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# SPORTSKI LOGOS

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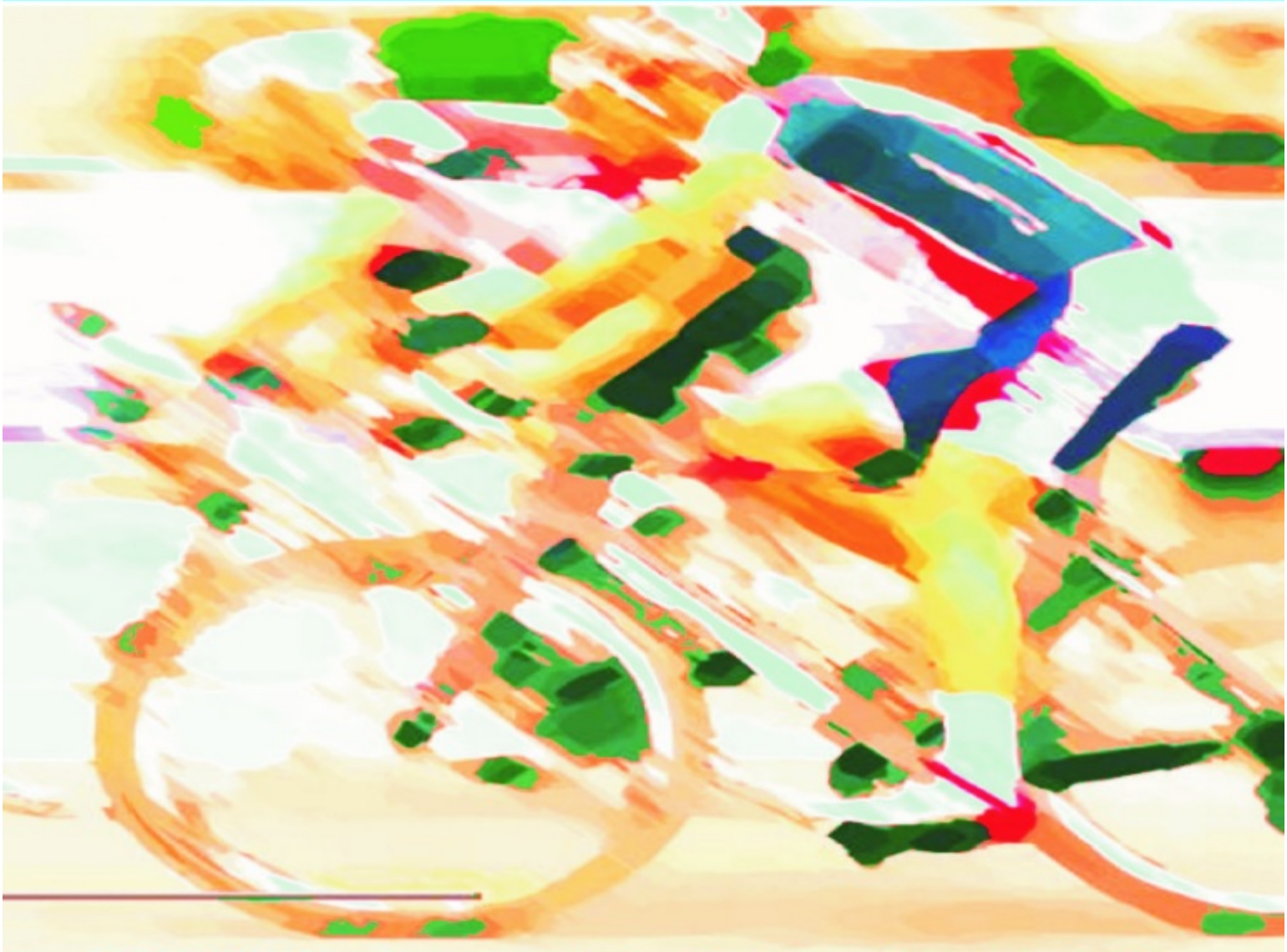

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# SPORTSKI LOGOS

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CONTENTS

# ANALISYS OF SUCCESS VOLLEYBALL CLUB IN KAKANJ BASED ON SITUATIONAL EFFICIENCY IN SEASON 2012/2013

Azer Korjenić, Adi Palić, Nabil Michael Sahab, Mensur Sarač

**Abstract:**
In order to make good-quality plan and program in any top class sport especially to realize it, it is necesseray to have knowledge in specific requirements of certain sport or its discipline but also, beside that, knowledge of relevant skills, characteristics and knowledge of player or group of players. Therefore, it is important to determine and follow situational effects which will help in succesful diagnosis of initial transitive and final state of training in order to reach good sports results. Aim of this research is to determine and show success of volleyball club based on situational efficiency season 2012/2013 where it is expected link between success and situational effiency of volleyball club.

**Keywords**: volleyball, situational efficiency, result success, training process.

## INTRODUCTION

Volleyball as sport demands certain level of particular antroplogical features in order player to have great performance under situational conditional. Therefor, there is constant need for theoretical research and practical checking of modern volleyball game.

## 2. METHOD OF WORK

### 2.2. Sample of respondents

In this research we used as sample volleyball club in Kakanj. We did analysis 19 games of this club in season 2012/2013 from total 21 played games , 19 of them contained statistical parameters while order 2 games could not be taken into account for analsyis due to lock their statistics.
Volleyball club in Kakanj played against following clubs: MOK Brčko Jedinstvo, HOK Domaljevac, OK 7.Lukavac, MOK Student Bobar, HOK Čapljina, OK Gacko, MOK Modriča Optima, OK Mladost Brčko, MOK Napredak, MOK Brčko Jedinstvo, HOK Domaljevac, OK 7. Lukavac, MOK Student Bobar, HOK Čapljina, MOK Gacko, MOK Modriča Optima, OK Mladost Brčko, MOK Napredak, MOK Modriča Optima.

### 2.2. Sample of variables

In this research will be used 15 variables in order to estimate situational efficiency in comparation with resultfull success: perfect attacks (SEUPN), postive attacks (SEPN), mistakes in attack (SEUGUN), percentage in attack (SEPUN), perfect services (SEPS), positive services (SEPS), perfect receiving (SEPP), positive receiving (SEPP), mistakes in receving (SEGUP), perfect defences (SEPO), positive defences (SEPO), mistakes in defence (SEGUO), perfect blocking (SEPB), positive blocking (SEPB), mistakes in blocking (SEGUB).

## 3. RESULTS AND DISCUSSION

Chart 1 is showing parameters with description of situational efficiency in volleyball with special overview on attack. For all given variables are calculated also central and dispersion parameters. We can see that players of volleyball club in Kakanj had approximately 72.32 $\pm$ 22.07 attacks from which they had minimum 26 and maximum 105 total attacks.
Perfect attacks they had approximately in range 40.16 $\pm$ 9.92 , while they had positive attack 11.11 $\pm$ 11.46 approximately.
Volleyball club in Kakanj did in total 13 $\pm$ 8.19 mistakes, with minimum 1 mistake until maximum 28 mistakes. Yet, volleyball club Kakanj in season 2012/2013 had big percentage of attacking success (57,53%). Normality of distribution of results is based on coefficient of curvature and flattening. Having a look at 2 parameters as skewness and kurtosis we can make conclusion that we have normal distribution.

| Variables | N | Range | Min. | Max. | AS | SD | Variance | Skew | Kurt |
|---|---|---|---|---|---|---|---|---|---|
| **U.attack** | 19 | 79 | 26 | 105 | 72.32 | 22.078 | 487.450 | .023 | -.347 |
| **PER.attack** | 19 | 39 | 22 | 61 | 40.16 | 9.923 | 98.474 | .462 | .010 |
| **POZ.attack** | 19 | 41 | 0 | 41 | 11.11 | 11.464 | 131.433 | 1.39 | 1.268 |
| **GRE.attack** | 19 | 27 | 1 | 28 | 13.00 | 8.199 | 67.222 | .335 | -1.15 |
| **Percent.attack** | 19 | 47 | 37 | 84 | 57.53 | 12.131 | 147.152 | .503 | .498 |

Table 1- Description parameters of situational efficiency in volleyball-attack

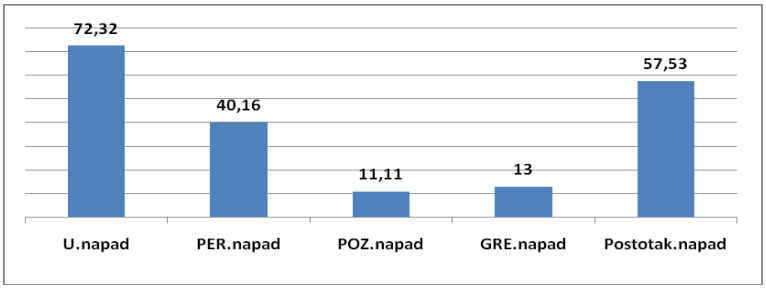


Chart 1- Average values of situational efficiency in volleyball-attack

Table 2. is showing description of parameters situational efficiency in volleyball regarding service. We can see that players of volleyball club in Kakanj had approximately 78.63 ± 13.313 service from which they had minimum 63 and maximum 113 total service.

Perfect attacks they had approximately in range from 10.47 ± 12.249, will positive service they had from 53.58 ± 18.45.
Volleyball club in Kakanj in servicing did 11.89 ± 8.35 mistakes from which they had minimum, 2 and maximum 43 mistakes.

| Variables | N | Range | Min. | Max. | AS | SD | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| **U.service** | 19 | 50 | 63 | 113 | 78.63 | 13.313 | 177.246 | 1.346 | 1.384 |
| **PER.service** | 19 | 57 | 2 | 59 | 10.47 | 12.249 | 150.041 | 3.809 | 15.591 |
| **POZ.service** | 19 | 76 | 11 | 87 | 53.58 | 18.425 | 339.480 | -.316 | .796 |
| **GRE.service** | 19 | 41 | 2 | 43 | 11.89 | 8.359 | 69.877 | 3.021 | 11.557 |

Table 2- Description parameters of situational efficiency-service

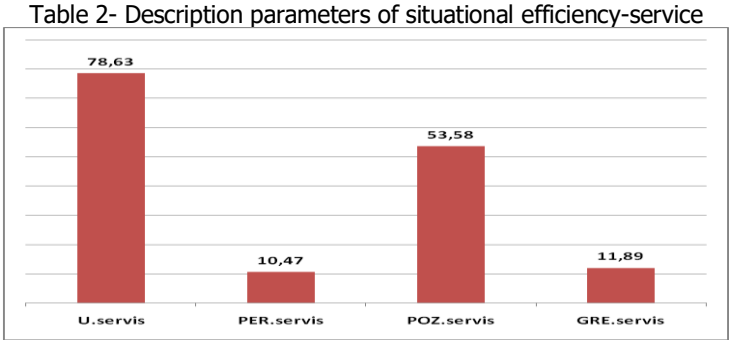


Chart 2.-Average values of situational efficiency in volleyball service

Table 3. is showing description parameters of situational efficiency in volleyball regarding receiving the ball. Players of volleyball club had average 50.68 ± 20.75 receiving, where they had minimum 0 and maximum 76 total receivings.

Perfect receiving average they had in range from 5.16 ± 9.69, will they had positive receiving from 39.84 ± 387.807. Volleyball club in Kakanj in receiving part did pravio 13 ± 8.19 mistakes, from which minimal 0 and maximum 7 mistakes.

| Variables | N | Range | Min. | Max. | AS | SD | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| **U.receiving** | 19 | 76 | 0 | 76 | 50.68 | 20.755 | 430.784 | -.941 | .556 |
| **PER.receiving** | 19 | 37 | 0 | 37 | 5.16 | 9.697 | 94.029 | 2.323 | 5.912 |
| **POZ.receiving** | 19 | 70 | 0 | 70 | 39.84 | 19.693 | 387.807 | -.846 | -.227 |
| **GRE.receiving** | 19 | 7 | 0 | 7 | 2.95 | 2.147 | 4.608 | .340 | -.470 |

Table 3. Description parameters of situational efficiency in volleyball-receiving

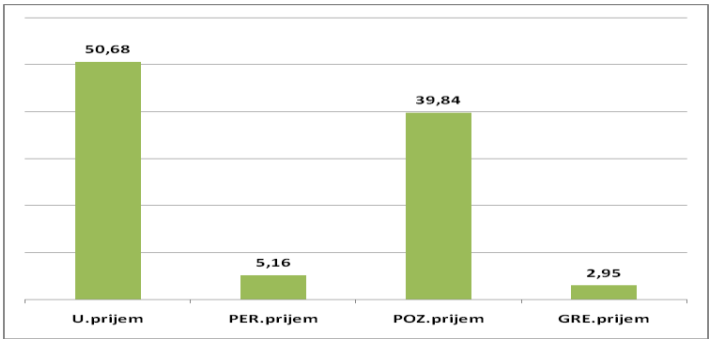


Chart 3- Average values of situation efficiency in volleyball-receiving

Table 4. is showing description parameters of situational efficiency in volleyball regarding blocking the ball. There we can see Kakanj players had a perfect block average 4.89 ± 4.52 blocks, where they had a minimum 0, and maximum 14 total blocks, while positive attack is 1.89 ± 2.76. Volleyball club in Kakanj had done in blocking 2.89 ± 4.80 mistakes, from which minimal 0 and maximum 9 mistakes.

| Variables | N | Range | Min. | Max. | AS | SD | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| **PER.block** | 19 | 14 | 0 | 14 | 4.89 | 4.520 | 20.433 | .791 | -.497 |
| **POZ.block** | 19 | 9 | 0 | 9 | 1.89 | 2.767 | 7.655 | 1.547 | 1.358 |
| **GRE.block** | 19 | 16 | 0 | 16 | 2.89 | 4.806 | 23.099 | 2.170 | 3.970 |

Table 4.- Descriptive parameters of situational efficiency in volleyball-block

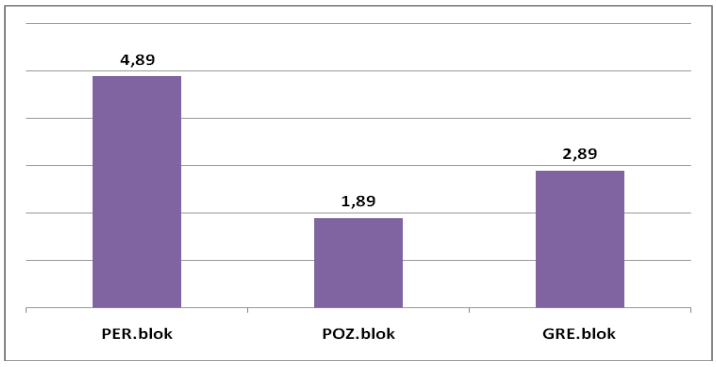


Chart 4.- Average values of situational efficiency in volleyball- block

Table 5. is showing description parameters of situational efficiency in volleyball regarsin defence. There are calculated central and dispersive parameters for whole applied variables.
We can see Kakanj players had average 15.47 ± 14.24 defences, from which minimal 0 and maximum 52 total defences. Perfect defence had average 1.53 ± 3.35, while positive defence had average 12.47 ± 10.86. Volleyball club in Kakanj did 0.88 ± 1.05 mistakes in defence, from which minimal 0 and maximum 1.02 mistakes.

| Variables | N | Range | Min. | Max. | AS | SD | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| **U.defence** | 19 | 52 | 0 | 52 | 15.47 | 14.245 | 202.930 | .868 | .717 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **PER.defence** | 19 | 13 | 0 | 13 | 1.53 | 3.356 | 11.263 | 2.640 | 7.433 |
| **POZ.defence** | 19 | 35 | 0 | 35 | 12.47 | 10.865 | 118.041 | .254 | -.917 |
| **GRE.defence** | 16 | 3 | 0 | 3 | .88 | 1.025 | 1.050 | .704 | -.863 |

Table 5.- Descriptive parameters of situational efficiency in volleyball- defence

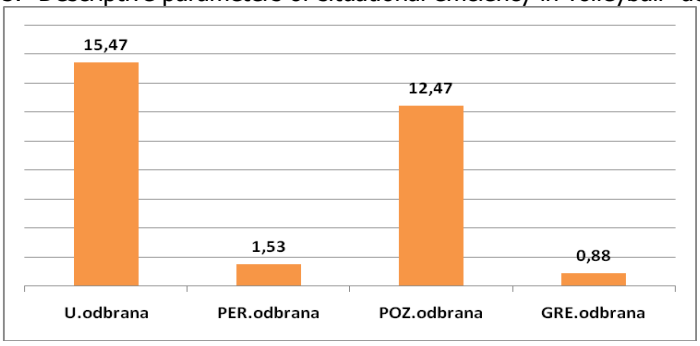


Chart 5.- Average values of situational efficiency in volleyball- block

Considering the table 6., we tried to interrogate connectivity between parameters situational efficiency of O.K. Kakanj on the level of statistic importancy p<0.050.
There we can see there is important connectivity between watched variables.
Connectivity between variable total attack and total service is very important, where coeficient of corelation is 0.713 togother with statistic importancy on level p=0.001.
Despite that, there is important connectivity between variables total attack and total receiving (r=0.599; p=0.007).

