, times	-,239
7	10	Hanging on bent arms, sec.	-,238
8	11	Long jump from the spot, cm.	-,207
9	7	Shtange's test, sec.	-,190
10	2	Genchi's test, sec.	,074
11	9	Serkin's test, sec.	-,018

Table 4

Results of classification of groups

		Classifier	Prognosticated belonging to group		Total
			7,00	8,00	
Final	Frequency	7,00	24	0	24

		8,00	0	35	35
	%	7,00	100,0	,0	100,0
		8,00	,0	100,0	100,0

Table 5

Functions in groups' centroids

Form	Function
	1
7 th form	3.593
8 th form	-2.464

In table 2 we can see normalized coefficients of canonic discriminant function, which permit to determine correlation of variables' contribution in result of function. With the greatest contribution variables 10, 6, 11 and 8 enter canonic function: the higher values of these variables are, the bigger is value of the function. The above said witnesses about possibility of classification of seventh and eighth forms boys' age distinctions on the base of testing of functional, coordination and power fitness.

In table 5 we give coordinates of centroids for first (7th form) and second (8th form) groups. They permit to interpret canonic function in respect to its role in classification. At negative pole there is centroid for 8th form; at positive pole – for 7th form. It witnesses about substantial difference in fitness of seventh and eighth forms' pupils.

In table 3 we present structural coefficients of canonic discriminant function, which are coefficients of variables' correlation with function. For example, function is most significantly connected with variables № 8, 6, 4 and 5: so substantial difference between boys of seventh and eighth forms is observed in condition of motor skills: speed-power, coordination and strength itself.

In table 4 one can see results of groups' classification. 100% of final grouped observations are classified correctly. Thus, canonic discriminant function can be used for classification of age peculiarities of seventh and eighth forms' boys.

Discussion

In the researches in the sphere of physical education and sports discriminant function is used for classification of pupils by their motivation for sport training [24], by motor activity [19], for classification of groups into sportsmen and not sportsmen [23], for determination of dynamic of 9-12 years' age children's physical condition under influence of fitness-programs [17].

Geoffrey D. Broadhead and Gabie E. Church (1982) points at possible application of discriminant analysis for classification of 5-12 years' age children's motor functioning, depending on its scope. Equations of discriminant functions permit for 93% of grouped data to be classified correctly. Titarenko A.A. (2010); Ivashchenko O.V. et al. (2015); Ivashchenko O.V. (2015); Khudolii O.M. (2015) also point at possibility to classify schoolchildren by level of their motor fitness with the help of motor tests.

The purpose of discriminant analysis is studying of discriminant function's coefficients in order to maximally accurately classify pupils into groups with the help of their values. It permits to solve two groups of problems:

- to answer the question how confidently one can separate one form from other by set of offered variables; which of these variables render the most significant influence on distinguishing of forms;
- to classify objects on the base of discriminant function. I.e. answer the question: to which class (form) object belongs on the base of values of discriminant variables.

In experiment we detected that by set of the offered variables it is possible to statistically confidently ($p < 0.001$) separate seventh form boys from eighth form pupils.

So, for finalizing pedagogic control of seventh boys' motor and functional fitness we can use first discriminant function with accent on the most informative variables. If results of seventh form's boys are classified as similar to results of eighth form's boys, we can speak about effectiveness of physical education.

Conclusions:

1. Analysis witnesses, that by most of indicators there are statistically confident differences between 7th and 8th forms boys ($p < 0.05:0.001$). By functional state of respiratory and blood circulation system 7-8 form pupils are assessed as healthy but not trained.

2. Statistically confident differences are also observed between 7th and 8th forms boys in tests, which characterize coordination and power fitness ($p < 0.001$). 7th form's boys are better by results of tests 1, 5 and 6 ($p < 0.001$). 8th form's boys have better indicators of speed-power and static power, coordination and functional state of respiratory and blood circulation systems.

