

The relationships between anthropometric and motor measurements with 13 years old children

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Abstract

Developmental psychology studies the changes that occur to human body with age, consisting of the human body, the way of thinking, emotions, behaviour, relationships and human behaviours throughout life. Physical development has to do with changes that occur only in the human body (height, weight, changes in different organs of the body etc.). The aim of this research is to conclude the main characteristics of physical and motor development of children aged 13 years old. During the period of growing and development of organism, anthropometric and motor parameters change constantly, so that the whole body is under major adaptation and changes, as we have noticed in the Primary and Lower Secondary School "Xhavit Ahmeti" in Hodonoc of Kamenica in the Republic of Kosovo. We implemented a survey with a number of 73 male students. The first measurements were performed in September (autumn measurements), while the second measurements in March (spring measurements). Students who have been subjected to measurement procedures were regular students of the school as well as capable in terms of psychophysical to do all the tasks set out in research.

Keywords: Anthropometric, motor, height, weight, students.

Introduction

Considering the rapid growth that occurs in early adolescence, which lasts 2-3 years, the rapid physical development of boys begins between the ages of 11-14 and culminates when the child reaches 15 years. Based on these data, we are focused on a 6 month study that has to do with the physical and motor measurements of boys. The connections of anthropometric area were treated with three variables based on the following indicators:

a) *Indicators of body development-physical development.* Development includes physical characteristics, cognitive and social changes of the person that occur over time. Physical development includes physical changes such as: weight, height, improvement of motor behaviour and physiological changes associated with processes such as puberty and aging (Pettijohn, 1996, 72).

b) *Indicators of movement development - motor development.* Researches that were undertaken until now show that structures present complex phenomena (composite) in terms of importance and anthropological features.

The aim of the research is to diagnose the initial condition and final anthropometric and motor parameters consisting of: **Anthropometric variables:** AHB (height of the body), ABW (body weight) and AHBSH (height of the body with stretched hand). **Motor space:** MHJP (high jump by place), MLJP (long jump by place) and MR60 (running 60 meters).

Basic statistical indicator and testing of normality

In this research three samples of anthropometric and motor variables are applied that are thought to be important parameters for this work. Based on the purpose of the research, sample size and the number of variables are calculated: basic statistical parameters, measures of variability and distribution, while testing on the average values changes between the initial and final measurement.

Boys

The test of normal distribution is in limit of symmetric distribution of results. Also there is a normal distribution of the results (table 2).

1. First measurements

One-Sample Kolmogorov-Smirnov Tést

		ABW.	AHB.	AHBSH	MLJP	MR60	MHJP
N		73	73	73	73	73	73
Normal Parameters ^{a,b}	Mean	40.85	150.97	192.90	153.29	11.3164	29.77
	Std. Deviation	10.223	7.723	11.069	18.842	1.13439	5.820
Most Extreme Differences	Absolute	.193	.081	.124	.130	.127	.201
	Positive	.193	.081	.124	.130	.127	.142
	Negative	-.096	-.071	-.087	-.091	-.078	-.201
Kolmogorov-Smirnov Z		1.647	.692	1.060	1.107	1.088	1.716
Asymp. Sig. (2-tailed)		.009	.724	.211	.173	.187	.006

a. Test distribution is Normal.

b. Calculated from data.

Table No. 1 Test of normal distribution for the group of boys

In the presented results (histogram No.4) we see that the distribution of applied results were not significant different from normal distribution- **Gaussian** distribution.

Graphic presentation No.1. Histogram for boys in the first measurement of height

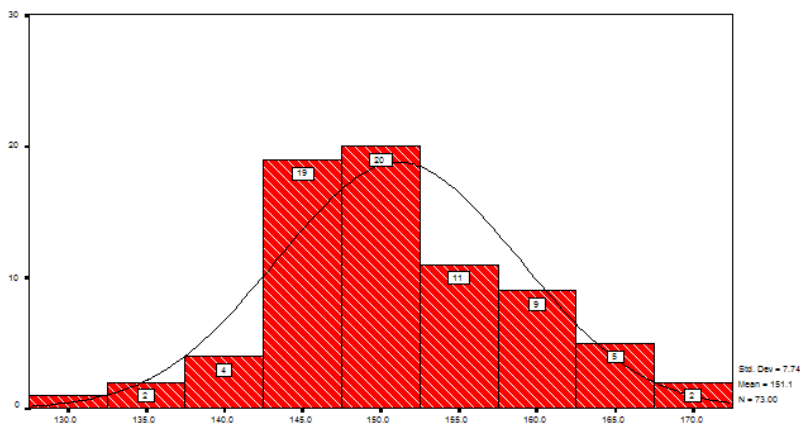


Table No. 2. Basic statistical parameters for the weight of boys (ABW)

