SOME PHYSICAL FITNESS CHARACTERISTICS OF CHILDREN AND ADOLESCENTS AGED 8 TO 14 YEARS

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ABSTRACT
The issue of physical activity among adolescents is a significant social concern. Numerous studies have demonstrated that the quality and quantity of physical activity among this age group have declined in recent years, which is directly related to various components of physical fitness. This study aimed to determine the levels of specific physical fitness components in Bulgarian children and adolescents in a private school. The study was conducted during May and June of the 2024–2025 school year. A total of 228 students from the private primary school "Dr. Petar Beron" in Sofia, Bulgaria, participated in the assessment. The sample included 29 students from 2nd grade, 44 from 3rd grade, 49 from 4th grade, 33 from 5th grade, 34 from 6th grade, and 38 from 7th grade. The measurement was conducted using the official Bulgarian test battery for assessing physical fitness. The data revealed a positive trend in performance across the grades for both boys and girls in two of the five tests—the 30-meter sprint and the Standing long jump. Among girls, a consistent improvement was observed in the 200-meter run and the T-test from 2nd to 5th grade, followed by a plateau in performance. In contrast, boys showed greater fluctuations in these tests. In 4th and 5th grades, girls outperformed boys in all the tests included in the battery. The performance gap between girls and boys was most pronounced in 4th grade. However, in 6th and primarily 7th grade, boys began to outperform girls, which may be attributed to the plateau in girls' performance. Both boys and girls demonstrated a general improvement in physical fitness test results. However, variability was seen in tests related to agility and endurance. Girls performed better than boys in 4th and 5th grade.

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INTRODUCTION

The issue of physical activity among children and adolescents is an important social phenomenon. According to the World Health Organization (WHO, 2020), children and adolescents should engage in at least 60 minutes of moderate to vigorous physical activity each day. However, their research indicates that 80% of adolescents do not meet these physical activity recommendations.

According to a national study, one in three first-grade students in Bulgaria is classified as obese (bTV News, 2024). The data from the study showed a concerning trend: by 2050, 50% of adults are projected to be obese.

After a systematic analysis, Warburton & Bredin (2017) identified several health benefits of physical activity, including:

– A negative correlation between physical activity and adiposity;
– A strong association between moderate to vigorous physical activity and lower cardiometabolic disease score;
– A strong relationship between physical activity and physical fitness;
– A positive correlation between physical activity and bone health;
– A relationship between total physical activity and motor skill;
– A negative correlation between physical activity and depression;

An interesting finding by Warburton & Bredin is that even short bouts of physical activity—as little as 5 minutes—are positively associated with improvements in certain cardiometabolic factors.

According to the Physical Activity Guidelines Advisory Committee Report (2008), the recommended minimum duration of physical activity was initially set at 10 minutes per session. However, the updated 2018 report concluded that any duration of moderate to vigorous physical activity can contribute to health benefits (Physical Activity Guidelines Advisory Committee, 2018). The report also highlighted a connection between daily step count and a reduced risk of cardiovascular disease and type 2 diabetes.

Recent research by Russo et al. (2024) has found a strong link between motor competence and overall health.

Interestingly, some private schools in Bulgaria offer more physical education lessons than the national standard. This raises the possibility that students attending these schools may demonstrate better physical fitness levels.

To our knowledge, there is a lack of research in Bulgaria specifically examining the physical fitness of students in private schools. Therefore, this study aimed to assess selected physical fitness components among Bulgarian children and adolescents enrolled in a private school.

Aim and Objectives

This study aimed to determine the level of specific physical fitness components among Bulgarian children and adolescents. The objective of this study was to evaluate and compare the physical fitness results of Bulgarian students with those from a limited sample of other countries.

METHODS

The investigation was conducted between May and June of the 2024–2025 school year. This cross-sectional study included 228 students from the private primary school "Dr. Petar Beron" in Sofia, Bulgaria. Of these, 29 were in 2nd grade, 44 in 3rd grade, 49 in 4th grade, 33 in 5th grade, 34 in 6th grade, and 38 in 7th grade.

