



Albania Final Report

EUFITMOS fitness testing 2022-2023

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EUROPEAN FITNESS MONITORING SYSTEM



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Introduction

The EUFITMOS project addresses the following topic: “Encourage participation in sport and physical activity especially by supporting Council Recommendation on HEPA and EU Physical Activity Guidelines”. Following the European recommendations for monitoring fitness, especially in youth, and given the resources that are already available and are underused in this population, the aim of the EUFITMOS project is to create a European network for monitoring fitness in youth in order to use fitness as an indicator of HEPA for individuals, the MS, the scientific community and the public health and education sectors.

The EUFITMOS project will bridge the gaps between knowledge, guidelines, concepts for monitoring and assessment, among countries and among different sets of indicators on fitness.

Albanian Sports Science Association (ASSA) is part as an external partner of the European Fitness Monitoring System (EUFITMOS) having permission to utilize the project resources.

<https://eufitmos.eu/>

EUFITMOS FITNESS TESTING PROTOCOL

The monitoring of physical fitness of adolescents is important because it reflects the impact of genetic and environmental factors on health indicators. Based on the physical fitness level of children, pedagogical, and public health strategies and policies can be developed. In this sense, it is necessary to have a battery of validated fitness tests, capable of assessing physical fitness to obtain data that allow us to determine the level of health and at the same time establish comparisons between.

We intend to apply and disseminate the test battery all over Europe. We further want to encourage researchers to assess the level of physical fitness in adolescents by using this manual because the derived findings will inform the development of pedagogical public health strategies and European physical fitness recommendations.

<https://eufitmos.eu/fitness-testing-protocol/>

Methods

Participation

Albanian children (N) participated in the project are stated below at table 1

Table 1 Albanian children participation into the study by school level and grade

School Level	N	Grade	N	Boys	Girls
Elementary	798	1	139	71	68
		2	169	90	79
		3	170	84	86
		4	168	90	78
		5	152	74	78
Secondary	843	6	211	103	108
		7	229	122	107
		8	198	97	101
		9	205	106	99
High School	296	10	128	63	65
		11	92	40	52
		12	76	36	40

The battery of tests presented are the following:

- Body Height and Weight
- BMI
The body mass index (BMI) is an established assessment of body composition.
- Waist circumference
Waist circumference (WC) aims to estimate abdominal adiposity.
- Arm Span and Reach





- Back-saver sit and reach
The back-saver sit and reach test aims to evaluate the flexibility of the lower back and the hamstrings.
- Handgrip
The handgrip test aims to measure maximum isometric strength.



- Push-up test
The push-up test aims to assess upper-body strength and resistance.
- Standing broad jump,
The standing broad jump, or standing long jump, aims to assess lower-body muscular power and explosive strength.



- 20m run
The 20m sprint run aims to assess acceleration and speed.
- Pacer Test
Purpose PACER The Progressive Aerobic Cardiovascular Endurance Run (PACER), or multistage 20m shuttle run, is an established endurance test that aims to measure cardiorespiratory fitness. 1-mile run

Reference- <https://eufitmos.eu/fitness-testing-protocol/>



Results

Mean values for the measurement and assessment done by grade level

The table below describe the mean and standard deviation of body height of pupils from first grade to 12 grade. The mean of body height for pupils of first grade is 1.24 m (0.06 SD) whereas, the mean of body height for pupils of second grade is 1.28 m (0.06 SD). The difference of body height means between 11 grade and 12 grade is 0.01 m. Pupils of 9 grade and 10 grade and 11 grade have the same body height mean 1.67 m. The progress of body height mean from first grade to seven grade is 6 cm.

Facts:

1. The mean of body height from 9 grade to 11 grade is the same
2. The progress of body height mean from first grade to seven grade is 6 cm.
3. Pupils of 12 grade have the highest body height mean with the difference of 1 cm from 11 grade.

Table 2 Descriptive Statistics for Body Height (m) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	1.24	1.28	1.34	1.40	1.46	1.52	1.58	1.63	1.67	1.67	1.67	1.68
Std. Deviation	0.06	0.06	0.08	0.07	0.07	0.08	0.09	0.09	0.09	0.08	0.08	0.07

Table nr 3 indicates the mean and the standard deviation of body weight for pupils from first grade to 12 grade. Pupils of the first grade has the mean of body weight 26.5 kg (5.6 SD) while the mean of body weight for 12 grade is 62 kg (11 SD). From 10 grade to 11 grade there is a decrease of 2 kg from 63.3 kg to 61.2 kg. The mean of body weight for seven grade pupils is 50.4 kg (12.5 SD). 46 kg (11.6 SD) is the mean weight of pupils in six grade level. For pupils of third grade level the mean of body-weight is 32.7 kg (8.6 SD).

Facts:

1. From 10 grade to 11 grade there is a decrease of 2 kg from 63.3 kg to 61.2 kg.
2. Pupils of 10 grade present the heaviest weight 63.3 kg (12.8 SD).
3. Pupils of first grade have the lighter weight around 26.5 kg (5.6 SD)

Table 2 Descriptive Statistics for Body Weight (kg) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	26.5	28.8	32.7	38.9	41.8	46.0	50.4	53.8	60.8	63.3	61.2	62.0
Std. Deviation	5.6	6.9	8.6	20.0	9.9	11.6	12.5	12.9	12.9	12.8	12.0	11.0

Table nr 4 show the mean and the standard deviation of BMI for children from first to twelfth grade. The mean of BMI for children of second grade is 17.5 (3.3 SD). Starting with the mean BMI of 17.1 (2.6SD) in the first grade, there is a gradual increase of BMI as pupils advance in grade, reaching 21.9 by the twelfth grade. The first and the second grades have the almost the same mean with the difference about 0.4 kg.



Facts:

1. BMI progressively increases from grade one through twelve, with a significant variability peak in grade four.
2. Grade 9 through twelve pupils maintain higher BMI mean above 21, reflecting changes in body composition during late adolescence.
3. The BMI values stabilize after a peak at grade ten, showing minor fluctuations in final school years

Table 3 Descriptive Statistics for BMI by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	17.1	17.5	18.0	19.6	19.3	19.8	20.1	20.1	21.9	22.5	22.0	21.9
Std. Deviation	2.6	3.3	3.6	10.0	3.8	4.1	4.0	3.8	4.4	3.7	3.9	3.2

Table nr 5 provides the mean and the standard deviation of waist circumference for pupils from first to twelfth grade. The data begins with the mean of waist circumference of 58.6 cm for the first graders, and standard deviation of (7.8 SD), indicating moderate variability in measurements. This mean steadily increases through the grades, culminating in a waist circumference of 74.4 cm in twelfth grade, with (8.8 SD).

