

## Dynamic of primary school age pupils' physical fitness

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### Abstract

**Purpose:** assessment of 6-9 yrs age pupils' (1st – 3rd forms) physical fitness level.

**Material:** in the research pupils of 6-9 yrs age participated ( $n = 94$ ; boys– 46, girls– 48). The pupils' physical fitness testing was carried out in compliance with school program norms.

**Results:** as per the norms of school program most of pupils (60.9%) demonstrated high level of fitness. Exclusion was the boys' indicators in test for flexibility. Only 12.6% of pupils fulfilled the test without remarks. 9.7% fulfilled the test at average level. 16.7% of pupils fulfilled the test at initial level. So we observed non uniform distribution of results. In the whole, by most of physical fitness indicators we observed gradual increment of result with every year. Significant improvement of results in 2nd and 3rd forms can be explained by more conscious and clear fulfillment of tests' technique.

**Conclusions:** we found pupils' high physical fitness level by norms of school program. But the objectiveness of the program's norms is doubtful. May be these norms are lowered and require reviewing.

**Keywords:** pupils, physical qualities, health, tests, program.

### Introduction

In modern Ukrainian social-economic conditions great number of schoolchildren has weak health, low motor activity and physical fitness [12]. For example at the moment of entering school 10-20% of children have health problems; at the end of primary school – 50-60 % have the same problems [20]. It is important that just in this period motor functioning is especially required, because it facilitates: smooth character of organism's functional systems' reconstructions; physical development and physical qualities' formation, which will be required in adult age [5].

For physical loads' rationing the data about pupils' physical fitness are important because they characterize the level of physical qualities and physical health condition [12, 19]. Physical fitness is a result of human physical activity; his/her integral indicators and to large extent reflects influence of physical education. Constant registration and assessment of physical fitness level permit to speak about physical education effectiveness [5].

Many authors pay attention in their publications to analysis of content, to structure and organization of primary schoolchildren's physical training [5, 18]. Assessment of physical fitness level of primary [4, 6, 19], secondary [1, 15] and senior schoolchildren [3, 16] has been fulfilled. Nevertheless it shall be constantly paid attention to by scientists; especially informative are researches of dynamic of pupils' physical fitness. In the mentioned aspect we can stress on the following topics:

- Modeling of schoolchildren's physical education [9, 24];
- Physical loads' rationing for schoolchildren [26, 30];
- Tendencies and status of children's physical fitness in different countries: Australia [21], Brazil [22], China [29], Switzerland [27], Check Republic [33];
- General status of children's health [35];
- Influence of physical activity on pupils' health [23, 25];

– Correlation of children health's different components [28, 31, 32, 34].

The authors note that it is necessary to perfect approaches to children's health improvement. It is underlined that pupils' physical fitness is the most important component of their health.

*Hypothesis:* it is assumed that physical qualities' increment will permit to judge about positive or negative changes in the definite period of time and form objective norms for schoolchildren.

*The purpose of the research* was to assess 6-9 yrs age pupils' physical fitness level.

### Material and methods

**Participants:** in the research pupils of 6-9 yrs age participated ( $n = 94$ ; boys– 46, girls– 48).

**Organization of the research:** the work was fulfilled on the base of Lvov comprehensive school № 9, № 13. For objectiveness we followed identification and terms of program tests' passing: we tested the same children; testing itself was conducted in October (at the beginning of academic year in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> forms, children's age – 6-9 yrs.) in gym conditions.

Testing of pupils' physical fitness was conducted as per norms, envisaged by school physical culture program [10, 13, 17]. The tests were: long jump from the spot from initial position – feet at shoulder width and toes behind start line. With legs' bending in knees, the tested waved arms backward and throwing the arms forward – jumps. The result is registered by a distance from start line to the point of heels' touching the mat. The result is measured in centimeters by the better of two attempts.

“Shuttle” run 4 x 9 meters was fulfilled from high start behind the start line. By command it was necessary to run 9 meters to other line, take one of two cubes, which are inside a circle; then run back, put the cube in start circle and run for the other cube, to put it also in start circle. The result was measured in seconds: from start to the moment of the second cube's putting in start circle.

Forward torso bending from sitting position: legs – at

shoulder width; distance between feet - 20 – 30 cm; hand are on the floor between knees, palm – down. By command the tested smoothly bend forward, trying to stretch arms as far as possible without bending knees. The position of maximal bent shall be kept for 2 seconds. Finger shall be fixed on marking. The result is measured in centimeters.

