# ASSESSMENT OF THE LEVEL OF PHYSICAL FITNESS AND PHYSICAL DEVELOPMENT OF GIRLS AGED 13-15 YEARS, STUDENTS OF GYMNASIUM

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- physical fitness,
- physical development,
- control and assessment.

**Abstract:**

Diagnosis of physical fitness and activity as well as physical development is the main scope of the specific requirements of the new core curriculum of physical education at all stages of education. Thus, physical education teachers were somehow obliged to systematically monitor motor, physical development and level of physical activity of children and adolescents - participants of the process of physical education. It should be emphasized at this point that the role of a physical education teacher is the systematic control of motor performance, and not assessment understood in the sense of the current (partial) evaluation. For these purposes, the teacher can use a variety of tests and measures of physical fitness. From a practical point of view, it would be best to use one test to monitor and evaluate physical fitness at one school.

This article presents an assessment of physical fitness and physical development of girls aged 13-15 years, rural gymnasium students. The study of fitness used the International Physical Fitness Test, and to assess the physical development, the BMI was calculated . The empirical material was subjected to a fairly thorough statistical analysis. The results of research were compared with nationwide standards developed by Pilicz [6].

## INTRODUCTION

The curriculum reform of the education system in Poland in 2009 introduced a fairly significant changes to the statutory process of physical education - at all levels of education and upbringing. The main change was the abandonment of attempts to describe the process of physical education and a shift in the emphasis on the identification and definition of its effects. Consequently, this led to the creation in physical education a common standard of civilization and education, referring to the values and activities in the field of physical culture, which must be taken into account by authors of all the new curriculums of physical education. This educational standard id saved by the analogy to other areas of education, in the form of specific requirements - grouped into seven thematic blocks [2]. Specific requirements are at the same time a set of basic content of education and physical education. These include the following areas of educational activity of teacher and student:

- diagnosis of physical fitness and activity and physical development
- health training
- sports throughout life and recreation
- safe physical activity and recreation
- sport (for 2$^{nd}$, 3$^{rd}$ and 4$^{th}$ stage of education)
- dance (for the 2$^{nd}$ and 3$^{rd}$ stage of education)

- health education (for the 3rd and 4th stage of education)

Of course, the above mentioned thematic blocks are repeated at subsequent stages of education, but the specific requirements included in them cover a wider range of knowledge, skills, ability and competence of the students.

The reading of the new core curriculum of physical education obliges all teachers of physical education in school for systematic diagnosis and efficiency of physical activity and physical development - on all levels of education. In turn, the publication of results of research showing the results of the inspection and evaluation of physical fitness and selected parameters of physical development of young people is an act highly desirable and necessary for the proper understanding of the needs of fitness and development of the young generation.

Physical fitness can be defined as a set of individual characteristics, which are expressed by the functional capacity of the organism [1]. The concept of physical fitness includes also a resource of acquired movement exercises, motor skills (for strength, speed, endurance and coordination) and some elements of a physically active lifestyle [4]. In other words, physical fitness means all human capabilities and skills in performing any movement activity [10]. In the structure of the human motor skills, physical fitness is considered to be an effective part, which includes the results of human motor activities [10]. Richard Przewęda and Roman Trześniowski [8] propose three approaches to the definition of physical fitness. The first approach is the definition of physical fitness as the utilization of their mobility potential. The second approach is physical fitness as a physical adaptation to the human environment, understood as widely as possible. And the last approach is physical fitness as the sum of motor skills.

In such a diverse and multi-directional understanding of the essence of physical fitness, it should be emphasized that its semantic meaning goes far beyond the dimension of sport activities, and to a large extent has a utilitarian character, which means that it includes other important areas of life of every human being, among others: economic activity, leisure, participation in cultural and social life and the daily self-maintenance activities. In contrast, systematic diagnosis of the physical fitness of children and youth constitutes a basis for taking specific actions, preparation of relevant programs, the selection of adequate methods, which will enable the physical education teacher the permanent improvement of various motor skills. The appropriate level of physical fitness is also a positive indicator of human health, which in the era of consumer civilization is also important.