Facts:

1. There is a consistent increase in mean of waist circumference as children progress through school, reflecting growth and changes in body composition.
2. The increase from grade to grade remains relatively steady, except for a notable increase between the eighth and ninth grades, where the mean jumps from 71.8 cm to 75.5 cm.

Table 4 Descriptive Statistics for Waist Circumference (cm) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	58.6	59.9	64.9	66.6	68.5	69.3	71.0	71.8	75.5	74.3	72.7	74.4
Std. Deviation	7.8	9.2	11.3	9.7	10.3	10.6	10.4	10.0	11.5	10.6	10.2	8.8

Table nr 6 shows the mean of arm span measurements and standard deviation for pupils from first to twelfth grade. It starts with the mean of arm span 121.2 cm (6.9 SD) for first graders, with a standard deviation of 6.9 (SD), indicating relatively low variability in measurements at this young age. The arm span increases progressively across the grades, reaching 170.3 cm by twelfth grade.

Facts:

1. Children show a gradual and consistent increase in arm span as they age
2. The changes from elementary to secondary school marks noticeable increases in arm span, particularly evident between sixth (157.8 cm) and seventh grade



Table 5 Descriptive Statistics for Arm Spam (cm) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	121.2	126.8	133.0	139.7	145.3	151.8	157.8	163.2	168.0	169.3	168.1	170.3
Std. Deviation	6.9	10.0	8.1	7.6	8.7	9.0	13.0	10.0	10.1	10.3	11.4	10.7

Table nr 7 show the mean and standard deviation of the arm reach across grades one through twelve. The data starts with a first-grade mean of arm reach of 155.1 cm, with the standard deviation of (8.4 SD). As pupils progress through the grades, arm reach significantly increases, culminating at 217.6 cm in twelfth grade, with standard deviation of (15.1 SD).

Facts:

1. There is a noticeable and consistent increase in the arm reach from early childhood through late adolescence, reflecting natural growth and developmental trends.
2. The most significant jump in mean of arm reach occurs between the sixth (193.5 cm) and seventh grade (208.4 cm), indicating a critical a critical growth spurt during these school years.

Table 6 Descriptive Statistics for Arm Reach (cm) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	155.1	161.4	171.9	178.4	186.6	193.5	208.4	207.2	214.5	214.6	239.4	217.6
Std. Deviation	8.4	8.0	25.0	9.8	10.5	13.4	121.1	16.6	13.6	14.1	232.4	15.1

Table below indicates the means and standard deviation of arm span and body height for pupils in elementary school grades one through five. The mean of arm span begins at 121.2 cm for first graders and grows to 145.3 cm by fifth grade, with corresponding body heights starting at 124 cm and growing to 146 cm over the same period.

Facts:

1. Both arm span and body height show a consistent increase from first to fifth grade, reflecting typical physical development in elementary-aged children.
2. The increment in arm span and body height from grade to grade remains relatively stable, illustrating a steady growth pattern during these foundational years.

Table 7 Descriptive Statistics for Arm Spam and Body Height (cm) in Elementary School by grade level

Grade	1		2		3		4		5	
	Arm Spam	B Height	Arm Spam	B Height	Arm Spam	B Height	Arm Spam	B Height	Arm Spam	B Height
Mean	121.2	124.0	126.8	127.8	133.0	134.2	139.7	140.3	145.3	146.0
Std. Deviation	6.9	0.1	10.0	0.1	8.1	0.1	7.6	0.1	8.7	0.1

Table nr 9 presents the mean and the standard deviation for both arm span and body height among pupils in secondary school from grades six through nine. The data begins with a mean arm span of 151.8 cm and a corresponding body height of 151.8 cm in sixth grade, indicating a direct correlation between



these two measurements at this stage. By ninth grade, the arm span grows to 168.0 cm and the body height reaches 166.5 cm. The standard deviations are low, around 0.1 for body height across all grades, showing consistent growth with minimal variability.

Facts:

1. Both arm span and body height show a continuous increase from sixth to ninth grade, highlighting a period of significant physical development during early adolescence.
2. The growth increments between consecutive grades are steady, suggesting a uniform

Table 8 Descriptive Statistics for Arm Spam and Body Height (cm) in Secondary School by grade level

Grade	6		7		8		9	
	Arm Spam	B Height	Arm Spam	B Height	Arm Spam	B Height	Arm Spam	B Height
Mean	151.8	151.8	157.8	157.9	163.2	163.0	168.0	166.5
Std. Deviation	9.0	0.1	13.0	0.1	10.0	0.1	10.1	0.1

Table 10 show the mean of arm span and body height among high school students in grades ten through twelve. The data shows that arm span begins at 169.3 cm in tenth grade and slightly increases to 170.3 cm by twelfth grade. Corresponding body height start at 167.3 cm in tenth grade and also increase modestly to 168.0 cm by twelfth grade.

Facts

1. Both arm span and body height increase slightly from tenth to twelfth grade.
2. The increment in growth is modest between grades, reflecting a deceleration of physical development as pupils approach adulthood.

Table 9 Descriptive Statistics for Arm Spam and Body Height (cm) in High School by grade level

Grade	10		11		12	
	Arm Spam	B Height	Arm Spam	B Height	Arm Spam	B Height
Mean	169.3	167.3	168.1	166.8	170.3	168.0
Std. Deviation	10.3	0.1	11.4	0.1	10.7	0.1

Table nr 11 show a comparative analysis between body height and arm span across grades one through twelve. It focuses on the differences between these two measurements to highlight the relative growth of limbs compared to overall height. The data starts with a small difference of 2.7 cm in first grade, where arm span slightly exceeds body height, and shows varying differences throughout the grades, reaching a notable difference of 2.3 cm in twelfth grade, where body height slightly exceeds arm span.

Facts:

1. The difference between arm span and body height fluctuates across different grades, indicating varied growth rates between limbs and overall body height.



2. By middle school, the difference reduces to nearly zero, suggesting a period where growth in arm span and boy height are closely aligned.
3. In high school, arm spans tend to be slightly less than body heights, reflecting a common physiological pattern where body height may exceed limb length in late adolescence.