One-Sample Kolmogorov-Smirnov Test^a

		ABW
N		73
Normal Parameters ^b	Mean	40.8
	Std. Deviation	10.223
Most Extreme Differences	Absolute	.193
	Positive	.193
	Negative	-.096
Kolmogorov-Smirnov Z		1.64
Asymp. Sig. (2-tailed)		.009

a. Test distribution is Normal.

b. Calculated from data.

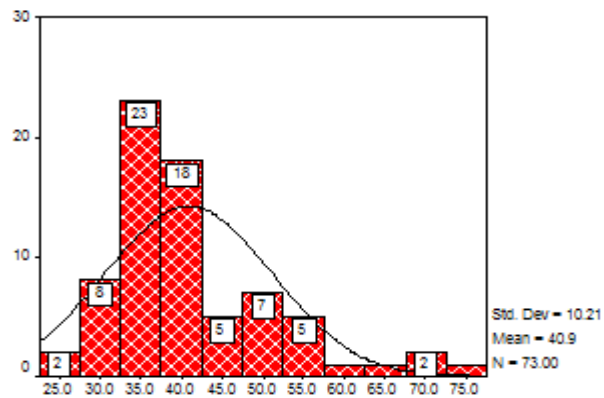


Table No. 3.Basic statistical indicators for boys in first measurement, body weight. (AWEI)

Graphical presentation No. 2 First measurement, body weight.

One-sample Kolmogorov-Smirnov Test^a

		AHBSH
N		73
Normal Parameters ^{a,b}	Mean	192.90
	Std. Deviation	11.069
Most Extreme Differences	Absolute	.124
	Positive	.124
	Negative	-.087
Kolmogorov-Smirnov Z		1.060
Asymp. Sig. (2-tailed)		.211

- a. Test distribution is Normal.
- b. Calculated from data.

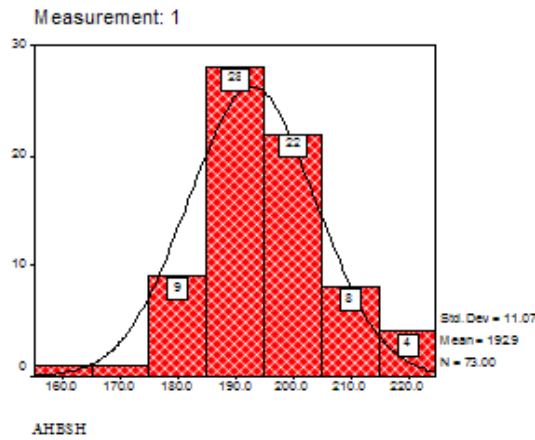


Table no. 2.Basic statistical indicators for boys in the first measurement, height of the body with stretched hand (AHBSH)

Graphical presentation No.1. **First measurement, height of the body with stretched hand (AHBSH)**

High jump (MHJP)

One-Sample Kolmogorov-Smirnov^a Test

		MLJP
N		73
Normal Parameters ^{a,b}	Mean	153.29
	Std. Deviation	18.842
Most Extreme Differences	Absolute	.130
	Positive	.130
	Negative	-.091
Kolmogorov-Smirnov Z		1.107
Asymp. Sig. (2-tailed)		.173

a. Test distribution is Normal.

b. Calculated from data.

