KOWALSKI Damian
Pomeranian University of Science and Technology in Starogard Gdański
Ivan Bobersky Lviv State University of Physical Culture
https://orcid.org/0000-0002-4083-5710
TSYHANOVSKA Nataliia
Kharkiv State Academy of Culture
https://orcid.org/0000-0001-8168-4245
e-mail: ncyganovskaa@gmail.com
SKALSKI Dariusz W.
Jedrzej Sniadecki University of Physical Education and Sport
National University of Water and Environmental Engineering
https://orcid.org/0000-0003-3280-3724
e-mail: dskalski60@gmail.com
KREFT Paulina
Jedrzej Sniadecki University of Physical Education and Sport
Ivan Bobersky Lviv State University of Physical Culture
https://orcid.org/0000-0002-6474-0601

COMPARISON OF THE PHYSICAL FITNESS OF WATER RESCUE GUARDS FROM RURAL AND URBAN AREAS

The work is of a research nature. The aim was to determine the level of physical development and motor skills of students aged 10-11 from two different environments: rural and urban. Physical development was determined based on height and weight. The Rohrer index was calculated and the Kretschmer typological system was used. The International Physical Fitness Test was used to assess the level of physical fitness. The test results indicate that women from rural areas showed a higher level of fitness tests than girls from the city. However, in the case of boys, the tests showed a similar level of fitness. After calculating the results, all groups were in the average physical fitness range. However, the points obtained allowed the conclusion that both women and men from rural areas have better physical fitness than their peers from the city. The purpose of the fitness test is to objectively assess the development of motor skills, general performance and physical fitness as well as technical skills. Such tests can be used individually and in groups. They can be performed at any age. The tests were developed mainly for rescuers aged 18-25, because most rescuers work in this age group.

***Keywords**: physical development, physical fitness, urban environment, rural environment, motor skills, rescuer.*

http://doi.org/10.31891/pcs.2024.2.22

Introduction

Observing the human body, it can be noticed that along with its physical development, changes in the body's efficiency also occur, and the locomotor system becomes capable of performing motor forms [2,4]. Physical fitness is a very well-known concept, commonly used but defined in various ways. In the theory of physical education, individual authors characterized physical fitness differently, it was called human motor skills interchangeably, and there were also those who distinguished these concepts from each other [1,5].

Motor skills are individual physical and mental properties that develop on the basis of innate biological features that determine the effective performance of motor activities. However, J. Szopa is of the opinion that motor skills are a genetically determined image of predispositions and the influence of the environment.

J. Raczek (1990) divided motor skills into:

1. fitness abilities determined mainly by energy processes - strength, speed and endurance,
2. coordination abilities determined mainly by control processes

and regulation of movements - agility, ability to orient, reaction speed, ability to differentiate movement, balance, sense of rhythm, ability to combine movements, ability to adjust and change movements [1, 12].

A separate link in the above classification is flexibility, which turned out to be impossible to define using the above division criteria.

Strength - is a basic feature of human motor skills, which is the result of muscle work. Strength is the ability to overcome or counteract external resistance at the expense of muscular effort.

Most often, a distinction is made between general strength and special strength. General strength means the ability to overcome resistance by engaging all basic muscle groups at the same time. Special strength is characterized by the ability to overcome resistance in only certain

movements, and only selected muscle groups are involved [4, 8].

The concept of "relative force" is also often used, which is the ratio of the resistance performed to the individual's body weight. In children up to 12 years of age, muscle strength does not show much difference due to gender, however, men show slightly better results in individual strength tests. Starting from the age of 13 - 14, the development of strength is noticeable in men, while in women it stabilizes and even regresses slightly. Speed - a motor characteristic whose mechanism is more complicated than that of strength, manifests itself in more forms and is more difficult to measure. Speed is the ability to perform movements in the shortest possible time. It depends largely on the morphological structure of the muscles working during movement, the level of neuromuscular coordination and the level of endurance. Speed ability depends on three components:

– reaction time – mainly related to the speed of receiving stimuli and transmitting impulses through the nerve pathways,

– speed of operation, i.e. the time it takes to move the elements of the movement apparatus in space,

– frequency of movements.

In individual motor activities, the speed of movement may vary, so it is not possible to determine a general speed. Speed is therefore more related to the type of movements performed, which is why we often talk about the special speed of a swimmer or runner [3, 7]. There are two types of reactions: simple and complex. A simple reaction responds to one movement, while a complex reaction responds to two or more.

and the reaction is geared towards one of them.

