

THE EFFECT OF BASKETBALL, VOLLEYBALL AND HANDBALL PROGRAM ON THE CHANGES OF BASIC-MOTOR SKILLS OF FIFTH GRADE ELEMENTARY SCHOOL FEMALE STUDENTS

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Original scientific work

Abstract:

At the core of every physical activity are basic-motor skills that can be changed in a positive or negative way under the influence of different factors. Body and health culture in school has a positive impact on all basic and motor skills as one of the main goals. The aim of the research was to determine the partial changes (differences) of basic-motor abilities that were created under the influence of a four-month program of basketball, volleyball and handball in the pupils of the fifth grade of elementary school. The study included N = 106 pupils of the V class, aged 10 to 11 years, clinically and mentally healthy, and with no pronounced morphological and locomotor impairments. The sample of respondents was divided into two subgroups, an experimental group (53 students), who conducted physical and health education classes according to the modified plan and program of sports games (basketball, volleyball and handball) for a half-year and control group (53 pupils) who attended regular classes from physical and health culture according to the current curriculum. 15 motor variables were used to assess basic-motor abilities. Descriptive statistics and discriminatory analysis were used to determine changes (differences) in basic-motor abilities. The results of the study at the descriptive level showed certain differences between the groups in the final versus the initial measurements. Based on the results of the discriminatory analysis, it can be concluded that the highest relative contribution has the variables MTAPN and MFRSKL, and the smallest MFESUM and MPD. Other variables give relatively moderate contributions to the accomplished discriminatory function. The advancement of basic and motor skills depends on good organization and realization of physical and health education.

Key words: experimental program, sports games, motor, pupils.

INTRODUCTION

Motor skills are defined as latent motor structures that are responsible for the infinite number of manifest motor responses and can be measured and described. Motor skills are not only important for themselves but also for the development of other qualities and abilities. If motor abilities do not develop to a level that is objectively possible with regard to genetic limitation, it is likely that such an individual will not be able to perform effectively and easily with various daily tasks, nor will the development of other traits and abilities with which the motorized capabilities are related. In addition, all motor skills do not have the same coefficient of inadequacy, which is why some during life are less, and some are more influenced by the exercise process. There is much more innate speed, coordination and explosive power than repetitive and static power, and flexibility (Findak, 2003). In order to influence the abilities with a higher level of innation, it is necessary to begin with the transformation process as soon as possible, respecting the sensitive periods for the development of individual traits and abilities (Prskalo, 2004). At the heart of every physical activity are basic motor skills that can be changed in a positive or negative way under the influence of different factors. Physical education at school has one of the main goals of having a positive impact on all basic motor skills. Additional physical activity in the form of systemic training, according to most of the previous studies, increases the positive effects of physical education (Ivković, 2007). The kinesiology determined initial state and the intended endpoint of the students would enable teachers to determine

precisely, quantitatively determining the transition states of the students during the year, from the initial to the final state, and ultimately the final analysis and assessment of the effectiveness of the applied model of exercise (Mraković, 1992). Pejčić, (2001) researched 655 pupils from the 1st to the 4th grade. Students were examined in 4 morphological variables and 6 motorcycles (long jump, 20 m sprint, high hanging, hull lift and polygon backlash). The conclusion is that the teaching of TZK can influence changes in morphological characteristics and motor abilities. Katić and Pažanin (2002) carried out research on 249 boys at the age of 7 years in 10 motor variables (polygon backlash, balance, footsteps, foot legs, hand tapping, hanging hook, hull lifting, 20 m sprint, jump far from the place and throwing the ball). One of the conclusions is that a programmed transformation process of less than a year and a half can not cause changes in general coordination and energy integration. On a sample of 22 students of elementary school students in Zagreb, students were trained for two years using 4 anthropometry tests, 6 tests for motor skills (polygon backlash, long-range jump, hanging in the fold, hand tapping, multiplying and hulling) and one test for functional abilities. It was confirmed that students, who did not participate in sports activities in the course of TZK, twice a 45 min. they could not significantly develop anthropological characteristics in the long run (Sertic et al., 2008). During the research on a sample of 400 pupils of the early school age anthropometric measurements were carried out with three standard instruments, motorized with six

instruments (hand-operated, long-range jogging, polygon backlash, hull lift, multi-row overhang and high-joint support), functional with one test, and motor achievements were assessed using six instruments. An analysis of the state of motor skills and achievements indicates progress in a large part of the motor space (Cetinić and Petrić, 2010).