## PURPOSE

The purpose of this study is to assess the level of physical fitness and physical development of girls aged 13-15 years who are students of the first, second and third class of gymnasium. Average results of the individual tests of fitness will be compared with the results of physical fitness of Polish youth in 2003 [6].

## MATERIAL AND METHOD

Empirical studies according to the trials of the International Physical Fitness Test were carried out on a group of 83 girls from the early September to the end of October 2013 - attending the John Paul II Public Gymnasium in Zarzecze. The structure of the study group is characterized in the table below.

**Tab. 1.** Structure of the research group

| Age (calendar) | N=83 | % |
|---|---|---|
| 13 years old | 23 | 27,7 |
| 14 years old | 30 | 36,1 |
| 15 years old | 28 | 33,7 |

The studied group of girls was divided by calendar age, that is, thirteen-year old student is one who has turned 13 years, and did not exceed 14 - that is, has at least 13 years and one day and a maximum of 13 years and 12 full months. Differences in the amount of n of studied girls are due to the fact that all students of gymnasium of a given age group participated in the study. Girls participating in the study carry mandatory physical education classes in the class-lesson system, 4 hours a week.

As already mentioned, the study used the following trials of the International Physical Fitness Test: 1) 50 m dash, 2) standing broad jump, 3) 800 m run, 4) bent arm hang, 5) shuttle run 4 x 10 m with carrying blocks, 6) sit-ups done within 30 s, 7) bend trunk. The fitness trials were performed by the studied group of girls during two consecutive physical education classes. The recommended sequence of trials was used (Pilicz et al. 2005 p. 9-10), i.e. during the first day of the study the state of efficiency in the first three attempts was assessed, while during the next class the physical fitness in the other trials was diagnosed. All the girls participating in the study wore appropriate sports clothing, and before the commencement of the trials a warm up was conducted.

**RESULTS**

The results obtained are summarized in Table 2, where the basic numerical statistics of the analysed trials were presented. To determine the statistical significance of differences in the analysed age groups, the ANOVA test was used, and its nonparametric counterpart - Kruskal-Wallis test.

While analysing the results obtained in the 50 m dash trial, it was noted that this distance was covered in the shortest time by the fifteen years old girls (8.81 s), while the worst result was obtained by girls aged 14 - 9.72 s. Additionally, in this age group the highest inter-group diversity was noted. In the standing broad jump trial, it was stated that the biggest explosive strength of the lower extremities have the girls at the age of 15 years (149.97 cm). In contrast, the worst performance in the tested parameter was observed in the group of fourteen year olds.

The results of the 800 m run indicate clearly that the best time was obtained by the youngest group of respondents (255 s). Fifteen year old covered this distance in 261.90 s, and girls aged 14 - 281,45 s. The results of bent arm hang trial indicate that the greatest strength of the arms have girls at the age of 15. In addition, the increase of the tested motor ability with age of the participants was noted. Recorded high values of the coefficient of variation indicate considerable diversity in terms of inter-group performance. Equally large inter-group variation was observed during the course of 4x10 m shuttle run with moving blocks. It is also noted that the best agility is characteristic for the youngest girls (12.53 s). Once again, a group of fourteen years olds, obtained the worst results. The research also shows that the strongest abdominal muscles have girls at the age of 13 years old ( 24.26 n). At the same time, the decrease of the tested motor skill along with the age of girls was noted. From the analysis of the results of the conducted flexibility trials one can state that the most flexible are the girls aged 15 years old (11.83 cm). The smallest flexibility was presented by the girls at the age of 14 years (9.19 cm). The conducted motor skills trials showed statistical significance in each case except for the arm strength and flexibility trial.