Table 10 Descriptive Statistics for Difference- Body Height- Arm Spam (cm) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	2.7	0.9	1.2	0.6	0.8	0.0	0.1	-0.2	-1.3	-2.0	-1.2	-2.3
Std. Deviation	5.4	9.2	6.6	4.0	4.9	4.6	8.9	6.8	7.3	6.1	6.7	5.8

In table nr 12 are shown the mean and standard deviation of flexibility through sit and reach test, across grades one through twelve. Sit and reach test assesses the flexibility of the lower back and hamstring muscles. The starting mean and standard deviation of the data available is 24.8 cm (5.4 SD). The general trend of fluctuating means throughout the grades is the peak flexibility observed at 26.7 cm in ninth grade and ending at 26.5 cm in twelfth grade.

Facts:

1. The sit and reach test, shows fluctuations across grade levels, peaking in middle school and slightly decreasing toward the end of high school.
2. Ninth grade show the highest mean of flexibility, possibly correlating with a peak in physical development or increases physical activity during these years.

Table 11 Descriptive Statistics for Flexibility- Sit and Reach test (cm) by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	24.8	24.7	22.6	23.0	22.1	22.3	23.4	26.1	26.7	25.4	23.3	26.5
Std. Deviation	5.4	5.2	5.7	5.9	5.5	7.2	7.4	24.0	8.8	8.8	7.7	7.1

Table nr 13 below describes the mean and standard deviation of the handgrip strength test for elementary school students from grades one through five for the both hands (left/right). The starting data was the mean and standard deviation of the handgrip strength for the right hand 12.0 Newtons (N) and 8.3 N for the left hand in the first grade. The strength increases through the grades, the mean of the right hand in 18.3 N for the fifth grade whereas, the mean of the of the left hand is 17.4 N.

Facts:

1. During the elementary school years there is highlighting developmental growth in physical strength.
2. The variability in handgrip strength is substantial and show diverse levels of physical development among children of the same age.
3. The growth pattern in handgrip strength indicating balanced development in upper limb strength, thus the increases is gradual.



Table 12 Descriptive Statistics for Strength- Handgrip test (Right and Left Hand- N) in Elementary School by grade level

Grade	1		2		3		4		5	
Hand	R	L	R	L	R	L	R	L	R	L
Mean	12.0	8.3	10.4	10.0	12.9	12.2	15.9	14.8	18.3	17.4
Std. Deviation	42.3	3.1	3.3	3.5	3.3	3.0	11.1	3.4	4.8	4.3

Table 14 indicates the results of the handgrip strength test for secondary school students from grades six through nine, assessing strength in right and left hands. The data begins with the mean of handgrip strength of 21.3 Newtons (N) for the right hand and 20.2 N for the left hand in sixth grade, with these values increasing to 33.6 N for the right hand and 32.0 N for the left hand by ninth grade. The standard is high for the eighth grade (17.9 for the right hand), indicating a significant spread in strength levels among students at this stage.

Facts:

1. There is a significant increase in handgrip strength from sixth to ninth grade.
2. The highest value in handgrip strength occurs in eight grades, suggesting a diverse range of development stages among students within this age group.

Table 13 Descriptive Statistics for Strength- Handgrip test (Right and Left Hand- N) in Secondary School by grade level

Grade	6		7		8		9	
Hand	R	L	R	L	R	L	R	L
Mean	21.3	20.2	25.9	23.6	28.7	27.7	33.6	32.0
Std. Deviation	5.4	5.1	17.9	6.8	7.3	7.8	8.9	8.0

Table nr 15 describes the handgrip strength for both hands for high school pupils from grades ten through twelve. The data starts with the mean and standard deviation of handgrip strength of 34.3 N for the right hand and for the left hand the mean is 32.3 N in the tenth grade. The standard deviation for the right hand is 10.4 in tenth grade and for the left hand is 11.0 in twelfth grade.

Facts:

1. Handgrip strength indicates a modest increase from tenth to twelfth grade.
2. The variability in handgrip strength is maintained through these grades.
3. The growth in handgrip strength indicates a consistent development of bilateral strength during the late high school years.

Table 14 Descriptive Statistics for Strength- Handgrip test (Right and Left Hand- N) in High School by grade level

Grade	10		11		12	
Hand	R	L	R	L	R	L
Mean	34.3	32.3	34.4	32.0	34.9	33.3
Std. Deviation	10.4	9.6	10.3	9.5	12.2	11.0



Table nr 16 shows the result of the push-up test measuring upper limb strength for students from grades one through twelve. This test consists in counting the number of push-ups that a children can perform in 30 seconds. The data shows that the starting mean of first grade is 2.6 (3.9 SD) push-ups. The number of push-ups increases steadily with each grade level, reaching the peak of 11.1 push-ups in tenth grade.

Facts:

1. There is a consistent increase from one grade to another in number of push-ups performed by pupils.
2. The highest mean of push-ups is shown in tenth grade

Table 15 Descriptive Statistics for Strength of Upper Limbs- Push Ups 30 sec test by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	2.6	4.5	5.5	6.1	6.4	6.8	7.5	9.4	10.3	11.1	8.6	9.8
Std. Deviation	3.9	7.2	6.0	6.7	6.3	7.1	8.2	10.7	10.7	12.9	10.8	9.8

Table nr 17 show the mean and standard deviation of long jump test, which assess the explosive power of lower limbs of pupils from grades one through twelve. The data show an initial mean 94.4 cm (20.4 SD) for first grades. As pupils advance in grade, the means significantly increase, reaching a max of 152.0 cm in the tenth grade. The peak of standard deviation is 49.7 cm in tenth grade.

Facts:

1. The increase of means from grades to grades show significant development in explosive power, correlating with physical maturity and strength gains.
2. The peak performance of means is reached in tenth grade

Table 16 Descriptive Statistics for Explosive Power of Lower Limbs- Standing Long Jump test by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
Mean	94.4	107.2	111.6	117.9	121.9	131.7	135.3	147.1	147.7	152.0	148.8	144.8
Std. Deviation	20.4	20.5	22.0	24.1	22.4	24.7	31.2	30.4	33.5	49.7	36.1	37.9

Table nr 18 show the mean and standard deviation of 20 m sprint test, which measures the speed of pupils from grade one through twelve. The test assesses the quickness of pupils, cover a short distance, serving as an indicator of their basic athletic speed. The data begins with first grades mean a time of 5.1 sec with the standard deviation of 0.8 sec. As the grades progress the mean times decrease, indicating increased speed, with twelfth grades achieving a mean of 4.0 sec.