Beside that, we identified there is connectivity between variables total service and total receiving, which is very high togother with coeficient of corelation r=0.504 and statistical important on the level p=0.028. Also, there is poor connectivity between whole applied variables, because coeficient of corelation has a range from 0.21 to 0.41, but that connectivity is not statistical important.

| **Person coef. corelatiom** | | **U.attack** | **U.service** | **U.receiving** | **U.defence** |
|---|---|---|---|---|---|
| **U.attack** | **Pearson Correlation** | 1 | .713** | .599** | .422 |
| | **Sig. (2-tailed)** | | .001 | .007 | .072 |
| | **N** | 19 | 19 | 19 | 19 |
| **U.service** | **Pearson Correlation** | .713** | 1 | .504* | .335 |
| | **Sig. (2-tailed)** | .001 | | .028 | .161 |
| | **N** | 19 | 19 | 19 | 19 |
| **U.receiving** | **Pearson Correlation** | .599** | .504* | 1 | .387 |
| | **Sig. (2-tailed)** | .007 | .028 | | .101 |
| | **N** | 19 | 19 | 19 | 19 |
| **U.defence** | **Pearson Correlation** | .422 | .335 | .387 | 1 |
| | **Sig. (2-tailed)** | .072 | .161 | .101 | |
| | **N** | 19 | 19 | 19 | 19 |

Table 6.- Connectivity between parameters of situational efficiency

## 4. CONCLUSION

In this research, we did analysis on total 19 games O.K. Kakanj in season 2012/2013 from total 21 played games, where we tried to analyse result succes of volleyball club in Kakanj based on situational parameters of efficiency which are achieved in season 2012/2013.

It was trying to interrogate connectivity between parameters situational efficiency at O.K. Kakanj on level of statistical importancy. At the end, we can conclude there is connectivity between resulted success and situational efficiency of volleyball club in Kakanj in season 2012/2013.

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# ANALYSIS OF THE INFLUENCE OF BASIC-MOTORIC ABILITIES ON BUOYANCY IN SWIMMING

Almir Popo, Mladen Pavlinović, Damir Đedović, Rijad Novaković, Azer Korjenić

**Abstract:**
The purpose of this research is to confirm multiple coherence and influence of basic-motoric dimensions on the buoyancy in swimming with the students. The sample of respondents on this research is composed of male students from Faculty of Physical Education and Sport from the University in Tuzla, who successfully realized the program of the subject Swimming with total number of 58 entities. A scope of basic-motoric abilities is represented with variables which reflect latent dimensions: coordination, flexibility, repetitive strength and explosive strength.
The scope of situational elements of swimming is covered with variables; place buoyancy.
In order to obtain relevant indicator of connection as well as the influence of researched areas, there were applied adequate analysis and statistic procedures for processing data on univariate and multivariate level. It is determined a significant statistic connection,as a criteria variable with regression analysis, between basic-motoric abilities as a predictor system, and place buoyancy.
Coefficient of multiple correlation is relatively high 63%, with totally explained variability of about 41% on statistically significant level. So we can conclude that researched variables of basic-motoric abilities in this paper are participating in prediction of buoyancy in place with 41% involvement, while the remaining part of the variable 59% belongs to the other anthropological dimensions and other factors which hadn't been treated by this research.
Partial influence of individual variables of basic-motoric abilities on buoyancy in place is selected on two variables with statistical significance. The highest predicative value was manifested by agility on the ground variable as well as backwards polygon variable, both from subspace of coordination.

**Keywords:** swimming, motoric abilities, students, buoyancy in swimming

## INTRODUCTION

The ability of maintenance of a person on the surface, in water, is based on the principles of specific body weight, buoyancy and balance in water.
Swimmers body, staying still or moving in water, is behaving differently because there is a tremendous difference between action of the forces on the ground and in water. There is 4-6% body weight in static position above the water, depending of specific weight of human organism and water (specific weight of plain water is 1gr/**cm**, sea water 1,15-1,25gr/cm-increased concentration of salt and minerals, and specific weight of a human is in average 0,93-1,06gr/cm)
Specific body weight and its value depends on specific weight of bone, muscle and subcutaneous fat tissue. Specific body weight is changing and it is not constant value. During the inspiration this value is about 0,93-0,98gr/cm and in a situation of strong exhalation the value is logically increasing and amounts 1,03-1,08gr/cm (Turković, S. 2001)
Gravitational force and thrust act on the body staying still in water and these two forces are interrelated as forces of action and reaction. Gravitation force is more or less constant value, while force of thrust is based on Archimedean principle. Pulling force (muscle force) and water resistance force are acting on the body when the body is moving through water. Water resistance force depends on the shape of the body, velocity of the body through fluid, angle of attack of longitudinal axis of swimmer, density of the liquid and smoothness of the body. Resistances can be frontal, lateral and aspirational. The pulling force is opposite by its actions to the resistance force and it depends on physiological section of muscles, speed and biochemical processes happening in the muscle, the amount of active motor units and central nerve system and its mobilization.

## WORKING METHODS

The purpose of this research was to reveal if there is, and in to what extent (if the answer was affirmative) influence of basic-motoric abilities on detection of buoyancy in place with student population which has successfully completed swimming lessons.

**SAMPLE OF RESPONDENTS**

Sample of respondents in this research is consisted of students from Faculty of physical education and sport of University in Tuzla, male gender, who successfully realized program from the subject Swimming with total number of 58 entities.

**THE SAMPLE OF VARIABLES**

Variables of basic-motoric abilities.

Motoric abilities are prerequisite for quality of performing swimming techniques. There has been a selection of basic-motoric variables from four latent dimensions of motoric space, suitable for research in swimming.

Latent dimensions applied in this research are: coordination, explained with three variables (agility on the ground, backwards polygon and backwards long jump), flexibility explained with three variables (tumble with a bat, split from lying position and reach on the bench), repetitive strength explained with two variables (lifting of the torso laying on the back and lifting of the torso lying on the stomach), and explosive strength explained with two variables ( standing long jump and standing high jump). For determining dimensions related to situational motor skills in swimming it is used next criteria variable: Buoyancy in place (SMPLOV).

**Variables samples**

Variables of basic-motoric abilities.

1. Agility on the ground (MKOKNT),
2. Backwards polygon (MKOPOL),
3. Backwards long jump (MKOSDN),
4. Tumble with a bat (MFLISK),
5. Split from lying position (MFLPRL),
6. Reach on the bench (MFLPRK),
7. Lifting of the torso laying on the back (MRSPTL)
8. Lifting of the torso laying on the stomach (MRSPTT),
9. Standing long jump (MESNDM),
10. Standing high jump (MESNVM).

Variable of situational elements in swimming.

Criteria variable:Buoyancy in place (SMPLOV).

**METHDOS OF DATA ANALYSIS**

Regarding the posted problem, goals and tasks in this research and determination of verification hypothetical assumptions there have been applied suitable analysis of univariante and multivariante level.

It is necessary to subdue the observed results of this research to the following statistic operations and procedures, using software packages SPSS and STATISTICA.

Using descriptive statistics there have been calculated basic central and dispersion parameters, as follows:

Arithmetical mean, standard deviation, variance, Min-minimal value, Max-maximal value and Range.

Testing the normality of distribution is made based on given measures: asymmetry coefficient (Skewness), coefficient of elongation (Kurtosis).

By regression analysis it is determined the impact of basic-motoric dimensions on the manifestation of situational elements of swimming presented by buoyancy in swimming.

**RESULTS AND DISCUSSION**

Regression analysis of basic motoric abilities and place buoyancy.

With the regression analysis of these sets (Chart 1), it is determined statistically significant correlation between basic-motoric abilities as a predicator system and place buoyancy as a criteria variable.

The coefficient of multiple correlation is relatively high 63% (R=.634) with totally explained variability of about 41% (R Square=.401) on statistically strictest level Sig.=.00.

So we can conclude that researched variables of basic-motoric abilities in this paper are participating in prediction place buoyancy with 41% involvement, while the remaining part of the variable 59% belongs to the other anthropological dimensions and other factors which hadn't been treated by this research.

Partial influence of individual variables of basic-motoric abilities on place buoyancy is selected on two variables with statistical significance.

The highest predicative value was manifested by agility on the ground variable (MKOKNT) as well as backwards polygon variable (MKOPOL), both from subspace of coordination.

Tests responsible for mechanisms of structuring of movement, or dimension of coordination which is the least explored because of its complexity, have on isolated predicative dominant function. Therefore, we have to approach extremely careful to the obtained results because they are difficult to interpret meaningfully.

With these obtained facts on this sample of respondents it is possible to implement the prediction of influence of certain variables of basic-motoric abilities on the criteria variable buoyancy in swimming and therefore we partially accept special hypothesis: it expected statistically significant influence of basic-motoric abilities on buoyancy in swimming.

**CONCLUSION REMARKS**

With the regression analysis between basic-motoric abilities as a predicator system and place buoyancy as a criteria variable it is determined statistically significant correlation.

The coefficient of multiple correlation is relatively high 63% with totally explained variability of about 41% on statistically significant level.

So we can conclude that researched variables of basic-motoric abilities in this paper are participating in prediction of place buoyancy with 41% involvement, while the remaining part of the variable 59% belongs to the other anthropological dimensions and other factors which had been treated by this research.

Partial influence of individual variables of basic-motoric abilities on buoyancy in place is selected on two variables with statistical significance.

The highest predicative value was manifested by agility o the ground variable as well as backwards polygon variable, both from subspace of coordination.

With these obtained facts on this sample of respondents it is possible to implement the prediction of influence of certain variables of basic–motoric abilities on the criteria variable buoyancy in swimming and therefore we partially accept special hypothesis: it is expected statistically significant influence of basic-motoric abilities on buoyancy in swimming.

**Chart 1. Regression analysis of basic-motoric abilities and place buoyancy**

**Variables Entered/Removed[b]**

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | MESNVM, MFLISK, MKOKNT, MRSPTT, MRSPTL, MFLPRK, MKOSDN, MESNDM, MKOPOL, MFLPRL[a] | . | Enter |

a. All requested variables entered.

b. Dependent Variable: SMPLOV

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,634[a] | ,401 | ,274 | ,801 |

a. Predictors: (Constant), MESNVM, MFLISK, MKOKNT, MRSPTT, MRSPTL, MFLPRK, MKOSDN, MESNDM, MKOPOL, MFLPRL

**ANOVA[b]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 20,232 | 10 | 2,023 | 3,151 | ,004[a] |
| | Residual | 30,181 | 47 | ,642 | | |
| | Total | 50,414 | 57 | | | |

a. Predictors: (Constant), MESNVM, MFLISK, MKOKNT, MRSPTT, MRSPTL, MFLPRK, MKOSDN, MESNDM, MKOPOL, MFLPRL

b. Dependent Variable: SMPLOV

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 7,386 | 2,923 | | 2,526 | ,015 |
| | MKOKNT | ,401 | ,117 | ,589 | 3,424 | ,001 |
| | MKOPOL | -,336 | ,128 | -,462 | -2,634 | ,011 |
| | MKOSDN | ,000 | ,001 | -,029 | -,196 | ,845 |
| | MFLISK | ,000 | ,001 | ,055 | ,365 | ,717 |
| | MFLPRL | -,031 | ,017 | -,316 | -1,788 | ,080 |
| | MFLPRK | ,002 | ,002 | ,114 | ,719 | ,475 |
| | MRSPTL | -,002 | ,017 | -,014 | -,110 | ,913 |
| | MRSPTT | -,007 | ,007 | -,126 | -,969 | ,338 |
| | MESNDM | -,002 | ,001 | -,289 | -1,748 | ,087 |
| | MESNVM | ,002 | ,003 | ,112 | ,660 | ,513 |

a. Dependent Variable: SMPLOV

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# THE IMPACT OF PHYSICAL AND HEALTH EDUCATION LESSONS TO TRANSFORMING ANTROPOLOGICAL STATUS OF STUDENTS WITH INCLUSIVE NEEDS – CASE STUDY

Faris Rašidagić Source Scientific Paper

**Abstract:**
Inclusiveness means giving equal opportunities and maximum flexibility when complying specific educational and wider social needs of inclusive children. Inclusiveness is the approach based on the belief that every person has equal rights and opportunities and the accomplishment of those rights and needs has to be possible in physical/sport activities. In accordance to the above mentioned, the goal of this paper is to prove positive enforcement of physical and health education to transforming anthropological status of students with inclusive needs. Inclusiveness, besides school, should also be enforced in sports clubs, that is, outside the school. This type of work organization has not yet had a massive breakthrough. Study results of what other children think about inclusive process in physical and health education are mostly positive. It shows that this inclusive approach helps young minds develop their own personal values and makes them gain positive attitude towards people with special needs. Unlike the children, the experience with teachers who work in inclusive physical and health education is rather negative. The problem seems to be with insufficient training, which results in failure to incorporate inclusiveness. The obtained results show that with teacher's intercession, appropriate contents of physical and health education can be done. Transformation results are positive too. Teacher's attitudes should be changed with excessive training, which would result with successful inclusive process in physical and health education lessons. Parents' consent is obtained for the realization of this study and the author is obliged not to state full information about the students or school where the study was done.

**Key words:** High School, Limited Mental Capability, EURO FIT

## Introduction

To gain teachers more positive attitude about inclusive lessons process, there should be more training during their education but also more practice when teaching children with special needs (Block, 1999). Inclusive processes can be, besides school (Rašidagić, Manić, Mahmutović, 2016) also realized outside, within the activities of sports clubs for example. This has been proved in a case study about „Karate Club Zrenjanin"'s work principles (Vojvodina, Central Banat Region), where positive example has been noted since the club has eight years long cooperation with organizations which include inclusive children in different creative activities (Rašidagić, 2017). Other studies in this domain show that girls have more positive opinion about inclusive process than boys (Loovis and Loovis, 1997) so male population should be more educated about this. Inclusiveness is about giving equal opportunities to everyone and maintaining maximum flexibility to satisfy other social needs of the children, in this case, realization of physical and health education classes (Lazor, Marković and Nikolić, 2008). In accordance with the above mentioned, the goal of this paper has been set to prove positive effect of physical and health education to transforming anthropological status of inclusive students. Whether we talk about regular or special schools, two goals can be achieved if special needs children are included in regular attendance of physical and health education classes – improvement of anthropological status but also social interaction of participants (Golubović, Š. Maksimović, Golubović, B. 2012). In this paper, transformational processes of anthropological status have been concretely analyzed – case study of a particular child whose inclusive need is defined as „limited mental capability". Classification of mental capability is determined according to Grgin (2004) where four states or levels of mental disfunction are stated along with the limited one, fifth level:

1. Mild Mental Retardation
2. Moderate Mental Retardation
3. Severe Mental Retardation
4. Profound Mental Retardation and
5. Limited Mental Retardation

## The Examinee Sample

Case study sample was one inclusive needs boy attending high school for children with special needs in the area of Sarajevo Municipality. The student is diagnosed with limited mental retardation and mild emotional and social squalor. The student is 17 years old. The student did not participate in any organized sport activities besides physical and health education classes. Parent's consent is obtained for the realization of this study and the author is obliged not to state full information about the students or school where the study was done.

**Variable Sample**
Anthropometric Measurements:

1. Height
2. Weight
3. BMI (Body Mass Index).

EURO-FIT Battery:

1. Flamingo Balance test
2. Plate Tapping
3. Sit-and-Reach
4. Standing Broad Jump
5. Handgrip Test (is not realized due to material limitations)
6. Sit-Ups
7. Bent Arm Hang
8. 10 x 5 meter Shuttle Run

**Test Description**
EURO-FIT tests (Drljačić, Arsić, K. i Arsić, D. 2012.) were realized by the examinee who was wearing physical and health education outfit (t-shirt, sneakers, shorts). All the tests were done in the school gym. Non-gliding surface was provided for jumping and running tests. The order of doing the tests was organized in circular formation. Every work spot was numbered and described with guidelines of how to do the test. The examinee was given simple explanations about specific ways to do the test before the actual realization. The examinee was still between the tests and was not allowed to make a test try. The examinee was verbally positively encouraged while doing the tests. Initial and final testing was done in a completely same way with same measuring instruments. The overall number of attended physical and health education classes was 70. The student attended 60 classes during the year (he was absent due to minor health issues). The student was not included in sport club's activities outside school during the year. Subject teacher made lesson plans and schedule based on the results of initial testing.

**Data Analysis**
The concept of the research is „case study". One of the definitions of case study is „research about performance level" (Cohen, Manion & Morrison, 2011). The above-mentioned method gathers the information about target sample but the main goal is primary information or permanent learnings that give direction to research paper. The initial and final results are arrayed by the comparative method, according to which all the conclusions and references are analytically formulated.