The distribution of students by age and sex is shown in the following table.

Table 1. *Distribution by age and sex*

Age	Grade	Total	Boys	Girls
9	2	29	15	13
10	3	44	20	25
11	4	49	23	26
12	5	33	16	18
13	6	34	17	17
14	7	38	19	19

The assessment of physical fitness was conducted according to the official test battery provided by the Bulgarian Ministry of Education and Science (Ministry of Education and Science, 2019). The test battery included the following assessments: 30 m sprint for speed, standing long jump for explosive strength, a 3 kg ball throw for upper body power, 200 m shuttle run for cardiorespiratory endurance, and T-test for agility (Table 2).

- ***30 m sprint*** – to assess running speed; one attempt was recorded.
- ***Standing long jump*** – to measure explosive lower-limb power; the best distance out of two jumps was taken.
- ***3 kg medicine ball throw*** – to measure upper body strength; the best distance of two throws was used. For the medicine ball throw test, the weight of the dense ball was adjusted according to the age of the participants: students up to 10 years of age used a 1 kg ball, while students aged 11 years and older used a 3 kg ball, in line with the national physical fitness assessment system (Ministry of Education and Science, 2019)
- ***200 m shuttle run*** – to assess cardiorespiratory endurance; performance time was recorded.
- ***T-test*** – to assess agility; performance time from one attempt was recorded.

Table 2. *Physical fitness monitoring battery*

Test	Measurement
30-meter run	0.01 s
Standing long jump	0.01 m
Throwing a dense ball	0.01 m
200-meter run (4x50)	0.01 s
T-test	0.01 s

Although the physical fitness tests are compulsory within the national school curriculum, participation in the research study was voluntary. Prior to data collection, written informed consent was obtained from the parents or legal guardians of all participants, in accordance with the principles outlined in the Declaration of Helsinki.

SPSS Statistics 26.0 and Python were used for data processing. From them, descriptive statistics were used.

RESULTS

The following table presents data from the motor tests depicted in the figure.

Table 3. *Mean data and standard deviation (SD) from the tests*

Grade	Gender	Sprint (s)	Standing Long Jump	Throw Dense Ball (m)	200m Shuttle Run (s)	*T*-test (s)
2	Boys	6.78 ± 0.80	1.30 ± 0.28	4.03 ± 0.84	55.67 ± 5.26	19.82 ± 3.98
	Girls	7.42 ± 0.59	1.17 ± 0.20	3.37 ± 0.58	62.69 ± 9.64	20.09 ± 2.72
3	Boys	6.83 ± 0.77	1.43 ± 0.17	4.08 ± 1.10	52.00 ± 7.94	16.81 ± 1.61
	Girls	7.01 ± 0.61	1.37 ± 0.18	3.94 ± 0.89	55.90 ± 6.11	17.61 ± 1.85
4	Boys	6.87 ± 0.76	1.40 ± 0.23	4.60 ± 1.44	55.85 ± 8.04	17.95 ± 2.42
	Girls	6.40 ± 0.55	1.50 ± 0.16	5.54 ± 0.92	53.03 ± 3.83	16.40 ± 1.29
5	Boys	6.25 ± 0.64	1.61 ± 0.22	4.09 ± 1.16	48.19 ± 7.31	15.64 ± 1.96
	Girls	5.93 ± 0.57	1.64 ± 0.16	4.10 ± 1.02	47.68 ± 4.54	15.45 ± 1.55
6	Boys	5.84 ± 0.92	1.70 ± 0.21	4.19 ± 1.09	50.72 ± 9.18	14.98 ± 0.98
	Girls	5.85 ± 0.38	1.67 ± 0.15	4.15 ± 0.67	50.27 ± 5.61	15.42 ± 0.98
7	Boys	5.91 ± 0.87	1.73 ± 0.27	5.73 ± 0.91	46.07 ± 9.52	15.38 ± 1.61
	Girls	6.07 ± 0.49	1.68 ± 0.22	4.44 ± 0.89	48.13 ± 3.48	15.53 ± 1.58

As can be seen, both boys and girls show gradual improvement in most indicators with age. The tendency in the 30-meter run test is illustrated in Figure 1.