Facts:

1. There is a consistent improvement from the first to the twelfth grade in speed.
2. The starting mean of 20m sprint test is 5.1 sec (0.8)

Table 17 Descriptive Statistics for Speed- 20m Sprint test by grade level

Grade	1	2	3	4	5	6	7	8	9	10	11	12
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Mean	5.1	4.8	4.9	4.6	4.5	4.3	4.3	4.3	4.1	4.0	4.2	4.0
Std. Deviation	0.8	0.6	0.7	1.0	0.5	0.5	0.5	0.6	0.6	0.7	0.6	1.0

Table nr 19 show the mean and standard deviation of the multi-stage shuttle run test. This test measures the cardiorespiratory fitness through the number of laps completed by pupils from grade six to twelve. This test shows the aerobic capacity and endurance. The data shows that sixth grades have the mean and standard deviation of 17.4 laps (6.7 SD). With ages the performance improved reaching the peak at 24.6 laps in twelfth grade.

Facts:

1. The increasing number of laps completed in the shuttle run test show the improvement in cardiorespiratory fitness from sixth to twelfth grade.
2. The peak of the performance is in the twelfth grade with the mean 24.6 laps (17.2 SD).

Table 18 Descriptive Statistics for CardioRespiratory Fitness- Multi Stage Shuttle Run test (N- Laps) by grade level

Grade	6	7	8	9	10	11	12
Mean	17.4	16.3	19.5	21.6	17.8	18.4	24.6
Std. Deviation	6.7	8.0	10.8	12.8	9.0	10.0	17.2



Mean values comparison by gender for the measurement and assessment done by grade level

Table nr 20 shows the comparison of body height measurements between boys and girls from grade one through twelve. In first grade boys have a mean height of 1.25 meters (0.05 SD), slightly taller than girls (1.24 meters (0.06 SD)). This pattern of boys generally being taller continues through each grade level, with the difference in mean height between genders increasing slightly in secondary and high school. The data also includes a significance value (Sig) to highlight differences between the genders at each grade level.

Facts:

1. Boys compare to girls are consistently taller from first grade to twelfth grade.
2. The smallest mean difference occurs in first grade (0.01 m) and this difference increase in ninth grade.

Table 19 Gender comparison for Body Height (m) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	1.25	0.05	0.01	0.25
		Girl	1.24	0.06		
	2	Boy	1.27	0.06	-0.01	0.38
		Girl	1.28	0.07		
	3	Boy	1.35	0.09	0.02	0.18
		Girl	1.33	0.08		
	4	Boy	1.40	0.06	0.00	0.72
		Girl	1.40	0.08		
	5	Boy	1.45	0.07	-0.03	0.03
		Girl	1.47	0.09		
Secondary	6	Boy	1.51	0.09	-0.02	0.04
		Girl	1.53	0.07		
	7	Boy	1.59	0.10	0.01	0.22
		Girl	1.57	0.07		
	8	Boy	1.65	0.10	0.04	0.00
		Girl	1.61	0.06		
	9	Boy	1.71	0.07	0.10	0.00
		Girl	1.62	0.08		
High	10	Boy	1.73	0.07	0.10	0.00
		Girl	1.62	0.06		
	11	Boy	1.73	0.06	0.12	0.00
		Girl	1.62	0.06		
	12	Boy	1.73	0.05	0.10	0.00
		Girl	1.63	0.06		



Table number 12 shows the comparisons of body weight between boys and girls from grades one to twelve. The results indicates that boys generally weight more than girls. In the first grade the mean weight of boys is 27.6 kg compared to girls at 25.7 kg. This trend is presented in all grade levels.

Facts

1. Boys have a higher mean of body weight than girls in all grade levels
2. In tenth grade is observed the largest weight differences between genders
3. Statistical significance values are notable in the higher grades, particularly in tenth and eleventh grades.

Table 20 Gender comparison for Body Weight (kg) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	27.6	5.6	2.0	0.06
		Girl	25.7	5.7		
	2	Boy	29.1	7.4	0.7	0.50
		Girl	28.4	6.3		
	3	Boy	34.0	9.4	2.6	0.05
		Girl	31.4	7.7		
	4	Boy	37.0	8.8	-4.0	0.26
		Girl	41.0	29.7		
	5	Boy	41.0	9.9	-1.6	0.31
		Girl	42.6	10.0		
Secondary	6	Boy	45.6	12.7	-0.8	0.62
		Girl	46.4	10.5		
	7	Boy	50.2	12.6	-0.3	0.88
		Girl	50.5	12.5		
	8	Boy	56.5	15.1	5.3	0.00
		Girl	51.3	9.7		
	9	Boy	63.3	14.4	5.2	0.00
		Girl	58.1	10.4		
High	10	Boy	68.9	13.2	11.0	0.00
		Girl	57.8	9.7		
	11	Boy	66.2	12.7	9.0	0.00
		Girl	57.3	10.0		
	12	Boy	66.2	11.5	8.0	0.00
		Girl	58.2	9.0		



Table below describes the differences in body mass index (BMI) between boys and girls from grades one through twelve. The data indicate that BMI varies slightly between genders at different grade levels, with boys generally having a slightly higher BMI in the earlier grades.

Facts:

1. Boys have a higher BMI than girls in elementary school
2. As pupils progress into secondary and high school the BMI values become less pronounced between genders.