**Research Results**
Research results are graphically presented from 1 to 3 as follows.

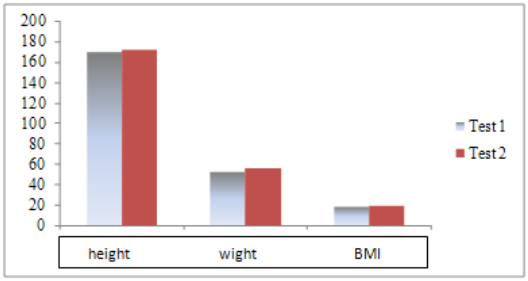
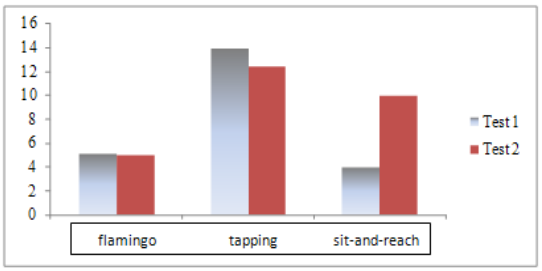



**Chart 1**. Differences between initial and final testing: height, weight and examinee's BMI

Regarding the student's height, at the beggining of the school year, he was 170,5 cm tall, while at the end of the year measured height increased to 172,5 cm. There is a positive difference of 4kg (52,2 kg / 56,1 kg) between initial and final measured body weight. The increase of height and weight reflected to vlaue changes of claculated BMI index - BMI=18 to BMI=19 .

**Chart 2.** Differences between initial and final




testing: Flamingo Balance test, Plate Tapping and Sit-and-Reach

Flamingo Balance Test results were negative. Final duration time of the test is 10 hundredths lower. Plate Tapping was done better than at the initial testing, 1 second and 56 hundredths. Sit-and-Reach test at the final measurement was increased for 6 cm.

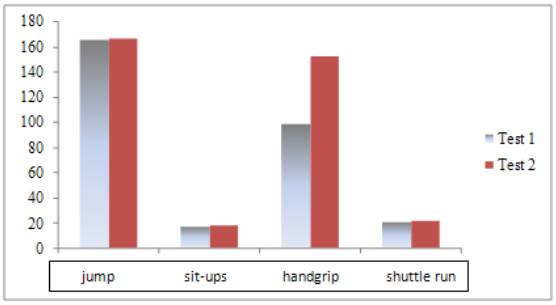



**Chart 3**. Differences between initial and final testing: Standing Broad Jump, Sit-Ups, Handgrip and 10 x 5 meter Shuttle Run

Standing Broad Jump has shown improvement in motoric capabilities – explosive strength of lower extremities. Initial measurement registered result of jump longitude is 166 cm and at the final measurement the result is 167 cm. The initial realization of Sit-Up test has recorded one repeat less when compared to final testing (initial – 18 repeats in 60 seconds / 17 repeats in 60 seconds). Handgrip test is usually done on the spindle. Due to lack of material and technical conditions (there was no spindle), the test was done on the loom. At the initial measurement, handgrip lasted 1 minute and 33 seconds. At the end of the school year and final testing, handgrip lasted 2 minutes and 33 seconds

and has significantly increased. 10 x 5 meter Shuttle Run, final results are lower than initial testing results. Initial time for test realization was 20:62 seconds and final time for test realization was 21:34 seconds.

**Discussion**

Noticing the student's height, you can say that in a period of one school year he has grown 2 cm. Taking in account that height is a morphological variable influenced by genetic factors (genetic factor inheritance: Y-haplotypeI-M170) student's height boost can be acknowledged as natural development. Scientific domain learnings show that height as a genetic factor is differently inherited in various regions (USA – 89% - other countries with poorer life conditions – lower than 89%). Nutrition style and physical activity can enhance height grow up to 10%. During the research, both mentioned factors are controlled (nutrition, physical activity) and it is assumed that such behavior can positively influence height grow.

Also, student's weight has transformed by growing for almost 4 kg between initial and final testing. After the values of height and weight have been connected by calculating BMI index (BMI=weight/height$^2$), level of initial „general anthropological status" is determined based on BMI=18 level. After that, it is safe to conclude that the examinee is at the point of denutrition. It is important to mention that BMI value graduation according to World Health Organization of United Nations (WHO UN established on 7th April 1948) has been used in this paper. Using the mentioned graduation, underweight value is BMI= 18,5 and overweight is BMI= 24,9. To suspend denutrition, student and his parents got instructions to arrange meals in few smaller portions and they also became familiar with daily nutrition values that are to be fed in the organism, how to calculate nutritive values in food and also that it is necessary for parents to regularly (after every meal) check and see if the student is consuming served food (Salapura, 2013). After final checkup, BMI value has increased to BMI=19 which is in accordance with height and weight improvement and confirms that having control over this segment of student's life has fulfilled its purpose.

Transformation of motoric abilities, after following the order of testing, has begun with the analysis of the Flamingo test which determines motoric ability to maintain balance (examinee's balance). This showed that final testing was slightly weaker, time difference was 10 hundredths. Such negative result does not show significant decrease, having in mind that value was lower for 0,01%. Recommendation for subject teacher: Have more content which enhances the above mentioned motoric capability in the lesson plans.

Hand tapping test is performed in a way to register the time in which a candidate executes 25 hand cycles (touching both boards represents one cycle). Time of the performance is shortened for 1 second and 56 hundredths or 11,16%. This result shows an advance compared to the initial testing.

The sit and reach test which determines flexibility of the examinee's body, has shown that the student has expressive low pain tolerance that occurs during body bending. This fact was stated after the student complained about strong back pain when he/she bends forward. Previously mentioned pain savor interfered with student's maximum capacity while undergoing the test. The achieved result was increased for 6 cm, that is improved for 40% at the final testing, and back pain was significantly decreased.

Standing Long Jump test has shown improvement of motoric skills – explosive strength of lower extremities. The result of the final measurement was +1 cm. The increasement of +0,5 cm can be considered as an advantage since the above mentioned motoric aptitude is greatly congenital. (H2=0,80; Čanaka, Šoš & Vučetić, 2005)

Sit-Up Test shows the strength of front part torso musculature and after the initial measurement, examinee did 17 repeats in 60 seconds. After the final testing he did 18 repeats in 60 seconds. The registered improvement is on the level of +5.5%.

Handgrip Test checks the static strength of upper extremities. Usually it is done on gym spindle. Due to lack of material and technical conditions (there was no spindle), the test was done on the loom. At the initial measurement, handgrip lasted 1 minute and 33 seconds. At the end of the school year and final testing, handgrip lasted 2 minutes and 33. Time expressed in percentage is longer for +85%.

10 x 5 meter Shuttle Run was the last to realize. The values of the test which show examinee's anaerobic stamina were weaker at the final then at the initial testing. Initial time of test realization was 20.62 sec, final registered time was 21.34 seconds (decreased for -3.37%). When the weaker result cause analysis was done, the examinee said his shoes were slippery and they were not properly tied. This explanation could not be entirely accepted since the test was done on non-slippery surface which is described in "Description" chapter. The main reason for failure on this test is the increase of examinee's height and weight.

Taking into account that gathered results for the majority of tests show positive difference between initial and final testing (Height, Weight, BMI Index, Movement Speed Frequency, Explosive Strength of Lower Extremities, Torso Strength, Upper Extremities Stamina), to conclude this research, we can say that the aimed goal was completed – positive influence of physical and health education to transforming anthropological status of inclusive students has been proved.

**Conclusions**

- Physical and health education lesson activities when adjusted to the needs of students with diagnosed limited mental capability and mild emotional and social squalor, can positively influence to anthropological status.

- Due to the fact this specific research was organized as case study and the given data was analyzed using descriptively-statistic and comparative work method, there was a certain limit to use these results. That is, the changes could only be determined by using comparative analytical methods of initial and final testing.
- Methods showing clearer and statistically significant differences between initial and final testing could not be used.
- This research should be organized and conducted on a larger number of examinees with similar or same cause characteristics, so the given results could be confirmed with more certainty.
- Organization of researches with same issues is recommended to other researchers, by using larger number of examinees or different examinee gender or different inclusive needs of examinee.

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# RELATIONS OF ANTROPHOLOGICAL STATUS AND RESULTS OF STATIONARY MOTORIC TESTS IN PHYSICAL EDUCATION LESSONS

Dženana Imamović , Faris Rašidagić

**Abstract:**
Research of influences and connection of different anthropological status of students is a continuous process. It is necessary to initially determine as many data as possible in order to enable the teachers to follow the development of their students. It is a good idea to determine initial motoric knowledge of students besides data that defines morphological and motoric status. According to given data, one can make a range of characteristics, capabilities and knowledge of students and compare them to data of similar or same age population.During the lessons, simple EUROFIT tests are used to gather data about motoric capabilities. Motoric knowledge is verified with situational-motoric tests and morphological status is determined by measuring height, weight and fat tissue on five different anthropological places. The goal of this research was to determine if there are correlational and cross correlational relations between different dimensions of anthropological status and results of situational motoric tests used in physical education lessons. Pearson's method of correlation and cross correlation measured the dependence of applied tests and anthropological space. Examinee sample is 85 students of first and second grade in high school. Teacher's knowledge of given parameters can enable individual approach to students as one of the steps to humanize physical education lessons.

**Key words:** *Correlation, Pearson, EUROFIT, Morphology, Motoric*

## INTRODUCTION

To make transformational effects of physical education lessons more effective, educators need to apply the newest data to plan their lessons. The connection of morphological characteristics with motoric capabilities and situational motoric knowledge is subject for a great number of researches (Krezić, 2002. Jašarević, 2006.). In the previously done research, there were significant connections of the entire anthropological status and it was confirmed that high level of motoric capabilities enables efficient realization of motoric exercises during physical education lessons. Besides motoric capabilities, body structure also has impact on different lesson units (Rašidagić, Manić, Vidović, 2011). Due to abovementioned reasons and continuous changes of investigated relations and correlations, research of anthropological spaces always has big appropriate impact (human population continually changes and develops). Positive or negative changes and their level can only be verified with continuous research. On classes, verification begins with determining initial status according to which one can decide about goal and choice of the most efficient means of transformation. One part of the data is gathered with EUROFIT test battery (Drljačić, Arsić, K. and Arsić D. 2012), second part is done by measuring certain morphological dimensions (Šoše & Rađo, 1998.), and third part is done with motoric and situational-motoric tests used in Bosnian schools described by Mikić (1999) amongst others.

Certain authors (Naumovski, 1984) have an opinion that physical education teachers must in certain extent apply scientific knowledge about increasing lesson effects. Lessons of 45 minutes two times a week are not sufficient and motoric active time has to be organized as efficiently as possible. Also, several authors „suggest "common work interaction of teachers, students, parents and school to enable best possible effects to increase physical capability and improve children's health (Adam et al. 1988, Strel, 1997 and Starc and Strel, 2012) Only then the lessons, even though short (45 min.) can have positive transformation of anthropological status.We can also add to this statement a research from group of Greek authors (Christodoulos, Flouris, Tokmakidis, 2006) who determined that there is a development during the school year but not during the holidays. Conclusion is that 30 minutes of everyday physical activity can decrease gaining weight and hyperkinesia. Newer research done by World Health Organization (WHO) show that this type of activity should be extended to 60 minutes a day. The aim of this research was to determine whether there are correlational and cross correlational between different dimensions of anthropological status and results of motoric tests on physical education lessons. Given

data should help educators and physical education teachers to acknowledge internal relations of different spaces after doing the tests and measurements (Momirović, 1989 and Rašidagić, 2002). Also, they should more efficiently use the data when planning even though there are only two classes per week.

## METHODS

### The Simple examinees

Examinee sample are high school male students between 16 and 17 years old. Total number of examinees – 85 students.

### The Simple variables

Gathered data is filled according to student's personal file. Given the fact there was great number of information in the file, number of used variables was reduced. Variables used to determine morphological characteristics were gathered in a way described by Šoše & Rađo (1998).

1.Variables to Determine Morphological Characteristics:

1.1. AVISTL (AVISTL),
1.2. Weight (ATEZTJ),
1.3. Skin Wrinkles (ANATRI),
1.4. Biceps Skin Wrinkle (ANABIC),
1.5. Subscapularis Skin Wrinkle (ANALED),
1.6. Subsprailiake Skin Wrinkle (ANATRB),
1.7. Calf Skin Wrinkle (ANAPOT).
EUROFIT battery test variables were used to determine basic motoric capabilities. These tests are used to determine motoric status of primary and high school students and that is why they were used here as well. Gathering of the variables to determine motoric capabilities was done in a way described in guidelines published by Council of Europe in 1983 (http:// www. bitworks - engineering. co. uk / linked / eurofit % 20 provisional % 20 handbook % 20 leger % 20beep % 20test % 201983. pdf, opened 5th April 2018).

2. Variables to Determine Motoric Capabilities:

2.1. Flamingo Test (MRFLAM),

2.2. Movement Frequency Speed/ Hand Tapping (MBFTAP),
2.3. Flexibility/Sit-and-Reach (MFLPRK),
2.4. Explosive Strength/Standing Broad Jump (MESDM),
2.5. Static Strength/Hand Grip (MSSAK),
2.6. Torso Strength/Sit-Ups (MRLS),
2.7. Functional Strength/Bent Arm Hang (MSAVIS),
2.8. Running Speed and Agility/Running 10x5m (SATL10×5).
Variable sample to determine specific movement structures in sports games demanded appliance of tests which revealed knowledge about basic technique elements. Data gathering was done according to Mikić (1999).

3. Variables to Determine Situational – Motoric Capabilities:

3.1. Basketball

3.1.1. Throwing the Ball Against the Wall (OKBLRZ),
3.1.2. Slalom Ball Lead (OKVLS),
3.1.3. Kos3. Throwing the Ball into the Basket (OKBLK),
3.2. Volleyball
3.2.1. Hitting the Wall with the Ball (OOOLZ),
3.2.2. Circle Ball Rebound (OOCK),
3.2.3. Service, (OOSR),
3.3. Handball
3.3.1. Throwing the Ball Against the Wall (ORBLZ),
3.3.2. Sevenoaks (ORIS),
3.3.3. Slalom Ball Lead (ORVLS).

### Statistical analysis

Program STATISTICA 12 was used during the research for data analysis. Testing of significance was done by applying correlation coefficient and inter correlation according to Pearson with level of significance set to (P<,05). While interpreting coefficient values one should use the rules:

- R from (0.25) to (0.50) or from (-0.25) to (-0.50) – low connection between variables
- R from (0.50) to (0.75) or from (-0.50) to (-0.75) medium to good connection between variables
- R from (0.75) to (1) or from (-0.75) to (-1) very good to excellent connection between variabl

## RESULTS

According to testing schedule, inter correlation data of morphological characteristics were analysed.

**Table 1: Results of Inter Correlation of Morphological Characteristics**

| ATEZTJ/ AVISTL | ANATRI/ ATEZTJ | ANALED/ ATEZTJ | ANATRB/ ATEZTJ | ANALED/ ANATRI | ANATRB/ ANATRI | ANATRB/ ANALED |
|---|---|---|---|---|---|---|
| .63 | .60 | .71 | .64 | .79 | .82 | .85 |

**Table 2: Results of Inter Correlation in Motoric Space**

| MFLPRK / MRFLAM | MSSAK / MESDM | SATL10×5/ MRFLAM | SATL10×5/ MFLPRK | SATL10×5/ MSSAK | SATL10×5/ MRLS |
|---|---|---|---|---|---|
| .69 | .25 | .26 | .25 | .28 | .34 |

**Table 3: Results of Inter Correlation in Situational – Motoric Tests**

| OKBLRZ/ OKVLS | OKBLRZ/ OKBLK | OKBLRZ OOCK | OKBLRZ OOSR | OOCK OKBLK | ORBLZ OKVLS |
|---|---|---|---|---|---|
| -.39 | .28 | .29 | .25 | .25 | -.25 |
| | | | | | |
| ORIS OKVLS -.25 | ORVLS OKVLS .70 | ORVLS OKBLK -.25 | ORVLS OOCK -.25 | ORVLS ORBLZ -.25 | / |

**Table 4: Results of cross correlation motoric/situational-motoric space**

| Dalj/ OKBLRZ | Sti.sake/ OKBLRZ | Sti.sake/ Kos2 | Sti.sake/ OOCK | Izdr.zgi/ ORBLZ | Taping ORVLS |
|---|---|---|---|---|---|
| .38 | .77 | .33 | .31 | .30 | .30 |

Weight of students is on correlational level (.63). Weight is in correlation with fat tissueANATRI (.60), ANALED (.71) and ANATRB (.64). Fat tissue correlates in internal relations: PMT ANATRI with PMT ANALED (.79), PMT ANATRI with PMT ANATRB - suprailiake (.82) and PMT ANALED with PMT ANATRB with (.85). After determined correlational values for morphological space, correlation in motoric space is introduced ( Table 1).

Less significant correlations were determined here. The highest value of correlation was shown in Flamingo test and student flexibility (,69). Other significant values are mostly of low connectivity (Table 2).

Highest correlation for situational - motoric tests was noticed between ORVLS and OKVLS tests, basketball and volleyball slalom ball lead (.70). Other inter correlational values within variables of basketball have significant connection. Basketball game test OKVLS – slalom ball lead correlates significantly with all situational – motoric tests of volleyball and handball (Table 3). ORBLZ – handball throwing the ball against the wall and handball test ORVLS – slalom ball lead is connected on lower level as well as test

circle ball rebound with handball slalom ball lead (.25).

There was no detected significance in the cross correlational space and relations between morphological measuring and motoric capabilities as well as situational – motoric capabilities. Due to that, results are not presented in this table.

