



THE CORRELATION ANALYSIS BETWEEN SUBJECTIVE AND OBJECTIVE INDICATORS OF PHYSICAL DEVELOPMENT OF STUDENTS OF 5TH AND 9TH GRADES

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Abstract

The study purpose was to investigate the correlation between the objective results of measurements of somatometric and physiometric indicators of physical development and the subjective indicators of its self-description for students of 5th and 9th grades.

Materials and methods. The study was conducted in Lutsk secondary school 17 involving 120 secondary school students (aged 10 and 15) as participants. Research methods: analysis of data of scientific and methodical literature, normative-legal documents, programs on physical culture, pedagogical testing of physical fitness, methods of mathematical statistics, E.V. Bochenkova test-questionnaire "Self-description of physical development".

Results. The correlation analysis between the results in mobility tests for strength, endurance, coordination and flexibility and self-assessment of these indicators by students of 5th and 9th grades shows that they differ. The 9th graders evaluate their physical abilities more objectively. This is due to gaining practical experience in physical education classes. The inadequacy of self-assessment of physical abilities shows that insufficient attention is paid to substantiating the importance of pedagogical control of physical fitness of students during the physical education classes.

Conclusions. The study demonstrates the inadequacy of self-assessment of physical fitness by students, which indicates the importance of theoretical presentation and practical implementation in physical education classes of pedagogical control and self-control of physical fitness, which should be an incentive for boys and girls' self-improvement in physical education.

Keywords: students, middle school age, physical development, motor fitness tests, self-assessment, adequacy.

Introduction

Taking into consideration the psychological and pedagogical aspects of health, first of all, it is necessary to note the importance of the emotional and evaluative components of this phenomenon (Krutsevich, Pangelova, & Trachuk, 2019a,b). The value of society's attitude to health is a guarantee not only of maintaining the current statistical level of diseases but also of reducing it. Work aimed obviously the

promoting a healthy lifestyle among school children as one of the key factors in improving the health of the population is absolutely impossible with insufficient development of the structure of understanding the value of health and its impact on the holistic psychological system of the self-concept (Bakiko, Radchenko, Faydevich, Chizh, & Konstankevich, 2003; Collins, Micheli, Yard, & Comstock, 2008; Trussell, 2009). The basic thesis of the theory of the self-concept formation in general, and the development of adequate-realistic self-esteem, in particular, in the context of the holistic development of individuality and personality were reflected and concretized in numerous investigations (Rogers, 1994; Fromm, 1994; Tangney, Baumeister, & Boone, 2004). It is

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considered that the self-concept is a set of human ideas about themselves, which is formed ontogenetically, including - and on the basis of human ideas about their body (Bakiko, Savchuk, Dmytruk, & Kovalchuk, 2021; Dedukh, 2018; Krasota, Olkhovyi, & Romanchuk, 2014). This concept reflects the aggregate idea of a human about the body, sensory, cognitive aspects of the body in human consciousness, unconscious aspects of the body, the physiological equivalent of the body, as well as a number of categories of subjectivity of the body existence.

The level of physical fitness and physical development can determine certain components of the self-understanding of the individual. This is due to one's own conscious reflection and the experiences associated with that reflection. It is possible to study human self-esteem among such components. In the case understand this phenomenon comprehensively, it is appropriate to study not only the psychological aspects of self-assessment of physical development of students, but also to determine the adequacy of self-assessment of their physical fitness by comparing actual self-assessment of students with self-assessment of physical development and health (Bakiko, & Cherkashin, 2021; Bakiko, Dmitruk, & Nikolaev, 2021; Bakiko, Savchuk, Dmytruk, & Kovalchuk, 2021).

The study of the properties of self-esteem, its adequacy, self-awareness, structure and functions of the image of self-understanding is not only theoretical but practical interest in connection with the formation of life position of students studying in secondary schools. Nowadays specialists focus a lot of attention at physical culture and sports to improve the control of physical development of students in the process of physical education (Bakiko, Kovalchuk, & Ivanova, 2021; Fedorenko, 2011; Dorsch, Smith, & McDonough, 2009). However, self-assessment of physical development in terms of physical fitness of students is a lack of scientific work.

The aforementioned provisions indicate the relevance of the research topic related to the solution of the issue, which is of significant theoretical and practical importance for improving the system of physical education of schoolchildren.

Self-esteem is an element of self-knowledge, reflection, which is characterized by emotionally rich assessment of oneself as a person, one's capabilities, critical attitude to oneself and thus affects the effectiveness of human activity. Self-esteem is formed during the development of children and adolescents under the influence of society and can reflect their value orientations, which stimulate or suppress activities aimed at self-development (Maevsky, 2016, 2019; Marchenko, 2018).