Table 21 Gender comparison for BMI by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	17.7	3.0	1.1	0.03
		Girl	16.6	2.1		
	2	Boy	17.8	3.8	0.7	0.20
		Girl	17.2	2.8		
	3	Boy	18.5	4.0	1.0	0.07
		Girl	17.5	3.2		
	4	Boy	18.7	3.4	-1.9	0.28
		Girl	20.6	15.2		
	5	Boy	19.1	4.1	-0.3	0.61
		Girl	19.5	3.4		
Secondary	6	Boy	19.9	4.5	0.2	0.68
		Girl	19.7	3.6		
	7	Boy	19.8	3.9	-0.5	0.38
		Girl	20.3	4.1		
	8	Boy	20.6	4.3	0.8	0.13
		Girl	19.7	3.1		
	9	Boy	21.6	4.5	-0.8	0.21
		Girl	22.3	4.3		
High	10	Boy	23.1	3.9	1.1	0.09
		Girl	22.0	3.4		
	11	Boy	22.0	3.8	0.0	0.96
		Girl	21.9	4.0		
	12	Boy	22.0	3.4	0.1	0.87
		Girl	21.9	3.1		

Table nr 23 shows differences of waist circumference between girls and boys from grade one through twelve. It is segmented by elementary, secondary and high school levels. The data illustrates that boys generally have a larger waist circumference compared to girls at most grade levels, with differences becoming more significant in secondary and high school

Facts:

1. Boys have a higher mean of waist circumference compare to girls throughout their schooling.
2. Particularly in seventh grade boys mean of waist circumference was 7.2 cm greater than girls.



- The pattern of increasing differences continues into high school, with the largest observed difference in tenth grade

Table 22 Gender comparison for Waist Circumference by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig	
Elementary	1	Boy	59.0	9.0	1.5	0.31	
		Girl	57.5	6.8			
	2	Boy	60.7	9.5	1.7	0.24	
		Girl	59.0	8.7			
	3	Boy	65.6	11.9	1.5	0.40	
		Girl	64.2	10.8			
	4	Boy	67.9	10.0	2.6	0.11	
		Girl	65.3	9.4			
	5	Boy	70.7	11.1	4.2	0.01	
		Girl	66.5	9.2			
Secondary	6	Boy	70.9	11.9	3.1	0.03	
		Girl	67.8	8.9			
	7	Boy	74.3	11.0	7.2	0.00	
		Girl	67.1	8.1			
	8	Boy	74.9	10.7	6.1	0.00	
		Girl	68.8	8.4			
	9	Boy	78.4	11.8	6.1	0.00	
		Girl	72.3	10.3			
	High	10	Boy	78.2	12.4	7.4	0.00
			Girl	70.8	7.1		
11		Boy	78.4	8.0	9.8	0.00	
		Girl	68.6	9.6			
12		Boy	78.2	7.8	7.1	0.00	
		Girl	71.1	8.2			

Table nr 24 indicates the comparison of arm span between girls and boys from grades one through twelve. The table below illustrates that boys have longer arm span than girls at nearly all grade levels. The mean and standard deviation of girls in the first grade 121.1 cm (8.2 SD) whereas, the mean and standard deviation of boys 122.3 cm (5.4 SD). In the high school the mean and standard deviation of arm span in boys is 176.4 cm (6.6 SD) and 162.4 cm (8.4 SD) for girls.

Facts:

- Boys consistently show a longer arm span compared to girls. This difference becomes more visible in high school.
- The trend indicates a steady increase in the difference of arm span between genders as they age.
- In elementary school boys have slightly longer arm span than girls.

Table 23 Gender comparison for Arm Span by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	122.3	5.4	1.1	0.38
		Girl	121.1	8.2		
	2	Boy	126.1	6.9	-1.5	0.34
		Girl	127.6	12.7		



	3	Boy	133.9	7.6	1.9	0.13
		Girl	132.0	8.5		
	4	Boy	140.0	7.2	1.3	0.30
		Girl	138.7	8.5		
	5	Boy	144.3	8.8	-1.9	0.18
		Girl	146.2	8.6		
Secondary	6	Boy	151.4	10.0	-0.7	0.56
		Girl	152.2	8.0		
	7	Boy	159.9	10.4	4.5	0.01
		Girl	155.4	15.2		
	8	Boy	165.9	9.8	5.3	0.00
		Girl	160.6	9.5		
9	Boy	173.6	7.3	11.6	0.00	
	Girl	161.9	9.1			
High	10	Boy	176.4	6.6	14.0	0.00
		Girl	162.4	8.4		
	11	Boy	177.9	7.7	17.3	0.00
		Girl	160.6	7.4		
	12	Boy	178.2	7.2	15.0	0.00
		Girl	163.2	8.0		

Table nr 25 show the difference between boys and girls in comparing arm reach. The data revealed that boys typically exhibit a longer arm reach than girls in almost all grades. The difference in arm reach becomes more pronounced in secondary and high school than in elementary school. The data starts with the mean and standard deviation of arm reach in 156.2 cm (6.4 SD) for boys and 155.1 cm (9.8 SD) for girls.

Facts:

1. In all grades boys have greater arm reach than girls.
2. The difference in more visible in high school, with the largest difference observed in ninth grade.
3. Boys continue to grow and develop physically for a longer period during adolescence compared to girls.

Table 24 Gender comparison for Arm Reach by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	156.2	6.4	1.1	0.45
		Girl	155.1	9.8		
	2	Boy	161.3	8.0	-0.2	0.90
		Girl	161.5	8.1		
	3	Boy	171.3	10.7	-1.2	0.76
		Girl	172.5	33.8		
	4	Boy	178.0	9.7	0.0	1.00
		Girl	178.0	10.5		
	5	Boy	185.7	9.9	-1.7	0.31



		Girl	187.5	11.1		
Secondary	6	Boy	192.7	14.6	-1.6	0.37
		Girl	194.3	12.2		
	7	Boy	202.2	19.7	-13.2	0.41
		Girl	215.5	176.0		
	8	Boy	210.5	20.6	6.4	0.01
		Girl	204.0	10.6		
9	Boy	221.1	14.5	13.5	0.00	
	Girl	207.6	8.0			
High	10	Boy	222.6	9.0	15.7	0.00
		Girl	206.9	13.8		
	11	Boy	280.5	350.3	72.8	0.14
		Girl	207.7	13.3		
	12	Boy	225.8	8.7	15.7	0.00
		Girl	210.2	15.8		

Table nr 26 below shows the difference between boys and girls in flexibility through test sit and reach. This test evaluates the flexibility of the lower back and hamstrings, and the data suggests that girls have better flexibility than boys across all grade levels. Also, the table includes standard deviation to highlight variability within each gender and significance values (Sig) to determine the statistical significance of the differences observed.

Facts:

1. In all grades girls have greater flexibility and boys through performing sit and reach test
2. The most significant difference appears in the third grade (elementary school) where the mean difference in flexibility between boys and girls was 1.9 cm (Sig = 0.04).