Cross correlation between motoric capabilities and situational-motoric space has shown higher number of significant relations. The highest cross correlation has been noticed between hand grip and OKBLRZ basketball throwing with both hands against the wall (.77). Hand grip is also related to OKVLS test – basketball slalom ball lead with negative sign (.33) and positive with OOCK – volleyball circle ball rebound (.31). Explosive strength of lower extremities is on level (.38) on cross correlation with OKBLRZ test – throwing the ball with both hands against the wall and movement speed frequency is in cross correlation with situational motoric test ORVLS – slalom ball lead (.30). The same cross correlation coefficient (0.30) also connects throwing the ball against the wall with bent arm hang (functional strength of upper extremities). Other significant noted cross correlational connections are in the zone of lower relations and were not presented in this chapter (Table 4 only presents coefficients with .30 significances and higher).

## DISCUSSION

Results of analysis in most of the researched spaces show lower number of significant correlation connections. Correlations of weight and fat tissue are positive. More wrinkles on fat tissue are direct indicators of bigger student weight so this positive correlation is not a surprise. It can be stated that fat tissue of subkapularis, suprailike and triceps have most correlations while fat tissue of biceps and lower leg are not. Given the indicators, controlled measures for fat tissue could be reduced only for these 3 items in lesson process. This approach would reduce time for data collection in lesson process which was stated in one research by Bala, Popović and Stupar (2002). According to results of other researches, one can conclude that there is a negative connotation in almost all age groups between weight, fat tissue and results of motoric tests.It is expected that students with given characteristics achieve lower results in motoric tests (Bala, 1996; Kalac and Gotarev, 2015, Deforche et All 2003) and lessons. Teachers should take this in consideration while planning their lessons. Inter correlation between motoric space has shown less significant connections. Data can imply the precision of used tests and confirm quality of EUROFIT battery tests (Adam et All, 1998). The highest value of correlation was between balance and student flexibility so this can mean that keeping the balance requires moving parts of the body that maintain that position. Inter correlation in situational-motoric space has shown higher number of significant connections, which was expected, given the fact that realization of motoric tasks requires interaction of motoric capabilities. The highest connectivity is noticed between tests ORVLS and OKVLS (handball and volleyball slalom ball lead). It is necessary to have appropriate „agility "to do this test that enables more developed motoric capabilities (Rašidagić, 2001; Bajrić et All, 2014). Cross correlation of morphological-motoric space and cross correlation of morphological measures with situational – motoric capabilities do not have statistical significance. Absence of inter reaction between these two spaces should be additionally investigated applying more complicated statistical methods because conclusions of this research are opposite to conclusions of other researches (Bajrić et All, 2014; Horvat, 2010, Kondrič et All, 2002; Lopes et All, 2012). Cross correlations between motoric capabilities and situational – motoric space have shown higher number of significant relations. The highest cross correlation coefficient is between hand grip and OKBLRZ test – basketball throwing with both hands against the wall so the conclusion is that good realization of given test depends on hand grip strength.Hand grip strength is negatively connected with OKVLS slalom ball lead, that is, lower value of hand grip strength has positive effect on realization of this test (Rašidagić, Rađo & Vidović, 2011). Harder hand grip also positively effects circle ball rebound. Explosive strength of lower extremities was very important for realization of throwing the ball against the wall test (OKBLRZ). Given the fact that ball needs to be thrown very hard against the wall so it can rebound faster, this connection is logical. Hand movement frequency speed is in cross correlation with ORVLS – slalom ball lead. It is assumed that the ball (handball size of ball is small) needs to be bounced on the floor many times to keep it under control (Rašidagić, 2011). Other significant cross correlation coefficients are in the zone of low connectivity. After the analysis of given data, one can conclude that aim of this research was to determine if there are correlations and cross correlations between different dimensions of anthropological status andresults of situational motoric tests realized in physical education lessons. The conclusion is this was partially succeeded because cross correlations between morphological measures and motoric capabilities, nor cross correlations between morphological measures and situational – motoric capabilities were not registered.

So, initial testing does not necessarily help physical education teachers to completely understand relations of different spaces after process of testing and measuring and plan their lesson units.

## CONCLUSIONS

According to data given by initial testing and measuring of morphological, motoric and situational – motoric status of students, it was not possible to fully state the most efficient lesson contents.

To understand morphological and motoric status more fully, statistical methods to analyse such data should be more complicated besides using correlations and cross correlations.

Results of this research should be compared to results of similar researches using the data of different age or sex categories of students. This would give more complete insight in anthropological and situational – motoric space. In this way, teachers could plan physical education lessons more efficiently and increase positive transformational effects within the frame of number of lessons estimated for physical education.

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# EFFECTS OF ADDITIONAL CLASSES OF PHYSICAL EDUCATION ON THE TRANSFORMATION OF MOTOR CAPABILITY OF PUPILS 14-16 YEARS

Stjepan Skoko

Original scientific work

**Abstract:**
The aim of this research was to determine the level of transformation of the motor skills of highschool school students by the method of parallel analysis of the results of the experimental group in relation to the control group. A sample of respondents consisted of 130 students of the "Široki Brijeg" secondary school of Široki Brijeg, first and second grade, aged 14 to 16, divided by random selection in two numbers of the same group, control and experimental, with 65 male subjects. Within this study, the changes in the motor set were presented with fifteen (15) variables. Based on the statistical analysis of the investigated variables we gained a look at the normality distribution of the variables of variables within the investigated space, and to determine the difference between the initial and the final measurement, the t-test was used for independent samples and the obtained data of the quantitative changes of the applied motor variables were analyzed on the investigated sample , as well as the established differences within two time points under the influence of the regular work program (control group) and the influence of additional work program (experimental group) in the teaching of physical education. By examining the results of the initial and final measurements of the sample of experimental group of students who have attended an additional curriculum of physical education of 2 + 2 hours per week and on the basis of the significance of the changes in T-test for independent samples, it is clear that the supplementary work program in the teaching of physical education has produced statistically significant partial quantitative effects in all the investigated motor variables. This t-test result tells us that the additional 2 hour work program of physical education confirmed its purpose and function when it comes to a positive transformation of the investigated motor skills of the experimental group of respondents. We hope that the results of this research will contribute to further efforts to make changes to the curriculum for physical and medical education in terms of raising the hours fund as well as to ensure the better material and technical performance of the lesson.

**Key words**: physical and health education, transformation processes, T-test, students

## 1. INTRODUCTION

One of the priority tasks in working with children is undoubtedly concerned with their optimal growth and development. A particularly sensitive period of child development is the age of school age. In order for this process to take place appropriately, participants in the educational process should specifically plan work to achieve an integrated development of all anthropological dimensions. Teaching in school has a long tradition, but the maturity of this process itself is not enough evidence of its effectiveness and validity. Level of research, which was used to determine the effectiveness of the use of various kinesiological activities within teaching and extracurricular sports activities, showed that its content and intensity were not such that it could significantly influence the development of motor skills of students (Milenković, 2002). Newly introduced curricula and programs for physical education have been introduced in recent years, which without a doubt represents a step forward in comparison with each of the previous ones, but one of the weaknesses is that which is still insisted on the breadth of the choice of subjects, and there is no clear minimum of knowledge, which students have to master. For this reason, the impression is that classical forms of physical education have not achieved the positive effects of the development of motor and specific motor skills, as the capacities and opportunities of students are not sufficiently exploited. The reasons for this state of affairs and the role of physical education in high school are, first and foremost, poorly and necessarily inconsistent with the set goals of physical education, and neglecting the fact that anthropological status is complex, where there are certain correlations between individual segments of that status and exclusively so should be understood in research, but also in the planning of teaching contents and methods of work. It is important to emphasize the undefined initial and desired final status as well as the excessive focus on gaining broad motor information. Based on all of the above, it is obvious that urgent, substantial changes in the curriculum and physical education program are necessary in the secondary and especially in elementary schools. We know that the present choice of content and methods of physical education in secondary schools is relatively long under the dominance of the concept of "general physical exercise". By contrast, the radical solution in these endeavors is the implementation of physical education classes, more or less, with a strong emphasis on sports training, which implies the choice and use of specific means of exercise as well as the greater scope and intensity of work.If one wants to make an important contribution to the anthropological status of high school children, it is necessary to choose the physical exercises of general character and to apply them with a considerably higher intensity than is common

practice. Such thoughts were the basis for this research, whose intentions to take regular classes with elementary and secondary school students significantly intensify their activity on anthropological status through the enrichment of teaching with elements of sports and developmental gymnastics as well as various movable structures from various sports games. Additional teaching activities, carried out within different school associations and sections, within the community play an important role in developing psycho-stable and quality personalities of each student, which will help them later to avoid undesired deviant asocial behavior (Brown, 2000). Likewise, taking part in additional teaching activities helps students discover and develop their talents, develop their character and competence, and thereby benefit from expanding their scope of friends and acquaintances, which will eventually have multiple benefits. Based on the research conducted on the 73nd various additional curricula, the results showed that students attending these activities were significantly improved in four areas:, cognitive, emotional (in order to express feelings and attitudes), motoric as well as lighter and better social adaptation of behaviors, and a sensible improvement in school success (Durlak et al., 2007). Since additional teaching activity is one of the more effective tools that the teaching teacher further teaches and extends knowledge and views to the learner, they should be their best advocate and use the efficient development of healthy and active thinking students. The main goal, both regular and additional, is the development of the entire person in all its dimensions without exception. Educate through all forms of work intellectual progress, emotional advancement, physiological progress, and as the starting point of all the educational component (Findak, 1989, Skender, Pistotnik and Čolakhodžić, 2007).

## 2. METHODS

### Sample of respondents

The survey included 130 male and female secondary school students from Široki Brijeg, the age of 14 to 16, divided by the random selection method in two numbers of the same group, control and experimental, with 65 respondents .

**Table 1.- Descriptive parameters of sample morphological variables**

| Variable | | Control group | | Experimental group | |
|---|---|---|---|---|---|
| | N | Mean | Std.dev | Mean | Std.dev. |
| AVISTJI | 65 | 177,2615 | 4,09564 | 182,8077 | 6,61597 |
| ATEŽTJI | 65 | 73,9462 | 6,84546 | 75,0769 | 8,41327 |
| AVISTJF | 65 | 178,1923 | 3,88375 | 184,5923 | 6,39512 |
| ATEŽTFJ | 65 | 71,7692 | 4,46258 | 73,6077 | 6,18750 |

### Variables

As a measuring instrument in this study, a battery of tests of 15 variables for the assessment of motor abilities was taken. All measurements were carried out using standard procedures and instruments as described in the International Biological Program (IBP) guidelines (Mišigoj - Duraković, 2008). For the estimation of motor dimensions, a set of variables used in the same or similar research (Bilić 2001, Čolakhodžić and Rađo, 2011, Skender 2004) was applied and the same variants were included, ie, motor tests, measured in the order of are and are listed:

- **Speed** Tests: Hand taping (MBFTAR); taping foot (MBFTAN); taping the feet on the wall (MBFTNZ).
- Tests for Evaluation of **Coordination** Determination: Coordination with Stick (MKOSPA); airiness (MKOOUZ); ground motion (MKOONT).
- Tests for assessing the **flexibility**: spark plug (MFLISK); preterm at the bench (MFLPRK); streaching on floor (MFLSPA).
- Tests for Determination of **Explosive Strenght**: Jump in Space (MESSVM); landing distance from place (MESSDM); run 20m with high start (MFE20V).
- Tests for Determining Precision: Darts (MPRPIK); ball target shooting (MPGHCR); kicking target using the tennis ball with a foot (MPGVCN).

### Description and instrumentation of research

In this study, the first was to diagnose the initial state of the examinees in terms of investigated morphological characteristics and motor abilities. The team of scouts was made up of professionally trained persons with a completed Kinesiology faculty. Prior to the measurement, all the students were familiar with the procedures and testing and measurement procedures. The testing of the motor skills was performed at the School of Secondary Vocational School in Siroki Brijeg, which was equipped with all the equipment and requisites necessary to carry out this research as well necessary diagnostic measuring instruments. During testing, all test subjects had the same treatment. The research was carried out within the regular classes of physical education classes in the morning hours from 8.00 to 12.00 and at a temperature of 18-22 oC. After that, students were included in the sub-tutors at a regular 2-hour program and an experimental program of 4 hours per week. After the program was completed, the diagnosis of the final status of the respondent was done.

**Methods of data processing**

The data in this study were processed using software systems for univariate and multivariate data analysis. The analysis was done with SPSS 19.0. To determine the differences in the results of the investigated variables, created at two time points (initial and final measurement), we used the T-Test for the Small-Samples Test.

## 3. RESULTS WITH DISCUSSION

In Table 2, the results of the analysis of the central and dispersion parameters of the investigated motor ability of the control group of examinees (65) are presented at initial measurement.

**Table 2.- Descriptive parameters of motor variables control group - initial measurement**

| Variable | N | Rang | Min | Max | Mean | Std.dev | Variance | Skew. | Kurt. |
|---|---|---|---|---|---|---|---|---|---|
| MBFTAR | 65 | 12,00 | 21,00 | 33,00 | 28,2154 | 2,36175 | 5,578 | -,699 | ,281 |
| MBFTAN | 65 | 8,00 | 16,00 | 24,00 | 19,4308 | 1,97618 | 3,905 | ,288 | -,261 |
| MBFTNZ | 65 | 6,00 | 15,00 | 21,00 | 18,7538 | 1,22514 | 1,501 | -,246 | ,611 |
| MFLPRK | 65 | 28,00 | -14,00 | 14,00 | 1,2923 | 6,79090 | 46,116 | -,033 | -,785 |
| MFLISK | 65 | 85,00 | 50,00 | 135,00 | 77,8154 | 16,39635 | 268,840 | ,863 | 1,495 |
| MFLSPA | 65 | 49,00 | 12,00 | 54,00 | 29,2154 | 11,48979 | 132,015 | -,286 | -,512 |
| MFV20V | 65 | 1,27 | 2,98 | 4,25 | 3,6878 | ,38079 | ,145 | -,456 | -1,186 |
| MESSVM | 65 | 32,00 | 18,00 | 50,00 | 29,1077 | 7,19401 | 51,754 | ,623 | ,246 |
| MFESDM | 65 | 114,00 | 101,00 | 215,00 | 160,0769 | 28,43650 | 808,635 | -,088 | -,597 |
| MKOOUZ | 65 | 6,83 | 9,21 | 16,04 | 11,8982 | 1,85005 | 3,423 | ,603 | -,777 |
| MAGONT | 65 | 22,42 | 9,58 | 32,00 | 18,5306 | 3,98034 | 15,843 | ,598 | 1,397 |
| MKTOSP | 65 | 7,73 | 9,07 | 16,80 | 6,7052 | 1,75452 | 3,078 | ,786 | ,361 |
| MPGVCN | 65 | 13,00 | 5,00 | 18,00 | 11,8462 | 2,98030 | 8,882 | -,380 | -,320 |
| MPGHCR | 65 | 24,00 | 7,00 | 31,00 | 22,8923 | 4,90256 | 24,035 | -,616 | ,718 |
| MPGPIK | 65 | 51,00 | 10,00 | 61,00 | 33,6923 | 12,82079 | 164,373 | ,261 | -,772 |

The obtained values of central and dispersion parameters for most motor variables are within the values corresponding to normal distribution. Based on the scope and the standard deviation, satisfactory discrimination of most of the tests can be ascertained. The range between the minimum and maximum results is most pronounced in the Flexibility Assessment Tests: MFLSPA and MESSVM and Precision (MPGPIK) tests. The obtained relatively high values of the realized range of results, standard deviations and measurements of variance within the distribution of the results of the measured values as well as the asymmetry of the same with the positive sign indicate the homogeneity of the selected sample relative to the obtained values of the investigated motor variables. Particularly highly pronounced variability variables on initial measurement (Table 2) show explosive power measurements (MFESDM), flexibility (MFLISK and MFLSPA) as well as precision (MPGPIK).

Normality distribution of results was tested based on Skewness and Kurtosis. The asymmetric distribution of the results of motor variables in this study depends on the intermediate positions of the central tendency parameters, the variability measures as well as the SKEWNESS distribution coefficient. Significantly highlights of this parameter on initial measurement, there is no way to say that the resulting distribution error results, does not deviate much from the normal curve. The curvature of the distribution of the results of the applied motor variables is in the majority (8 variables) with a negative sign (hypochurical distribution), indicating the location of the expressed values of said variables in the zones of higher values of the arithmetic mean, while the 7 variables with the positive sign (epicurtic distribution) which indicate the location of the expressed values of the said variables in the zones of lower values of the arithmetic mean. Data on the discriminative value of the applied motor variables can also be obtained by examining elongation coefficients (KUTTOSIS). The slightly larger value of this parameter on the initial measurement in the control group is expressed by variables: MFLISK, ground coordination (MAGONT) and high start 20 meters (MFV20V). In Table 3, the results of the descriptive parameters of the applied

motor variables in the control group of respondents are shown on the final measurement. Particularly highly expressed variability variables at the final measurement, identical initial measurement are expressed by MFESDM, Flexibility (MFLISK and MFLSPA) as well as Precision (MPGPIK) variables. When it comes to a parameter that determines the normality of the horizontal distribution of results (Skewness), we can say that there are no significant deviations from the normal curve and that the majority of the values obtained with a positive sign tells us that it is an epicurical form of the wrong distribution of the obtained motor performance results at the final measurement, which directly indicates also the location of the expressed result values of the mentioned variables in the zones below the arithmetic mean. Data on the discriminative value of the applied motor variables can also be obtained by examining elongation coefficients (KUTTOSIS). The slightly higher value of this parameter on the initial measurement in the control group is expressed by variables: pre-clone on the bench (MFLPRK) and high start 20 meters (MFV20V).