Marchenko conducted the research with 5-11 grades. It has been determined that in middle school age students have an overestimated self-esteem with low physical activity, but later the general level of self-esteem becomes more realistic and critical of their own health and appearance. However, the author did not conduct a correlation analysis between objective indicators of mobility test results and subjective indicators of self-assessment of the mobility for respondents (Krutsevich, Marchenko, Trachuk, Priymak, Panhelova, & Kholodova, 2021; Moskalenko, Yakovenko, Sidorchuk, & Marchenko, 2019).

The need to study the self-assessment of physical condition and comparison with the actual performance of students arose along with the need to examine the readiness

of 5th and 9th grades for self-control and self-improvement through physical education and is important for determining the effectiveness of pedagogical control of physical fitness at school, which should be an incentive to exercise both in and in curricular and extracurricular forms (Barnett, 2008; Olkhovyi, & Finohenov, 2015; dos Santos, Nevill, Buranaruga, Pereira, Gomes, Reyes, Barnett, & Maia, 2018).

From the point of view of the scientists of age psychology, there is an intensive formation of self-awareness in school age to reorient external evaluation, adult opinion, academic success on internal evaluation, on themselves, on their own personal qualities. There is the emergence of psychological discoveries, a system of values, orientation, priorities, goals, relationships with adults and peers. These changes affect various aspects of adolescents' lives, including the process of professional self-determination and psychological readiness for independent living (Barnett, Lubans, Timperio, Salmon, & Ridgers, 2018; Barnett, Telford, Strugnell, Rudd, Olive, & Telford, 2019; Bolger, Bolger, O'Neill, Coughlan, O'Brien, Lacey, Burns, & Bardid, 2021).

The purpose of the study is to investigate the relationship between the objective results of measurements of somatometric and physiometric indicators of physical development and subjective indicators of its self-description in students of the 5th and 9th grades.

Materials and Methods

Study participants

The research was conducted in Lutsk secondary school 17 with the participation of middle school students in the amount of 120 (5th grades – 60 (boys – 30, girls – 30), 9th grades – 60 (boys – 30, girls – 30). Their ages are 10 and 15 years. Informed consent was obtained from all students to participate in this experiment.

Study organization

The following research methods were used to solve this goal: analysis and generalization of data from scientific and methodological literature, legal documents, physical education programs; Bochenkova's test questionnaire "Self-description of the physical development"; physical fitness testing, anthropometric research methods, Rufier's, Robinson's index and Martine-Kushelevsky functional test indicators; correlation analysis; methods of mathematical statistics.

To study the individual profile of the physical self-understanding of the individual, Bochenkova's test questionnaire "Self-description of the physical development" was used (Bochenkova, 2000). The proposed questionnaire consists of 70 statements related to the field of physical development. During the answers, students express their attitude to statements about health assessment, coordination of movements, physical activity, slimness, athletic ability, global physical self-understanding, appearance, strength, flexibility, endurance and overall self-esteem using one of six answer options.

The following somatometric indicators were used for correlation analysis: body length (BL), body weight (BW), vital capacity of the lungs (VCL), wrist dynamometry, body mass index (BMI), vital index (VI), strength index (SI). Anthropometric examinations of children were performed with

standard equipment according to the generally accepted and unified method.

Physiometric parameters included measurements of resting heart rate (RHR), blood pressure (SBP and DBP), Robinson's index (RI), Rufier's test, Martine-Kushilevsky functional test (MK test) and physical fitness: 30 meters running (5th grades), 60 meters running (9th grades), 500 meters steady run (5th grades), 1500 meters (9th grades), flexion and extension of the arms emphasis lying down, lifting the torso to sit for 1 minute, long jump from a place, tilt the torso from a sitting position, "Flamingo test".

Statistical analysis

Mathematical processing of factual material was carried out in order to interpret the results of pedagogical experiments. The following mathematical procedures were performed:

- estimation and characteristics of variational series of parameters of representatives of different age and gender groups, namely – the sum (Σ), arithmetic mean of the variational series ($\bar{x}$);
- comparison and determination of the significance of differences between individual groups using Student's t-test at a level of significance not lower than 0.05;
- a pairwise correlation analysis between self-assessment of physical development and somatometric and physiometric indicators was carried out, on the basis of which the indicators with the highest degree of correlation were identified (r).

All data obtained during the study were processed using statistical software packages "STATISTIKA 7.0" and EXCEL.

The research procedure was conducted in accordance with the ethical standards of the responsible human rights committee with the approval of the Department of Education and Science of the Lutsk City Council and the written consent of school principals and parents of respondents, as evidenced by relevant documents.

Results

We notice the differences between the levels of correlations between boys and girls of different ages were found out in the comparison of the actual indicators of physical development with the indicators of the test-questionnaire "Self-description of physical development".

The study of the correlations between self-esteem of respondents of different ages and genders revealed some differences in the interdependence of physical qualities, health status, assessment of appearance and global self-understanding of the students.

In this case the 5th grade boys have the greatest correlation with the strength index (SI) with self-esteem ($r = 0.50$, $p < 0.01$). Correlation matrix SI with indicators of health, coordination, strength, body shape, appearance is at an average correlation level within ($r = 0.23-0.41$).

