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**CANONICAL RELATIONS OF MORPHOLOGICAL CHARACTERISTICS WITH THE RESULTS OF EXPLOSIVE POWER AMONG CHILDREN IN CLASSROOM TEACHING****Abstract**

*A sample of 42 respondents consists of the fourth grade 10 years old Elementary School pupils in East Sarajevo who participated in regular Physical Education activities. By the battery of the four anthropometric measures and three motor variables were measured the following dimensions: volume and mass of the body (upper arm circumference -AONL), thorax -AOGK, the volume of the lower leg -AOPK), body mass -ATEZ and explosive strength (throwing balls in the long jump -MBLP, jump out of -MSKV, jump out of -MSDM). The main objective of the research is to determine statistically significant canonical relations between morphological characteristics (as a predictor system) to individual criterion variable of explosive strength dimensions (as a criterion system) among the respondents. The research problem is to examine statistically significant relations between the latent dimensions corresponding to the morphological characteristics and dimensions of the explosive force. The results are important for the implementation of programs of regular and additional teaching of Physical Education and more efficient implementation of educational technology as well as specialization of explosive power dimensions. Results of canonical correlation analysis showed that there exist statistically significant correlation of circular dimensionality, body mass and subcutaneous adipose tissue as a predictor system on the achieved results of explosive strength as a criterion system, on the multivariate levels among the respondents of Primary School pupils in classroom teaching.*

**Keywords:** *Canonical Correlation Analysis, pupils of classroom teaching, morphological characteristics and explosive power.*

**1. INTRODUCTION**

Regular teaching of Physical Education among pupils in classroom teaching represents the adaptation process by which a systematic repetition of motor exercise contributes to the mastery and development of motor skills, developing and maintaining of morphological characteristics, functional and motor skills, correcting bodily deformities, developing positive

moral and military characteristics, as well as satisfying other special personality needs (Stojanovic, 1975; Hadzikadunic, Krsmanovic and Kazazovic 1988; Kragujevic, 2005).

Essentially, these classes should contribute to the full development of personality, which is competent for the creative application of purposeful motor movements in everyday life and work, play, sport, gymnastics and other forms of physical culture that directly or indirectly contribute to the humanization and socialization of his/her personality.

To achieve this goal is possible only with the extensive knowledge of interpersonal relationships and conditional levels of specific dimensions of anthropological characteristics. Only on the basis of established and scientifically proven findings it is possible to plan and program content that will work in qualitative terms to satisfy the authentic needs of each individual, as a priority objective of the pedagogical activity (Visnjic, Jovanovic and Krasomenko, 2004; Przulj, 2012).

The research problem is to examine statistically significant relations between the latent dimensions corresponding to morphological characteristics and dimensions of explosive strength in the Primary School pupils.

The main objective of the research is to determine statistically significant canonical relations between morphological characteristics (as a predictor system) to individual criterion variable of explosive strength dimensions (as a criterion system) in patients. Knowledge of the structure of mutual direction and size of the connection among specified dimensions is important for structure of the educational content of regular and additional Physical Education in order to optimize performance and overall harmonious development of a number of anthropological dimensions.

## 2. METHODS

A sample of 42 respondents is composed of the fourth grade 10 years old Elementary Schools pupils in East Sarajevo who participated in regular Physical Education. A battery of four anthropometric measures and three motor variables (Kurelic et al., 1975) measured the following dimensions:

- The volume and weight of the body: the upper arm (AONL), thorax (circumference -AOKG), the volume of the lower leg (AOPK), body weight (butts).

- Explosive power: throwing balls in the long jump (MBLP), jump from place to place, long jump (MSDM).

In order to determine the relations between the two different multidimensional anthropological system of manifest variables, in which anthropometric measures are first and tests of explosive power second system was implemented method of canonical correlation analysis. To determine the correlation of the predictor and criterion was used SPSS Statistics 12.0 and 7.0.

## 3. RESULTS

Parameters of descriptive statistics and canonical correlation analysis for defining the relation between morphological dimensions and results of explosive power were calculated with the obtained results.

**Table 1.** Basic statistical parameters for assessing morphological characteristics

Antr. mere	N	Mean	Min.	Max.	Std.	Skewn.	Kurtos.
AONL	42	17.54	14.00	22.00	4.23	0.230	1.243
AOGK	42	64.27	59.00	72.00	5.21	0.554	1.146
AOPK	42	26.42	20.00	32.00	4.40	0.474	2.225
AMAS	42	33.75	29.00	46.00	3.14	0.242	2.374
AKND	42	8.54	5.00	15.00	5.36	0.221	2.431
AKTR	42	10.32	6.70	17.00	3.73	0.162	1.148
AKNL	42	6.26	4.00	19.00	4.45	0.368	2.345

Explanation: mean (Mean), minimum (Min), maximum (Max), standard deviation (Std. Dev.), Skjunis (Skewn.), Kurtozis (Kurtosi.)