**Table 3.- Descriptive parameters of motor variables control group - final measurement**

| Variable | N | Rang | Min | Max | Mean | Std.dev | Variance | Skew. | Kurt. |
|---|---|---|---|---|---|---|---|---|---|
| MBFTAR | 65 | 22,00 | 23,00 | 45,00 | 31,3385 | 4,99461 | 24,946 | ,687 | ,375 |
| MBFTAN | 65 | 12,00 | 17,00 | 29,00 | 21,9385 | 2,24915 | 5,059 | ,479 | ,542 |
| MBFTNZ | 65 | 10,00 | 14,00 | 24,00 | 18,7846 | 2,13228 | 4,547 | ,111 | -,132 |
| MFLPRK | 65 | 20,00 | 3,00 | 23,00 | 8,4615 | 4,51067 | 20,346 | 1,242 | 1,906 |
| MFLISK | 65 | 120,00 | 20,00 | 140,00 | 80,3385 | 21,95541 | 482,040 | -,184 | ,742 |
| MFLSPA | 65 | 50,00 | 4,00 | 54,00 | 33,7538 | 11,16780 | 124,720 | -,059 | -,197 |
| MFV20V | 65 | 3,64 | 2,36 | 4,00 | 4,0282 | ,64513 | 22,416 | ,589 | 1,444 |
| MESSVM | 65 | 30,00 | 20,00 | 50,00 | 32,0000 | 6,11095 | 37,344 | ,557 | 1,342 |
| MFESDM | 65 | 137,00 | 103,00 | 240,00 | 182,2308 | 26,95179 | 726,399 | ,028 | -,102 |
| MKOOUZ | 65 | 7,73 | 4,07 | 11,80 | 6,7052 | 1,75452 | 3,078 | ,786 | ,361 |
| MAGONT | 65 | 26,47 | 5,53 | 32,00 | 16,7862 | 4,93023 | 24,307 | ,376 | 1,262 |
| MKTOSP | 65 | 12,71 | 9,10 | 13,21 | 8,1103 | 2,30707 | 5,323 | ,817 | 1,240 |
| MPGVCN | 65 | 18,00 | 4,00 | 22,00 | 12,2308 | 3,69869 | 13,680 | ,209 | ,172 |
| MPGHCR | 65 | 20,00 | 12,00 | 32,00 | 23,2000 | 5,12713 | 26,288 | -,160 | -,707 |
| MPGPIK | 65 | 50,00 | 10,00 | 60,00 | 33,0462 | 13,78680 | 190,076 | ,216 | -1,111 |

Based on the presented results of motor variables in initial and final measurement in the control group of respondents (tables 2, 3), it is obvious that the results of average values of motor and variables in final measurement are significantly above average values of results in initial measurement in all examined variables , which tells us that the applied regular physical education program contributed to improving the results in the investigated areas in the control group of respondents. Table 4 shows the results of the analysis of the central and dispersion parameters of the investigated motor skills (15 variables) of the experimental group of examinees (65) on initial measurement. The obtained values of central and dispersion parameters for most motor variables are within the values corresponding to normal distribution. Based on the scope and the standard deviation, satisfactory discrimination of most of the tests can be ascertained. The range between minimum and maximum results is most pronounced in MFESDM, Precision (MPGPIK), MFLISK (MFLISK) and Side Spacing (MFLSPA) tests. Here too the relatively high values of the realized range of results, standard deviations and variance measurements are obtained within the distribution of the measured values of the results. The similarity with the positive sign indicates the homogeneity of the sample in relation to the obtained values of the investigated motor variables.

**Table 4.- Descriptive parameters of experimental group motor variables - Initial measurement**

| Variable | N | Rang | Min | Max | Mean | Std.dev | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| MBFTAR | 65 | 12,00 | 22,00 | 34,00 | 28,1846 | 2,80007 | 7,840 | ,139 | -,614 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MBFTAN | 65 | 8,00 | 15,00 | 23,00 | 18,8769 | 1,64419 | 2,703 | -,167 | ,188 |
| MBFTNZ | 65 | 8,00 | 14,00 | 22,00 | 18,3846 | 2,30280 | 5,303 | -,029 | -,900 |
| MFLPRK | 65 | 25,00 | -11,00 | 14,00 | 4,1538 | 5,40899 | 29,257 | -,804 | ,365 |
| MFLISK | 65 | 50,00 | 59,00 | 109,00 | 82,2308 | 12,08275 | 145,993 | ,465 | -,533 |
| MFLSPA | 65 | 32,00 | 19,00 | 51,00 | 33,9077 | 7,29667 | 53,241 | ,020 | -,440 |
| MFV20V | 65 | 1,22 | 3,29 | 4,51 | 3,8125 | ,26138 | ,068 | ,148 | -,594 |
| MESSVM | 65 | 26,00 | 19,00 | 45,00 | 32,3846 | 5,27877 | 27,865 | ,209 | ,088 |
| MFESDM | 65 | 107,00 | 113,00 | 220,00 | 164,7538 | 23,52195 | 553,282 | ,392 | ,257 |
| MKOOUZ | 65 | 6,93 | 9,67 | 16,60 | 12,3683 | 1,50691 | 2,271 | ,443 | -,118 |
| MAGONT | 65 | 12,42 | 11,58 | 24,00 | 16,5583 | 2,80282 | 7,856 | ,597 | -,032 |
| MKTOSP | 64 | 8,50 | 9,71 | 18,21 | 11,8802 | 1,87458 | 3,514 | 1,181 | 1,000 |
| MPGVCN | 65 | 12,00 | 7,00 | 19,00 | 13,1692 | 3,15520 | 9,955 | ,104 | -,834 |
| MPGHCR | 65 | 14,00 | 15,00 | 29,00 | 24,3077 | 3,60088 | 12,966 | -,747 | -,113 |
| MPGPIK | 65 | 42,00 | 15,00 | 57,00 | 31,8923 | 10,35936 | 107,316 | ,665 | -,070 |

Particularly highly expressed variability variables on initial measurement are expressed by MFESDM, MFLISK, and precision estimation variable (MPGPIK). In the case of Skewness curve, the results indicate that there are no significant values of this parameter, as the majority of the variables with a positive sign (epicuric distribution), indicating the location of the expressed values of the specified variables in zones of lower values than arithmetic environment. With regard to the obtained values of the Kurtosis coefficient, we can say that there are no significant vertical deviations from the normal curve. Table 5 shows the results of the analysis of the central and dispersion parameters of the investigated motor skills of the experimental group (65) on the final measurement. The obtained values of central and dispersion parameters for most of the experimental group experimental variables examined are within the values corresponding to normal distribution. Based on the scope and the standard deviation, a satisfactory discriminativeness of the larger part of the tests can be found. Here relatively high values of the realized range of results, standard deviations and variance measures were obtained within the distribution of the measured values.

**Table 5.- Descriptive parameters of experimental group motor variables- final measurement**

| Variable | N | Rang | Min | Max | Mean | Std.dev | Variance | Skew. | Kurt. |
|---|---|---|---|---|---|---|---|---|---|
| MBFTAR | 65 | 10,00 | 27,00 | 37,00 | 30,3231 | 2,52554 | 6,378 | ,716 | -,098 |
| MBFTAN | 65 | 8,00 | 24,00 | 31,00 | 28,8769 | 4,64419 | 22,703 | -,067 | ,688 |
| MBFTNZ | 65 | 8,00 | 16,00 | 24,00 | 19,3077 | 2,21446 | 4,904 | ,398 | -1,020 |
| MFLPRK | 65 | 19,00 | 4,00 | 23,00 | 10,1077 | 3,80839 | 14,504 | 1,146 | 1,565 |
| MFLISK | 65 | 45,00 | 51,00 | 96,00 | 71,8462 | 10,63783 | 113,163 | ,158 | -,488 |
| MFLSPA | 65 | 28,00 | 14,00 | 42,00 | 29,1385 | 6,59753 | 43,527 | -,422 | -,385 |
| MFV20V | 65 | ,93 | 3,19 | 4,12 | 3,6634 | ,23483 | ,055 | ,255 | -,665 |
| MESSVM | 65 | 19,00 | 29,00 | 48,00 | 36,3538 | 5,13393 | 26,357 | ,741 | -,056 |
| MFESDM | 65 | 68,00 | 156,00 | 224,00 | 182,4923 | 18,40272 | 338,660 | ,666 | -,256 |
| MKOOUZ | 65 | 3,88 | 8,74 | 12,62 | 10,5886 | ,94029 | ,884 | ,258 | -,597 |
| MAGONT | 65 | 7,39 | 10,08 | 17,47 | 13,3063 | 1,94744 | 3,793 | ,103 | -,900 |
| MKTOSP | 65 | 5,51 | 9,11 | 14,62 | 11,0432 | 1,41162 | 1,993 | ,835 | -,048 |
| MPGVCN | 65 | 12,00 | 10,00 | 22,00 | 14,8923 | 2,88381 | 8,316 | -,006 | -,639 |
| MPGHCR | 65 | 18,00 | 18,00 | 36,00 | 26,0615 | 4,42252 | 19,559 | -,001 | -,570 |
| MPGPIK | 65 | 46,00 | 16,00 | 62,00 | 37,4154 | 10,45809 | 109,372 | ,189 | -,597 |

Asymmetry of the same with positive sign indicates the homogeneity of the selected sample relative to the obtained values of the investigated motor variables. Particularly highly expressed variability variables on the final measurement are expressed by MFESDM, MFLISK, and the precision estimation variable (MPGPIK). When it comes to curve coefficient - Skewness, the results indicate that there are no significant values of this parameter as well as that most variables with a positive sign (epicurtical distribution), indicating the location of the expressed values of these variables in smaller value zones from the arithmetic environment. With regard to the obtained values of the Kurtosis

coefficient, we can also state that there are no significant significant vertical deviations from the normal curve. Based on the presented results of the motor variables in initial and final measurement in the experimental group of respondents, it is obvious that the results of the average values of the motor variables in the final measurement are significantly above the average values of the results in the initial measurement in all the examined variables, which indicates that the supplementary teaching program of 2 hours of physical education, contributed to improving the results in the investigated areas in the control group of respondents. With the help of t-test, the results of quantitative changes of the applied motor variables on the investigated sample were analyzed as well as the established differences within two time points under the influence of regular and additional work program in the teaching of physical education. By examining the results of the arithmetic meanings in the investigated motor variables on the initial and final measurement of samples of the examinees of the control group of the students who attended a regular plan and program of physical education of two hours per week. Based on the significance of the variation (T-test) of the T-test for dependent samples (Table 6), it is clearly apparent that the regular curriculum of physical education has produced statistically significant partial quantitative effects in most investigated engine room variables.

**Tabela 6.- Significance of engine variables difference in initial and final test control group**

| Variable | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Dev. | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| Initially-Final (2) | | | | | Lower | Upper | | | |
| 1 | MBFTAR – 2 | -3,12308 | 5,60276 | ,69494 | -4,51137 | -1,73478 | -4,494 | 64 | ,000 |
| 2 | MBFTAN – 2 | -3,18462 | 2,62138 | ,32514 | -3,83416 | -2,53507 | -9,795 | 64 | ,000 |
| 3 | MBFTNZ – 2 | ,50769 | 2,06249 | ,25582 | -,00337 | 1,01875 | 1,985 | 64 | ,051 |
| 4 | MFLPRK – 2 | -7,18462 | 7,44541 | ,92349 | -9,02950 | -5,33973 | -7,780 | 64 | ,000 |
| 5 | MFLISK – 2 | -2,60000 | 26,10843 | 3,23835 | -9,06935 | 3,86935 | -,803 | 64 | ,425 |
| 6 | MFLSPA – 2 | -4,76923 | 18,07689 | 2,24216 | -9,24847 | -,29000 | -2,127 | 64 | ,037 |
| 7 | MFV20V – 2 | -,20831 | ,51972 | ,06446 | -,33709 | -,07953 | -3,231 | 64 | ,002 |
| 8 | MESSVM – 2 | -2,89231 | 9,57719 | 1,18790 | -5,26542 | -,51920 | -2,435 | 64 | ,018 |
| 9 | MFESDM – 2 | -22,15385 | 34,88205 | 4,32659 | -30,79719 | -13,51050 | -5,120 | 64 | ,000 |
| 10 | MKOOUZ – 2 | 4,97969 | 2,22131 | ,27552 | 4,42928 | 5,53011 | 18,074 | 64 | ,000 |
| 11 | MAGONT – 2 | 1,81415 | 5,78789 | ,71790 | ,37999 | 3,24832 | 2,527 | 64 | ,014 |
| 12 | MKTOSP – 2 | -1,40508 | 3,30894 | ,41042 | -2,22499 | -,58516 | -3,423 | 64 | ,001 |
| 13 | MPGVCN – 2 | -,38462 | 4,79157 | ,59432 | -1,57191 | ,80268 | -,647 | 64 | ,520 |
| 14 | MPGHCR – 2 | -,30769 | 7,35468 | ,91224 | -2,13009 | 1,51471 | -,337 | 64 | ,737 |
| 15 | MPGPIK – 2 | ,64615 | 18,56360 | 2,30253 | -3,95368 | 5,24599 | ,281 | 64 | ,780 |

These changes occurred in all the engineered variables except for the variables of MFLISK and precision (MPGHCR, MPGVCN and MPGPIK), which tells us that the regular program applied Physical education teaching was not sufficient, ie it is not adequately planned and programmed in terms of operator choice, scope and intensity of work in the development of precision and partial flexibility (operators for the development of shoulder strap flexibility). Based on the results of the arithmetic meanings in the motor variables on the initial and final measurement for the samples of the experimental group of pupils who attended an additional curriculum of physical education of 2 + 2 hours per week and on the basis of the significance of changes (differences) tested by T-test for the dependent samples (Table 7), it is clearly apparent that the regular and additional work program in the teaching of physical education produced statistically significant partial quantitative effects in all investigated motor variables.

Table 7.- Significance of engine variables difference in initial and final test experimental group

| Variable | | Paired Differences | | | | | t | Df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Dev. | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| 1 | MBFTAR – 2 | -2,13846 | 2,69767 | ,33460 | -2,80691 | -1,47001 | -6,391 | 64 | ,000 |
| 2 | MBFTAN – 2 | -,92308 | 1,54422 | ,19154 | -1,30572 | -,54044 | -4,819 | 64 | ,000 |
| 3 | MBFTNZ – 2 | -5,95385 | 6,64368 | ,82405 | -7,60007 | -4,30762 | -7,225 | 64 | ,000 |
| 4 | MFLPRK – 2 | 10,38462 | 11,94217 | 1,48124 | 7,42549 | 13,34374 | 7,011 | 64 | ,000 |
| 5 | MFLISK – 2 | 4,76923 | 6,75872 | ,83832 | 3,09450 | 6,44396 | 5,689 | 64 | ,000 |
| 6 | MFLSPA – 2 | ,14908 | ,22085 | ,02739 | ,09435 | ,20380 | 5,442 | 64 | ,000 |
| 7 | MFV20V – 2 | -3,96923 | 4,86367 | ,60326 | -5,17439 | -2,76407 | -6,580 | 64 | ,000 |
| 8 | MESSVM – 2 | -17,73846 | 22,25090 | 2,75988 | -23,25196 | -12,22496 | -6,427 | 64 | ,000 |
| 9 | MFESDM – 2 | 1,77969 | 1,23986 | ,15379 | 1,47247 | 2,08692 | 11,573 | 64 | ,000 |
| 10 | MKOOUZ – 2 | 3,25200 | 2,33963 | ,29020 | 2,67227 | 3,83173 | 11,206 | 64 | ,000 |
| 11 | MAGONT – 2 | ,82692 | 1,26014 | ,15630 | ,51467 | 1,13917 | 5,291 | 64 | ,000 |
| 12 | MKTOSP – 2 | -1,72308 | 2,51562 | ,31202 | -2,34642 | -1,09974 | -5,522 | 64 | ,000 |
| 13 | MPGVCN – 2 | -1,75385 | 5,15701 | ,63965 | -3,03169 | -,47600 | -2,742 | 64 | ,008 |
| 14 | MPGHCR – 2 | -5,52308 | 9,96260 | 1,23571 | -7,99169 | -3,05447 | -4,470 | 64 | ,000 |
| 15 | MPGPIK 2 | -5,47901 | 7,16460 | 1,34571 | 7,21469 | 3,04400 | 4,101 | 64 | ,000 |

This t-test result tells us that the additional 2 hour work program of physical education confirmed its purpose and function when it comes to a positive transformation of the investigated motor skills of the experimental group of respondents.