3. Normalized coefficients of canonic discriminant function permit to determine correlation of variables' contribution in function's result. Variables 10, 6, 11 and 8 enter in function with largest contribution: the higher values of these variable are, the bigger if value of the function. The above said witnesses about possibility to classify of age distinctions of seventh and eighth forms' boys on the base of testing of their functional, coordination and power fitness.

4. Structural coefficients of canonic discriminant function witness, that the function is most substantially connected with variables № 8, 6, 4 and 5: so, significant difference between boys of seventh and eighth forms is observed in condition of motor skills, speed-power, coordination and strength itself.

Acknowledgement

The research has been fulfilled in compliance with plan of scientific-research works of Ministry of education and science, youth and sports of Ukraine by topic 13.04 "Simulation of teaching and training of children's and adolescents' motor skills" (2013-2014) (state registration number 0113U002102).

Conflict of interests

The author declares that there is no conflict of interest.

References

1. Baltsevych VK. *Onto kinesiology of a man*. Moscow, Theory and practice of physical culture; 2000. (in Russian)
2. Ilyin PE. *Psychomotor organization of a man*. Sankt Petersburg, Peter; 2003. (in Russian)
3. Ivashchenko OV, Cieślicka M, Khudolii OM, Iermakov SS. Simulation as a method of classification power state of preparedness 6-7 classes girls. *X International Conference. Modeling and information technology in physical education and sport*. Kharkiv, 2014. p. 34-36. (in Ukrainian)
4. Ivashchenko OV, Muszkieta Radosław, Khudolii OM, Iermakov SS. Simulation as a method of classifying state power training boys 6-7 classes. *X International Conference. Modeling and information technology in physical education and sport*. Kharkiv, 2014. p. 37-39. (in Ukrainian)
5. Krutsevych TYu, Bezverkhnya GV. *Recreation in physical education of different population groups*. Kiev, Olympic Literature; 2010. (in Ukrainian)
6. Nosko MO, Iermakov SS, Garkusha SV. Theoretical and methodological aspects of strengthening physical health of pupils and students. *Visnik Chernigivs'kogo nacional'nogo pedagogichnogo universitetu*, 2010;76:243-247. (in Ukrainian)
7. Titarenko AA. Features of motor abilities of girls of primary school age. *Teoria ta metodika fizycznego vihovanna*, 2010;9:3-13. (in Ukrainian)
8. Khudolii ON. Zakonomernosti formirovaniia dvigatel'nykh navykov u iunykh gimnastov [Regularities of motor skills' formation in junior gymnasts]. *Nauka v olimpijskom sporte*, 2012;1:36-46 (in Russian)
9. Khudolii OM, Shlemin AM. *Methods of preparing young gymnasts*. Kharkov, KHPY, HHPY; 1988. (in Russian)
10. Khudolii OM, Iermakov SS. Regularities of the learning process of young gymnasts. *Teoria ta metodika fizycznego vihovanna*, 2011;5:3-18. <http://dx.doi.org/10.17309/tmfv.2011.5.707> (in Ukrainian)
11. Khudolii OM, Zabora AV. Theoretical foundations of curriculum of physical culture at school. *Teoria ta metodika fizycznego vihovanna*, 2001;1:3-12. <http://dx.doi.org/10.17309/tmfv.2001.1.1> (in Ukrainian)
12. Khudolii OM, Ivashchenko OV. Conceptual modeling approaches to learning and development of motor skills in children and adolescents. *Teoria ta metodika fizycznego vihovanna*, 2013;10:3-16. <http://dx.doi.org/10.17309/tmfv.2013.2.1012> (in Ukrainian)
13. Cieślicka M, Napierała M. The somatic build of lightweight rowers. *Medical and Biological Sciences*, 2009;23(3): 33 – 38.
14. Cieślicka M, Napierała M, Zukow W. State building somatic and motor abilities in kids practicing tennis on prebasic training. In: *Health - the proper functioning of man in all spheres of life*. Bydgoszcz school higher, Bydgoszcz, 2012.
15. Cieslicka Mirosława, Słowiński Mariusz. Training loads of female canoeing youth national team in sprint competitions. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2012;12:149-157.
16. Dmitruk K, Adamczyk W, Cieślicka M, Napierała M, Wasielewska K. The influence of swimming training on postural control system. In: *Impact of a healthy and unhealthy lifestyle on wellness*. Publisher NeuroCentrum in Lublin, Lublin; 2008.