Endurance – the ability to perform intense and long-lasting exercise without signs of fatigue. Endurance depends mainly on the body's efficiency, which in turn depends on the proper functioning of the circulatory and respiratory systems. These systems provide the muscles with conditions for long-term work, supply them with oxygen and energy materials, and remove combustion products. Endurance is the ability to continue long-term work that requires intensity (usually from 60 to 80-90%), maximum capacity without reducing the effectiveness of activities and while maintaining increased resistance to fatigue [6, 10].

The individual phases of a given organism's life show a very even level

and dynamics of endurance development. Fluctuations can be observed in individuals of different sexes. The puberty phase of youth is a favorable period for developing endurance. Endurance exercise stimuli work very effectively during this period. We measure endurance by the time that elapses from the moment of exertion to the occurrence of fatigue, which usually results in a reduction or loss of the ability to perform specific work with the assumed intensity [15, 19].

There are three types of strength:

– general, i.e. the ability to perform non-specific physical work for a long time,

– directed, i.e. efficiency of specific efforts, e.g. jumping or throwing endurance,

– special, i.e. the ability to make a special effort in a given competition

Strength can also be divided into:

I. starting training time:

1. long time endurance (over 8 minutes)

2. medium time endurance (2 to 8 minutes)

3. short time endurance (from 5 seconds to 2 minutes)

II. nature of physiological processes:

1. aerobic endurance (aerobic)

2. anaerobic (anaerobic)

III. contribution to the load of other motor features:

1. speed endurance

2. strength endurance [13]

Dexterity - involves performing a specific motor activity quickly, smoothly and economically, i.e. with the least loss of energy. Dexterity is determined by assessing the perfection of coordination of a specific motor activity with the smallest possible number of movements that are unnecessary for a given activity [2, 8].

Flexibility – the ability to perform movements with large amplitude. The human amplitude, i.e. the range of movements, depends primarily on the shape of the joints, the flexibility of muscles, tendons and ligaments [11, 14].

The measure of flexibility is the maximum range of motion achieved in individual joints of the human body. It is a predisposition of the musculoskeletal system determined by the structure of a given joint and the function it performs. The greater the range of motion demonstrated in individual joints, the greater flexibility is achieved. Contrary to general belief, the level of flexibility is not influenced by genetic

conditions[6, 9]. Its level depends, among other things, on physical activity, anatomical structure of the joint, gender (women are more flexible), flexibility of tendons, ligaments, muscle elasticity and temperature, and age (the younger a person is, the more flexible he or she is).

Agility is a skillful and fast movement. Agility is a combination of speed, dexterity and flexibility that allows for quick changes in body position and posture. When measuring this feature, the time needed to perform motor activities, which include a large number of turns, is used.[6] The level of motor agility in the first years of life is determined primarily by the degree and state of development of the nervous system. Agility reaches its peak in females at the age of 5, while in males only at the age of 12

Power – illustrates the ability to release maximum force in the shortest possible time[7]. Research conducted on this feature shows that its level is significantly influenced by the static and spring force of the muscle, the morphological features of the human being and the ability of the nervous and muscular systems to quickly respond to changes in the external situation. The most common way to measure this feature is the reach jump, which is why we often replace the term power with jumping ability. Men are characterized by better jumping ability, which increases most intensively between the ages of 13 and 15. Women, on the other hand, may take longer to develop this feature. It increases until the age of 18, but it does not reach such a high level as in men.

Results

Table 1.

The level of general fitness of the respondents according to the MTSF point tables

Sex / Location	Town	Village	D
Women	377	393	16
Men	345	352	7

Table 1 shows that in five trials women achieved better results

from a rural environment, and these are the tests: 50 m run with a difference in arithmetic means of 0.35 s, 600 m run with a difference of 0.09 s, hand strength with a difference of 0.63 kG averages, shuttle run with a difference of 0.41 s and sit-ups from lying down by 1.52 repetitions. However, women from the city school turned out to be better in: long jump with a difference of 17.5 cm from the woman from the countryside, hanging on the bar by 0.11 s and inward bend by 0.38 cm.

Table 2.