The 5th grades cannot adequately assess their coordination skills. The concept of sufficient "physical activity" for boys is associated with the perception of their physical strength ($r = 0.34$, $p < 0.05$) and the number of attempts to perform the "Flamingo" test ($r = -0.34$, $p < 0.05$). The boys

feel their "athletic ability" depending on their body length ($r = 0.34$, $p < 0.05$), the higher is the stronger, the forces of the right and left hands ($r = 0.37$, $p < 0.05$; $r = 0.33$, $p < 0.05$) and "Flamingo" test ($r = -0.36$, $p < 0.05$).

Strength abilities in self-assessment are related to the results of the Martine-Kushilevsky functional test ($r = 0.30$, $p < 0.05$), strength index ($r = 0.29$, $p < 0.05$) and negative correlation with the number of flexions and extensions of the arms in the emphasis lying down ($r = -0.32$, $p < 0.05$), however, with a low objective result in the test, self-assessment of strength training is inflated. Physical abilities such as flexibility and endurance have no significant correlation with mobility test results.

In general, the "self-assessment" of the physical development of the 5th grade boys is based on the indicators of the life index ($r = 0.42$, $p < 0.01$) and a strength index ($r = 0.50$, $p < 0.01$). The highest average correlation coefficients between self-esteem and actual indicators of physical development do not exceed $r = 0.19$, $p > 0.05$ (self-esteem) $r = 0.17$, $p > 0.05$ (slender of the body and athletic ability) (table 1).

Thus, fifth-grade girls demonstrated the highest level of correlation of the parameters studied was recorded between the Rufier Index, which characterizes physical performance and assesses the functional state of the cardiovascular and respiratory systems and the following indicators of the questionnaire "Self-description physical development": "self-esteem" ($r = 0.49$, $p < 0.01$), "body slenderness" ($r = 0.49$, $p < 0.01$), "appearance" ($r = 0.45$, $p < 0.01$), "movement coordination" ($r = 0.37$, $p < 0.01$), "strength" ($r = 0.33$, $p < 0.05$), "flexibility" ($r = 0.31$, $p < 0.05$) and "health" ($r = 0.28$, $p < 0.05$).

According to the adequacy of self-assessment of physical fitness of 5th grade girls, we did not find significant correlations between indicators of self-description of physical development and real indicators of physical fitness of girls.

"Movement coordination" for the 5th grade girls was compared with the results of motor tests: short distance run 4x9 m and "Flamingo" test, however, no significant correlations were found between them, indicating some difficulty in assessing one's own coordination abilities. Girls feel their athletic ability only through the Robinson's index ($r = 0.37$, $p < 0.01$), which was used to assess the functional state of the cardiovascular system. Indexes "strength" ($r = 0.33$, $p < 0.05$) and "flexibility" ($r = 0.31$, $p < 0.05$) have a moderate correlation with the results of the Rufier functional test. This fact can not indicate the adequacy of self-esteem, because the higher the Rufier index, the lower the physical capacity. "Endurance" is correlated with body length ($r = 0.33$, $p < 0.05$) and negative correlation with the Martine-Kushilevsky test ($r = -0.29$, $p < 0.05$).

The highest average correlation coefficients between self-esteem and actual indicators of physical development do not exceed $r = 0.18$, $p > 0.05$ (body slenderness and appearance) and $r = 0.15$, $p > 0.05$ (coordination of movements, strength and self-esteem), which indicates a low level of adequacy of self-esteem of physical development of the 5th grade girls (table 2).

Thus, we can say that the lack of significant correlations with the results of motor tests and functional indicators, indicates the low importance of pedagogical control of physical fitness in the process of physical education of 5th grade students.

Table 1. Correlation coefficients of self-assessment of physical development and somatometric and physiometric indicators of the 5th grade boys (n = 30)