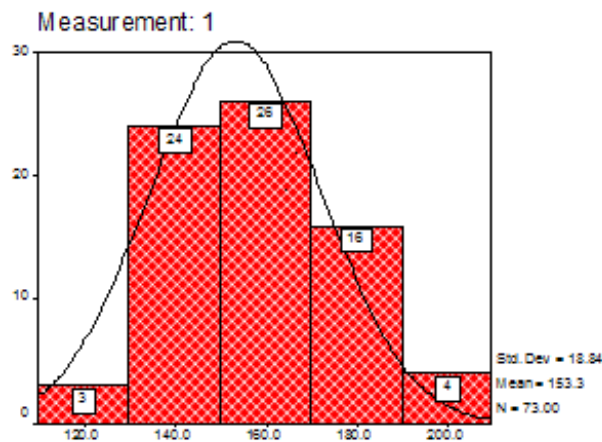


Table no.5. Basic statistical indicators for boys in the first measurement, high jump by place.

Graphical presentation no.2. First measurement, high jump by place (MHJP).

Running 60 meters (MR60)

One-Sample Kolmogorov-Smirnov^a Test

		MR60
N		73
Normal Parameters ^{a,b}	Mean	11.3164
	Std. Deviation	1.13439
Most Extreme Differences	Absolute	.127
	Positive	.127
	Negative	-.078
Kolmogorov-Smirnov Z		1.088
Asymp. Sig. (2-tailed)		.187

a. Test distribution is Normal.

b. Calculated from data.

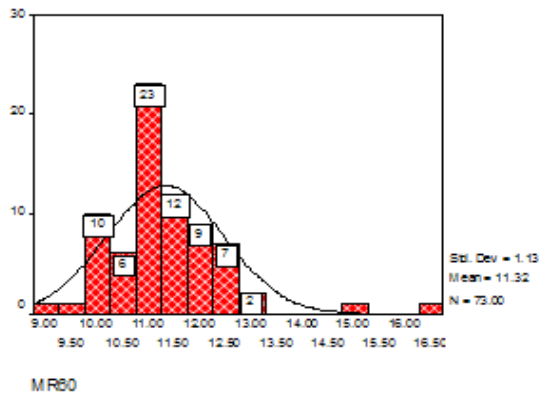


Table No 6. Basic statistical indicators for boys in the first measurement, running 60 meters.
Graphical presentation No. 5. First measurement, running 60 meters.

High jump (MHJP)

One-Sample Kolmogorov-Smirnov Test

		MHJP
N		73
Normal Parameters ^{a,b}	Mean	29.77
	Std. Deviation	5.820
Most Extreme Differences	Absolute	.201
	Positive	.142
	Negative	-.201
Kolmogorov-Smirnov Z		1.716
Asymp. Sig. (2-tailed)		.006

a. Test distribution is Normal.
b. Calculated from data.

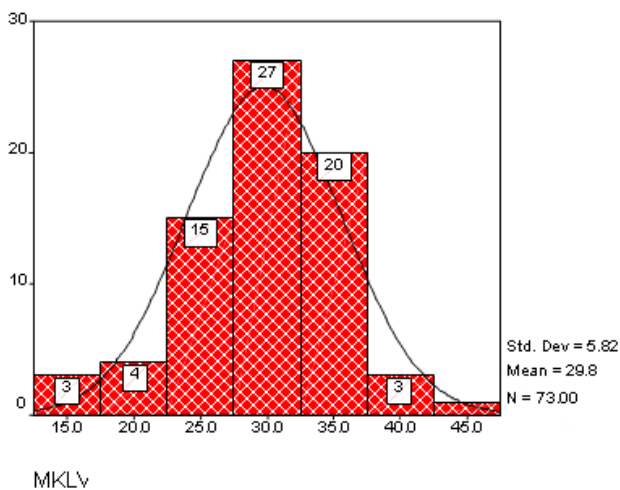


Table no. 3. Basic statistical indicators for boys in the first measurement, high jump by place (MHJP).

Graphical presentation no.6. First measurement, high jump by place (MHJP).