## 4. CONCLUSION

The aim of this paper was to establish the level of transformation of the motor skills of high school students by the method of parallel analysis of the results of the experimental group samples in relation to the control group, while determining which of the offered teaching model offers more efficient results. The t-test for independent samples was analyzed and the obtained data of quantitative changes of the applied motor (15) variables on the investigated sample were analyzed as well as the established differences within two time points under the influence of the regular work program (control group) and the influence of the additional work program (experimental group) in the teaching of physical education. By examining the results of the initial and final measurements for the samples of the examinees of the control group of the students who attended regular curricula and classes of physical education of two hours per week, and on the basis of the significance of the changes (tests) tested by the T-test for the dependent samples, that the regular curriculum of physical education has produced statistically significant partial quantitative effects in most of the explored variables of the motor space. Changes occurred in all the engineered variables except for the variables for MFLISK and precision (MPGHCR, MPGVCN and MPGPIK), which tells us that a regular program of instruction physical education was insufficient, ie it was not adequately planned and programmed with regard to operator choice, scope and intensity of work in the development of precision and partial flexibility. By examining the results of arithmetic meanings in motor variables on initial and final measurement for samples of the experimental group of students, it is clearly apparent that the regular and additional work program in the teaching of physical education produced statistically significant partial quantitative effects in all investigated motor variables. This t-test result tells us that the additional 2 hour work program of physical education confirmed its purpose and function when it comes to a positive transformation of the investigated motor skills of the experimental group of respondents. Realizing a process of transformation is a process in which man as a system leads from one state to another. With these processes, it is necessary to manage or direct the system to the desired goal, and for the efficiency of management it is necessary to know the elements of the system and their mutual relations. Physical and health education, in essence, represents a specific transformation process in which the effects are achieved by specific means and targeted work programs. Managing this transformation process is maximally effective if there is a backlinks that provides flow of information from teacher to student and vice versa. In order to achieve this, it is necessary for a physical and health educator, or a teacher, to have information on the status of the

subjects with which he or she is teaching. That is why every curriculum of physical and medical education must be based on realistic and feasible assumptions and must be adapted to the objective possibilities of each individual student as much as possible. In many previous studies, it has been established that certain exercise processes have a significant impact on the changes in different human traits, abilities and motor skills. The practical justification of this research is to provide an insight into the level of quantum changes in the motor skills of students aged 14 to 16, under the influence of a specially designed work program, through additional 2 hours of physical education (2 + 2), and to create a greater habit and motivation of students to engage more actively in sports and sport activities, outside and within teaching, within sports and social organizations that gather young people, and to, among other things, preserve health and healthy lifestyles, because all this activity will enable greater working and thus educational productivity. Every activity, especially kinesiological, which can effectively influence the development of basic motor skills and morphological characteristics in our interesting period of growth and development, is of great interest and interest to the entire social community because the foundation of anthropological features is the basis of good status and prerequisite for acquiring and training of motor skills. Theoretically, looking for new knowledge and information, the significance of this work and its contribution and a solid basis for some other scientific research, where comparisons of the obtained results could contribute to the analysis of the impact of designed programs on some dimensions of morphological characteristics and motor abilities. Certainly, the results of this research will also contribute to further efforts to make changes to the curriculum of physical and medical education in terms of raising the hours fund as well as to ensure the better material and technical conditions of performance.

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# THE INFLUENCE OF MORPHOLOGICAL CHARACTERISTICS ON THE PERFORMANCE OF STATIC POWER IN THE BODYBUILDING AND WEIGHT LIFTING

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**Abstract:**
The aim of this study was to determine the influence of certain morphological characteristics on the expression of static strength in bodybuilders and weightlifters. The sample of respondents in this research is made up of athletes (N = 61) who are actively engaged in bodily building and weight lifting, members of U.G. Fitness club "GYM" in Banovići. The choice of variables was carried out in accordance with the problems encountered in this research, based on which the relevant indicators of the relationships and the influence of the investigated anthropological features - morphology in the expression of static strength in the respondents can be reached. The choice of variables is based on past experience and research of similar issues. The area of morphological characteristics is represented by nine variables according to the International Biological Program (IBP): 1. Body height (ATJVIS), 2. Leg length (ADULT), 3.Arm length (ADDRESS), 4.Breast circumference (AOBGRU), 5.The volume of the abdomen (AOBTRB), 6.The circumference of the upper arm (AOBNAD), 7.The circumference of the forearm (AOBPOD), 8.The circumference of the thigh (AOBNAT), 9.The circumference of the lower leg (AOBPOT). The variables are structured from the longitudinal dimensionality of the skeleton and body circumference as variables subject to transformation under the influence of different operators and responsible for the manifestation of different types of strength. For the research of strength as a segment of the motor space, tests that were used reflect the apparent dimensions of static power and make it two variables: 1. Semi-tongue discharge (SSIPCU), 2. Tumble hold (SSIZGI). The results show that the morphological characteristics have 24% influence on the expression of the static strength of the lower extremities. Individually, the greatest influence on the manifestation of static foot strength was achieved by the variables of the circumference of the hip, the volume of the abdomen and the volume of the breast. We can conclude that subjects with higher circumference and breast, and without adipose tissue of the abdomen, had higher static strength of lower extremities than subjects who do not possess such morphological characteristics. The researched variables of morphological characteristics in this paper participate in the prediction of the static power of the upper extremities with 63% impact. On the isolated predictive function, the dominant role is played by the variables of the body height and length of the arm, and the volume of the abdomen. All three measures are a negative sign, meaning that subjects with these characteristics had lower static strength of the upper extremities, while subjects with lower body height and volume of the abdomen and shorter upper extremities manifested greater static strength of the arm.

**Keywords**: bodybuilding, static force, transformations, anthropological features

## INTRODUCTION

The problems and tasks of the structure, influence, and relation of certain anthropological dimensions of man represent the basic methodological principles of research as well as the application of the obtained scientific results in sports practice. The reasons for this lie primarily in the complexity of the functioning of a human being, which integrates the functioning of motoric, functional and cognitive features, as well as various anthropological characteristics and other resources. All these segments of human existence are mutually interconnected and interdependent, making the human being, without any doubt, a special place in a familiar universe with a complexity that often exceeds the possibilities of understanding (Rađo et al 2000). When added to the fact that man as a being is constantly evolving and that his features practically do not have a static character at any time, there is a knowledge of the degree of complexity and dynamics that often exceeds the possibilities of identifying his characteristics, abilities, other characteristics, and their mutual relations. The process of understanding anthropological dimensions should begin by examining the structure of certain characteristics and abilities and in the first place morphological and motoric characteristics. Among all anthropological dimensions, morphological dimensionality is first observed, and we know that the importance of body structure is a very important predisposition for some sporting activity. The influence of a program depends on the complexity of units, their interconnectedness, the volume of the transformation process, the energy and information orientation of the program, as well as the circumstances in which the procedure is performed (Mraković, 1992).The precondition for carrying out innumerable moving activities consists of basic and motor skills that are called those abilities of the man

who participate in solving motor tasks and condition the successful movement, regardless of whether they have been acquired by training or not (Malacko and Radjo, 2004) that the greatest positive shift in the development of these abilities is achieved in the younger age group. Anthropologists alarmingly warn that today we forget one of the basic human needs - the need for movement. Lack of movement and decreased physical activity - hypokinesia, with obesity, as a consequence of untapped energy, which is introduced mainly by poor quality "fast" food, and stress, as an unavoidable consequence of fast lifestyle, are also called deadly triad of diseases of modern civilization. The manifestations of these diseases are visible and troubling. Bodies and organic systems are decaying, primarily the heart, which increases the possibility of infarction, and lungs, which lose their capacity. In addition, blood vessels lose their elasticity, the muscles of the lumen, the joints reduce mobility, numerous postural deformations, and more. Is the solution to the above-mentioned problems raised? The solution certainly exists - it's physical activity. By the definition of the American College of Sports Medicine (ACSM, 2001), physical activity is any movement of the body that is a consequence of muscular contraction and which leads to energy consumption. It includes a wide range of activities, games, physical exercise, competitive sports disciplines, as well as physical effort during professional activities or during housework, in one word, any kind of physical work. Physical activity in the form of a designed physical exercise has a very positive effect on human psychophysical health. Symptoms of depression, phenomena so inherent in modern society, physical exercise reduces as effective as psychotherapy. The mechanism of action of physical activity on the psyche is mostly simple. It is in the nature of man that he reacts to stressful situations by attack or escape. Because of moral norms, a man often suppresses his frustrations and anger, not reacting. Physical exercise is an ideal valve for previous frustration, as well as a means of psychic preparation for coping with the challenges of modern life. The physical impact of exercise is reflected in a harmoniously developed body, morphological changes, and composition of the body, a high level of development of motor abilities, numerous motor habits, harmonious functioning of organs and organic systems, etc.

In general, a revolution in the body concept (including the commercial market) is underway. Body culture is expanding and includes bodybuilding, yoga, pilates, taj chi chuan, dancing, therapeutic exercises, martial arts, jazz gymnastics, medical procedures, sports tourism including a series of social groups and subgroups (Jarić, 2003). The American Association for Health, Physical Education, Recreation and Dance (1989) mentions the so-called AAHPERD - American Alliance for Health, Physical Education, Recreation and Dance. Physical fitness components include aerobic endurance, muscular strength, muscular endurance, flexibility, and body composition. On the basis of the obtained initial indicators in the area of morphological and motoric characteristics, optimal planning and programming of physical activity, as well as control of ontogenetic development can be done.

Changing the level of motor abilities is an indivisible part of growth and development and is determined by chronological, physiological age and gender, and is influenced by a number of endogenous and exogenous factors. It is necessary to recognize the importance of understanding contemporary sports and youth health for the purpose of programming the appropriate program. It is widely known that physical activity can positively affect physical and psychosocial health and that it is important at all times in the life cycle, from childhood to deep age.

It is believed that a high level of basic-motor abilities is a basic precondition for efficient learning of new motor structures, their improvement and successful use (Mraković, 1972, Kurelić et al., 1975, Wolf and Rađo, 1998). For this reason, monitoring of the developmental qualities and skills of young people is a special task of all experts in sports, because without objective indicators it is not possible to objectively program the transformational processes (Čolakhodžić et al., 2016).

## WORKING METHODS

In this research, it was attempted to find out whether there is and to what extent the influence of morphological characteristics on the expression of static strength in athletes who are actively involved in bodily building has been pronounced.

### The sample of respondents

The sample of respondents in this research is composed of athletes who are actively engaged in bodily building and weight lifting with the total number of 61 entities, members of U.G. Fitness club "GYM" in Banovići.

### Sample variables

The choice of variables was carried out in accordance with the problems raised in this research, based on which relevant indicators of the relations and impact of the investigated anthropological characteristics and the manifestation of strength can be obtained. The choice of variables is based on past experience and research on similar issues. The area of morphological characteristics is represented by 9 variables subject to the International Biological Program (IBP). The variables are structured from

the longitudinal dimensionality of the skeleton and body circumference as variables subject to transformation under the influence of different operators and responsible for the manifestation of different types of strength. To investigate the strength as a segment of the motor space, tests have been applied which, by selecting, depict the apparent dimensions of static power and made by two variables.

**Variables samples**

Variables of morphological characteristics: 1. Body height (ATJVIS), 2. Leg length (ADULT), 3.Arm length (ADULT), 4.Breast circumference (AOBGRU), 5.Abdominal circumference (AOBTRB), 6. Leg circumference (AOBNAD ), 7. The circumference of the forearm (AOBPOD), 8.The circumference of the thigh (AOBNAT), 9. The circumference of the lower leg (AOBPOT).Static power variables: 1. Semi-tongue hold (SSIPCU), 2. Hold in the hinge (SSIZGI).

**Methods of data analysis**

According to the needs of this research, the observed results of analyzed anthropological spaces are subject to the following statistical operations and procedures and using the software packages SPSS and STATISTICA.

The descriptive statistics compute the basic absolute and relative measures of central tendency and variation of the univariate level: Range-range of variation, Minimum-minimum value, Maximum-maximum value, Mean-arithmetic mean, Variance variance, Std. Dev.- standard deviation. The distribution of the results of the respondents was tested with the following statistical parameters: Skewness coefficient of asymmetry, Kurtosis - coefficient of elongation.Regression analysis was applied at the multivariate level in order to determine the multiple connections and the size of the general and individual impact of the predictor system, ie morphological characteristics on the criterion system, which is represented by static power.

**RESULTS AND DISCUSSION**

Since the entire system of selected morphological characteristics has a statistically significant relationship at the level of $p < .05$ (sig. = .049) with the criterion variable, the support in semi-school (SSIPCU), we can approach the analysis of the general and individual impact of these morphological measures on the criterion variable (Table 1) . The multi-correlation coefficient (R) is 0.49 while the size of the general impact (R Square) is modest 0.241. We can conclude that the entire system of investigated variables of morphological characteristics has 24% influence on the expression of static strength of the lower extremities, while the remaining 76% belongs to the influence of other endogenous and exogenous factors that are not included in this study. Individually, the greatest influence of morphological characteristics on the static strength of leg performance was achieved by three variables: AOBNAT, AOBTRB, and AOBGRU. The orientation of the signs of these variables speaks of the fact that the two variables had a positive effect, which is the circumference of the AOBNAT and the volume of the breast (AOBGRU) while the volume of the abdomen (AOBTRB) had a negative effect. From this relationship, we can assume that they are subjects with higher muscle mass because they have a smaller volume of belly that is surely structured without fat deposits. We can conclude that subjects with higher circumference and breast, and without adipose tissue on the stomach, had higher static strength of the lower extremities than subjects who do not possess such morphological characteristics.

We can conclude that the investigated variables of the morphological characteristics in this paper participate in the prediction of the static strength of the upper extremities with 63% of the influence, while the remaining part of the variance of 37% belongs to all other anthropological dimensions that have not been investigated in this paper, as well as other exogenous and unknown factors. The partial influence of individual variables of morphological characteristics in the prediction of the expression of the static strength of the hand was selected on three variables with statistical significance. On the isolated predictive function, the longitudinal dimensionality of the skeleton is dominant, and these are the body height (ATJVIS) and arm length (ADUZRU), and the volume of the abdomen (AOBTRB). All three measures are a negative sign, meaning that subjects with these characteristics had lower static strength of the upper extremities, while subjects with lower body height and volume of the abdomen and shorter upper extremities manifested greater static strength of the arm. Based on the results presented, we can conclude that there is a statistically significant influence of morphological measures on the expression of static strength.

**CONCLUSION REMARKS**

We can conclude that the entire system of investigated variables of morphological characteristics has 24% influence on the expression of static strength of the lower extremities, while the remaining 76% belongs to the influence of other endogenous and exogenous factors that are not investigated by this work. Individually, the greatest influence of morphological characteristics on the manifestation of static foot strength was achieved by three variables, the circumference of the hip, the

volume of the abdomen and the volume of the breast. The orientation of the signs of these variables speaks of the fact that the two variables had a positive effect, which is the circumference and volume of the breast and thigh while the volume of the abdomen had a negative effect. From this relationship, we can assume that they are subjects with higher muscle mass because they have a smaller volume of belly that is surely structured without fat deposits. We can conclude that subjects with a higher circumference of thighs and breasts, and without adipose tissue of the abdomen, had higher static strength of lower extremities than subjects who do not possess such morphological characteristics.

Regression analysis between morphological characteristics as a predictor system and static hand strength as a criterion variable has established a statistically significant connection. The multi-correlation coefficient is high of 80%, with a total hanging variation of 63% at the statistically strictest level of Sig. = .00. We can conclude that the investigated variables of the morphological characteristics in this paper participate in the prediction of the static power of the upper extremities with 63% of the influence, while the remaining part of the variance of 37% belongs to all other anthropological dimensions that have not been investigated in this paper, as well as other exogenous and unknown factors. The partial influence of individual variables of morphological characteristics in the prediction of the expression of the static strength of the hand was selected on three variables with statistical significance. On the isolated predictive function, the longitudinal dimensionality of the skeleton has the dominant role, which is the body height and length of the arm and the volume of the abdomen. All three measures are a negative sign, meaning that subjects with these characteristics had lower static strength of the upper extremities, while subjects with lower body height and volume of the abdomen and shorter upper extremities manifested greater static strength of the arm.