In their research "Discrimination analysis of some basic motor skills of students of sports gymnasium and students of mixed secondary schools", they came to the knowledge that students of sports gymnasium have much better results in tests of motor skills than students of mixed high school. The reason is why it came to this, and that is that students of the sports gymnasium have a higher amount of hours of physical activity compared to students of mixed secondary schools. What is another indication that a fund of two hours of physical education is limited to optimal development of abilities (Tabaković et al., 2003).

Physical education of two hours a week can hardly fully satisfy the need for movement. In some instances, there is a lack of motivation for physical exercise in children, and they try to avoid active participation in classes in all possible ways. In the physical education classes, students have four sports games: handball, basketball, football and volleyball. Sports games are characterized by varied natural movements. All these movements are applied in the conditions of cooperation between the teammates. The effectiveness of the game in a great deal depends on the speed of movement, perception of space and players in it, from the adoption of the technique of movement, and the level of motor and general abilities. The place of sports games in the teaching of physical education is not accidental. Participation in sports games is characterized by intense muscular, psychological and functional activity, which results in a positive impact on the biopsychosocial development of the child (Nikšić et al., 2015).

METHODS

Sample of examinees

The study was conducted on a sample of N = 106 pupils in the fifth grade, female, aged 10 to 11 years, clinically and mentally healthy, and with no pronounced morphological and locomotor impairments. The sample of respondents was divided into two subgroups, an experimental (53 pupils) and a control group (53 students). The experimental group conducted classes according to the changed curriculum. The program included sports games from handball, basketball and volleyball. The control group carried out the teaching according to the current curriculum.

Variable sample

The variables used in this study consisted of 15 motor variables:

- Variables for estimating the frequency of the movement (Taping by hand - MTAP;

Taping the leg - MTAPN; Taping the feet against the wall - MTAPNZ).

- Variables for flexibility assessment (Stick turn - MFLISK; Reach in the seat - MBFDS; Preclination right - MPD).
- Variables for estimating explosive power (Long Distance Jump - MFESDM; High Jump from the Site - MFESUM; High Speed Sprint 20m - MFE2OV).
- Variables for estimating repetitive power (Lay-sit test - MRCLDM; Test squad for 40 seconds - MFRDC; Sketches - MFRSKL).
- Variables for assessing coordination (Steps aside - MAGKUS; Magnetic Test - MAGTUP; Polygon Background - MRGEPOL).

Methods of data processing

A descriptive statistical procedure was applied in the data processing process.

The following descriptive parameters are calculated:

- Arithmetic mean (Mean);
- Standard deviation (Std. Deviation).

Changes were calculated at the multivariate level:

- A discriminatory analysis was used to determine the changes and differences between the experimental and control group under the influence of the experimental program in the tests of basic-motor abilities.

Work program

During the first semester, three teaching units were processed as part of regular classes: athletics, basketball and volleyball. A total of 35 teaching hours of regular physical and health education were held, of which 12 hours of athletics, 12 hours of basketball, 11 hours of volleyball. The program of additional classes through the basketball, volleyball and handball sports games consisted of a modified curriculum from basketball: adding and catching balls from basketball, running a ball with a stop, a basketball technique, a low-lead technique, a kick-off practice with zipper positions, zigzag guiding, one - handed addition, moving the ball with arms in motion, running the ball with stop in the position of the shot, ball manipulation, pivoting technique with the ball, straight line guidance from high to low, and vice versa. From the volleyball sports, some teaching units were done, for example: hammer hit, passing with fingers over the net, training a school service, mini volleyball, hammering overhead, refusing to throw a ball out of the wall, adding alternate fingers - a hammer, school service with six and nine meters, jumping with both legs from dockyards on the net, shooting a basket with a hammer. From the handball, the teaching units were done as follows: foreclosure, lateral addition, jumping, kicking on the goal, slalom, handball, straight tracking, mini handball, goal kicking - seven, manipulation with a handball, Shade Adding,

Adding To The Triples Game 1: 1 Shooting on the goal. Only girls were involved in this program and

for this reason football was not taken as a sports game.

RESULTS

The display of the obtained data by the given markings.

Table 1. Values of arithmetic meanings and standard deviations of basic motor initial measurement