Phys. train.	Self-esteem Health	Movement coord	physical activity	Body slender ness	Athletic abilities	Global self esteem	Appearance	Strength	Flexibility	Endurance	Self-esteem
BL	0.12	0.19	0.11	0.14	0.34	0.09	0.20	0.09	0.23	0.23	0.06
BW	0.10	-0.01	0.18	-0.18	0.07	0.03	0.02	0.18	-0.14	0.14	0.04
RHR	0.08	-0.06	0.04	-0.22	-0.09	-0.08	-0.18	0.05	-0.18	-0.13	0.12
SBP	0.22	0.10	0.31	0.15	0.29	0.14	0.12	0.14	-0.04	-0.07	0.35
DBP	0.07	0.16	0.23	0.15	0.27	0.13	0.21	0.22	0.06	0.21	0.18
VCL	-0.11	-0.14	-0.23	-0.22	-0.20	-0.21	-0.19	-0.26	0.02	-0.11	-0.24
Rufier's test	-0.10	0.08	-0.08	0.14	0.13	-0.02	0.11	-0.02	0.22	0.17	-0.05
MK test	0.19	0.17	0.26	0.21	-0.07	0.19	0.20	0.30	0.03	0.12	0.23
BMI	0.07	0.10	-0.02	-0.09	0.08	0.05	0.05	-0.02	0.01	0.21	-0.25
VI	0.13	0.28	0.15	0.36	0.02	0.15	0.19	0.16	0.10	-0.16	0.42
SI	0.23	0.27	0.11	0.41	0.20	0.22	0.32	0.29	-0.01	-0.04	0.50
Robinson's index	0.20	0.02	0.07	0.06	0.13	-0.06	0.03	0.03	-0.24	-0.13	0.19
30 metres run	-0.07	-0.04	-0.10	-0.11	-0.19	-0.04	-0.10	0.02	0.03	0.09	-0.13
steady running	0.05	0.04	0.04	0.14	0.15	0.01	0.10	-0.08	0.01	-0.12	0.09
Flexion and extension of the arms	-0.35	-0.34	-0.24	-0.24	-0.25	-0.23	-0.22	-0.32	-0.01	-0.05	-0.34
right hand strength	0.24	0.16	0.34	0.19	0.37	0.20	0.33	0.10	0.12	0.20	0.13
left hand strength	-0.01	0.06	0.21	-0.01	0.33	0.11	0.14	-0.04	0.21	0.22	-0.16
Lifting the torso	-0.13	-0.01	-0.08	0.07	-0.08	-0.12	-0.02	0.00	-0.03	-0.06	0.15
Distance jump	-0.25	-0.19	-0.18	-0.24	-0.10	-0.18	-0.15	-0.10	-0.03	0.08	-0.25
Short dist run	-0.21	-0.02	0.03	-0.21	0.12	-0.14	-0.10	-0.04	0.10	0.14	-0.10
Tilt the torso	-0.01	0.17	-0.02	0.14	0.05	-0.04	0.03	0.01	-0.03	-0.19	0.21
"Flamingo" test	-0.06	-0.17	-0.34	-0.22	-0.36	-0.19	-0.29	-0.14	-0.16	-0.23	-0.14
Total Σ	3.0	2.96	3.37	3.9	3.89	2.63	3.3	2.61	2.01	3.1	4.33
r arithmetic mean	0.13	0.13	0.15	0.17	0.17	0.11	0.15	0.11	0.09	0.14	0.19

Notice: $r_{(p=0.05)} = 0.2731$; $r_{(p=0.01)} = 0.354$

The correlation results of ninth-graders' testing show the highest number of correlations (table 3). To start with the analysis of the value of "health", which in the imagination of students is significant and a priority. In particular, a positive correlation was found between self-assessment of "health" and the results of the following tests: vital index (VI), ($r = 0.38$, $p < 0.01$), strength index (SI) ($r = 0.38$, $p < 0.01$) and long jump from a place ($r = 0.37$, $p < 0.01$), and a negative correlation with the Robinson's index ($r = -0.41$), RHR ($r = -0.32$), which suggests that with age, the adequacy of self-esteem "health" becomes more real and in their imagination is associated with the development of strength and functionality of the human body, which is a positive factor to form a healthy lifestyle. An analysis of the negative correlations between subjective assessment of "health" and body weight, length, and body lift shows that young men do not associate these indicators with the impact on their health.

The next indicator of self-description of physical development, which has strong correlations with many indicators, is "coordination of movements". There is a positive correla-

tion 3: SBP ($r = 0.31$, $p < 0.05$), DBP ($r = 0.44$, $p < 0.01$), right hand strength ($r = 0.31$, $p < 0.05$), lifting the torso to sit ($r = 0.31$, $p < 0.05$) and tilt the torso forward from a sitting position ($r = 0.56$, $p < 0.01$). But from these indicators we can not judge the adequacy of self-assessment of this quality. Negative correlation is observed in short distance running 4x9 m ($r = -0.51$, $p < 0.01$), Rufier's test ($r = -0.40$, $p < 0.01$), steady running ($r = -0.37$, $p < 0.01$), which is objective, because the lower these indicators, the better the result in the tests.

The self-description of "physical activity" is significant for 9th graders, as it is also closely correlated with many test results.