*Statistical analysis* for assessment of physical fitness level was used on the base of Microsoft Office Excel program.

### Results

For assessment of physical fitness level we used school norms [13], which showed the following levels: speed-power qualities (long jump from the spot); dexterity (shuttle run 4 x 9 m) and flexibility (forward torso bending from sitting position) [10, 13, 17].

For period from 1<sup>st</sup> to 3<sup>rd</sup> forms, by every school normative we observed gradual increment of results (see table 1). In every test improvements have certain specific features and statistically confident difference ( $p < 0.001$ ).

It should be noted that boys demonstrated better results than girls ( $p < 0.001$ ) in long jumps from the spot and “shuttle” run 4 x 9 m. It is explained by the fact that in sensitive period increments of muscular strength do not coincide in girls and boys. Besides, strength of boys’ torso and arms is greater than girls’ [5, 11].

Only in test “Forward torso bending in sitting position” girls’ results were better ( $p < 0.001$ ). As per other researches the highest increment of flexibility is observed from 7 to 8 yrs age. Girls have better joints mobility: approximately by 10-15% than boys. It is conditioned by greater elasticity of woman’s organism [11].

The presented in table 1 results show that the tested groups were homogenous from 1<sup>st</sup> to 3<sup>rd</sup> forms by results of “shuttle” run 4 x 9 m ( $V < 8.2\%$ ). By results of long jump from the spot ( $V < 15.5\%$ ) homogeneity was on average level. Significant difference in indicators was in forward

torso bending in sitting position ( $V > 151.1\%$ ). Dispersion of boys’ results is greater ( $V = 98.7 - 151.1\%$ ), than the girls’ ( $V = 65.7 - 100.5\%$ ). Substantial non homogeneity of children’s contingent is explained by the following: high flexibility of the part of children, resulted from their attending choreographic trainings and sport circles; low flexibility of the rest of children. Besides, at physical culture lessons this physical quality is paid insufficient attention to.

In general, by most of physical fitness indicators gradual improvement of results is observed from year to year. For example, increment of girls’ results in “long jump from the spot” is 16.2 cm every year. Boys improved this indicator by 13.6 cm by the 2<sup>nd</sup> form. From 2<sup>nd</sup> to 3<sup>rd</sup> forms boys improved this indicator by 10.2 cm ( $p < 0.05$ ). In the 1<sup>st</sup> form boys jump better than girls by 15.5 cm. In the 3<sup>rd</sup> form difference between results reduces up to 9.5 cm.

The data, characterizing flexibility, have the following statistically confident difference in girls ( $p < 0.001$ ). In the 1<sup>st</sup> form girls improved this result by 1.8 cm; during 2<sup>nd</sup> form – by 1.4 cm. Concerning boys, we did not observe such confident difference ( $p > 0.05$ ). Increment of every following year’s results is, in average, 0.4 cm. Girls are more flexible in 1<sup>st</sup> form than boys by 2.9 cm. In 2<sup>nd</sup> form girls are more flexible than boys by 4.2 cm and in the 3<sup>rd</sup> form – by 5.2 cm.

Statistically confident difference between boys and girls was registered in “shuttle” run 4 x 9 m ( $p < 0.01$ ). During 1<sup>st</sup> form girls improved this result by 0.6 cm. Increment of boys results with every coming year was 2.3 sec. and 0.8 sec. In 1<sup>st</sup> form boys have better dexterity than girls by 0.8 sec. In 2<sup>nd</sup> form boys have better dexterity than girls by 0.5 sec. and in 3<sup>rd</sup> form – by 0.7 sec. (see table 2).

Significant results’ improvement in 2<sup>nd</sup> and 3<sup>rd</sup> forms can be explained by more conscious and accurate tests’ fulfillment as well as quick increase of dexterity, which

**Table 1.** Comparative characteristics of pupils’ physical fitness in period from 1<sup>st</sup> to 3<sup>rd</sup> forms (n = 94)