**Table 2.** Basic statistical parameters for the assessment of motor abilities in the segment of explosive strength

Varijable	N	Mean	Min.	Max.	Std.	Skewn.	Kurtos.
MBLP	42	19.85	14.00	34.00	3.28	0.064	1.263
MSVIS	42	21.43	16.00	28.00	5.24	0.152	0.609
MSDM	42	119.56	98.00	146.00	3.16	0.584	0.437

Explanation: mean (Mean), minimum (Min), maximum (Max), standard deviation (Std. Dev.), Skjunis (Skewn.), Kurtozis (Kurtosi.)

The results presented in Table 1 and 2 among the respondents in the scope of morphological characteristics and motor abilities of explosive power segments show that with none of the measures and variables exist statistically significant difference between the results of the normal distribution because the value of skewn does not exceed 1.00. Results kurtosis are below the normal distribution is 2.75, which makes it platykurtic or rambling.

**Table 3.** Canonical correlation analysis of morphological characteristics and repetitive force on the multivariate level

Can R	Can R <sup>2</sup>	Chi-sqr.	Df	P- Level
.63	.48	55.32	42	.00

Explanation: canonical correlation coefficient (R), the coefficient of determination (R<sup>2</sup>), the chi-square test (Chi-sqr.), The degree of freedom (Df.), Significance (P)

Results of canonical correlation analysis shows (Table 3) that the relations between the predictor system, which consists of anthropometric measures for assessing of morphological characteristics and criteria. According to the variables for assessment of explosive strength statistically significant pair of canonical factors is obtained.

Canonical factor explains the level of integration of a set of predictor variables with the criterion ( $R = .63$ ), as well as their common variance ( $R^2 = .48$ ). The influence of morphological characteristics on the performance of the explosive force is explained by the determination coefficient of 48%. The probability of error for the rejection of the hypothesis whether the function is significant or not, was found between predictors and criteria ( $P = .00$  Level) at the level of 99%.

Concerning the size of the coefficient of canonical correlation and common variance, it can be concluded that the explosive power of classroom teaching respondents will be manifested depending on their morphological characteristics.

**Table 4.** Canonical factors predictor of anthropometric measures

Antrtopometrijske mjere	Root 1
AONL	0.56
AOGK	0.63
AOPK	0.48
AMAS	0.58
AKND	-0.28
AKTR	-0.33
AKNL	0.22

In Table 4 are presented the biggest projections on the canonical factor . They have the following anthropometric measures of circular dimensionality of the skeleton and the mass of the body: chest circumference ( $r = 0.63$ ), body mass ( $r = 0.58$ ), upper arm circumference ( $r = 0.56$ ) and the volume of the lower leg ( $r = 0.48$ ). Therefore they have maximum condition on the results in all tests of explosive power. The smallest and insignificant projection on canonical factor have measures of subcutaneous fat.

**Table 5.** Canonical factors criterion variables of explosive strength

Varijable	Root 1
MBLP	0.56
MSVIS	0.47
MSDM	0.42

In Table 5 the results indicate that the maximum projection of the canonical factor has throwing the ball test ( $r = 0.56$ ), slightly smaller projection has jump in the air ( $r = 0.47$ ) and long ( $r = 0.42$ ).

According to the obtained results in this study it can be concluded that the establishment of relations of morphological characteristics with the results of the explosive power among the children in classroom teaching is an important practical and theoretical problem, which is of great importance for optimum orientation and selection of gifted children for sport, for planning, control and programming of regular and additional teaching of Physical Education, and to effectively monitor the development of important anthropological dimension (Stojanovic et al., 1975; Bala, 1981; Matvejevi Ulaga, 2000; Przulj, 2006; Durakovic, 2007).

#### 4. CONCLUSION

The results of the research indicate the high level of correlation between the latent structure dimensions of morphological characteristics and dimensions of the explosive force.

In the study is particularly observed negative impact of increased amounts of subcutaneous adipose tissue in relation to muscle tissue, resulting in a reduction in the manifestation of explosive strength dimensions.

These findings indicate the necessity of innovate teaching content directed to the reduction of subcutaneous fat and increase muscle mass, with the aim of achieving optimal relationship for integrated development of all anthropological dimensions for the fourth grade pupils of Primary School.

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