There is a positive correlation with body weight (MT, $r = 0.44$, $p < 0.01$), body mass index (BMI) ($r = 0.41$, $p < 0.01$), tilt the torso ($r = 0.50$, $p < 0.01$), negative correlation with the Rufier test result ($r = -0.45$, $p < 0.01$), short distance running (4x9 m) ($r = -0.46$, $p < 0.01$), which can be considered an adequate result of physical activity. But such positive correlations 3 RHR ($r = 0.46$, $p < 0.01$), Robinson's (RI) ($r = 0.51$, $p < 0.01$). Negative correlation with vital and strength in-

Table 2. Correlation coefficients of self-assessment of physical development and somatometric and physiometric indicators of the 5th grade girls, (n = 30)

Phys. train.	Health	Movement coord	physical activity	Body slender ness	Athletic abilities	Global self esteem	Appearance	Strength	Flexibility	Endurance	Self-esteem
BL	0.19	0.15	0.17	0.21	0.04	0.34	0.31	0.23	0.20	0.33	0.23
BW	-0.06	-0.09	-0.01	0.03	0.08	-0.06	0.06	-0.13	-0.12	-0.06	0.06
RHR	0.04	-0.27	-0.09	-0.11	-0.06	-0.04	-0.15	-0.16	-0.11	-0.03	-0.17
SBP	-0.15	-0.34	-0.16	-0.34	-0.08	-0.01	-0.27	-0.23	-0.23	0.02	-0.35
DBP	0.08	0.05	0.06	-0.02	-0.02	0.19	0.02	0.11	0.07	0.15	-0.02
VCL	-0.31	-0.17	-0.14	-0.32	0.03	-0.15	-0.04	-0.22	-0.23	-0.13	-0.25
Rufier's test	0.28	0.37	0.22	0.49	0.03	0.21	0.45	0.33	0.31	0.23	0.49
MK test	-0.12	-0.17	-0.03	-0.34	-0.04	-0.23	-0.27	-0.22	-0.20	-0.29	-0.13
BMI	0.06	0.03	0.05	0.22	-0.08	-0.03	0.16	0.17	0.00	0.04	0.20
VI	-0.13	-0.09	0.04	-0.37	0.16	-0.19	-0.24	-0.29	-0.14	-0.31	-0.12
SI	-0.07	-0.23	0.05	-0.32	0.17	-0.10	-0.22	-0.23	-0.08	-0.13	-0.12
Robinson's index	0.07	0.08	0.20	-0.08	0.37	-0.04	-0.08	0.04	0.11	-0.16	0.02
30 metres run	0.03	0.08	0.09	0.02	0.05	0.20	0.15	0.12	0.11	0.19	0.06
steady running	0.00	-0.05	-0.06	0.05	-0.04	-0.14	-0.07	-0.09	-0.09	-0.13	0.02
Flexion and extension of the arms	-0.04	-0.24	-0.08	-0.21	-0.06	0.07	-0.17	-0.13	-0.14	0.06	-0.22
right hand strength	0.02	-0.05	-0.02	0.08	-0.02	0.01	0.11	0.00	0.03	0.09	0.07
left hand strength	-0.02	-0.04	-0.03	0.01	0.04	-0.09	0.06	-0.03	0.05	-0.03	0.01
Lifting the torso	-0.07	-0.25	-0.17	-0.15	-0.14	-0.12	-0.20	-0.17	-0.15	-0.03	-0.19
Distance jump	-0.04	0.16	0.02	0.09	-0.21	-0.07	0.18	0.16	0.07	0.15	0.16
Short dist run	0.15	-0.10	0.07	-0.13	0.15	-0.12	-0.21	0.03	-0.06	-0.15	-0.16
Tilt the torso	0.01	0.22	-0.01	0.25	-0.13	0.09	0.29	0.16	0.15	0.16	0.24
"Flamingo" test	0.04	-0.20	-0.05	-0.16	0.06	-0.06	-0.26	-0.14	-0.17	-0.12	-0.18
Total Σ	1.98	3.38	1.83	4.0	2.06	2.56	3.97	3.39	2.82	2.99	3.47
r arithmetic mean	0.09	0.15	0.08	0.18	0.09	0.11	0.18	0.15	0.12	0.13	0.15

Notice: $r_{(p=0.05)} = 0.2731$; $r_{(p=0.01)} = 0.354$

dexes, hand strength, long jump indicate that physical activity loses its meaning when the all these indicators with low results become more important instead.

The 9th grades athletic ability is more adequately associated with the relationship with the Rufier test ($r = -0.308$, $p < 0.05$), 60 m running ($r = -0.24$, $p < 0.05$), hand strength ($r = 0.26$, $p < 0.05$), lift the torso ($r = 0.32$, $p < 0.05$), short distance running (4×9 m) ($r = -0.66$, $p < 0.01$), tilt the torso ($r = 0.26$, $p < 0.05$).

Self-esteem of young people's strength qualities has a positive correlation with distance jump ($r = 0.32$, $p < 0.05$), and left hand strength ($r = 0.29$, $p < 0.05$).

Researchers claim that boys' self-assessment of physical development is directly related to their strength and physical activity, girls – to their appearance and coordination of movements (Danish, Forneris, Hodge, & Heke, 2004). In this research, we also observe the fact of the self-esteem for girls while becoming adult, which is influenced by the appearance and slenderness of the body, becomes especially important (table 4).