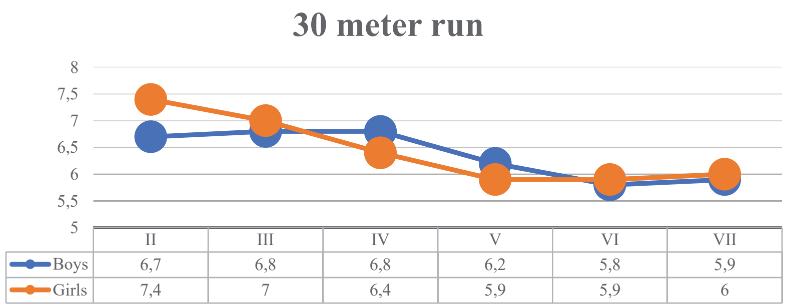


Figure 1. *Data from the 30-meter run test*

Boys tend to achieve better results than girls in the 2nd and 3rd grades. However, in 4th and 5th grade, girls achieved better results than boys. We believe this is related to earlier peak height velocity (PHV) in girls, which is strongly associated with the onset of puberty. In 6th and 7th grade, the performance dynamics are approximately the same for both boys and girls.

The following graph shows results from the standing long jump test.

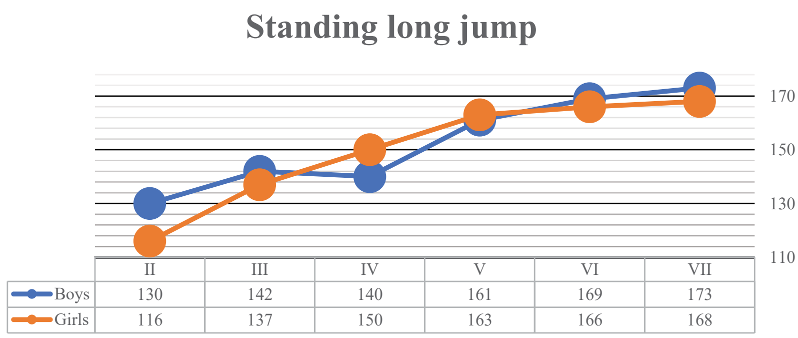
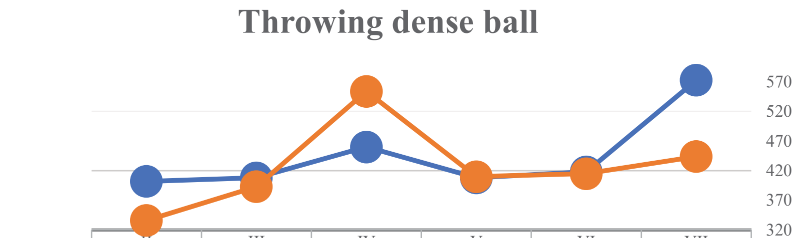


Figure 2. *Data from the standing long jump test*

A similar trend is observed in the standing long jump test. Once again, boys perform better in 2nd and 3rd grades. Girls outperform boys in 4th and 5th grades, which we again attribute to differences in the timing of peak height velocity (PHV) between boys and girls. In 6th and 7th grades, the performance dynamics are approximately the same for both sexes.

The performance trend for the Throwing dense ball is shown in Figure 3.