Comparison of the level of physical fitness of women

Lp.	Chain	Type of trial	Environment		D
			Town	Village	
1	s	50 m run	9,76	9,41	0,35
2	cm	skok w dal	154,93	137,43	17,5
3	s	600 m run	2,62	2,53	0,09
4	kG	Hand strenght	24,08	24,71	0,63
5	s	Hanging on the bar	6,65	6,54	0,11
6	s	4x10m run	12,45	12,04	0,41
7	number	Sitting up from lying down	19,62	21,14	1,52
8	cm	Inclination towards the depths	-0,62	-1	0,38

As Table 3 shows, in the case of men from the studied communities, it turns out that out of eight categories, urban men are better in four of them and rural men are better in the remaining four categories. Men living in the city are better in: the 50 m run with a difference of 0.5 s, in the long jump by 11.25 cm, in the hanging on the bar by 2.11 s and in the shuttle run by 0.35 s. However, men from rural areas they stood out in the 600 m run with a difference of 0.58 s, in hand muscle strength with a difference of 1.5 kG, in

sit-ups with a difference of 0.87 repetitions and in inward bends with a difference of 3.88 cm.

Table 3.

Comparison of the level of physical fitness of men.

Lp.	Chain	Type of trial	Environment		D
			Town	Village	
1	s	50 m run	**9,33**	9,83	0,5
2	cm	Long jump	1**55,5**	144,25	11,25
3	s	600 m run	3,31	**2,73**	0,58
4	kG	Hand strenght	32,25	3**3,75**	1,5
5	s	Hanging on the bar	**7,18**	5,07	2,11
6	s	4x10m run	1**1,9**1	12,26	0,35
7	number	Sitting up from lying down	20,13	**21**	0,87
8	cm	Inclination towards the depths	-3,63	**0,25**	3,88

Discussion

One of the basic goals of a physical education teacher is to properly shape and maintain students' physical fitness. Due to this assumption, research on physical fitness should be conducted in a systematic way, which would allow us to determine whether the teacher's actions are effective or not. Thanks to the tests performed, it is also possible to demonstrate deficiencies in physical development or health.

Conculsion

The analysis of the research conducted and the statistical calculations made in the work allows the following conclusions to be formulated:

1. Women from the city turned out to be taller and lighter than women from the countryside. However, men from the city are taller and heavier than men from the countryside.

2. The test results indicate that women from the rural environment achieved better results in five tests, demonstrating a higher level of fitness tests (speed, endurance, hand muscle strength, agility and abdominal muscle strength). Women from the city turned out to be better in three tests: jumping, shoulder girdle muscle strength and flexibility.As the study results show, men from urban environments were better in four categories: speed, jumping ability, and shoulder girdle muscle strength.

and agility. In the remaining four categories, better results were achieved by rural men, i.e. in endurance, hand muscle strength, abdominal muscle strength and flexibility.

3. After converting the physical fitness results into points according to the MTSF classification, both students from urban and rural environments are in the group with average physical fitness. However, the points obtained allow us to conclude that both women and men from rural areas have better physical fitness than their peers from the city.Based on the results obtained, it can be concluded that in the group of women from the Astoria swimming pool, the focus should be on speed, endurance, hand muscle strength, agility and abdominal muscle strength. In this school, men should work on: endurance, hand muscle strength, abdominal muscle strength and flexibility. Women from Sępólno Krajeńskie should focus on jumping, shoulder girdle muscle strength and flexibility. Swimming pool men should work on: speed, jumping ability, strength of the shoulder girdle muscles and agility.

References

1. Cochen R.C.Z., Clery P.W., Mason B. (2010). *Improving Understanding of Human Swimming Using Smoothed Particle Hydrodynamics, Proceedings of 2010 Singapore IFMBE*, 6th World Congress of Biomechanics (WCB 2010). Vol. 31, 174–177.

2. Costill D.L. (1978). *Adaptations in skeletal muscle during training for sprint and endurance swimming*., In B. Eriksson & B. Furberg, (Eds.), Swimming Medicine IV (pp. 233-248). Baltimore: University Park Press. 43-46.

3. Diachenko-Bohun, M., Hrytsai, N., Grynova, M., Grygus, I., Muszkieta, R., Napierała, M., Zukow, W. (2019). *Characteristics of Healthbreakers in the Conditions of Realization of Health-Safety Technologies in Education Structures*. International Journal of Applied Exercise Physiology, 8(3.1), 1-8.

