

PRIORY FACTORS OF MORPHOLOGICAL STRUCTURE, FUNCTIONAL STATUS AND PHYSICAL READINESS OF CHILDREN AGED 12-14 YEARS WITH POOR HEALTH

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Annotation. Defined factor structure of the morpho-functional state and physical fitness of children 12-14 years old with a low level of physical health, with disharmonious physical development, low efficiency, insufficient levels of physical activity. The study involved 45 male and 51 female grades 7-8. Using 26 variables. Highlighted by three factors in each group. Set general factor for all groups - physical development. Contribution variables other factors differ in each of the study groups. Found that the first factor (physical development), high load (0.73 to 0.98) have the following characteristics: body weight, chest circumference at rest, during inspiration and expiration, girth size of the shoulder, arm, pelvis, waist and hips strong hand dynamometry. The guys on the first factor accounted 36.66% explanatory variance in girls - 26.24%. The second factor is identified with the physical readiness (for boys - 31.11% explanatory variance in girls - 17.41%).

Keywords: factor structure, morpho-functional, preparedness, children.

Introduction

While actively conducting research in physical education of preschool, junior (Semenenko 2005 Moskalenko 2007, Tyuh 2009, Guk 2011 and others) high school (Stepanova 2007, Kibalnyk 2008, Kovaleva 2013 and others) and students (Yedynak 2002, Podlesnaya 2008, Sayenchuk 2012 and others), physical education of secondary school age children remain out of sight, which is associated with specific studies of the contingent due to the rapid morphological and functional changes in the body [1, 2, 3, 5, 10, 11].

However, the deterioration of the general health of children and adolescents (O.H.Suharyev, 1991; H.L.Apanasenko, 1992; T.Y.Krutsevych, 1999; B.M.Shyyan, 2001; N.V.Moskalenko and others, 2007), increasing the diversity of functional variations in health status observed in our time, sharply raises the need to use the differential approach as a weakened physical education of children and the use of regulatory requirements for the assessment of the results of motor tests [8, 9].

Applying differential approach will enhance motivation towards physical education as based on the features and needs of children with weakened health.

Evaluation of the learning process in physical education, which takes into account not only the physical qualities weakened children, but also takes into account the level of physical health can be one of the directions of its further individualization and humanization [6].

The research was carried out as part of the consolidated plan of research in the field of physical culture and sport in 2006 - 2010, under the theme 3.1.2. "Scientific - methodological bases of improvement of teaching" Theory and Methodology of Physical Education »" (№ state registration 01,064,010,782) and in accordance with the theme of 3.1. "Improving software normative foundations of physical education in schools" (state registration 0111U001733) Consolidated Plan of research in the field of physical culture and sports in 2011 - 2015 Ministry of Education, Youth and Sports of Ukraine.

Goals, objectives, material and methods.

Goal: to identify priority factors among indicators of morphofunctional development and physical readiness of children 12-14 years with weak health for the differential approach in physical education.

Objectives of research: set the input variables and their load in factor structure of the morphofunctional status and physical readiness of children 12-14 years with low physical health, disharmonious physical development, low serviceability, insufficient physical activity.

Methods of research: theoretical analysis and synthesis of the literature, anthropometric and physiological methods, teacher testing, factor analysis (performed using an integrated system for statistical analysis of her data - «Statistic»). Principal components method was used and the method of rotation axis - "varimaks not worked" (www.statsoft.ru) [4, 7]).

Organization of research. The study was conducted at a specialized school № 78 in Kyiv, which was attended by 201 student middle school age (105 boys and 96 girls). During the research children with poor health were found and formed following sexual groups: the "dangerous level" physical health, disharmonious physical development, low levels of physical serviceability, physical readiness, insufficient physical activity.

Table 1

The variables used in the factor analysis

Anthropometric indicators	Physiological indicators	Indicators of physical readiness
<ul style="list-style-type: none"> ▪ Body Height (cm) ▪ Body weight (kg) ▪ Chest circumference (cm) ▪ Arm circumference (cm) ▪ Prearm circumference (cm) ▪ Waist circumference (cm) ▪ Pelvic circumference (cm) ▪ Hip circumference (cm) ▪ Calf circumference (cm) ▪ Chest circumference at inhaling (cm) ▪ Chest circumference at exhaling (cm) ▪ Tour of chest (cm) 	<ul style="list-style-type: none"> ▪ Resting heart rate (beats / min) ▪ systolic blood pressure (mmHg) ▪ diastolic blood pressure (mmHg) ▪ lung vital capacity (ml) ▪ Stange sample (s) ▪ Ghencea sample (s) 	<ul style="list-style-type: none"> ▪ stronger hand dynamometry (kg) ▪ weaker hand dynamometry (kg) ▪ Tilt forward from a seated position (cm) ▪ Raising up from a prone position for 1 min (times) ▪ Long jump off (cm) ▪ Jumping with rope for 1 min (times) ▪ Shuttle run 4x9 (m / s) ▪ run with a high lifting hip-ups for 15 seconds (times).