**Table 2.** Numerical statistics of the analysed physical fitness trials

| Tests | Age [years] | MTSF score | $\bar{x}$ | sd | min | max | V [%] | ANOVA | | Kruskal-Wallis | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | F | p | KW | p |
| 50 m dash [s] | 13 | 45 | 9,34 | 0,96 | 7,2 | 11,18 | 10,3 | 5,44 | 0,006 | 8,88 | 0,011* |
| | 14 | 40 | 9,72 | 1,40 | 7,7 | 13,55 | 14,4 | | | | |
| | 15 | 50 | 8,81 | 0,66 | 7,87 | 10,24 | 7,5 | | | | |
| standing broad jump [cm] | 13 | 43 | 147,13 | 21,78 | 100 | 190 | 14,8 | 2,70 | 0,073 | 7,89 | 0,019* |
| | 14 | 36 | 137,74 | 20,52 | 113 | 190 | 14,9 | | | | |
| | 15 | 42 | 149,97 | 21,60 | 110 | 210 | 14,4 | | | | |
| 800 m run [s] | 13 | 47 | 255,00 | 29,72 | 201 | 288 | 11,7 | 5,17 | 0,008 | 9,20 | 0,0101* |
| | 14 | 40 | 281,45 | 37,16 | 191 | 358 | 13,2 | | | | |
| | 15 | 44 | 261,90 | 33,74 | 217 | 331 | 12,9 | | | | |
| bent arm hang [s] | 13 | 51 | 8,70 | 9,04 | 1 | 37 | 104,0 | 1,47 | 0,235 | 2,20 | 0,332 |
| | 14 | 50 | 8,90 | 8,45 | 0 | 32 | 94,9 | | | | |
| | 15 | 51 | 12,52 | 10,51 | 0 | 40 | 84,0 | | | | |
| 4x10 m shuttle run with carrying blocks [s] | 13 | 52 | 12,53 | 0,94 | 11,06 | 14,98 | 7,5 | 1,63 | 0,202 | 17,70 | 0,001* |
| | 14 | 40 | 13,84 | 1,16 | 11,63 | 17,91 | 8,4 | | | | |
| | 15 | 42 | 13,51 | 1,21 | 11,19 | 15,66 | 9,0 | | | | |
| sit ups done within 30 s [n] | 13 | 54 | 24,26 | 3,32 | 13 | 28 | 13,7 | 9,32 | 0,0001 | 8,65 | 0,0132* |
| | 14 | 51 | 23,65 | 3,37 | 17 | 30 | 14,3 | | | | |
| | 15 | 51 | 22,34 | 4,88 | 17 | 38 | 21,8 | | | | |
| bend trunk [cm] | 13 | 53 | 9,91 | 5,96 | 0 | 22 | 60,1 | 1,50 | 0,229 | 2,21 | 0,331 |
| | 14 | 52 | 9,19 | 5,22 | 0 | 18 | 56,8 | | | | |
| | 15 | 54 | 11,83 | 6,83 | 1 | 24 | 57,7 | | | | |