4. Espinosa, H.G., Lee Jim, James, D.A. (2015). *The inertial sensor: A base platform for wider adoption in sports science applications*, Journal of Fitness Research. 4, 1:13-20.

5. Kashuba V., Stepanenko O., Byshevets N., Kharchuk O., Savliuk S, Bukhovets B., Grygus I., Napierała M., Skaliy T., Hagner-Derengowska M., Zukow W. (2020*). The Formation of Human Movement and Sports Skills in Processing Sports-pedagogical and Biomedical Data in Masters of Sports*. International Journal of Human Movement and Sports Sciences, 8(5): pp. 249–257.

6. Lavrin G.Z., Sereda I.O., Kuczer T.V., Grygus I.M., Zukow W. (2019*). The Results of Student's Survey on Models of Physical Education in Universities and Motivations to Encourage for Active Participation in Physical Education.* International Journal of Applied Exercise Physiology. VOL. 8 (2). 140-143.

7. Maglischo E.W. (2003) *Swimming Fastest*. Human Kinetics, Champaign, 123-129.

8. Mihăilescua L., Dubiţb N. (2015). *Contributions for programming and implementing an evaluation instrument of the swimming technique correctness*: Social and Behavioral Sciences.

9. Moska W., Skalski D., Makar P., Kowalski D. (2018*). Trening zdolności motorycznych w pływaniu,* (Swimming motor skills training) PSW w Starogradzie Gdańskim, Satrogard Gdański. 132-135.

10. Nesterchuk N., Grygus I., Ievtukh M., Kudriavtsev A., Sokolowski D. (2020). *Impact of the wellness programme on the students' quality of life*. Journal of Physical Education and Sport ® (JPES), Vol 20 (Supplement issue 2), Art 132 pp 929–938.

11. Savliuk S., Kashuba V., Vypasniak I., Yavorskyy A., Kindrat P., Grygus I., Vakoliuk A., Panchuk I., Hagner-Derengowska M. (2020). *Differentiated approach for improving the physical condition of children with visual impairment during physical education*. Journal of Physical Education and Sport ® (JPES), Vol 20 (Supplement issue 2), Art 136 pp 958–965.

12. Swim England Safe Supervision of Programmed Swimming Sessions. (2017).

13. Zhan J.M., Li T.Z., Chen X.B., Li Y.S., Onyx Wai W.H. (2014). *3D numerical simulation analysis of passive drag near free surface in swimming*, China Ocean Eng., Vol. 29(2).

Анотація

КОВАЛЬСЬКИЙ Даміан, ЦИГАНОВСЬКА Наталія, СКАЛЬСЬКИЙ Даріуш В., КРЕФТ Пауліна

ПОРІВНЯННЯ ФІЗИЧНОЇ ПІДГОТОВЛЕНОСТІ ВОДНИХ РЯТУВАЛЬНИКІВ СІЛЬСЬКОЇ ТА МІСЬКОЇ МІСЦЕННОСТІ

Робота носить дослідницький характер. Метою було визначити рівень фізичного розвитку та рухових якостей учнів 10-11 років із двох різних середовищ: сільського та міського. Фізичний розвиток визначали за зростом і вагою. Розраховано індекс Рорера та використано типологічну систему Кречмера. Для оцінки рівня фізичної підготовки використовувався міжнародний тест фізичної підготовки. Результати тестування свідчать про те, що жінки з сільської місцевості показали вищий рівень фітнес тестів, ніж дівчата з міста. Проте у випадку з хлопцями тести показали схожий рівень тренованості. Після підрахунку результатів всі групи були в межах середньої фізичної підготовленості. Проте отримані бали дозволили зробити висновок, що як жінки, так і чоловіки з села мають кращу фізичну підготовленість, ніж їхні однолітки з міста. Метою фітнес-тесту є об'єктивна оцінка розвитку моторики, загальної працездатності та фізичної підготовки, а також технічних навичок. Такі тести можна використовувати індивідуально та в групах. Їх можна виконувати в будь-якому віці. Тести розроблені в основному для рятувальників 18-25 років, оскільки більшість рятувальників працює саме в цій віковій категорії.

Ключові слова: фізичний розвиток, фізична підготовленість, міське середовище, сільське середовище, моторика, рятувальник.

Стаття надійшла до редакції 09.04.2024 р.