Table 1 shows the set of variables used in the factor analysis, that we have received as a result of anthropometric, functional research, and the results of physical readiness testing of children of secondary school age.

For the interpretation of the content of factors designed limit load factor at $\lambda_{\min} \geq 0,7$.

Results of research.

As a result of factor analysis in order to obtain smallest number of factors that account for the bulk dispersion contained in 26 variables were identified 3 factors.

Sequence analysis of the factor loadings weakened children 12-14 years of disharmonious physical development (Table 2) yielded factors contribute to the main dispersion and the contribution of variables in each factor.

Table 2

Factor structure of the morphofunctional status and physical readiness of children 12-14 years of disharmonious physical development

Sex	Factor 1	Factor 2	Factor 3
boys (n=27)	<ul style="list-style-type: none"> ▪ body weight 0,75 ▪ Chest circumference 0,96 ▪ Arm circumference 0,92 ▪ Waist circumference 0,80 ▪ Pelvic circumference 0,94 ▪ Hip circumference 0,93 ▪ Chest circumference at inhaling 0,98 ▪ Chest circumference at exhaling 0,909 ▪ Resting heart rate 0,82 ▪ stronger hand dynamometry 0,84 	<ul style="list-style-type: none"> ▪ weaker hand dynamometry 0.70 ▪ Tilt forward from a seated position 0.98 ▪ lifting of up from a prone position for 1 min -0.85 ▪ jump from a place -0.89 ▪ jumping rope for 1 min -0.84 ▪ shuttle run 4 * 9 m / s 0.98 ▪ run with a high lifting hip-ups for 15 seconds 0.94 	<ul style="list-style-type: none"> ▪ Chest circumference 0,75 ▪ systolic blood pressure - 0,84 ▪ diastolic blood pressure - 0,82
girls (n=31)	<ul style="list-style-type: none"> ▪ Chest circumference 0,96 ▪ Arm circumference 0,73 ▪ Chest circumference at inhaling 0,953 ▪ Chest circumference at exhaling 0,951 ▪ stronger hand dynamometry 0,73 	<ul style="list-style-type: none"> ▪ Prearm circumference 0,85 ▪ Waist circumference 0,75 ▪ Pelvic circumference 0,77 	<ul style="list-style-type: none"> ▪ Sample Stange -0.76 ▪ Sample Ghencea -0.91 ▪ run with a high lifting hip-ups for 15 seconds 0.70

In the first, general factor, which we identify with physical development, following parameters are with high pressure (from 0.73 to 0.98): body weight, chest circumference at rest, chest circumference at inhaling and exhaling, girth of shoulder, forearm, pelvis, waist and hips, stronger hand dynamometry as an indicator characterizing the muscle tone of the musculoskeletal system. First factor accounts for 36.66% of the explanatory variance in boys group and 26.24%.7% in the girls group.

The second factor in boys group (31.11% of the explanatory variance) identify the physical preparedness, as it included indicators with very high factor loadings describing the basic physical manifestation of qualities: endurance,

strength endurance, flexibility, agility, speed and power-speed quality. The second factor in girls group (17.41% of the explanatory variance) included circumference of forearm, waist and pelvis, which can characterize body physique.

The third factor is the boys group with the biggest load contains indicators of the cardiovascular system (systolic blood pressure (0.84) and diastolic blood pressure (0,82)). It accounts for 13.24% of the explanatory variance. In the girls group the third factor included functional tests that characterize the respiratory system, as well as an index that characterizes the development speed. It accounts for 15.37% of the explanatory variance.

Factor structure of children 12-14 years of satisfactory and poor physical serviceability is reflected in the three factors, load of which is different. The first factor is the biggest load (from 0.73 to 0.96) include the indicators of physical development of children, such as body height, body weight and circumference of different body parts. First factor accounts for 30.01% of the explanatory variance in boys group and 23,52% 7% in the girls group. Identify this factor with physical development.

The second factor include the following parameters: the weaker hand dynamometry (0.76) in the boys group, and functional Ghencea sample (0.76) and jumping on the rope for 1 min (0,74) in the girls group. Second factor accounts for 16.44% of the explanatory variance in boys group and 12,81% in the girls group. Identified second factor as muscle tone of locomotor apparatus in boys group and respiratory health and endurance development in girls group.

The third factor with low load contains indicators of the flexibility (tilt forward from a seated position (0.70)) in the guys group and arm circumference (0.82) in girls group. Third factor accounts for 8.22% of the explanatory variance in boys group and 12.30% in the girls group. Identified second factor with the development of flexibility in boys group and with body physique in girls group.

Considering the factor structure of 11-15 year old children with insufficient physical activity was found the first factor in boys group (21,26% of the explanatory variance) and girls group (22.28% of the explanatory variance) with the greatest load (from 0.70 to 0.91.). It was body weight and body circumference. Considering the totality of the factor loadings in both sexual groups we can characterize first factor as physical development.