*statistical significance p<0,05

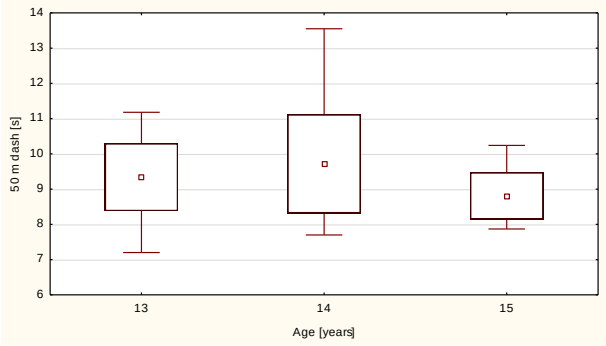


**Fig 1.** Boxplot of: 50 m dash

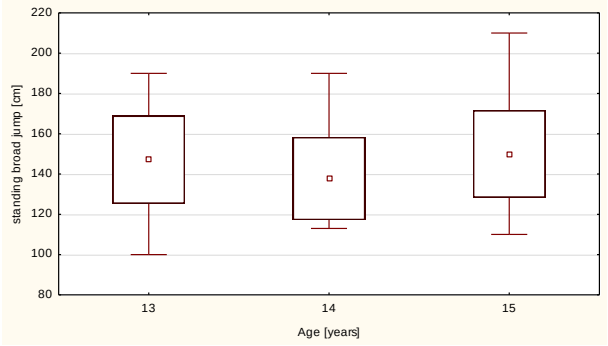


**Fig 2.** Boxplot of: standing broad jump

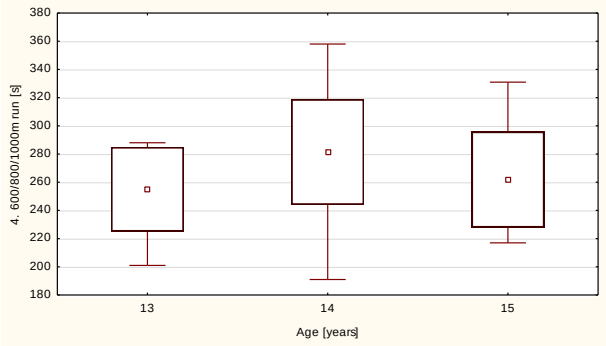


**Fig 3.** Boxplot of: 800 m run

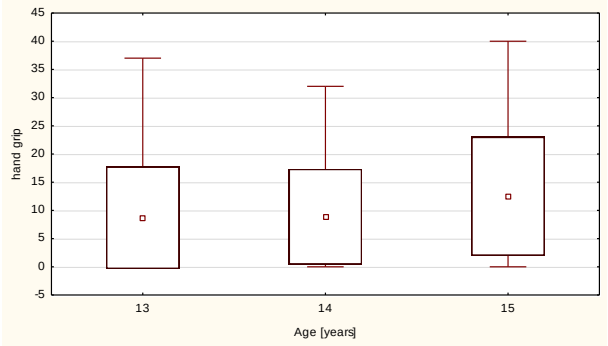


**Fig 4.** Boxplot of: bent arm hang

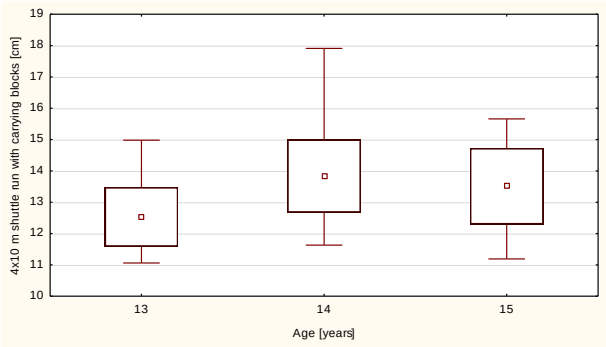


**Fig 5.** Boxplot of: 4x10 shuttle run

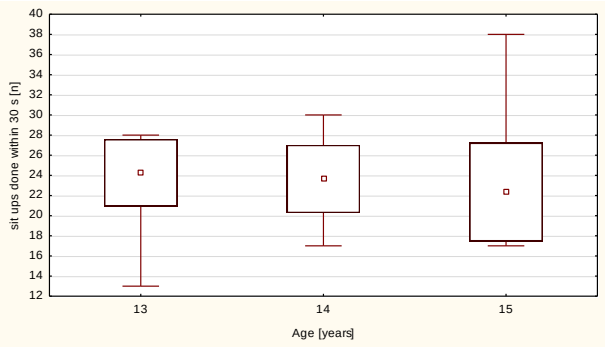


**Fig 6.** Boxplot of: sit ups done within 30 s


**Fig 7.** Boxplot of: bend trunk

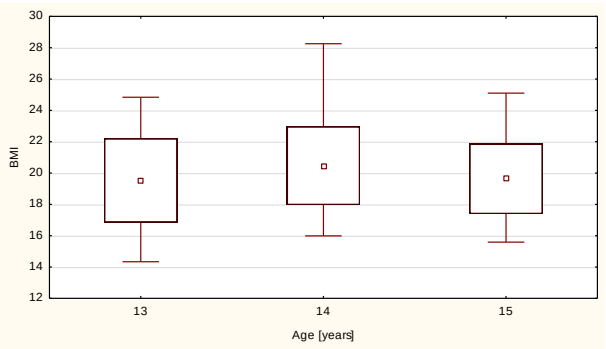


**Fig 8.** Boxplot of: Body Mass Index

The results obtained in the various tests were standardized by tables compiled by Pilicz [6]. Standardized values were used to determine the fitness profiles of the examined groups (Fig. 9).

Comparison of the obtained fitness profiles in different age groups clearly highlights the advantage of 13 year old girls' performances over the rest