Table 1. - Regression analysis of morphological characteristics and static strength of the leg

**Variables Entered/Removed[b]**

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | AOBPOT, ADUZNO, AOBNAD, ADUZRU, AOBTRB, AOBPOD, ATJVIS, AOBGRU, AOBNAT[a] | . | Enter |

a. All requested variables entered.

b. Dependent Variable: SSIPCU

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,491[a] | ,241 | ,107 | 38,873 |

a. Predictors: (Constant), AOBPOT, ADUZNO, AOBNAD, ADUZRU, AOBTRB, AOBPOD, ATJVIS, AOBGRU, AOBNAT

**ANOVA[b]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 24431,907 | 9 | 2714,656 | 1,797 | ,049[a] |
| | Residual | 77064,847 | 51 | 1511,075 | | |
| | Total | 101496,8 | 60 | | | |

a. Predictors: (Constant), AOBPOT, ADUZNO, AOBNAD, ADUZRU, AOBTRB, AOBPOD, ATJVIS, AOBGRU, AOBNAT

b. Dependent Variable: SSIPCU

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 294,594 | 152,948 | | 1,926 | ,060 |
| | ATJVIS | -1,353 | 1,961 | -,234 | -,690 | ,494 |
| | ADUZNO | 1,209 | 2,185 | ,160 | ,553 | ,583 |
| | ADUZRU | -1,442 | 2,737 | -,124 | -,527 | ,601 |
| | AOBGRU | 3,138 | 1,432 | ,768 | 2,191 | ,033 |
| | AOBTRB | -3,386 | 1,441 | -,848 | -2,350 | ,023 |
| | AOBNAD | -3,185 | 3,782 | -,334 | -,842 | ,404 |
| | AOBPOD | -1,838 | 4,972 | -,113 | -,370 | ,713 |
| | AOBNAT | 3,074 | 2,714 | ,417 | 2,332 | ,023 |
| | AOBPOT | -,526 | 2,044 | -,053 | -,257 | ,798 |

a. Dependent Variable: SSIPCU

Table 2. - Regression analysis of morphological characteristics and static strength of the hand

**Variables Entered/Removed[b]**

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | AOBPOT, ADUZNO, AOBNAD, ADUZRU, AOBTRB, AOBPOD, ATJVIS, AOBGRU, AOBNAT[a] | . | Enter |

a. All requested variables entered.

b. Dependent Variable: SSIZGI

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,795[a] | ,632 | ,568 | 9,899 |

a. Predictors: (Constant), AOBPOT, ADUZNO, AOBNAD, ADUZRU, AOBTRB, AOBPOD, ATJVIS, AOBGRU, AOBNAT

**ANOVA[b]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 8599,516 | 9 | 955,502 | 9,751 | ,000[a] |
| | Residual | 4997,500 | 51 | 97,990 | | |
| | Total | 13597,016 | 60 | | | |

a. Predictors: (Constant), AOBPOT, ADUZNO, AOBNAD, ADUZRU, AOBTRB, AOBPOD, ATJVIS, AOBGRU, AOBNAT

b. Dependent Variable: SSIZGI

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 145,913 | 38,949 | | 3,746 | ,000 |
| | ATJVIS | -,932 | ,499 | -,440 | -2,866 | ,018 |
| | ADUZNO | ,816 | ,557 | ,296 | 1,466 | ,149 |
| | ADUZRU | -,047 | ,697 | -,011 | -2,068 | ,046 |
| | AOBGRU | ,657 | ,365 | ,439 | 1,802 | ,077 |
| | AOBTRB | -1,253 | ,367 | -,857 | -3,416 | ,001 |
| | AOBNAD | ,731 | ,963 | ,210 | ,759 | ,451 |
| | AOBPOD | 1,955 | 1,266 | ,329 | 1,544 | ,129 |
| | AOBNAT | -,465 | ,691 | -,173 | -,673 | ,504 |
| | AOBPOT | -,834 | ,521 | -,231 | -1,602 | ,115 |

a. Dependent Variable: SSIZGI

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# RELATIONSHIPS IN THE PE ACTIVITY BETWEEN TEACHERS AND STUDENTS

Nuhić Dženana, Husejn Musić, Rijad Novaković

**Abstract:**
During the history and through the whole development of the society, relations between teachers and their students have been met with different changes and they also depend on the constant changes of the society which affect the progress and development of educational system. Different changes and reforms in the whole educational system lead to the same changes of methods of work in the PE (Physical Education) lessons in which all principles of universal and harmonious development of personality are observed. Good relations between teachers and students show their openess where all the participants are honest with each other, they respect each other and they create students' self-reliance and independence which let the child develop her/his creativity,individualism and uniqueness and its basic aim is the improvement od the healthy life style. The teacher is responsible for the implementation of that curriculum and basic aims in PE teaching process.This research has been done in order to get the feedback about the relationship in the teaching process.

**Key words:** students, teachers, relations, PE curriculum

## INTRODUCION

Today's everyday work with children implies a continuous follow-up of student progression, evaluation of work results, and a friendly democratic relationship between students and teachers. The relationship between students and teachers needs to be permanently improved in order to obtain the best possible results for the child. Teachers must adhere to some of the basic princes such as respect for the principles of humanity and personality of the child, the principle of versatile and harmonious development. A very important factor is also respecting the psychophysical abilities of the child, which must be developed in accordance with the child's capabilities, modern teaching requirements and the society in which we live. The content and activities are tailored to the age of children and their abilities. The relationship between students and teachers is built on the real democratic principles of respect for the child's personality.

## DISCUSSION

### Students

The focus of this relationship is the student. For some authors, "a student is a person who is educated and educated in a teaching process that is designed, planned, prepared, organized, realized, repeated, practiced, valued, monitored, conducted, evaluated, evaluated by students and teachers" (Potkonjak, Šimleša , 1989, pp. He is one of the factors, main subject or teaching institution. A student should be taught and developed as a personality to be better prepared for life and the world around him.

Teaching as "elementary school activity has to show its purposefulness, uniqueness, intentionality, certain effect, in the second, characteristic of every other activity" (Čolaković, Musić, 2012, p. 20). In the past period and in traditional classes the student was a multiple object. More attention is devoted to reproduction of the facts and the adoption of the material according to the principle that must and must be taught. More recently, teachers emphasize the needs of students. Teachers have to influence the transformation of anthropological characteristics of students into their level of knowledge and achievement.

When talking about a kinesiological point of view, then the health of children is the first in the teaching process and as the ultimate goal is the exercise process, optimal development of individual abilities and the creation of motor skills that children will use in life. Exercise students need to experience habit, develop their abilities and create preconditions for a healthier and more active life.

### Teacher

The teacher is an expert, qualified person who teaches and transmits the knowledge to the students. According to the Pedagogic Encyclopaedia, the teacher is a professionally trained "person to whom society and the public authorities recognize that they are qualified for education and training of children, youth and adults" (Pedagogical Encyclopedia, 1989, 103). The teacher provides the students with theoretical and practical knowledge. Physical and health education is a person whose success depends on work.

In the contemporary school, attention is focused on the development of the learning process, the development of thinking and individual abilities. The teacher is a helper for learning, a leader of a group, a model for children, a person of trust. Teachers need to achieve successful two-way communication with students based on a healthy democratic relationship.

An in-class teacher should have human qualities, be a physically healthy and mobile person who supports healthy lifestyles, engage in physical activity, and be able to demonstrate certain physical exercises. The teacher should be a model or practice model for physical exercises and exercises.

The teacher creates a classroom working climate, establishes control in the physical gymnasium, only if it is just, consistent, systematic, honest, public misunderstandings of the pupils but also praises and is

open to co-operation. It is natural that a teacher communicates with the movement, movement, or exercise that he or she is performing with the students during the process of working, and must have a sense of sensibility as responsible and humane to the people they teach.

**Relationship between students and teachers**

When it comes to the relationship between pupils and teachers in elementary school it has changed with the changes of society. The relationship is defined as: "interpersonal perception, perception, response, treatment and action in mutual contacts and interactions in the process of teaching, school and beyond" (Musić, Muratović, 2010, p. 25). In other words, this is the interaction between the participants in the teaching process.

In relationships with different historical epochs and communities, these relationships had a different character, where each human community sought to incorporate into their school system different ways and forms of physical activity that were later incorporated into the exercise process.

Musić, H., (2009, p 175) in the Micro Organization of Teaching, the determinant of the relationship between students and teachers emphasizes that: "The relationship between students and teachers during the process of microorganization of teaching and the free activities in teaching practice are predominantly subordinate, autocratic, inhumane , insufficiently pedagogic-stimulating, seen from the aspect of planning, preparing, introducing pupils to teaching, processing of new programs, teaching contents and activities, repetition of specific subjects and activities, exercising and evaluating the stages of monitoring, testing and evaluating the work of students and teachers ". A student based on student reactions receives feedback on whether something needs to be changed in her work. It is important to quickly and timely understand the sender and recipient of the message.

**Activity**

Teaching contents and activities in the teaching of physical education are defined in the Framework Curriculum and the First Triad Program in the Federation of Bosnia and Herzegovina. Due to its versatility and benefits, many activities are carried out through the game, and the games contain a rich variety of motion elements that enable further development and development of the motion motor.

According to Findaku, "plays the oldest form of physical and health culture and the most humane activity of man, it is a spontaneous and freely chosen human activity, characterized by a variety of movements and accompanied by a strong sense of pleasure and satisfaction" (Novaković, Budimlić and Turković, 2014, p.12). Teachers in children are the easiest to notice their character traits, so the games in the classroom are much used. When we mention various forms of movement and exercise, we can not ignore kinesiology.

The word kinesiology comes from two Greek words chinese-movement, motion and logos-law. According to Mrakovic (1992) etymological, kinesiology is the science of movement (taken over by Čolakhodžić, Rađo, 2011, p. 11). People in the late past have noticed how important physical activity is for the growth and development of children.

The curriculum is divided into several areas, and for the aforementioned areas are written the activities that are carried out: natural modes of movement, jumps and jumps, lifting and carrying, climbing, creeping, pulling, climbing, drawing, dragging and pushing, educational goals, athletic contents, gymnastics, skipasses, balance exercises, rhythms and dancing, ball games, swimming and health prevention activities. Teaching contents and activities are tailored to the age of children, and are arranged according to the principle of easier and more difficult, from a simpler to more complex task.METODOLOŠKI OKVIR ISTRAŽIVANJA

**Population**

The population of this survey consists of students of the second grade of a nine-year elementary school in the City of Mostar at the School of Hercegovačko-Neretva Canton in April, 2017. From the population we take a sample consisting of four second grade classes. The total number of children is 83.

**PROCESSING OF DATA**

For the analysis and interpretation of the data, a five-degree Likert-type assessment scale was used, whereby the respondents, or students, indicated with the sign "X": A = 5 points, B = 4 points, C = 3 points, D = 2 points and E = 1 point.

The scale of ranks determines the order from the maximum to the minimum value. The data is grouped and then tabulated. Methods of theoretical analysis and synthesis, historical method, comparative method, Servey method (survey) and analytical-descriptive method were used. The results of the research are presented in a tabular way, which are analyzed and compared.

**PROBLEM, OBJECTIVE, TASKS AND HIPOTHES OF RESEARCH**

In teaching TE students adopt skills, develop skills, and improve their health. The subject of this research is current and in the pedagogical practice insufficiently explored.

The problem of this research is the relationship between pupils and teachers in the realization of content and activities of physical and medical education in didactic theory and modern teaching practice of elementary school.

The aim of the research is to determine the relationship between the pupils and the teachers in the realization of the content and activities of the EDU in the teaching practice, depending on the development of society and social relations, and then analyze the relationships in the teaching practice.

Research tasks were:

1. Get survey data
2. process the data obtained statistically

3. to determine whether relations are democratic, cooperative, in accordance with their psychophysical abilities, friendly, cooperative

4. Determine whether the teaching is dominated by autocratic relations followed by forced discipline and a monotonous working atmosphere.

The hypothesis of the study was:

"Relationships between students and teachers in the realization of content and activities of physical and medical education are autocratic, insufficiently pedagogical and stimulating."

**RESULTS**

Data are grouped, followed by tabular presentation in the following order.

Table 1 shows the student's response to the question of "whether they are physical exercise".

Table1.Are Exercises at Body Fat

| | Frequency | Perc. |
|---|---|---|
| Always | 5 | 6.00 |
| Often | 6 | 7.20 |
| Sometimes | 23 | 27.70 |
| Mainly | 7 | 8.40 |
| Never | 42 | 50.60 |
| In total | 83 | 100.00 |

With this question, we aimed at examining their subjective sense of the intensity and complexity of the various motor tasks that are being placed on the students of this age. By looking at the table we can see that 59% of respondents stated that exercises on TiZO are never or essentially not difficult for them. Only 13.2% of the respondents argued that their physical exercise was always or often difficult.

This tells us that there is still plenty of room for complications and intensification of exercise in the students, and that we do not need to strictly and blindly adhere to a certain intensity of exercise according to the age characteristics offered in the previously written literature.

This points to one item, which is that the child's organism should be viewed as an individual, because something difficult, the other is easy, and vice versa.

Table 2. Does this teacher help you

| | Frequency | Perc. |
|---|---|---|
| Always | 58 | 69.90 |
| Often | 11 | 13.30 |
| Sometimes | 10 | 12.00 |
| Mainly | 2 | 2.40 |
| Never | 2 | 2.40 |
| In total | 83 | 100.00 |

The results show that 83.1% of the respondents argue that the teacher always or often helps, which indicates that the teacher regularly provides assistance and assistance to the students in the work. For students, there are very important guidelines, instructions, and confirmation that they are doing something good.

Table 3. Does the teacher explain the exercises previously

| | Frequency | Perc. |
|---|---|---|
| Always | 69 | 83.10 |
| Often | 8 | 9.60 |
| Sometimes | 2 | 2.40 |
| Mainly | 3 | 3.60 |
| Never | 1 | 1.20 |
| In total | 83 | 100.00 |

We see that 92.7% of the respondents have always or often declined, and 4.8% of the respondents are mostly or never. It is a delightful fact that the teacher besides being a lecturer that the demonstrator is also an active participant in exercising. This shows us how much effort we have to invest in the relationship between students and teachers.

The results from Table 4, we can say, are almost equally distributed and come as a response to the question "whether the adherents comply with the rules of conduct".

Table 4. Do the Friends Comply with the Rules of Conduct

| | Frequency | Perc. |
|---|---|---|
| Always | 20 | 24.10 |
| Often | 7 | 8.40 |
| Sometimes | 35 | 42.20 |
| Mainly | 19 | 22.90 |
| Never | 2 | 2.40 |
| In total | 83 | 100.00 |

Out of the total number of respondents, 32.5% responded always or often. The answer was sometimes given by 42.2% of respondents, and 25.3% of respondents responded largely or never. Children like TIZO classes, which can be supported by the responses from table no. 5, and a large number of answers can sometimes be associated with the fact that in our real lives our children have fewer physical activities and that they need to take the opportunity to channel and direct their increased activity in the right direction or to develop their psychomotor skills.

Table 5. Is your time interesting?

| | Frequency | Perc. |
|---|---|---|
| Always | 38 | 45.80 |
| Often | 23 | 27.70 |
| Sometimes | 11 | 13.30 |
| Mainly | 7 | 8.40 |
| Never | 4 | 4.80 |
| In total | 83 | 100.0 |

We see that 73.5% of respondents have always or often expressed their interest, which is justified by the fact that children like their physical classes. Of these, 13.25% of respondents or (11 respondents out of 83) stated that their time was mostly interesting or never.

In response to the question "whether the teacher is strict?" In Table No.6 we got the results.

Table 6. Is the teacher rigorous

| | Frequency | Perc. |
|---|---|---|
| Always | 13 | 15.70 |
| Often | 5 | 6.00 |
| Sometimes | 24 | 28.90 |
| Mainly | 18 | 21.70 |
| Never | 23 | 27.70 |
| In total | 83 | 100.00 |

Out of the total number of 49.4% of respondents think the teacher is mostly strict or never, and 28.9% think the teacher is rigorous sometimes. A very important segment and concern is placed on the teacher's back because the teacher has to take care of the children and make sure that while performing the exercises the children do not hurt and therefore is very important teacher's authority.

By looking at Table 7 we come up to the question "whether the teacher respects the student's opinion".

Table 7. Does the teacher respect the student's opinion

| | Frequency | Perc. |
|---|---|---|
| Always | 46 | 55.40 |
| Often | 26 | 31.30 |
| Sometimes | 8 | 9.60 |
| Mainly | 2 | 2.40 |
| Never | 1 | 1.20 |
| In total | 83 | 100.00 |

Of the total 86.75% of respondents stated that the teacher respected the opinion of pupils always or often, and 3.6% declined mainly or never, while 9.6% responded sometimes. These findings support the assertion that the relationship between the pupils and teachers in the teaching profession is good because the teacher accesses the students as equal members of the teaching process and respects their individual thinking, fosters individual access to the students.

Table 8. We bring together the rules of the game

| | Frequency | Perc. |
|---|---|---|
| Always | 35 | 42.20 |
| Often | 9 | 10.80 |
| Sometimes | 19 | 22.90 |
| Mainly | 2 | 2.40 |
| Never | 18 | 21.70 |
| In total | 83 | 100.00 |

We have 53% of respondents, who have always been or often together with their fellow students and the teacher give rules of play, and 22.9% of respondents sometimes. The curriculum is pre-determined, and in order to develop positive cooperative relationships, children's opinions should also be respected, but keep in mind that the games are motivating and with a certain goal.

Table 9 gives the results of how many students get help from colleagues in the classroom.

Table 9. I get help from my colleagues in the classroom

| | Frequency | Perc. |
|---|---|---|
| Always | 45 | 54.20 |
| Often | 22 | 26.50 |
| Sometimes | 8 | 9.60 |
| Mainly | 8 | 9.60 |
| In total | 83 | 100.00 |

Table 9 shows that pupils in 80.7% of percent always or often receive help from their classmates, and 9.6% of respondents generally or sometimes did. We can point out that there is a good cooperative working climate and that friendship is fostered.

Table 10. Students can freely turn to help the teacher

| | Frequency | Perc. |
|---|---|---|
| Always | 55 | 66.30 |
| Often | 16 | 19.30 |
| Sometimes | 5 | 6.00 |
| Mainly | 7 | 8.40 |
| In total | 83 | 100.00 |

From Table 10 we can read the results that 85.6% of the respondents stated that they can always or often freely address the help teacher, 8.4% of them, and 6% of them sometimes. If we take into account the fact that a teacher is in daily communication with children, then a democratic, partnership relationship with children leads to a good relationship where relationships and stronger relationships exist, two-way communication based on trust and support.