17. Dorita du Toit, Anita E Pienaar, Leani Truter. Relationship between physical fitness and academic performance in South African children. *South African Journal for Research in Sport, Physical Education & Recreation*, 2011;33(3):23-35.
18. Geoffrey D Broadhead, Gabie E Church. Discriminant analysis of gross and fine motor proficiency data. *Perceptual and Motor Skills*, 1982;55:547-552. <http://dx.doi.org/10.2466/pms.1982.55.2.547>
19. Gert-Jan de Bruijn, Benjamin Gardner. Active Commuting and Habit Strength: An Interactive and Discriminant Analyses Approach. *American Journal of Health Promotion*, 2011;25(3):27-36. <http://dx.doi.org/10.4278/ajhp.090521-QUAN-170>
20. Ivashchenko OV, Yermakova TS, Cieślicka M, Zukowska H. Discriminant analysis in classification of motor fitness of 9-11 forms' juniors. *Journal of Physical Education and Sport (JPES)*. 2015;15(2):238-244. <http://dx.doi.org/10.7752/jpes.2015.02037>
21. Ivashchenko OV, Khudolii OM, Yermakova TS, Pilewska Wiesława, Muszkieta Radosław, Stankiewicz Błażej. Simulation as method of classification of 7-9th form boy pupils' motor fitness. *Journal of Physical Education and Sport (JPES)*, 2015;15(1):142-147. <http://dx.doi.org/10.7752/jpes.2015.01023>
22. Khudolii OM, Iermakov SS, Prusik K. Classification of motor fitness of 7-9 years old boys. *Journal of Physical Education and Sport (JPES)*. 2015;15(2):245- 53. <http://dx.doi.org/10.7752/jpes.2015.02038>
23. Lulzim I. Discriminant analysis of morphologic and motor parameters of athlete and non athlete girl pupils of primary school on age 14 to 15 years. *Research in kinesiology*, 2012;40(2):185-190.
24. Milić M, Milavić B, Grgantov Z. Relations between sport involvement, selfesteem, sport motivation and types of computer usage in adolescents. *Proceedings of 3rd International Scientific Congress. Anthropological Aspects of Sport, Physical Education and Recreation*. Banja Luka, University of Banja Luka; 2011. p. 34-40.
25. Mrozkowiak Mirosław, Posłuszny Mariusz, Żukowska Hanna, Iermakov Sergii, Szark-Eckardt Mirosława. The correlations among the complex of spine-pelvis traits and the feet traits in boys aged 4 to 6 years. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2014;8:46-50. <http://dx.doi.org/10.6084/m9.figshare.1022955>
26. Yermakova TS. Individualization of forming health culture in schoolchildren of Polish schools. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2015;1:29-33. <http://dx.doi.org/10.15561/18189172.2014.1206>

Information about the authors:

Ivashchenko O.V.; <http://orcid.org/0000-0002-2708-5636>; tmfv@tmfv.com.ua; H.S. Skovoroda Kharkiv National Pedagogical University; Artema str. 29, Kharkov, 61002, Ukraine.

Yermakova T.S. ; <http://orcid.org/0000-0002-3081-0229>; tatiana-iermakova@rambler.ru; H.S. Skovoroda Kharkiv National Pedagogical University; Artema str., 29, Kharkiv, 61002, Ukraine.

Cite this article as: Ivashchenko O.V., Yermakova T.S. Assessment of functional, coordination and power fitness of 7-8 form boys. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2015;9:20-25. <http://dx.doi.org/10.15561/18189172.2015.0903>

The electronic version of this article is the complete one and can be found online at: <http://www.sportpedagogy.org.ua/html/arhive-e.html>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (<http://creativecommons.org/licenses/by/3.0/deed.en>).

Received: 03.06.2015

Accepted: 15.07.2015; Published: 20.07.2015