2. Second measurement

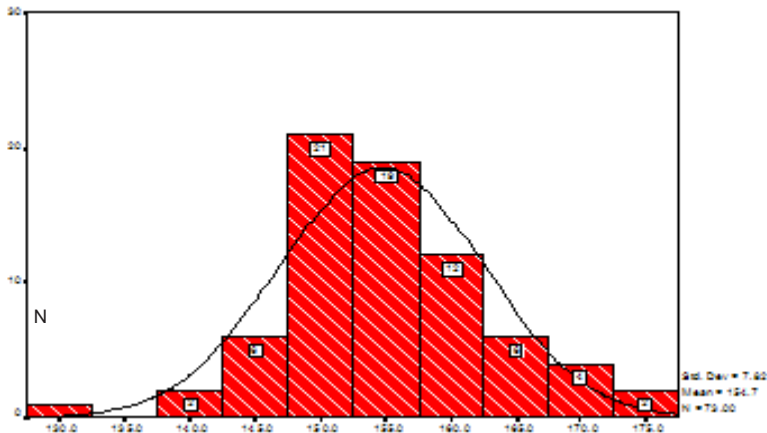
In the second measurement for boys, table no.8 confirms that normal distribution of results exists.

Normal Parameters ^{a,b}		Mean	29.77
		Std. Deviation	5.820
Most Extreme Differences	Absolute		.201
	Positive		-.142
	Negative		-.201
Kolmogorov-Smirnov Z			1.716
Asymp. Sig. (2-tailed)			.006

a. Test distribution is Normal.
b. Calculated from data.



Table No. 8. The test of normal distribution for the group of boys.



Graphical presentation no.8. Histogram for boys in the second measurement, height of the body.

Body Weight (ABW)

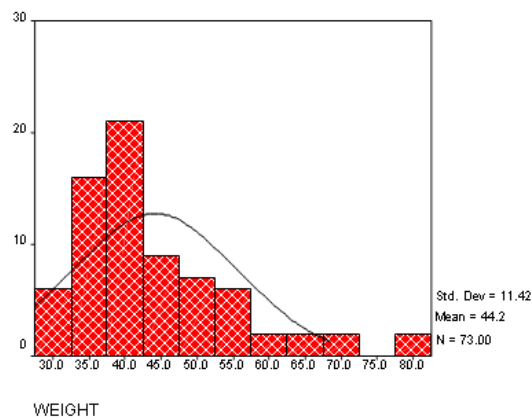
Table no.9. Basic statistical indicators for boys in the second measurement, body weight. (ABW)

One-sample Kolmogorov-Smirnov Test

		ABW
N		73
Normal Parameters ^{a,b}	Mean	44.14
	Std. Deviation	11.410
Most Extreme Differences	Absolute	.170
	Positive	.170
	Negative	-.089
Kolmogorov-Smirnov Z		1.453
Asymp. Sig. (2-tailed)		.029

a. Test distribution is Normal.

b. Calculated from data.



Graphical presentation No. 8. Second measurement, body weight (ABW).
 Height of the body with stretched hand (AHBSH)

One-sample Kolmogorov-Smirnov Test

		AHBSH
N		73
Normal Parameters ^{a,b}	Mean	197.01
	Std. Deviation	10.548
Most Extreme Differences	Absolute	.165
	Positive	.165
	Negative	-.089
Kolmogorov-Smirnov Z		1.408
Asymp. Sig. (2-tailed)		.038

a. Test distribution is Normal.

b. Calculated from data.

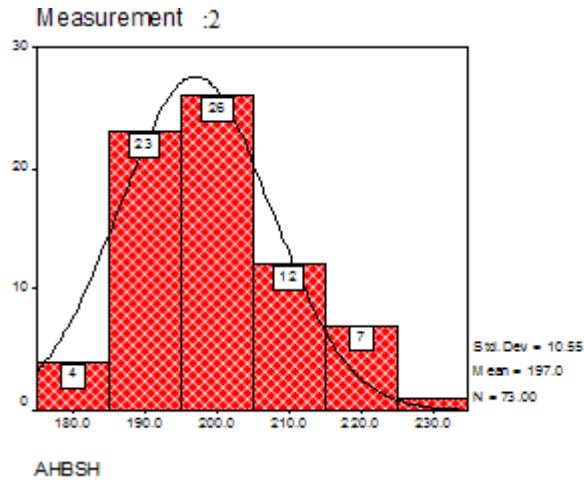


Table No. 10. Basic statistical indicators for boys in the second measurement, height of the body with stretched hand. (AHBSH)

Graphical presentation No.9. Second measurement, height of the body with stretched hand (AHBSH).