Self-assessment of "body slenderness" in girls correlates with body length (BL) ($r = 0.30$, $p < 0.05$), the higher, the slimmer girl, according to Martine-Kushelevsky test ($r = -0.41$, $p < 0.01$) indicating physical fitness. They associate appearance with the Martin-Kushelevsky test ($r = -0.33$, $p < 0.05$) and Robinson's index ($r = 0.30$, $p < 0.05$). Such data is not informative for us and, unfortunately, we can not determine the adequacy of girls' self-esteem on the indicators: "appearance".

Girls' strength abilities correlate only with body length ($r = 0.30$, $p < 0.05$). No significant correlations were found in the self-assessment of physical qualities such as "flexibility", "endurance". Self-esteem of physical development correlates with VCL ($r = 0.30$, $p < 0.05$) and there is a negative correlation with the 60 m running ($r = -0.30$), tilt the torso forward ($r = -0.34$, $p < 0.05$) and a balance exercise ($r = -0.37$, $p < 0.01$).

The 9th graders demonstrated such indicators of self-description of physical development as: "coordination of movements", "physical activity", "sports ability" do not have

Table 3. Correlation coefficients of self-assessment of physical development and somatometric and physiometric indicators of 9th grade boys, (n = 30)

Self-esteem	Health	Movement coord	physical activity	Body slender ness	Athletic abilities	Global self esteem	Appearance	Strength	Flexibility	Endurance	Self-esteem
Phys. train.											
BL	-0.50	0.15	0.19	0.02	-0.13	-0.37	0.10	-0.14	0.23	0.27	0.00
BW	-0.31	0.17	0.44	-0.11	0.07	-0.20	0.20	0.15	0.05	0.41	0.09
RHR	-0.32	0.19	0.46	-0.25	0.04	0.20	0.13	0.38	-0.23	0.35	0.13
SBP	0.18	0.31	0.28	-0.21	0.26	0.24	0.11	-0.09	-0.04	0.18	-0.12
DBP	0.06	0.44	0.17	-0.44	0.34	0.32	0.06	-0.04	0.00	0.24	0.07
VCL	-0.24	0.14	-0.16	-0.05	-0.25	-0.16	0.13	-0.38	0.19	0.04	-0.02
Rufier's test	0.53	-0.40	-0.45	0.44	-0.38	-0.09	-0.06	0.01	0.04	-0.12	0.27
MK test	-0.14	-0.21	-0.24	-0.01	0.05	-0.10	-0.23	-0.27	0.23	-0.31	0.17
BMI	-0.19	0.14	0.41	-0.13	0.12	-0.10	0.20	0.21	0.00	0.37	0.12
VI	0.38	-0.22	-0.36	0.19	-0.03	0.07	-0.18	-0.22	0.06	-0.35	-0.20
SI	0.38	-0.06	-0.33	0.12	-0.13	0.16	-0.12	-0.09	-0.07	-0.37	-0.07
Robinson's index	-0.41	0.19	0.51	-0.12	-0.11	-0.01	-0.04	0.21	-0.09	0.30	-0.13
30 metres run	-0.11	-0.01	0.03	0.02	-0.24	-0.26	-0.01	0.10	0.10	0.22	-0.26
steady running	0.00	-0.37	-0.16	0.21	-0.04	-0.04	0.00	0.29	-0.05	-0.23	0.08
Flexion and extension of the arms	-0.13	-0.13	-0.09	0.30	-0.15	-0.38	0.05	-0.09	0.20	-0.03	0.07
right hand strength	-0.54	0.31	0.14	-0.39	0.26	0.18	0.09	-0.03	0.15	-0.12	-0.17
left hand strength	0.26	-0.35	-0.30	0.24	-0.04	0.09	0.00	0.29	0.02	-0.08	0.14
Lifting the torso	-0.37	0.31	0.17	-0.19	0.32	0.06	0.16	0.04	0.21	0.16	-0.14
Distance jump	0.37	-0.35	-0.31	0.17	-0.05	0.22	-0.04	0.32	-0.07	-0.07	0.14
Short dist run	0.11	-0.51	-0.46	0.32	-0.26	-0.06	-0.05	0.14	0.08	-0.42	0.18
Tilt the torso	-0.48	0.56	0.50	-0.37	0.26	-0.06	0.10	-0.21	0.05	0.23	-0.23
"Flamingo" test	-0.05	0.11	0.20	0.04	-0.12	-0.28	-0.03	-0.26	-0.06	0.07	-0.04
Total Σ	6.06	5.63	6.36	4.34	3.65	3.65	2.09	3.96	2.22	4.94	2.84
r arithmetic mean	0.27	0.25	0.28	0.19	0.16	0.16	0.09	0.18	0.1	0.22	0.12

Notice: $r_{(p=0.05)} = 0.2731$; $r_{(p=0.01)} = 0.354$

any significant correlation with any indicator of physical fitness. The highest correlation coefficients between self-esteem indicators and actual indicators of physical development do not exceed $r = 0.15$, $p > 0.05$.