Second factor in boys group (13.18% of the explanatory variance) and girls group (12.73% of the explanatory variance) include systolic blood pressure and lung vital capacity with high factor loadings from 0.83 to 0.96. We characterized the second factor the cardiovascular and respiratory systems.

The third factor in group of boys (9.95% of the explanatory variance) and group of girls (11.28% of the explanatory variance) respectively includes indicators of the development of strength endurance (0.71) and agility (0.73). the same name we give to this factor.

Analysis of factor structures of morphofunctional development and physical preparedness of children 12-14 years with low levels of physical health showed factors contribute to the main dispersion and the contribution of variables in each factor. Thus, the first factor explaining 30.30% of variance for boys group and 22.20% variance for girls group. The greatest load (from 0.70 to 0.97) has body circumference and body weight. Characterize this factor as physical development.

In the second factor, explaining 17.07% of variance for group of boys includes such factors as the circumference of forearm (0.70), a stronger hand dynamometry (0.81), weaker hand dynamometry (0,75). Identifies second factors in boys group with muscular tone of locomotor apparatus. Second factor in girls, which explains 11.39% variance, include jumping with the rope for 1 min (0.79) and run with a high lifting hip-ups for 15 seconds (0,70). Identifies second factor with development of girls endurance and speed qualities.

The third factor in the boys group (10.61% of the explanatory variance) and girls group (11.36% of the explanatory variance) respectively included Ghencea test (0.77) and circumference of forearm (0.84) and pelvis (0, 76). Characterize this factor in group of boys as functional state of the respiratory system, and in the group girl with body physique.

Conclusions.

The input of variables in the priority structure factors morphofunctional status and physical fitness of children 12-14 years was set. Its slightly different depending on the reasons on which they attributed to the weak children including "insufficient" level of physical health, disharmonious physical development, low serviceability, lack of physical activity.

Physical development performs as a general factor in each group.

Factorial structure of morphological and functional indicators and indicators of physical readiness of weakened children 12-14 years that was found, can more specifically and differentially manage the physical education.

Further research is to conduct a factor analysis of morphofunctional parameters and indicators of physical readiness weakened children 11-15 years depending on the level of physical readiness. New data together with previous researches will help develop new models of scientific evidence of the educational process for students of secondary school age and find forms of health oriented physical culture for children with weakened health.

References:

- 1 Apanasenko G.L. *Fiziologichni osnovi fizichnoyi kul'turi j sportu* [Physiological basis of physical education and sports], Uzhhorod, 2004, 144 p.
- 2 Andrieieva O.V. *Programuvannia fizkul'turno-ozdorovchikh zaniat' divchat 12-13 rokov* [Programming of fitness training girls aged 12-13 years], Cand. Diss., Kiev, 2002, 190 p.
- 3 Vajmbaum Ia.S., Koval' V.I., Radionova T.A. *Gigiiena fizicheskogo vospitaniia i sporta* [Programming of fitness training girls aged 12-13 years], Moscow, Academy, 2003. – 240 c.
- 4 Denisova L.V., Khmel'nickaia I.V., Kharchenko L.A. *Izmereniia i metody matematicheskoi statistiki v fizicheskoi vospitanii i sporte* [Measurement and statistical methods in physical education and sport], Kiev, Olympic Literature, 200pp. 74-80.
- 5 Kruceovich T. Iu., Vorob'ev M.I. *Kontrol' v fizicheskoi vospitanii detej, podrostkov i iunoshej* [Control in the physical education of children, adolescents and young], Kiev, Olympic Literature, 2005, 195 p.
- 6 Kruceovich T. Iu. *Teoriia i metodika fizichnogo vikhovannia i sportu* [Theory and methods of physical education and sport], 2006, vol.4, pp. 20-27.
- 7 Nachinskaia S.V. *Osnovy sportivnoji statistiki* [Fundamentals of sports statistics], Kiev, High School, 1987, 190 p.
- 8 Sitovskij A.M. *Diferencijnij pidkhid u fizichnomu vikhovanni pidlitkiv z rizmni tempami biologichnogo rozvitku klasiv* [Differential approach to physical education of adolescents with different rates of biological development classes], Cand. Diss., Lviv, 2008, 21 p.
- 9 Diatlenko S.M. *Fizichna kul'tura v shkoli: 5 – 11 klasi* [Physical education at school: 5 - 11 classes], Kiev, Litera, 2011, 368 p.
- 10 Cale L., Harris J. Fitness testing in physical education – a misdirected effort in promoting healthy lifestyles and physical activity? *Physical Education and Sport Pedagogy*. 2009, vol.14(1), pp. 89–108. doi:10.1080/17408980701345782.
- 11 Hoffman J.R., Kang J., Faigenbaum A.D., Ratamess N.A. Recreational Sports Participation is Associated with Enhanced Physical Fitness in Children. *Research in Sports Medicine*. 2005, vol.13(2), pp. 149–161. doi:10.1080/15438620590956179.

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