of girls included in the study. The observed fitness profile of girls aged 14 years old is characterized by the lowest level in the majority of the analysed motor trials. To a large extent, this is due to the reluctance of students to actively participate in physical education classes. It should also be noted that the vast majority of the results is below the standard (50 points).

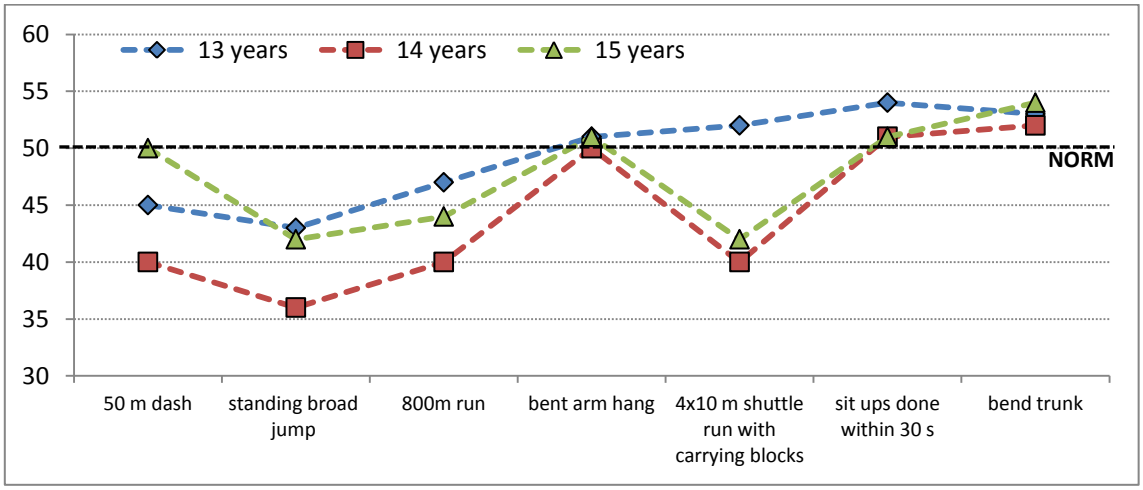


**Figure 9.** Fitness profiles of the tested groups (according to Pilicz et al. 2005)

For the purpose of overall comparison, besides the indicated profiles, the sum of points obtained in all trials was also calculated (Fig. 10). The highest amount of points is characteristic for the girls at the age of 13 years. The next result is the result of 334 points for the girls at the age of 15 years. In contrast, the worst summary result is characteristic for the girls at the age of 14 years. All of the analysed groups of girls are below the standard of 350 points.