Table 11. The teacher is creative

| | Frequency | Perc. |
|---|---|---|
| Always | 49 | 59.0 |
| Often | 24 | 28.9 |
| Sometimes | 6 | 7.2 |
| Mainly | 3 | 3.6 |
| Never | 1 | 1.2 |
| In total | 83 | 100.0 |

In the table "Teacher is creative" of the total number of respondents 87.9% stated that the teacher is always or often creative, and 4.8% that the teacher is mostly or never creative; 7.2% of the respondents think that the teacher sometimes creative. Teachers are people who are learning throughout their lives and are trying to adapt to the children, and thus bring newspaper and creativity to their work.

Table 12. I feel good at times of physical education

| | Frequency | Perc. |
|---|---|---|
| Always | 46 | 55.40 |
| Often | 21 | 25.30 |
| Sometimes | 12 | 14.50 |
| Mainly | 3 | 3.60 |
| Never | 1 | 1.20 |
| In total | 83 | 100.00 |

A large number of people, 80.7% of respondents feel good or often, and 14.5% of respondents sometimes feel good at times. Of the total number of respondents, 1.2% said they never feel good at the time of physical education, which is one student when the total number of 83 subjects is taken. All the previous responses of the respondents in the tables analyzed earlier lead to the children feeling good at the time of physical education.

## CONCLUSION

In contemporary teaching, the relationship between pupils and teachers in the realization of the content and activities of physical and medical education rests on appreciation, understanding, support and encouragement of the students, which is the foundation of well-established human, democratic and partner relationships for achieving the ultimate goal. This is the healthy growth and development of our children. Based on the results obtained hypothesis the relationships between students and teachers in the realization of content and activity of physical and medical education are autocratic and insufficiently pedagogically stimulating has not been confirmed

because we have proved that they are democratic and pedagogic stimulating, which is positive and provides guidelines for further progress and motivation teachers to develop and develop this relationship further.

Attached we cite the facts.

- Tasks, activities and exercises at the time of physical and health education are not serious and indicate that the limit load students can rise to a higher level, but taking account of the individual workload of individual students.

- When it comes to helping and assisting the teacher in the practice of the exercises, then there is an essential demonstration and verbal reasoning and explanation, which shows us that it is in our teaching practice present and desirable forms of communication and relationships with children.

- Active participation of teachers is characterized by the pursuit of establishing a democratic climate to produce new quality of relations between students and teachers.

- Children in the absence of after-school activities, and under the influence of living conditions and the fast pace of life, and increased physical activity of children should be directed and channeled that are under the auspices of the development of psychological and physical abilities and all-round development of personality.

- The teaching process should be designed in a creative way.

- When implementing activities, it is very important for the segment to respect the rules of conduct without being authoritative. The rules of behavior prevent children from physical injuries and help in communicating and improving relationships.

- Communication is two-way and students respect the rules, though the teachers are generally stiff and are trying to keep their stance. There is also a very important role in respecting the opinions and proposals of children. When children see that the teachers treat them with respect, they receive support in the teacher and friends which is the basic precondition for normal physical and mental development of children of this age.

- The teacher should abide by all the principles of the ECTS methodology, so that the students understand the tasks and achieve the expected results.Nastavnici trebaju kontinuirano učiti kako bi ovaj odnos promovisali i unaprijedili, kao i nastavničku profesiju.

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# DIFFERENCES IN STRENGTH, SPEED AND FLEXIBILITY AMONG STUDENTS AGED BETWEEN 16 AND 18 ACTIVELY ENGAGED IN FOOTBALL AND STUDENTS NOT ENGAGED ACTIVELY IN FOOTBALL

Adi Palić, Adnan Ademović, Nijaz Skender, Edis Topić

**Abstract:**

This research has the character of a transversal study with a goal to determine differences in strength, speed and flexibility of students aged between 16 and 18 which are actively engaged in football and those which are not engaged in football actively. Sample of examinees was made of 52 students of III and IV grade which attend High school for Mechanical Engineering (Srednja-mašinska škola) placed in Mostar and are aged between 16 and 18 years. For the assessment of basic-motor abilities 10 variables were used, as follows: two tests assessing explosive strength, three tests assessing repetitive strength, two tests assessing flexibility and three tests assessing speed. Acquired results show that all ten variables have statistical significance. After analysis was conducted, it can be concluded that students which are actively engaged in football in extracurricular activities have better results in the area of motor abilities of speed, strength and flexibility than students which are not engaged in football in extracurricular activities. This shows the importance of developing awareness of significance of regular physical practice of high school students.

**Keywords:** football, students, motor abilities

## INTRODUCTION

Physical exercise and sports are integral parts of educational process. Notion of physical exercise and sports in educational process implies physical education and extracurricular sports activities in school sports society within school sports. Effects of physical education are seen primarily through positive effect on growth and development of young organism, on one side, and increment of motor abilities, on the other (Višnjić et al, 2004; Marković, 2008). Physical exercise in schools has, as one of its main goals, positive effect on all basic-motor abilities. Additional physical activity, according to majority of previous research (Nićin, 2000; Petković, 2007), increases positive effects not only of physical development, but also of basic-motor abilities.

Children of high school age are at the end of puberty, after which comes age of youth or adolescence (post puberty). Gradually discordance in motor and functional abilities disappears; children gain higher level of function of all body systems which allows setup of by far higher demands in the area of ballast in process of physical exercise and sports. Deficiency of systems of school sports is insufficient number of discussions and analysis outside of narrow professional and scientific circles as well as problems of strategic thinking of the place and role of physical exercise and sports in high school education. Therefore, the importance of conducting extracurricular sports activities of students is high, since this organizational type of work has a goal to decrease difference between scientifically proved requirement of children and young for physical activity and sports and its actual implementation in educational system. Students of high schools belong to cadet and junior age category which is included in demanding training process in school sports club. This training process has to ensure, on one side, higher level of cognition of technical and tactical knowledge and, on the other side, sufficient level of functional and motor abilities. It is necessary to know characteristics of beginning, needs of development, problems of end, i. e. ending of sports career. All phases of young footballer's development have its characteristics and differences of approach, its methods of work, i. e. training. True, football can be played before puberty, which is done, but those are not maximum requirements nor highest football achievements. Football can be thought after puberty, but then it consists more of teaching elements and improvement. For conditional preparation factor structure of football gives especially important information which show hierarchically defined motor, functional and morphological characteristics of which success in the game depends. Factor structure in football is defined through five motor abilities, the most important being stamina, speed, strength, coordination and flexibility. Factor structure of efficacy in football in area of motor abilities (Milanović, Jukić and Šimek, 2003), stamina 30%, speed 25%, strength 20%, coordination 15%, flexibility 10%.

## METHODS OF WORK

This research is of transversal character from time aspect with the goal to determine in one point of time differences in quantitative indicators of certain motor abilities of high school children which are actively engaged with football and those which are not.

### Sample of examinees

Sample of examines is made of high school children aged between 16 and 18 actively engaged with football and those which are not actively engaged with football. Sample of examinees for this research is a group of 52 student of High school for Mechanical Engineering from Mostar divided into two groups (control group – the one inactively engaged in football and experimental – the one actively doing football).

**Sample of variables**

For the estimate of basic motor abilities 10 variables were applied: two tests used to estimate explosive strength:

- horizontal jump (MFESDM),
- high jump from place (MFESVM).

Three tests to estimate repetitive strength:

- push-ups (MRSSKL),
- lying – squat (MRSLES),
- deep squats (MRSČUĆ).

Two tests to estimate flexibility:

- forward bend straddle(MFLPRR),
- shoulder circumductionMFLISP).

Three tests to estimate speed:

- foot tapping (MBFTAN),
- plate tapping (MBFTAR),
- 20 m sprint (MFE20M).

**Methods of data analysis**

In order to test differences of arithmetic means of treated motor abilities T-test of independent samples had to be used. Analysis of results in tables 1 and 2 shows descriptive indicators of variables for estimate of basic-motor abilities of students actively engaged in football and those not engaged in football. Table 1 shows results of students engaged in football. Through insight into content of table 1 we see that all variables, except push-ups, have normal distribution of results. That is visible based on values of Skewness and Kurtosis, which exceed benchmarks. Through further insight into table 1 it is visible that three variables (lifting torso while lying, push-ups and 20 m sprint) of seven have heterogeneous results. This can be seen since value of Variance is higher than Arithmetic mean. Through insight into table 2 it's visible that all variables have normal result distribution. That is visible based on values of Skewness and Kurtosis which are in limits of benchmark. When it comes to homogeneity of results of players actively engaged in football, situation is somewhat different. Namely, six of ten variables have higher values of Variance than they have of Arithmetic means, which indicates heterogeneity of results.

Table 3 shows differences of Arithmetic means of two tested groups, at treated variables. Through insight into table 3 and rows referring to variable plate tappingit's visible that value of Levene's test is F = 2,17 with Significance p = 0,14. Value of T-test for plate tappingis t = 5,20 with Significance p = 0,00. Based on these values we can determine that there is statistically significant difference between two tested groups. In the row referring to variable foot tappingit is visible that value of Levene'stest is F = 3,34 with Significance p = 0,07. Value of T-test for variable foot tappingis t = 9,19 with significance p = 0,00. At this case we can determine that there is statistically significant difference. In the row referring to variable shoulder circumductionit is visible that value of Levene's test is F = 4,59 with significance p = 0,03. Value of T-test of variable shoulder circumductionis t = -5,15 with Significance p = 0,00. Based on this value we can determine that there is statistically significant difference between two tested groups. In the row referring to variableforward bend straddleit is visible that value of Levene's test is F = 0,35 with Significance p = 0,55. Value of T-test for variable forward bend straddleis t = 4,73 with Significance p = 0,00. Also, this case shows that there is statistically significant difference between two tested groups.

Through insight into table and rows referring to variable high jump from place it is visible that value of Levene's test is F = 0,09 with Significance p = 0,75. Value of T-test at high jump from place is t = 4,50 with Significance p = 0,00. These values confirm presence of statistically significant values between two groups. In the row referring to variable 20 m sprint it is visible that value of Levene's test is F = 3,94 with Significance p = 0,05. Value of T-test for variable 20 m sprint is t = 6,46 with Significance p = 0,00. Also, on this case we can determine that there is statistically significant difference. Through insight referring to variable horizontal jump it is visible that value of Levene's test is F = 24,44 with Significance p = 0,00. Value of T-test for variable horizontal jump is t = 5,85 with Significance p = 0,00. This case shows as well statistically significant difference.

Through insight into table and rows referring to variable push-ups it's visible that value of Levene's test is F = 0,45 with Significance p = 0,50. Value of T-test for push-ups is t = 6,33 with Significance p = 0,00. Based on these values we can determine that there is statistically significant difference between two tested groups. In the row referring to squats it is visible that value of Levene's test F = 7,05 with Significance p = 0,01. Value of T-test for variable squats is t = 9,28 with Significance p = 0,00. Also, this case shows statistically significant difference. In the row referring to variable lifting torso from lying position into sitting we can determine that value of Levene's test is F = 8,33 with Significance p = 0,00. Value of T-test for variable lifting torso from lying position into sitting is t = 7,75 with Significance p = 0,00. This case shows also statistically significant difference.

After we have finished analysis of research, it can be said that students actively engaged in football in extracurricular activities have better results in the area of motor abilities of speed, strength and flexibility compared to students which are not engaged in football in extracurricular activities. This shows the importance of awareness of high school students about the significance of regular physical exercise. Promoting healthy lifestyle among adolescents has even higher sense of awareness, and which emphasizes positive correlation between regular sports-recreational activities and proper feeding habits. Therefore, involvement of maximum number of high school students into regular physical activity could lead to reduction of risk of later on illness such as arterial hypertension, obesity, non-insulin dependent diabetes

and many more, which would also mean long-term decrease of state health care costs. That goal is achievable in more ways. For example: to motivate high school students to regularly and actively participate in classes of Physical education; through work of school sports clubs increase number of hours which studentswill actively spend, within organized school sports; motivate students to do sports in extracurricular activities; as soon as possible introduce students with short and long-term consequences of sedentary way of life; through constant monitoring of influence of additional physical exercise rise consciousness of the importance of regular physical exercise; to make closer to students the fact that by their effort they can change appearance and health through constant monitoring of effects of additional physical exercise on their anthropometric status.

## CONCLUSION

Based on obtained results we can conclude that extracurricular football activities have significantly influenced on development of measured basic-motor abilities as well as on changes in some morphological characteristics of students which are actively engaged in football compared to students which are not engaged in organized sports through football clubs. Also, extracurricular activities have brought better results in measured variables to students actively playing football compared to students which don't play football. Based on obtained results, following conclusions can be given:

- Engaging in football in extracurricular activities has favourablyinfluenced explosive strength, repetitive strength and flexibility of shoulder area and adductor of thethigh.
- Engaging in football in extracurricular activities has favourably influenced on speed – frequency of movements of upper and lower extremities.

Table 1. Descriptive indicators of variables for assessment of motor abilities of students not engaged in football

| Variables | Range | Min. | Max. | A.S. | Std. Dev. | Var. | Skew. | Kur. |
|---|---|---|---|---|---|---|---|---|
| Plate tapping | 14 | 33 | 47 | 41.12 | 4.256 | 18.114 | -.364 | -1.128 |
| Foot tapping | 14 | 33 | 47 | 40.75 | 4.296 | 18.457 | -.183 | -1.271 |
| Shoulder circumduction | 38 | 50 | 88 | 68.13 | 8.174 | 66.810 | -.203 | 1.768 |
| Forward bend straddle | 34 | 50 | 84 | 66.88 | 8.013 | 64.201 | .004 | .093 |
| High jump from place | 17 | 38 | 55 | 48.00 | 3.845 | 14.783 | -.431 | .826 |
| Torso lifting while lying | 65 | 45 | 110 | 70.25 | 17.884 | 319.848 | .779 | .513 |
| Squats | 6 | 22 | 28 | 24.12 | 1.597 | 2.549 | .547 | -.150 |
| Push-ups | 54 | 26 | 80 | 40.58 | 10.725 | 115.036 | 2.178 | 7.454 |
| Horizontal jump | 40 | 215 | 255 | 233.00 | 11.451 | 131.130 | .209 | -.821 |
| 20 m sprint | 0.80 | 2.92 | 3.72 | 3.35 | 16.452 | 270.667 | .142 | 1.864 |

Table 2. Descriptive indicators of variables for assessment of motor abilities of students engaged in football

| Variables | Range | Min. | Max. | A.S. | Std. Dev. | Var. | Skew. | Kur. |
|---|---|---|---|---|---|---|---|---|
| Plate tapping | 29 | 15 | 44 | 32.81 | 6.714 | 45.080 | -.717 | .790 |
| Foot tapping | 13 | 20 | 33 | 25.78 | 3.412 | 11.641 | .349 | -.429 |
| Shoulder circumduction | 33 | 67 | 100 | 81.59 | 10.445 | 109.097 | .322 | -1.023 |
| Forward bend straddle | 34 | 36 | 70 | 55.78 | 8.662 | 75.026 | -.164 | -.397 |
| High jump from place | 20 | 30 | 50 | 40.52 | 5.754 | 33.105 | -.529 | -.700 |
| Torso lifting while lying | 32 | 28 | 60 | 39.74 | 7.588 | 57.584 | .741 | .487 |
| Squats | 10 | 13 | 23 | 18.07 | 2.934 | 8.610 | .119 | -.648 |
| Push-ups | 39 | 5 | 44 | 21.41 | 10.839 | 117.481 | .712 | -.096 |
| Horizontal jump | 94 | 140 | 234 | 196.85 | 29.667 | 880.131 | -.527 | -1.003 |
| 20 m sprint | 1.00 | 3.30 | 4.30 | 3.74 | 25.563 | 653.462 | .240 | -.057 |

Table 3. T-test of independent samples at variables for assessment of motor abilities

| Variables | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference |
|---|---|---|---|---|---|---|
| Plate tapping | 2.170 | .147 | 5.202 | 49 | .000 | 8.310 |
| | | | 5.337 | 44.533 | .000 | 8.310 |
| Foot tapping | 3.342 | .074 | 9.199 | 49 | .000 | 7.556 |
| | | | 9.417 | 45.464 | .000 | 7.556 |
| Shoulder circumduction | 4.593 | .037 | -5.082 | 49 | .000 | -13.468 |
| | | | -5.155 | 48.268 | .000 | -13.468 |
| Forward bend straddle | .352 | .556 | 4.730 | 49 | .000 | 11.097 |
| | | | 4.752 | 48.913 | .000 | 11.097 |
| High jump from place | .098 | .756 | 4.500 | 49 | .000 | 8.606 |
| | | | 4.419 | 41.789 | .000 | 8.606 |
| 20 m sprint | 3.947 | .053 | -6.469 | 49 | .000 | -0.395 |
| | | | -6.631 | 44.864 | .000 | -0.395 |
| Horizontal jump | 24.444 | .000 | 5.605 | 49 | .000 | 36.148 |
| | | | 5.859 | 34.355 | .000 | 36.148 |
| Push-ups | .455 | .503 | 6.337 | 49 | .000 | 19.176 |
| | | | 6.341 | 48.417 | .000 | 19.176 |
| Squats | 7.053 | .011 | 8.983 | 49 | .000 | 6.051 |
| | | | 9.281 | 41.055 | .000 | 6.051 |
| Torso lifting while lying | 8.354 | .006 | 8.090 | 49 | .000 | 30.509 |
| | | | 7.759 | 30.265 | .000 | 30.509 |

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