Table 25 Gender comparison for Flexibility- Sit and Reach test (cm) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	24.4	5.8	-0.4	0.76
		Girl	24.8	5.6		
	2	Boy	24.3	5.3	-1.0	0.25
		Girl	25.3	5.0		
	3	Boy	21.6	5.1	-1.9	0.04
		Girl	23.5	6.1		
	4	Boy	22.1	5.3	-1.9	0.05
		Girl	24.0	6.4		
	5	Boy	22.8	5.1	1.3	0.16
		Girl	21.4	5.8		
Secondary	6	Boy	20.4	7.0	-3.7	0.00
		Girl	24.2	6.9		
	7	Boy	21.1	6.9	-5.0	0.00
		Girl	26.1	7.0		
	8	Boy	24.2	9.9	-3.8	0.27
		Girl	28.0	32.1		
	9	Boy	24.7	7.5	-4.1	0.00



High	10	Girl	28.9	9.6		
		Boy	24.2	10.0	-2.3	0.14
	11	Girl	26.5	7.4		
		Boy	24.5	7.5	2.2	0.19
	12	Boy	25.5	8.1	-1.8	0.27
		Girl	27.4	6.1		

Table nr 27 indicates the comparison of right-hand grip strength between boys and girls from elementary, secondary and high school levels. This test assesses upper body strength and the data in almost all grades show that boys have greater hand grip strength than girls. Standard deviations illustrate variability within each gender group and significance values (Sig) are included to highlight the statistical significance of the differences observed.

Facts:

1. Boys have higher handgrip strength across all grades.
2. The largest difference is revealed in high school in twelfth grade
3. The difference in handgrip strength increases notably during secondary school years.

Table 26 Gender comparison for Strength- Handgrip test (Right Hand- N) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	8.6	3.2	0.1	0.83
		Girl	8.5	3.1		
	2	Boy	11.2	3.1	1.6	0.00
		Girl	9.6	3.2		
	3	Boy	13.5	3.0	1.2	0.02
		Girl	12.3	3.5		
	4	Boy	17.1	15.9	2.4	0.23
		Girl	14.7	3.0		
	5	Boy	19.1	5.0	1.6	0.04
		Girl	17.5	4.4		
Secondary	6	Boy	21.6	6.0	0.6	0.43
		Girl	21.0	4.9		
	7	Boy	26.5	7.9	1.4	0.55
		Girl	25.1	24.8		
	8	Boy	32.1	7.5	6.6	0.00
		Girl	25.5	5.3		
	9	Boy	38.4	8.8	10.2	0.00
		Girl	28.2	5.2		
High	10	Boy	41.3	9.1	13.5	0.00
		Girl	27.8	6.6		
	11	Boy	40.4	11.5	10.3	0.00
		Girl	30.1	6.6		
	12	Boy	43.2	11.2	16.1	0.00
		Girl	27.1	6.8		

Table nr 28 indicates the difference in handgrip strength for the left between boys and girls in elementary, secondary, and high school levels. Similar to the right-hand measurements, this table shows



that boys have greater left-hand grip strength than girls in almost all grades. This difference is more visible in adolescence and puberty. In table are included standard deviation and significance values (Sig).

Facts:

1. Boys demonstrate greater left-hand grip strength of all grades
2. The largest differential is seen in high school, particularly in twelfth grade.
3. The disparity in left-hand grip strength between boys and girls becomes more visible in secondary school.

Table 27 Gender comparison for Strength- Handgrip test (Left Hand- N) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	8.4	3.0	-0.1	0.92
		Girl	8.5	3.3		
	2	Boy	10.6	3.3	1.3	0.02
		Girl	9.3	3.5		
	3	Boy	12.9	2.8	1.4	0.00
		Girl	11.5	3.2		
	4	Boy	15.1	3.6	1.0	0.08
		Girl	14.2	3.1		
	5	Boy	18.3	4.2	1.7	0.01
		Girl	16.6	4.4		
Secondary	6	Boy	20.4	5.3	0.3	0.63
		Girl	20.1	4.9		
	7	Boy	25.3	7.7	3.6	0.00
		Girl	21.6	4.8		
	8	Boy	31.5	8.0	7.4	0.00
		Girl	24.1	5.7		
	9	Boy	36.4	7.3	9.5	0.00
		Girl	26.9	5.1		
High	10	Boy	39.2	7.7	13.3	0.00
		Girl	25.9	6.0		
	11	Boy	38.7	9.6	11.6	0.00
		Girl	27.1	5.6		
	12	Boy	41.3	9.3	15.5	0.00
		Girl	25.8	6.2		

Table nr 29 show the mean and standard deviation of push-ups test between boys and girls from all grades in elementary, secondary and high school levels. This test evaluates the number of push-ups a pupils can perform in 30 second, thus it provides measurements of upper body endurance and strength. Boys perform greater than girls in every grade level which is more visible in advance grades. Standard deviation and (Sig) are included in the table.

Facts:

1. Boys perform more push-ups than girls in every grades.
2. The difference in performance widens during secondary school years.
3. The mean of boys in ninth grade is 16.4 push-ups and the mean of push up girls is 2.1 push-ups.



Table 28 Gender comparison for Strength of Upper Limbs- Push Ups 30 sec test by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	3.4	5.0	1.6	0.05
		Girl	1.8	2.8		
	2	Boy	5.7	8.2	2.6	0.03
		Girl	3.0	5.5		
	3	Boy	7.8	6.1	4.3	0.00
		Girl	3.4	5.1		
	4	Boy	8.7	7.6	5.8	0.00
		Girl	2.9	3.2		
	5	Boy	9.5	7.0	6.1	0.00
		Girl	3.5	3.8		
Secondary	6	Boy	9.7	8.1	5.7	0.00
		Girl	4.0	4.4		
	7	Boy	11.4	8.9	8.4	0.00
		Girl	3.0	4.0		
	8	Boy	15.0	12.0	10.7	0.00
		Girl	4.2	5.7		
	9	Boy	16.4	10.3	14.3	0.00
		Girl	2.1	3.4		
High	10	Boy	18.5	14.2	14.6	0.00
		Girl	3.9	5.3		
	11	Boy	17.1	11.5	15.0	0.00
		Girl	2.2	2.7		
	12	Boy	18.3	8.6	14.8	0.00
		Girl	3.4	4.2		

Table nr 30 describes the difference in means between boys and girls which measure the explosive power of the lower limbs in elementary, secondary and high school levels. Standing long jump test evaluates the explosive power of lower extremities. The data indicates that boys typically jump farther than girls across all grade levels. As pupils age the difference increase. Sigma (Sig) and standard deviation are included in the table.