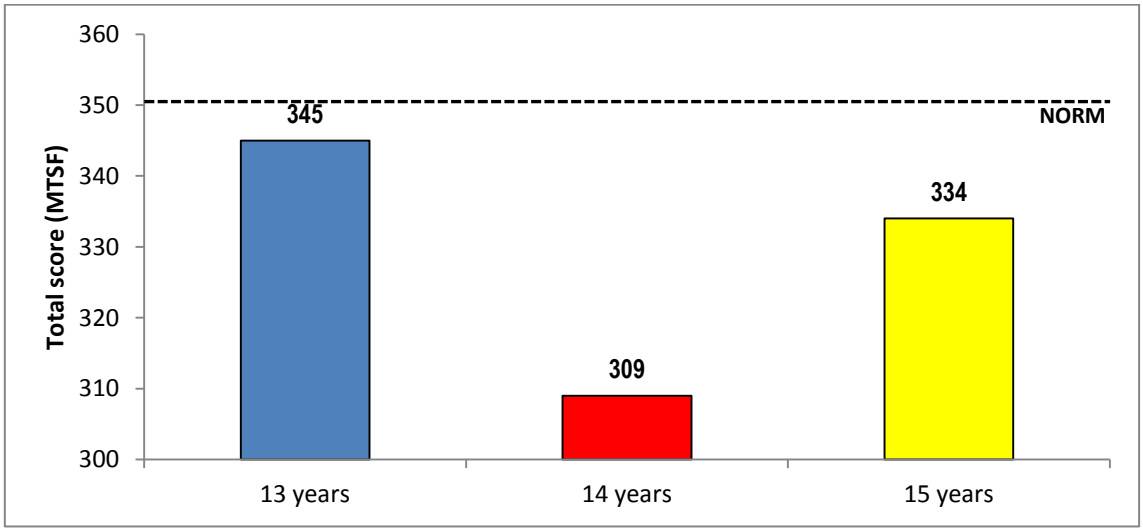


**Figure 10.** Summary results MTSF

In addition, the analysis determined the relationship between body composition of the tested group and the results of individual trials. For this purpose, the Pearson correlation matrix was determined. Statistically significant dependencies for girls at the age of 13 has been shown between BMI and performance on the 800 m run ($r_{xy}$ = 0.52; moderate strength, with an increase in BMI increases the time it takes to overcome the distance) and the bent arm hang ($r_{xy}$ = -0.69, high strength of connection). A similar situation was noted between the above mentioned trials and body weight of girls. At age of 14, none of the analysed trials is not statistically significantly associated with the structure of the body of examined girls. This may be mainly due to a very similar physique of the analysed girls. The only significant correlation at the age of 15 years is the relationship between body weight and the result of the 800 meters run ($r_{xy}$ = 0.52; moderate strength of correlation, with an increase in BMI, increases the time it takes to overcome the distance).

**Table 3.** Correlations at the age of 13

| **Age = 13 years** | **50 m dash [s]** | **standing broad jump [cm]** | **800 m run [s]** | **Bent arm hang [s]** | **4x10 m shuttle run with carrying blocks [cm]** | **sit ups done within 30 s [n]** | **bend trunk [cm]** |
|---|---|---|---|---|---|---|---|
| BMI | 0,2398 | -0,2554 | **0,5230** | **-0,6931** | 0,0609 | -0,1624 | 0,0396 |
| | p=0,270 | p=0,240 | **p=0,010** | **p=0,000** | p=0,782 | p=0,459 | p=0,858 |
| Body mass [kg] | 0,0847 | -0,1246 | **0,4332** | **-0,5631** | -0,0160 | -0,0418 | 0,1484 |
| | p=0,701 | p=0,571 | **p=0,039** | **p=0,005** | p=0,942 | p=0,850 | p=0,499 |
| Body height [cm] | -0,2520 | 0,2216 | 0,0997 | -0,0546 | -0,1687 | 0,2513 | 0,3035 |
| | p=0,246 | p=0,309 | p=0,651 | p=0,805 | p=0,442 | p=0,247 | p=0,159 |