Long jump (MLJP)

One-Sample Kolmogorov-Smirnov Test ^a

		MLJP
N		73
Normal Parameters ^{a,b}	Mean	158.40
	Std. Deviation	19.480
Most Extreme Differences	Absolute	.133
	Positive	.133
	Negative	-.100
Kolmogorov-Smirnov Z		1.132
Asymp. Sig. (2-tailed)		.154

a. Test distribution is Normal.
 b. Calculated from data.

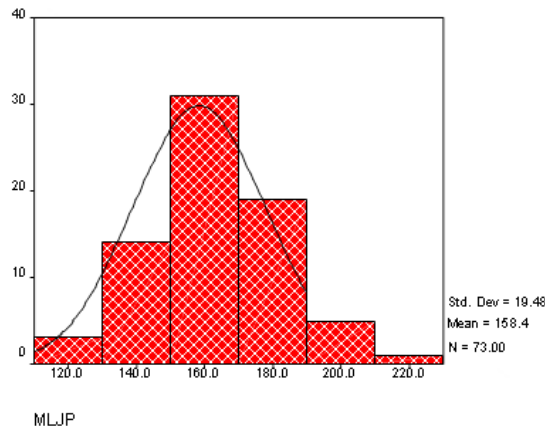


Table No.11. Basic statistical indicators for boys in the second measurement, long jump by place.

Graphical presentation No.10. Second measurement, long jump by place (MLJP).

Running 60 meters (MR60)

One-Sample Kolmogorov-Smirnov Test

		MR60
N		73
Normal Parameters ^{a,b}	Mean	10.6895
	Std. Deviation	1.15270
Most Extreme Differences	Absolute	.091
	Positive	.091
	Negative	-.066
Kolmogorov-Smirnov Z		.777
Asymp. Sig. (2-tailed)		.583

a. Test distribution is Normal.
 b. Calculated from data.

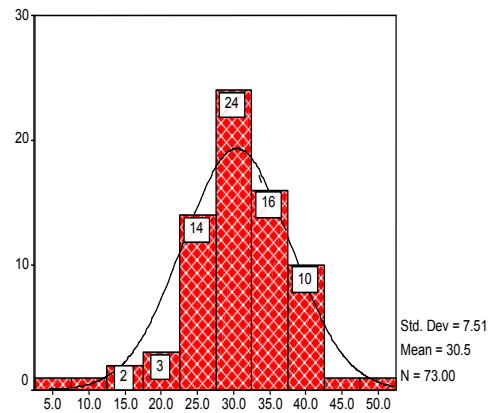
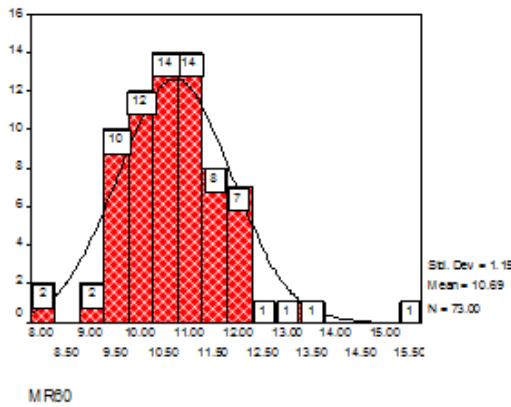


Table No. 12. Basic statistical indicators for boys in the second measurement, running 60 meters (MR60).

Graphical presentation No.11. Second measurement, running 60 meters. (MR60).

High jump (MHJP)

One-Sample Kolmogorov-Smirnov Test

		MHJP
N		73
Normal Parameters ^{a,b}	Mean	30.52
	Std. Deviation	7.511
Most Extreme Differences	Absolute	.185
	Positive	.144
	Negative	-.185
Kolmogorov-Smirnov Z		1.578
Asymp. Sig. (2-tailed)		.014

a. Test distribution is Normal.
 b. Calculated from data.

Table No.13. Basic statistical indicator for boys in the second measurement, high jump by place (MHJP).

