DIFFERENCES IN BODY MASS, BODY HEIGHT AND EPLOSIVE, REPETITIVE AND STATIC STRENGTH BETWEEN 16-YEAR-OLD MALES AND FEMALES

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Summary

This study utilized a sample of 16-year-old males and females. Two anthropometric tests were administered to the sample, as well as 5 motoric tests that measuredexplosive, repetitive and static strength. The main purpose of the study was that in addition to validation of current status of measured parameters in both samples to verify whether there are significant differences between the two genders along the dimensions addressed in the study. Findings indicate that differences are evident and for all cases of this age group the difference was in favour of males. The research confirmed that for the 16-year-old age group: 1) There are significant differences between the two genders, and 2) All identified differences are in favour of male sample.

Keywords*: Anthropometric characteristics, motor abilities, correlations, differences.*

Introduction

In school practice, in Physical Education course in particular, it is necessary to continuously track the effects of course content on developments of various aspects of anthropologic status. This puts teachers in the position to face the need that their work is organized relying on latest scientific achievements in the field as well as sports fields. It is important to track and determine relations that are in place among various differences of anthropologic status as well as to verify how the organized process affects positive changes in these relations. Due to this, it is important to gather as much factual information as possible, which would clearly indicate certain segments that must be taken into consideration when implementing various activities.

Dimensions of strength represent the most significant skills and a required basis for all sports. Also, this dimension is specific in the sense of differences that exist between genders at different age groups. These differences should be taken into consideration when implementing exercises with mixed groups in school practices in order to achieve desired effects.

Bilić (2005) in his doctoral thesis in a two-stage study (with a sample of 400 students

in first stage and 400 students in the second stage) researched students in grades 5-8 of elementary school and identified structural quantitative differences from year to year and confirmed that there are significant differences that should be taken into account while organizing the learning process.

PURPOSE OF THE STUDY

The main purpose of the study is the verify differences in some anthropometric characteristics and tactile dimensions of 16-year-old male and female students. The purpose of the study is limited to:

1. Verification of the correlation ratios, and
2. Verification of the difference between the two genders with regard to development level of anthropometric characteristics and dimensions of explosive, repetitive and static strength.

HYPOTHESIS

Given the topic and purpose of the research, the following hypotheses are tested:

H1. There will be significant statistical correlations between morphological and motoric area.

H2. There will be significant statistical differences between the two genders of the same age group.

WORK METHODOLGY

Sampel of respondents

In this research participated the sampel of the Secondary Schooll of students from the school "Adem Gllavica" in Lipjan.Age of the students is 16 years.Group consist of 110 students, 60 of them are males and 50 are females. All they are atending the same shchool.

Sampel of Variables

There were measured two anthropometric characteristics, as well as five motoric tests that measured explosive, repetitive and static strength.

Anthropometric variables:

1. Body mass- BMASS
2. Body height – BHEIHGT

Motoric variables:

1. Standing Long - SLJUMP
2. Running 30 m - RUN30m
3. Curl Up - CURLUP
4. Beck extension - BECKEX
5. Hanging with the arms in Static position90 º - HARM90º

Methods of data procesing

Based in the research aim and hypothesis folowing methods were used: *Arithmetic Mean, Standard Deviation, Minimal and Maximal result, Skewness and Kurtosis. The relation are treated with the linar correlatin method and diferences with the T-test.*

RESULTS AND DISCUSSION

INTERPRETATION OF DESCRIPTIVE STATISTICAL PARAMETERS - MALES

In Table 1, results indicate that distribution of results in two morphological variables in in the range of normal distribution considering that skewness values are lower

than 1. In both cases we have a positive skew of results, which indicates that the majority of the results are higher than their mean, which in the case of body mass is 60.2 kg, while mean of body height is 169 cm. These results indicate that the male group was homogenous. In the case of variables of this age group, there were no significant deviations from the normal distribution. In the group of motoric variables, there was a higher level of heterogeneity with regard to tests of repetitive bodystregth, more specifically of Curl Ups and Beck Extension tests, which measure the repetitive strength of the abdominal and backmuscles. Skewness values for these tests were .720 and .616. These values indicate a positive skew. Lower values of distribution were found in motoric tests that measures exoplosive strength of feet – Standing Long Jump test with value of -.296 and Running 30m test with skewness value of .375. These values indicate that male group of this age group shares significant differences in the dimension of repetitive strength. Regarding explosive and static strength, the values are more stable and the group did not show significant differences.