**Table 4.** Correlations at the age of 14

| **Age=14 years** | **50 m dash [s]** | **standing broad jump [cm]** | **800m run [s]** | **Bent arm hang [s]** | **4x10 m shuttle run with carrying blocks [cm]** | **sit ups done within 30 s [n]** | **bend trunk [cm]** |
|---|---|---|---|---|---|---|---|
| BMI | 0,1446 | -0,0002 | 0,2077 | -0,1141 | 0,2309 | 0,0397 | 0,0870 |
| | p=0,438 | p=0,999 | p=0,262 | p=0,541 | p=0,211 | p=0,832 | p=0,642 |
| Body mass [kg] | 0,0735 | 0,1317 | 0,1665 | -0,0288 | 0,1137 | 0,1801 | 0,1552 |
| | p=0,694 | p=0,480 | p=0,371 | p=0,878 | p=0,543 | p=0,332 | p=0,405 |
| Body height [cm] | -0,1097 | 0,2658 | 0,0089 | 0,1135 | -0,1249 | 0,3259 | 0,1879 |
| | p=0,557 | p=0,148 | p=0,962 | p=0,543 | p=0,503 | p=0,074 | p=0,311 |

**Table 5.** Correlations at the age of 15

| **Age=15 years** | **50 m dash [s]** | **standing broad jump [cm]** | **800m run [s]** | **Bent arm hang [s]** | **4x10 m shuttle run with carrying blocks [cm]** | **sit ups done within 30 s [n]** | **bend trunk [cm]** |
|---|---|---|---|---|---|---|---|
| BMI | 0,1569 | 0,1241 | 0,2681 | -0,0720 | 0,2770 | 0,0028 | 0,2413 |
| | p=0,416 | p=0,521 | p=0,160 | p=0,710 | p=0,146 | p=0,989 | p=0,207 |
| Body mass [kg] | 0,2011 | 0,0644 | **0,4173** | -0,0868 | 0,3094 | -0,0914 | 0,1332 |
| | p=0,296 | p=0,740 | **p=0,024** | p=0,654 | p=0,102 | p=0,637 | p=0,491 |
| Body height [cm] | 0,1191 | -0,0517 | 0,2681 | -0,0209 | 0,0640 | -0,1289 | -0,1479 |
| | p=0,538 | p=0,790 | p=0,160 | p=0,914 | p=0,741 | p=0,505 | p=0,444 |

## SUMMARY AND CONCLUSIONS

Subjective treatment of a student in the physical education process is related to, among others, providing him/her with objective, reliable and comprehensive knowledge of his/her current state of physical fitness and physical development. Conscious taking up of physical activity among young people may be conditioned by the results of control of motor tests. Monitoring and evaluation of physical fitness is also an important link in the pedagogical control of psychophysical development of the young generation in the period of school education.

The presented results of physical fitness and physical development of girls aged 13-15 who are gymnasium students, however, do not inspire too much optimism. To a large extent and scope they confirm the previously observed trend of gradual reduction and regressive trend in the level of motoric skills in our youth [3, 5, 7, 9]. In order to guarantee a better-healthier-level of physical fitness, physical education programs should promote physical activity among young people, primarily focusing on exercises that improve general physical condition. This task is particularly important with regard to girls during adolescence and puberty.

## CONCLUSIONS

1. Based on the analysis of fitness profiles it can be concluded that the thirteen years old girls gained fitness advantage over a group of fourteen and fifteen years old girls.
2. According to the same analysis, 14 years old girls obtained the lowest level of fitness in the majority of the analysed motor trials.
3. The vast majority of the results of fitness trials of the studied groups of girls is below the standard of 50 points [6].
4. MTSF summary results for all trials situate the analysed groups of girls also below the points standard.
5. Analysis of the correlation between the body structure and results of individual trials - the vast majority has not confirmed statistically significant dependencies. Such dependence occurred in the group of 13-year old girls between BMI and 800 m run

and bent arm hang. A similar relationship was found between body weight of girls and the aforementioned trials.

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