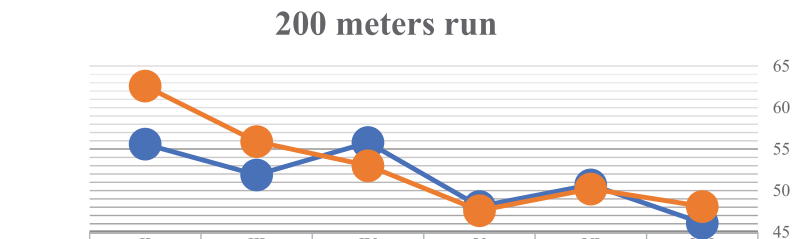


	II	III	IV	V	VI	VII
Boys	402	408	460	408	418	573
Girls	336	393	554	410	415	444

Figure 3. *Data from the Throwing dense ball test*

Boys outperform girls in 2nd and 3rd grades. However, in 4th grade, girls achieve significantly better results than boys—again, we believe this is related to the timing of peak height velocity (PHV). In 5th and 6th grades, the performance levels between boys and girls are approximately equal, while in 7th grade, boys significantly outperform girls. It is important to note that the weight of the ball differs by grade: In 2nd, 3rd, and 4th grades, students throw a 1 kg ball, in 5th, 6th, and 7th grades, they throw a 3 kg ball.

The trend in the 200-meter run test is presented in Figure 4.

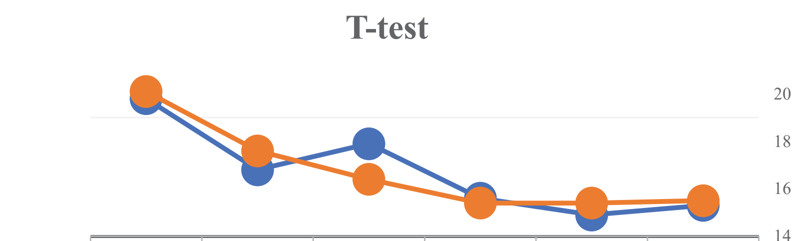


	II	III	IV	V	VI	VII
Boys	55,6	51,9	55,8	48,1	50,7	46,1
Girls	62,6	55,9	53	47,6	50,2	48,1

Figure 4. *Data from a 200-meter run test.*

Boys achieve better results than girls in the 2nd and 3rd grades. In 4th and 5th grades, girls perform better, while in 6th and 7th grades, the results become approximately equal.

The tendency in the T-test results is shown in Figure 5.



	II	III	IV	V	VI	VII
Boys	19,8	16,8	17,9	15,6	14,9	15,3
Girls	20,1	17,6	16,4	15,4	15,4	15,5

Figure 5. *Data from the T-test.*

The same pattern is observed: Boys outperform girls in the early grades, and girls outperform boys in 4th and 5th grades. In the later grades, performance results converge.

DISCUSSION

The objective of this research was to investigate specific physical fitness components in children and adolescents. To achieve this, the Test Battery for Physical Fitness Monitoring was used. The data show a slight improvement in performance across all tests. The mean results from the 30-meter run test are presented and compared with the mean data reported by Veligekas et al. (2012) and Imamoglu & Sener (2019).

Table 4. *Mean results shown by Bulgarian, Greek, and Turkish students.*

Test/years	Bulgarian students		Greece		Turkey	
30 meters run – 8	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**
30m – 9	7.4	6.7				
30m – 10	7	6.8	5.9	5.8		
30m – 11	6.4	6.8	5.7	5.7	5.8	6
30m – 12	5.9	6.2	5.7	5.4	5.7	6
30m – 13	5.9	5.8				
30m - 14	6	5.9				

The table indicates that students from Greece and Turkey achieved better results than their Bulgarian counterparts in this test. In 2nd grade, the differences are 1.1 seconds for girls and 1 second for boys, which we consider a significant gap. The same trend continues in the 3rd and 4th grades.

These results highlight the need for improvement in the teaching methods employed by physical education teachers, particularly in developing this motor quality.

The following table presents results from a national assessment involving 12,000 students in North Macedonia (Gontarev et al., 2014), as well as data from Veligekas et al. (2012) on the "standing long jump" test.