School norms	Statistical characteristics	Boys (n = 46)			Girls (n = 48)			P*
		1 <sup>st</sup> form	2 <sup>nd</sup> form	3 <sup>rd</sup> form	1 <sup>st</sup> form	2 <sup>nd</sup> form	3 <sup>rd</sup> form	
Long jump from the spot (cm)	M	108.5	122.1	132.3	90.1	106.6	122.8	<0.001
	SD	16.5	17.5	20.5	13.9	16.5	16.3	
	V,%	15.2	14.3	15.5	15.4	15.5	13.3	
“Shuttle” run 4x9 m with carrying objects (sec.)	M	14.7	12.4	11.6	15.5	12.9	12.3	<0.001
	SD	0.9	0.9	0.9	1.1	1.1	1.0	
	V,%	6.4	7.0	8.0	7.1	8.2	7.9	
Forward torso bending in sitting position (cm)	M	1.8	2.3	2.7	4.7	6.5	7.9	<0.001
	SD	2.8	2.4	2.6	4.8	4.6	5.2	
	V,%	151.1	104.9	98.7	100.5	70.7	65.7	

\*p – difference between boys’ and girls’ physical fitness results.

progresses in primary school age. In this age period new motor skills and abilities to reconstruct them successfully are easily formed [5, 11].

We can state that boys and girls' speed power abilities by indicators of "long jump from the spot" and "shuttle run 4 x 9 m (except 1<sup>st</sup> form) corresponds to high level. This level meets school program norms (see table 2).

The girls' flexibility indicators in "Torso bending in sitting position" are at high level. In boys these indicators are at sufficient and high level.

### Discussion

As numerous studies show, recent time there has been a

tendency to children's health, physical fitness and physical workability worsening [22, 28, 35]. By our data increment in speed-power abilities, flexibility and dexterity points are positive changes. It is explained by natural changes in child's organism and influence of physical culture lessons. Physical fitness results, presented by us, coincide with results, received in other works [6, 8, 14, 18].

According to school program most of pupils (60.9%) demonstrate high level of fitness. Exclusion was boys in test for flexibility. Sufficient level was achieved only by 12.6% of pupils. 9.7% fulfilled the test at average level and 16.7% - at initial level. Non uniform distribution is observed. It causes doubts about objectiveness of program

**Table 2.** Comparison of physical fitness mean indicators of 1<sup>st</sup> – 3<sup>rd</sup> forms pupils according to school norms

Form	Sex	Data	Peleshenko I. [13]	Vlasiuk O. [6]	Golovata O. [8]	Titarenko A. [17]	High level (as per program)
Long jump from the spot							
1 form	Girls	90.1	101.2	117.5	–	–	> 90
	Boys	108.5	110.6	122.5	–	–	> 100
2 form	Girls	106.6	109.7	136.4	99.9	108.0	> 95
	Boys	122.1	122.4	145.7	109.0	–	> 105
3 form	Girls	122.8	121.9	141.8	–	123.4	> 100
	Boys	132.3	131.9	157.9	–	–	> 110
Forward torso bending in sitting position, cm							
1 form	Girls	4.7	5.5	1.6**	–	–	> 4
	Boys	1.8***	4.5	- 1.3*	–	–	> 2
2 form	Girls	6.5	7.6	4.9	3.1**	7.2	> 4
	Boys	2.3	6.8	2.3	1.1**	–	> 2
3 form	Girls	7.9	7.9	5.3	–	9.9	> 5
	Boys	2.7***	5.8	2.8***	–	–	> 3
"Shuttle" run 4 x 9 m with carrying objects, sec.							
1 form	Girls	15.5*	14.7**	–	–	–	< 14.1
	Boys	14.7**	14.9*	–	–	–	< 13.6
2 form	Girls	12.9	13.2	–	14.0***	13.1	< 14.0
	Boys	12.4	14.0**	–	13.7**	–	< 13.5
3 form	Girls	12.3	12.9	–	–	12.5	< 13.2
	Boys	11.6	12.8***	–	–	–	< 12.6

Notes, level of achievements: \* – initial; \*\* – average; \*\*\* – sufficient.

norms. May be the norms were artificially lowered and require reviewing. The same situation exists with norms for secondary and senior school age children [3, 15, 16].

Results of our work supplement the data of other authors [24, 26, 30] about optimization of physical loads for pupils. It facilitates strengthening of children's health. Our results prove that there is demand in critical analysis of existing physical fitness norms for pupils. In other researches [9, 24] such approaches are also mentioned.

## Conclusions

1. In the period from 1<sup>st</sup> to 3<sup>rd</sup> forms there happens improvement ( $p < 0.001$ ) of physical fitness by all the tests in boys and girls. Boys' results in tests for dexterity and speed power qualities were better than girls'. But girls had ahead in test for flexibility.
2. High level of pupils' results in practically all the tests may be explained by lowered school norms that requires their reviewing.

## Conflict of interests

The authors declare that there is no conflict of interests.

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