Discussion

The results of the research demonstrate the self-assessment of physical development with the physical fitness of the 5th grade boys did not reveal any significant correlations between such indicators as: "health", "coordination of movements", global self-understanding, "Appearance", "flexibility" and "endurance". "Physical activity" correlates with boys' strength abilities and has a negative correlation with statistical balance. This means that the stronger the guy, the more physically active he is. Balance is not a priority for boys. Self-assessment of strength abilities has a correlation with the Martine-Kushelevsky test, strength index and flexion and extension of the arms while emphasis lying down.

The 5th grade girls demonstrated the highest correlation between the Rufier index and the following Physical Development Self-Test Questionnaire: "health", "coordination", "body slenderness", "appearance", "strength" and "self-esteem". Girls are more demanding of "body slenderness" and their appearance.

The largest number of correlations in 9th grade boys fell on the value of "health", which is reflected in the following indices: Rufie, vital and strength, as well as speed and strength exercise. This fact demonstrates a positive guarantee of maintaining and leading a healthy lifestyle among schoolchildren. There is an inflated self-esteem among young people in the "coordination of movements". The indicator of self-description "physical activity" is significant for the 9th grade students, but "body slenderness" is not a priority.

The highest average correlation coefficients between self-esteem and actual indicators of physical development do not exceed $r = 0.28$, $p < 0.05$ (physical activity), $r = 0.27$, $p < 0.05$ (health) & $r = 0.25$, $p < 0.05$ (coordination of move-

Table 4. Correlation coefficients of self-assessment of physical development and somatometric and physiometric indicators of 9th grade girls, (n = 30)

Phys. train.	Health	Movement coord	physical activity	Body slenderness	Athletic abilities	Global self-esteem	Appearance	Strength	Flexibility	Endurance	Self-esteem
BL	0.04	-0.02	-0.06	0.30	0.11	0.00	0.21	0.30	0.16	0.12	-0.12
BW	0.04	0.05	0.03	-0.08	-0.16	0.00	-0.08	-0.13	-0.05	-0.06	0.03
RHR	0.07	-0.03	-0.02	0.05	-0.16	0.04	0.09	0.03	0.07	0.02	0.16
SBP	-0.09	0.07	0.09	-0.23	-0.02	0.06	-0.15	-0.10	-0.09	0.03	0.12
DBP	-0.16	0.18	0.08	0.03	-0.06	0.11	-0.16	-0.05	-0.02	-0.06	0.19
VCL	0.10	-0.14	-0.13	-0.26	0.15	0.21	-0.08	-0.14	0.01	0.04	0.30
Rufier's test	-0.18	0.12	-0.01	-0.07	0.03	0.20	-0.20	-0.24	-0.11	-0.17	0.09
MK test	-0.19	0.05	0.13	-0.41	0.00	0.06	-0.33	-0.24	-0.20	-0.07	-0.10
BMI	-0.01	0.04	0.06	-0.24	-0.16	0.00	-0.19	-0.27	-0.13	-0.12	0.09
VI	-0.06	0.02	0.01	0.01	0.12	0.00	0.03	-0.07	-0.08	-0.06	-0.23
SI	-0.03	-0.04	-0.03	0.03	0.14	-0.01	0.06	0.04	0.01	0.01	0.00
Robinson's index	0.17	-0.05	-0.11	0.34	-0.04	-0.03	0.30	0.16	0.16	0.03	0.10
30 metres run	-0.11	0.12	0.24	-0.22	-0.06	-0.25	-0.15	-0.22	-0.18	-0.13	-0.30
steady running	-0.17	0.13	0.17	0.00	-0.06	-0.04	-0.16	-0.02	-0.09	0.01	0.09
Flexion and extension of the arms	0.03	-0.01	-0.02	0.21	-0.04	-0.08	0.11	0.08	0.06	-0.06	-0.20
right hand strength	0.06	-0.16	-0.06	-0.16	0.08	0.05	0.08	0.06	0.01	0.06	-0.24
left hand strength	0.01	-0.08	-0.01	-0.12	0.02	0.07	0.04	0.09	0.04	0.05	-0.13
Lifting the torso	0.01	0.05	-0.11	0.22	0.00	0.04	0.08	-0.11	0.05	-0.17	0.02
Distance jump	0.15	-0.20	-0.15	0.01	0.14	0.04	0.17	0.02	0.09	0.03	-0.02
Short dist run	-0.21	0.19	0.22	0.06	-0.15	-0.23	-0.13	-0.22	-0.19	-0.17	-0.09
Tilt the torso	-0.02	0.01	0.10	-0.12	-0.09	-0.15	0.03	0.15	-0.09	0.11	-0.34
"Flamingo" test	-0.09	0.13	0.09	0.06	-0.15	-0.20	0.03	-0.01	-0.13	-0.07	-0.37
Total Σ	2.0	1.89	1.93	3.23	1.94	1.87	2.86	2.75	2.02	1.65	3.33
r arithmetic mean	0.09	0.08	0.08	0.14	0.08	0.08	0.13	0.12	0.09	0.07	0.15

Notice: $r_{(p=0.05)} = 0.2731$; $r_{(p=0.01)} = 0.354$

ments), indicating a low level of adequacy of self-esteem of physical development of the 9th grade students. Self-esteem of appearance and slenderness of the body becomes especially important for girls while becoming adult.