Variables	GROUP	N	Mean	Std. Dev.	Std. Error
MTAP	1	53.00	27.30	2.74	.38
	3	53.00	28.09	4.01	.55
MTAPN	1	53.00	24.57	2.79	.38
	3	53.00	22.66	2.71	.37
MTPNZ	1	53.00	18.74	2.25	.31
	3	53.00	19.36	3.26	.45
MFLISK	1	53.00	71.89	15.91	2.19
	3	53.00	74.57	18.63	2.56
MBFDS	1	53.00	21.30	7.83	1.08
	3	53.00	19.38	7.06	.97
MPD	1	53.00	42.17	11.35	1.56
	3	53.00	42.36	9.91	1.36
MFESDM	1	53.00	147.17	24.91	3.42
	3	53.00	148.68	25.06	3.44
MFESUM	1	53.00	26.72	5.22	.72
	3	53.00	26.49	5.57	.77
MFE20V	1	53.00	4.31	.41	.06
	3	53.00	4.41	.55	.08
MRCLDM	1	53.00	20.60	4.03	.55
	3	53.00	21.42	4.77	.66
MFRDC	1	53.00	31.25	5.57	.77
	3	53.00	29.72	7.60	1.04
MFRSKL	1	53.00	8.21	8.78	1.21
	3	53.00	11.04	9.86	1.35
MAGKUS	1	53.00	12.87	1.17	.16
	3	53.00	13.04	1.61	.22
MAGTUP	1	53.00	31.18	2.73	.37
	3	53.00	32.17	4.02	.55
MRGEPOL	1	53.00	22.82	6.52	.90
	3	53.00	22.08	6.57	.90

In the table above are presented the representations of the average values and measures of deviation of basic motor results of the examinees from the control group and experimental group in the initial measurement, based on which the differences in all variables between groups are noticeable.

Table 2. Values of arithmetic meanings and standard deviations of basic motors final measurements

Variables	GROUP	N	Mean	Std. Dev.	Std. Error Mean
MTAP	2	53.00	29.85	2.82	0.39
	4	53.00	30.21	3.50	0.48
MTAPN	2	53.00	26.70	2.84	0.39
	4	53.00	26.68	3.22	0.44
MTPNZ	2	53.00	21.26	2.53	0.35
	4	53.00	21.53	3.10	0.43
MFLISK	2	53.00	62.96	14.92	2.05
	4	53.00	63.40	17.72	2.43
MBFDS	2	53.00	23.28	7.75	1.06
	4	53.00	21.30	6.64	0.91
MPD	2	53.00	46.98	10.61	1.46
	4	53.00	45.96	10.06	1.38
MFESDM	2	53.00	157.26	24.49	3.36
	4	53.00	159.15	22.91	3.15
MFESUM	2	53.00	29.53	5.44	0.75
	4	53.00	29.72	5.38	0.74
MFE20V	2	53.00	4.10	0.36	0.05
	4	53.00	4.08	0.47	0.06
MRCLDM	2	53.00	23.45	4.01	0.55
	4	53.00	24.49	4.25	0.58
MFRDC	2	53.00	35.43	5.42	0.74
	4	53.00	35.04	6.59	0.91
MFRSKL	2	53.00	12.00	10.48	1.44
	4	53.00	15.81	11.99	1.65
MAGKUS	2	53.00	12.01	1.18	0.16
	4	53.00	11.97	1.38	0.19
MAGTUP	2	53.00	29.44	2.50	0.34
	4	53.00	29.93	3.30	0.45
MRGEPOL	2	53.00	17.78	5.22	0.72
	4	53.00	18.47	5.44	0.75

The table above gives an overview of the average values (mean columns) and deviation measures (st. deviation columns) on the individual variants of basic motor in the control and experimental group in the final measurement. As shown in the table, there are some differences in the descriptive level. In the following section, a discriminatory analysis was carried out to determine the intergroup differences in individual components of basic motor in initial and final measurements.

Table 3. Box's M test initial measuring

Box's M		157.51
F	Approx.	1.11
	df1	120.00
	df2	33533.50
	Sig.	0.19

As can be seen from the above table, the Box test is not statistically significant at any level indicating that the elements of the variance-covariance matrix variables of basic motorism are uniformed.

Table 4. Significance of isolated discriminant functions initial measurement

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation	
dimension0	1	.17 ^a	100.00	100.00	.38

A discriminating function with a canonical correlation value of 0.38 was determined, and according to the value of this coefficient it can be concluded that this is a mild connection between factors that represent the latent structure of the variation of the isolated discriminant function.

Table 5. Wilks' Lambda initial measuring

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.	
dimension0	1	0.86	14.88	15.00	0.46

The Wilks lambda expression and the correlation coefficient are not statistically significant, and it can be said that in the initial measurement no significant models of differentiation between the control and the experimental group regarding the value of the variations of individual components of basic motor are determined. In the initial measurement, there are no noticeable significant differences between the control and the experimental group in terms of differential weighted combinations of basic motoring elements.