Facts:

1. Boys achieve longer jumps than girls in the standing long jump test
2. The trend increases differences aligns with physiological developments during puberty.
3. Boys experience greater gains in muscle mass and explosive power compare to girls.



Table 29 Gender comparison for Explosive Power of Lower Limbs- Standing Long Jump test by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig	
Elementary	1	Boy	91.1	20.6	-5.0	0.21	
		Girl	96.1	18.9			
	2	Boy	115.2	17.9	17.6	0.00	
		Girl	97.6	19.3			
	3	Boy	119.1	22.9	15.0	0.00	
		Girl	104.1	18.3			
	4	Boy	126.7	23.7	19.0	0.00	
		Girl	107.7	20.3			
	5	Boy	129.7	22.3	15.3	0.00	
		Girl	114.4	19.8			
Secondary	6	Boy	138.2	24.7	12.7	0.00	
		Girl	125.5	23.1			
	7	Boy	148.6	28.1	28.7	0.00	
		Girl	119.9	27.3			
	8	Boy	161.3	29.8	29.0	0.00	
		Girl	132.2	23.2			
	9	Boy	168.4	26.4	42.9	0.00	
		Girl	125.6	25.2			
	High	10	Boy	175.7	44.9	48.1	0.00
			Girl	127.6	42.2		
11		Boy	167.1	34.2	31.9	0.00	
		Girl	135.2	31.4			
12		Boy	171.6	33.5	51.6	0.00	
		Girl	120.0	21.0			

Table nr 31 describes the mean and standard deviation between girls and boys in order to make a comparison of the 20 m sprint test from grades of elementary, secondary and high school. 20 m sprint test assess how quickly pupils can cover a short distance. The data available indicates that boys run faster than girls in almost all grades. Standard deviation and sigma (Sig) are presented in the table.

Facts:

1. Boys perform 20 m sprint test faster than girls from elementary through high school.
2. The trend of increasing speed differences correlates with physical growth patterns, where boys often develop muscular strength at a rate that exceeds compare to girls



Table 30 Gender comparison for Speed (20m Sprint test) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Elementary	1	Boy	5.0	0.5	-0.2	0.26
		Girl	5.2	1.0		
	2	Boy	4.6	0.6	-0.3	0.00
		Girl	5.0	0.6		
	3	Boy	4.6	0.6	-0.5	0.00
		Girl	5.1	0.6		
	4	Boy	4.4	0.5	-0.5	0.00
		Girl	4.9	1.2		
	5	Boy	4.2	0.4	-0.4	0.00
		Girl	4.7	0.5		
Secondary	6	Boy	4.2	0.6	-0.2	0.01
		Girl	4.4	0.5		
	7	Boy	4.1	0.5	-0.3	0.00
		Girl	4.4	0.5		
	8	Boy	4.1	0.7	-0.3	0.00
		Girl	4.4	0.5		
	9	Boy	3.8	0.4	-0.6	0.00
		Girl	4.4	0.6		
High	10	Boy	3.6	0.4	-0.8	0.00
		Girl	4.4	0.6		
	11	Boy	3.9	0.6	-0.6	0.00
		Girl	4.5	0.4		
	12	Boy	3.4	0.7	-1.3	0.00
		Girl	4.6	0.9		

Table nr 32 shows the mean and standard deviation of multi-stage shuttle run test between boys and girls from grades six to twelve. The multi-stage shuttle run test assess the cardiorespiratory fitness or the endurance/ aerobic capacity. The data shows that boys generally perform better than girls in this test, with the differences becoming more pronounced and statistically significant as pupils progress through the grades. Standard deviations are provided to indicate variability within each gender, and significance values (Sig) are included to assess the statistical significance of these differences.

Facts:

1. Boys consistently complete more laps than girls in the multi-stage shuttle run test, illustrating higher levels of cardiorespiratory fitness. The largest gap occurs in twelfth grade, where boys complete an average of 22.0 more laps than girls, marked as statistically significant (Sig = 0.00).
2. The performance improvement among boys is particularly notable from middle school to high school, with a peak difference observed in the last grade, highlighting the culmination of growth and physical development.



Table 31 Gender comparison for CardioRespiratory Fitness- Multi Stage Shuttle Run test (N- Laps) by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig
Secondary	6	Boy	16.6	7.1	-1.4	0.39
		Girl	18.0	6.4		
	7	Boy	18.4	8.6	5.0	0.01
		Girl	13.5	6.2		
	8	Boy	22.6	12.8	6.8	0.01
		Girl	15.8	6.2		
9	Boy	25.9	13.7	10.6	0.00	
	Girl	15.2	8.0			
High	10	Boy	18.7	8.1	1.7	0.48
		Girl	17.0	9.8		
	11	Boy	26.0	11.7	11.8	0.00
		Girl	14.3	6.0		
	12	Boy	35.6	17.8	22.0	0.00
		Girl	13.6	6.3		

Table 33 mirrors the format of Table 29 but focuses on providing a side-by-side analysis for grades one through twelve, again comparing the number of push-ups performed by boys and girls within a 30-second interval. This physical test assesses upper body strength and endurance. The results consistently show that boys perform more push-ups than girls across all grade levels, with the differences increasing significantly as pupils progress through the grades. The data includes standard deviations to illustrate variability within each gender group, and significance values (Sig) to highlight the statistical significance of the differences observed.

Facts:

1. Boys outperform girls in the push-ups test across all educational stages, starting from elementary school. The largest difference is observed in high school, particularly in ninth grade, where boys perform an average of 14.3 more push-ups than girls, a difference that is statistically significant (Sig = 0.00).
2. The trend suggests a steady increase in the number of push-ups performed by boys, peaking during the secondary school years, which aligns with peak physical growth phases associated with puberty.