Graphical presentation No.12. Second measurement, high jump by place (MHJP).

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Deviation Statistic	Statistic	Std. Error	Statistic	Std. Error
ABW	73	28	80	44.16	1.34	11.415	1.290	.281	1.527	.555
AHB	73	132	175	154.71	.92	7.822	.203	.281	.609	.555
AHBSH	73	175	225	197.01	1.23	10.548	.464	.281	.084	.555
MHJP	73	5	50	30.52	.88	7.511	-.626	.281	1.786	.555
MLJP	73	120	210	158.40	2.28	19.480	.298	.281	.111	.555
MR60	73	8.24	15.74	10.6895	.1349	1.15270	1.205	.281	4.325	.555

a = 2

Table N o.14. Basic statistical parameters for boys.

Conclusions

There are valid differences between the two measurements: the first and the second measurement Table no.15 presents basic statistical anthropometric results:

ABW (body weight), AHB (height of the body),

AHBSH (height of the body with stretched hand).

Based on the results, there are many differences in arithmetic average of body weight. The weight has changed by 3.30 kg There are many differences from the initial measurements. Significant difference were analyzed in height of the body (AHB). The first measurement consisted of 151.14 cm, while the second measurement was 154,71cm, which means that there is a difference of 3.57 cm. Also in the height of the body with stretched hand, there were significant differences for example: in the first measurement the average was 192.90 cm while in the second it was 197.01 cm - the difference was 4.11cm.

Based on the results, comparing both initial and final measurements, to boys, in anthropometric and motor space, it can be seen that statistically there are valid differences in these variables: height of the body (AHB), body weight (ABW), height of the body with stretched hand (AHBSH), long jump by place (MLJP), running 60 meters, (MR60). While in variable high jump by place (AHJP) there are no valid differences between two measurements.

Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
ABW	1	7	40.86	10.213	1.195
	2	7	44.16	11.415	1.336
AHB.	1	7	151.14	7.745	.906
	2	7	154.71	7.822	.916
AHBSH	1	7	192.90	11.069	1.296
	2	7	197.01	10.548	1.235
MHJP	1	7	29.77	5.820	.681
	2	7	30.52	7.511	.879
MLJP	1	7	153.29	18.842	2.205
	2	7	158.40	19.480	2.280
MR60	1	7	11.3164	1.13439	.13277
	2	7	10.6895	1.15270	.13491

Table no. 4. Table of results of the two measurements, the arithmetic average and standard deviation.

The implemented testing of difference between two arithmetic averages of both groups is done by t-test (tab. No.17).

The t-test should have the value of probability level $p < 0.5$ so the differences are statistically important. Based on the value of probability we can conclude that children of age 13 ± 6 months from first measurement (initial), to second measurement (final), in the system of anthropometric and motor system, applied in this paper, have systematic changes in all anthropometric variables and motor variables.

	Measurement	N	Correlation	Sig.
ABW	1 & 2	73	.954	.000
AHB	1 & 2	73	.981	.000
AHBSH	1 & 2	73	.950	.000
MLJP	1 & 2	73	.493	.000
MR60	1 & 2	73	.729	.000
MHJP	1 & 2	73	.684	.000

Table No.16. Correlation of variables between two measurements.

In motor variable, high jump by place (MHJP) there are statistically no valid differences.

	Paired Differences						t	df	Sig. (2-tailed)
	Measurement	Mean	Std. Devia- tion	S t d . E r r o r Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
ABW	1 & 2	-3.577	2.3527	.27536	-4.1256	-3.0278	-12.980	72	.000
AHB	1 & 2	-3.301	2.4363	.28515	-3.8698	-2.7329	-11.578	72	.000
AHBSH	1 & 2	-4.110	3.4303	.40383	-4.9146	-3.3046	-10.177	72	.000
MLJP	1 & 2	.6270	1.1521	.13484	.3582	.8958	4.650	72	.000
MR60	1 & 2	-5.110	14.119	1.65252	-8.4038	-1.8154	-3.092	72	.003
MHJP	1 & 2	-7534	5.5196	.64602	-2.0412	.5344	-1.116	72	.247

Table No.17. Results and differences between two measurements- of boys.

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