Thus, the adequacy of self-assessment of physical development in terms of physical fitness becomes more objective.

The results of our study of age and gender characteristics of students' attitudes to their physical self-understanding coincide with the results of Bochenkova's research E. B. (Bochenkova, 2000). The author also studied the self-esteem of young men and women. Boys rate their physical abilities higher than girls. But the general self-esteem of girls is inflated. While studying the age characteristics of self-description of physical development (Krutsevich & Bakiko, 2020) we can notice for boys of middle school age in comparison to boys of senior school age the value of self-description is higher in 8 out of 11 indicators. Boys grades 5-7 have higher self-esteem scores than boys grades 10-11 (grades 10-11). At the same time, the general self-esteem of boys is higher

than that of girls. This result of the study coincides with the data of Ilin (2013). The author notes that boys in the 5th and 9th grades are generally more satisfied with their appearance and give it a higher grade than girls. Sitnikov also claims that boys rated their physical characteristics much higher than girls. They attach great importance to their own physical self-understanding (Sitnikov, 2001). But such scientists as Stepanova (2012) and Federikin et al. (2021), according to the results of studies of students' self-description, claim that self-esteem and the level of harassment do not have a gender difference in middle school age. They also argue that children's physical development does not significantly affect self-esteem. This contradicts the results of our previous research.

The adequacy of self-assessment of physical development is associated with gaining practical experience in physical education lessons. Inadequacy indicates that in physical education lessons insufficient attention to substantiating the importance of pedagogical control of physical fitness of students. Performing mobility test in physical education

lessons is used by the teacher in general to assess, and not to determine the progress of student achievement in the development of physical qualities in the process of specially organized mobility. Therefore, students do not see the correlation between the results of specific exercises and the development of their physical abilities, ie pedagogical control does not become an incentive for their self-development and self-improvement. This explains the fact that scientists (Tsybullska, 2019; Tkachenko, 2020) determine in their research the lack of children's motivation to increase physical fitness in physical education.

Conclusion

Thus, the correlation analysis between the results in mobility test for strength, endurance, coordination and flexibility and self-assessment of these indicators by students of the 5th and 9th grades are differ. The 9th graders evaluate their physical abilities more objectively.

Studies have shown the inadequacy of self-assessment of physical fitness of students, which indicates the importance of theoretical coverage and practical implementation in physical education classes of pedagogical control and self-control of physical fitness, which should be an incentive for self-improvement of boys and girls in physical education.

Conflict of interest

The authors declare that there is no conflict of interest.

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АНАЛІЗ ВЗАЄМОЗВ'ЯЗКІВ СУБ'ЄКТИВНИХ І ОБ'ЄКТИВНИХ ПОКАЗНИКІВ ФІЗИЧНОГО РОЗВИТКУ ШКОЛЯРІВ 5-ИХ ТА 9-ИХ КЛАСІВ

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 10 с., 4 табл., 34 джерела.

Мета: дослідити взаємозв'язок між об'єктивними результатами вимірів соматометричних і фізіометричних показників фізичного розвитку та суб'єктивними показниками його самоопису у школярів 5-их та 9-их класів.

Матеріал і методи. Дослідження проводились у загальноосвітній школі № 17 м. Луцька за участю учнів середнього шкільного віку у кількості 120 учнів (вік 10 та 15 років). Методи дослідження: аналіз даних науково-методичної літератури, нормативно-правових документів, програми з фізичної культури, педагогічне тестування

фізичної підготовленості, методи математичної статистики, тест-опитувальник Є.В. Боченкової «Самоопис фізичного розвитку».

Результати. Проведений кореляційний аналіз між результатами у рухових тестах на силу, витривалість, координацію і гнучкість та самооцінкою цих показників учнями 5-их та 9-их класів відрізняються. Більш об'єктивно оцінюють свої фізичні здібності школярі 9-го класу. Це пов'язано з набуттям практичного досвіду на уроках фізичної культури. Неадекватність самооцінки фізичних здібностей свідчить, що на уроках фізичної культури недостатньо уваги приділяється обґрунтуванню значення педагогічного контролю фізичної підготовленості школярів.

Висновки. Проведені дослідження виявили неадекватність самооцінки фізичної підготовленості учнів, що свідчить про важливість теоретичного висвітлення і практичного впровадження в уроки фізичної культури школярів розділу педагогічного контролю і самоконтролю фізичної підготовленості, який має бути стимулом для самовдосконалення хлопців і дівчат в процесі фізичного виховання.

Ключові слова: учні, середній шкільний вік, фізичний розвиток, рухові тести, самооцінка, адекватність.

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