Table 32 Gender comparison for Strength of Upper Limbs- Push Ups 30 sec test by grade level

School Level	Grade	Gender	Mean	Std. Dev	Mean Diff	Sig	
Elementary	1	Boy	3.4	5.0	1.6	0.05	
		Girl	1.8	2.8			
	2	Boy	5.7	8.2	2.6	0.03	
		Girl	3.0	5.5			
	3	Boy	7.8	6.1	4.3	0.00	
		Girl	3.4	5.1			
	4	Boy	8.7	7.6	5.8	0.00	
		Girl	2.9	3.2			
	5	Boy	9.5	7.0	6.1	0.00	
		Girl	3.5	3.8			
Secondary	6	Boy	9.7	8.1	5.7	0.00	
		Girl	4.0	4.4			
	7	Boy	11.4	8.9	8.4	0.00	
		Girl	3.0	4.0			
	8	Boy	15.0	12.0	10.7	0.00	
		Girl	4.2	5.7			
	9	Boy	16.4	10.3	14.3	0.00	
		Girl	2.1	3.4			
	High	10	Boy	18.5	14.2	14.6	0.00
			Girl	3.9	5.3		
11		Boy	17.1	11.5	15.0	0.00	
		Girl	2.2	2.7			
12		Boy	18.3	8.6	14.8	0.00	
		Girl	3.4	4.2			



Conclusion

✚ **Mean values comparison by grade level for the measurement and assessment done**

Body Height and Weight

The progress of body height mean from first grade to seven grade is 6 cm.

From 10 grade to 11 grade there is a decrease of 2 kg from 63.3 kg to 61.2 kg.

Abdominal adiposity.

There is a consistent increase in mean of waist circumference as children progress through school, reflecting growth and changes in body composition.

The increase from grade to grade remains relatively steady, except for a notable increase between the eighth and ninth grades, where the mean jumps from 71.8 cm to 75.5 cm.

Comparative analysis between body height and arm span across grades

The difference between arm span and body height fluctuates across different grades, indicating varied growth rates between limbs and overall body height.

By middle school, the difference reduces to nearly zero, suggesting a period where growth in arm span and body height are closely aligned.

In high school, arm spans tend to be slightly less than body heights, reflecting a common physiological pattern where body height may exceed limb length in late adolescence

Flexibility of the lower back and the hamstrings

The sit and reach test (flexibility), shows fluctuations across grade levels, peaking in middle school and slightly decreasing toward the end of high school.

Ninth grade show the highest mean of flexibility, possibly correlating with a peak in physical development or increases physical activity during these years.

Maximum isometric strength (upper extremities)

During the elementary school years there is highlighting developmental growth in physical strength.

The variability in handgrip strength is substantial and show diverse levels of physical development among children of the same age.

The growth pattern in handgrip strength indicating balanced development in upper limb strength, thus the increases is gradual.

The highest value in handgrip strength occurs in eight grades, suggesting a diverse range of development stages among children within this age group

Upper-body strength and resistance.

There is a consistent increase from one grade to another in number of push-ups performed by pupils.

The highest mean of push-ups is shown in tenth grade



Lower-body muscular power and explosive strength.

The increase of means from grades to grades show significant development in explosive power, correlating with physical maturity and strength gains.

The peak performance of means is reached in tenth grade

Acceleration and speed.

There is a consistent improvement from the first to the twelfth grade in speed.

The starting mean of 20m sprint test is 5.1 sec (0.8)

Cardiorespiratory fitness

The increasing number of laps completed in the shuttle run test show the improvement in cardiorespiratory fitness from sixth to twelfth grade.

The peak of the performance is in the twelfth grade with the mean 24.6 laps (17.2 SD).

Mean values comparison by gender for the measurement and assessment done by grade level

Body Height and Weight

Boys compare to girls are consistently taller from first grade to twelfth grade.

The smallest mean difference occurs in first grade (0.01 m) and this difference increase in ninth grade.

Boys have a higher mean of body weight than girls in all grade levels

In tenth grade is observed the largest weight differences between genders

Statistical significance values are notable in the higher grades, particularly in tenth and eleventh grades.

Abdominal adiposity.

Boys have a higher mean of waist circumference compare to girls throughout their schooling.

Particularly in seventh grade boys mean of waist circumference was 7.2 cm greater than girls.

The pattern of increasing differences continues into high school, with the largest observe difference in tenth grade

Comparative analysis between body height and arm span across grades by gender

Boys consistently show a longer arm span compared to girls. This difference become more visible in high school.

The trend indicates a steady increase in the difference of arm span between genders as they age.

In elementary school boys have slightly longer arm span than girls.

In all grades boys have greater arm reach than girls.

The difference in more visible in high school, with the largest difference observed in ninth grade.

Boys continue to grow and develop physically for a longer period during adolescence compared to girls.

Flexibility of the lower back and the hamstrings

In all grades girls have greater flexibility to boys through performing sit and reach test



The most significant difference appears in the third grade (elementary school) where the mean difference in flexibility between boys and girls was 1.9 cm (Sig = 0.04).

Maximum isometric strength (upper extremities)

Boys have higher handgrip strength across all grades.

The largest difference is revealed in high school in twelfth grade

The difference in handgrip strength increases notably during secondary school years.

Upper-body strength and resistance.

Boys perform more push-ups than girls in every grades.

The difference in performance widens during secondary school years.

The mean of boys in ninth grade is 16.4 push-ups and the mean of push up girls is 2.1 push-ups.

Boys outperform girls in the push-ups test across all educational stages, starting from elementary school.

The largest difference is observed in high school, particularly in ninth grade, where boys perform an average of 14.3 more push-ups than girls, a difference that is statistically significant (Sig = 0.00).

The trend suggests a steady increase in the number of push-ups performed by boys, peaking during the secondary school years, which aligns with peak physical growth phases associated with puberty.

Lower-body muscular power and explosive strength.

Boys achieve longer jumps than girls in the standing long jump test

The trend increases differences aligns with physiological developments during puberty.

Boys experience greater gains in muscle mass and explosive power compare to girls.

Acceleration and speed.

Boys perform 20 m sprint test faster than girls from elementary through high school.

The trend of increasing speed differences correlates with physical growth patterns, where boys often develop muscular strength at a rate that exceeds compare to girls.

Cardiorespiratory fitness

Boys consistently complete more laps than girls in the multi-stage shuttle run test, illustrating higher levels of cardiorespiratory fitness. The largest gap occurs in twelfth grade, where boys complete an average of 22.0 more laps than girls, marked as statistically significant (Sig = 0.00).

The performance improvement among boys is particularly notable from middle school to high school, with a peak difference observed in the last grade, highlighting the culmination of growth and physical development.



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