Tab.1. Descriptive statistical parameters – Males

Descriptive Statistics[a]										
	N	**Min.**	**Max.**	**Mean.**	**Std. Devi.**	**Varia.**	**Skewness**		**Kurtosis**	
Bmass	60	43.00	87.00	60.22	9.99	99.77	.662	.309	.169	.608
Bheihgt	60	155.00	182.00	169.83	6.60	43.56	.079	.309	-.510	.608
Sljump	60	160.00	240.00	202.67	18.83	354.63	-.296	.309	-.159	.608
Run30m	60	4.27	5.40	4.78	.26	.07	.375	.309	-.215	.608
Curlup	60	20.00	110.00	46.92	19.78	391.43	.720	.309	.465	.608
Beckex	60	15.00	90.00	43.18	14.86	220.97	.616	.309	.758	.608
Harm90^0	60	5.31	62.00	35.68	14.45	208.78	-.160	.309	-.588	.608

INTERPRETATION OF DESCRIPTIVE STATISTICAL PARAMETERS - FEMALES

Table 2 shows values for the female group. Here, the distribution has been much more heterogeneous in the body weight variable, where skewness values were in the range of non-normal distribution. In the group of motoric variables and in this case for the female group of this age group, in 3 out of 5 motoric tests there were significant deviations from the normal distribution. In

the test of explosive strength of Running30m, skewness value was 1.145; in the test of abdominal muscles the value was 1.406, while the highest value was present in the test of static strength, which required students to keep a hanging position on iron in 90 degrees, where the value of distribution was 2.171. High distribution value in this test was a result of the situation where for a significant number of girls the score was 0, while the average score was about 9 sec. Such a score was affected by body weight of children as well as by low level of static strength of girls of this age group. These values show that female group shared significant differences with regard to factors of strength and that this situation is significantly affected by post-puberty phase.

Tab. 2. Descriptive statistical parameters – Females

Descriptive Statistics[a]										
	N	**Min.**	**Max.**	**Mean**	**Std. Devi.**	**Vari**	**Skewness**		**Kurtosis**	
Bmass	50	41.00	68.00	52.12	6.78	46.03	.919	.337	.151	.662
Bweihgt	50	149.00	172.00	158.76	5.04	25.41	.199	.337	-.478	.662
Sljump	50	125.00	200.00	157.80	16.42	269.55	.541	.337	.224	.662
Run30m	50	4.95	7.10	5.74	.44	.19	1.145	.337	2.164	.662
Curlup	50	10.00	62.00	26.58	10.62	112.78	1.406	.337	3.358	.662
Beckex	50	12.00	60.00	32.82	11.84	140.15	.341	.337	-.216	.662
Harm90^0	50	.00	45.22	8.98	10.09	101.80	2.171	.337	5.300	.662

INTERPRETATION OF CORRELATIONS – MALES

Analysis of correlation table in Tab. 3 shows that in morphological area in both variables there was a statistically significant correlation at .616 and this shows that taller boys have a higher body weight and in this situation presence of obese students is not very significant. In correlations among morphological and motoric area, there is only one significant correlation between body height and Standing Long Jump where the value is .234,which indicates that taller students have predispositions to jump further distances. Correlation table that measures tactile dimensions of students we see that both tests that measure the dimension of sprint strength indicate positive correlations with values of -417. Negative sign is a result of the situation where in the running test the lower score is the better score. Jumping test showed positive correlations with the test of static strength.