Table 5. *Data from Bulgarian, North Macedonian, and Greek students.*

Test/years	Bulgarian students		North Macedonian students		Greece	
Standing long jump – 8	Girls	Boys	Girls	Boys	Girls	Boys
SLJ – 9	116	130	115.1	129.6		
SLJ – 10	137	142	121.2	136.8	132	141
SLJ – 11	150	140	128.4	148.3	142	139
SLJ – 12	163	161	136.3	157.7	137	153
SLJ – 13	166	169	136.1	168.7		
SLJ - 14	168	173	135.8	180.5		

The table shows that Bulgarian students performed better in almost every grade compared to students from North Macedonia and Greece.

The results in 2nd grade are approximately the same, but in the following grades, Bulgarian students—especially girls—achieve better outcomes. We believe this trend is due to the methodology used in the examined school and the daily Physical Education lessons provided.

Although the throwing dense ball, 200-meter run, and T-test are widely used in physical education and motor performance assessments, the availability of normative data for school-aged children between 9 and 14 years remains very limited. In our study, we relied on the few existing sources that provide average results for specific age groups, most of which are drawn from international studies or samples involving partially trained or physically active children. However, to the best of our knowledge, no comprehensive study currently offers average performance data across the entire 9–14 age range in a general school context, especially in private school settings. This reveals a clear gap in the literature and underscores the need for more representative data collection in this age group to enable accurate comparisons and informed educational decisions.

The following table compares data from our investigation with private school students (standing long jump) to data from non-private school students in Bulgaria (Borisov et al., 2019; Angelov & Kachaunov, 2019).

Table 6. *Mean results from the standing long jump test: comparison between private and non-private school students.*

Test/years	Private school		Non-private school	
SLJ	Girls	Boys	Girls	Boys
SLJ – 9	116	130	127.6	136.7
SLJ – 10	137	142	137.1	145.9
SLJ – 11	150	140	145.8	151.8
SLJ – 12	163	161	149.6	160.1
SLJ – 13	166	169	153.7	173.2
SLJ - 14	168	173	155.6	187.1

The table shows that girls from the private school have better results, while the opposite trend is observed for the boys.

Table 7 presents data from the 30-meter run test, based on the study by Angelov & Kachaunov (2019).

Table 7. *Mean results from the 30-meter run test: comparison between private and non-private school students.*

Test/years	Private school		Non-private school	
30m run	Girls	Boys	Girls	Boys
9	7.4	6.7	7	6.4
10	7	6.8	6.2	5.7
11	6.4	6.8	6.3	6.2
12	5.9	6.2	6.2	5.8
13	5.9	5.8	6.2	5.8
14	6	5.9	5.4	5.2

The data shows a similar trend. In this test, not only do boys from the non-private school perform better, but girls also achieve higher results in almost every grade.

In Table 8, the opposite tendency is observed. In the endurance test, private school students—both girls and boys—achieved better results.

Table 8. *Mean results from the 200-meter run test: comparison between private and non-private school students.*

Test/years	Private school		Non-private school	
200m run	Girls	Boys	Girls	Boys
9	62.6	55.6	61.1	59.7
10	55.9	51.9	61.3	57.2
11	53	55.8	54	56.1
12	47.6	48	57.3	54.7
13	50.2	50.7	54	50.6
14	48.1	46.1	47.5	44.6

The comparative data show that although private school students receive five hours of organized physical education lessons per week, their results are not consistently better than those of students in non-private schools.
Further investigations are needed to identify the reasons behind this trend.

CONCLUSION

The results reveal a consistent pattern in performance dynamics between boys and girls across all grades. In every test, boys outperform girls in 2nd and 3rd grade. However, in 4th grade, this trend reverses, and by 6th and 7th grade, the results between the sexes are approximately equal.
This study contributes to addressing the lack of normative data for several standard motor tests among 9–14-year-old schoolchildren, particularly the T-test, 200-meter run, and throwing a dense ball.
Future research should focus on developing reference datasets for a broader range of motor tests across different educational settings within this age group.
There appears to be no significant difference in physical fitness indicators between students from private and non-private schools, despite the fact that private school students receive five physical education lessons per week.

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