Meanwhile running test had a significant correlation with repetitive back strength, which implies that students who have a larger strength at their mid-body, especially with extensive muscles showed better scores in 30m sprint running. Tests of repetitive force of the body measured by strength of abdomen and back muscles did not show correlations between them nor with tests of explosive strength. The only significant correlations was between the tests of Hanging with the arms in static position , at .250 and of the same test with repetitive strength of back muscles at the value of .452.

Tab. 3. Correlations – Males

Correlations							
	Bmass	**Bweihgt**	**Sljump**	**Run30m**	**Curlup**	**Beckex**	**Harm90^0**
Bmass	1						
Bweihgt	.616**	1					
Sljump	.044	.234*	1				
Run30m	-.080	-.056	-.417**	1			
Curlup	-.004	-.018	.148	-.148	1		
Beckex	-.001	-.062	.155	-.236*	.057	1	
Harm90^0	-.037	-.167	.250*	-.164	.269*	.452**	1

INTERPRETATION OF CORRELATIONS - FEMALES

Analysis of correlation table in Tab. 4 shows that correlation value for morphological area is at .499. Correlations between morphological area and motoric tests it is worth noting the fact that in all cases, with exception of correlation of body weight with running 30m, where the value was at .546, other correlations are insignificant. Negative correlation between weight and running speed makes complete sense since it implies that students with higher weight have slower running speed. A different picture from males' case is shown in females' case with regard to jumping distance, which did not depend on body height. The correlation table of tests that measure motoric dimensions of students shows that both tests that measure the dimension of the explosive strength showed positive correlations at.617.The jumping test showed positive correlations with tests of repetitive abdominal and back strength with values at .596 and .433 respectively. Meanwhile there was insignificant correlation with the test of static strength of arms. Running test showed a significant correlation with the repetitive stomach strength, which implies that students that have a higher strength in the mid-body region, especially with regard to abdominal muscles, showed better scores in 30m sprint running. This correlation among males was more significant between 30m running scores and repetitive strength of back muscles. Tests of repetitive strength of the body measured with strength of stomach and back muscles showed higher correlation between themselves with the value at .629. From this, we observe that among female group the puberty phase was completed earlier and that the structure of higher

order latent mechanisms, and which pertain to energy regulation of motoric area are better defined and these have affected to have a higher level of significant correlations between tests that measure different factors of strength.

Tab. 4. Correlations – Females

Correlations[a]							
	Bmass	**Bweihgt**	**Sljump**	**Run30m**	**Curlup**	**Beckex**	**Harm90^0**
Bmass	1						
Bweihgt	.499**	1					
Sljump	-.126	.100	1				
Run30m	.546**	-.013	-.617**	1			
Curlup	.140	.048	.596**	-.314*	1		
Beckex	-.002	.007	.433**	-.208	.629**	1	
Harm90^0	-.156	-.235	.005	-.158	.226	.079	1

DIFFERENCES BETWEEN MALES AND FEMALES – T-TEST

To study differences between males and females, the t-test method was employed. In all cases when statistically significant differences were observed, those differences are in favour of the male group. With regard to weight variable, the difference between males and females is 8 kg in favour of males, while regarding body height variable, males are 11cm taller than females. This indicates that in the post-puberty phase we can already observe differences pertaining to better morphological development among males, which differences are statistically significant at confidence level of .000. In the motoric area we also observe statistically significant differences, which are also in favour of males. In the dimension of explosive strength, males had better scores. In jumping test, males had a score of 60 cm longer than females. Also, in the 30m running test, males were faster than females for 1 sec. In the test of Curl up's, males had almost double the level of values compared to females, having on average about 20 more repetitions, while with regard to the back strength, the difference was only 10 repetitions in favour of males. There was a larger difference in the test of static strength, where males stood for 25 seconds longer than girls, and girls' scores were quite low, which makes us understand that this test can be considered as inappropriate test to measure this skill among girls. The overview of comparisons between the two genders implies that males are significantly in more favourable situation with regard to both morphological area and explosive, repetitive and static strength of certain body regions. This fact must be respected by teachers when they set requirements for meeting tasks that depend on these factors,

especially when planning these tasks for mixed groups of both genders.

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Bmass	Meshkuj	60	60.217	9.988	1.289
Bweihgt	Vajza	50	52.120	6.784	.959
Sljump	Meshkuj	60	169.833	6.600	.852
Run30m	Vajza	50	158.760	5.041	.713
Curlup	Meshkuj	60	202.667	18.832	2.431
Beckex	Vajza	50	157.800	16.418	2.322
Harm90^0	Meshkuj	60	4.781	.265	.034
Bmass	Vajza	50	5.740	.436	.062
Bweihgt	Meshkuj	60	46.917	19.785	2.554
Sljump	Vajza	50	26.580	10.620	1.502
Run30m	Meshkuj	60	43.183	14.865	1.919
Curlup	Vajza	50	32.820	11.839	1.674
Beckex	Meshkuj	60	35.676	14.449	1.865
	Vajza	50	8.984	10.089	1.427

Independent Samples Test										
		Levene's Test for Equality of Varianc		**t-test for Equality of Means**					**95% Confidence Interval of the Differenc**	
		F	**Sig.**	**t**	**df**	**Sig.**	**Mean Diffe**	**Std. Error Diffe**	**Lower**	**Upper**
Bmass	Equ.variances assumed	5.978	.016	4.87	108	.000	8.09	1.66	4.80	11.39
Bweihgt	Equ.variances assumed	3.527	.063	9.72	108	.000	11.07	1.13	8.81	13.32
Sljump	Equ.variances assumed	.577	.449	13.18	108	.000	44.86	3.40	38.11	51.61
Run30m	Equ.variances assumed	7.236	.008	-14.20	108	.000	-.959	.06	-1.09	-.82

Curlup	Equ.variances assumed	21.67	.000	6.52	108	.000	20.33	3.11	14.15	26.51
Beckex	Equ.variances assumed	1.506	.222	3.98	108	.000	10.36	2.600	5.211	15.516
Harm90^0	Equ.variances assumed	11.10	.001	11.01	108	.000	26.69	2.424	21.887	31.496

CONFIRMATION OF HYPOTHESIS

H1. The first hypothesis was partially confirmed since we did not find significant correlations between morphological and motor areas at the expected level.

H2. The second hypothesis was fully confirmed since we found statistical significant differences between the two genders of the same age group.

SUMARY

The research aimed to identify the main differences between males and females aged 16 years. The sample of 110 students from the secondary school was treated with two anthropometric tests 5 motoric tests that measured explosive, repetitive and static strength. The main purpose of the study was that in addition to validation of current status of measured parameters in both samples to verify whether there are significant differences between the two genders along the dimensions addressed in the study. Findings indicate that differences are evident and for all cases of this age group the difference was in favour of males. The research confirmed that for the 16-year-old age group: 1) There are significant differences between the two genders, and 2) All identified differences are in favour of male sample.

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Sažetak

Ova studija koristi uzorak 16-year-old žena i muškaraca. Dva antropometrijska testa su davani na uzorku, kao i 5 motoričkih testova koji measuredexplosive, ponavljajući i statičke snage.Glavni cilj istraživanja bio je da se uz validaciju trenutnog stanja mjerenih parametara u oba uzorka, kako bi provjerili da li postoje značajne razlike između dva spola. Rezultati pokazuju da su razlike vidljive i za sve slučajeve u ovoj dobnoj skupini razlika bila je u korist muškaraca.Istraživanje je potvrdilo da su za 16-godišnje dobne skupine: 1) postoje značajne razlike između dva spola, a 2) Sve utvrđene su razlike u korist muškog uzorka.

Keywords*: antropometrijska obilježja, motoričke sposobnosti, povezanosti, razlike.*

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