Table 6. The structure of the discriminatory function of the initial measurement

Variables	Function
	1
MFRSKL	0.42
MBFDS	-0.34
MRCLDM	0.31
MAGTUP	0.21
MRGEPOL	0.16
MTAP	0.14
MPD	-0.12
MTPNZ	0.12
MFESDM	0.10
MFRDC	-0.08
MFE20V	-0.05
MFESUM	0.04
MAGKUS	-0.04
MFLISK	0.03
MTAPN	-0.01

Table 7. Centroids group initial measurement

GROUP	Function
	1
1	-0.40
3	0.40

The greatest contribution to the discriminatory function, according to the values of the above-mentioned coefficients, have variables MFRSKL – Push-ups and MBFDS - Reach in the seat, and at least MFLISK – Stick turn and MTAPN - Taping a foot. However, all these coefficients are low and the discriminatory function itself is not statistically significant.

In a discriminatory analysis of the basic motor components in the control and experimental group in the final measurement, a significant discriminatory function was discovered. The canonical correlation coefficient indicates a moderate correlation between variants of latent factors that are in the basic motor structure of both groups in the final measurement.

Table 8. Box's M test final measurement

Box's M		186.38
F	Approx.	1.32
	df1	120.00
	df2	33533.50
	Sig.	0.01

Box's test is statistically significant at the level equal to 1%, indicating a significant unevenness of the elements of the variance-covariance matrix variables of the basic motor of the control and experimental group in the final measurement.

Table 9. Significance of isolated discriminatory functions Final Measurement

Function		Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
dimension0	1	.49 ^a	100.00	100.00	.57

From the table above, it can be seen that the value of the characteristic root is 0.49, which means that the function is isolated based on the value of cross-saturation can explain, on average, 49% of the variability of the manifest variables of basic motoring.

Table 10. Wilks' Lambda final measurement

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.	
dimension0	1	0.67	38.20	15.00	0.00

The Wilks-Lambda expression and the Chi-square are statistically significant at a level far below 1% indicating that the model of the function significantly makes distinctions between the groups in the final measurement and based on the values of the basic motor variables. This significance of the distinction has arisen under the effect of a work program that is proven in this way.

Table 11. The structure of the discriminating function of the final measurement

Variables	Function
MTAPN	-0.50
MFRSKL	0.22
MAGTUP	0.21
MBFDS	-0.19
MTAP	0.17
MFRDC	-0.17
MTPNZ	0.16
MFE20V	0.15
MRCLDM	0.13
MFLISK	0.11
MAGKUS	0.09
MRGEPOL	-0.08
MFESDM	0.04
MFESUM	-0.03
MPD	0.01

Table 12. Centroids group final measurement

GROUP	Function
	1
1	-0.69
3	0.69

The table above shows the coefficients on the basis of which the relative contribution of each of the mentioned variants of basic motorism to the discriminatory function itself can be concluded. In addition, it can be noticed that MTAPN - Taping foot and MFRSKL - Push-ups have the highest relative contribution, while the smallest MFESUM - High jump and MPD - Turn right. Other variables give relatively moderate contributions to the accomplished discriminatory function. Centroid values are higher than in the base motor situation in the initial measurement, which is also expected from the canonical correlation coefficient (which is higher in the final measurement). Also, the differentiation models were statistically significant in the final versus the initial measurement where they were not statistically significant (see Wilks Lamda and Hi-square for initial measurement). According to these results, it can be concluded that there has been divergence in the latent structure of the discriminatory function in both groups, which can most likely be a consequence or effect of the program itself. For this reason, it can be concluded that there are more and more significant possibilities for distinguishing groups in the final measurement.

DISCUSSION

In his doctoral dissertation: "Transformational processes of motor skills and morphological characteristics under the influence of a seven-month program for pupils of the third and fourth grade of primary school", on a sample of 206, divided into two subsamples (experimental and control), a standard and experimental treatment that lasted for 7 months was applied. The results showed that three-hour experimental treatment performed by professors of physical education showed better results than the standard physical education program conducted by class teachers (Skender, 2004). In his research: "The influence of programmed physical education on changes in motor skills in eleven years old students", the results of 70 hours of physical and health education in one year led to changes in all tested motor skills. Variables were the capabilities included in the tests of the eurofit battery test (Stankovic and Hadžikadunic, 2005). An interesting study in which (Delija et al., 2005), analyzes the difference between groups of subjects aged 10 to 11 involved in different kinesiological activities. Subsample consists of three groups: athletes, students working in team sports and students engaged in other sports. Three anthropometric variables, 6 motor variables and one functional were measured. The MANOVA method (analysis of quantitative differences) concluded that different kinesiological treatments created quite large differences among the groups of subjects.

On a sample of 110 pupils (boys and girls) 11 - 13 years, statistically significant changes were found in the structural process of motor dimensions of initial and final measurement, under the influence of the

curriculum. A discriminatory analysis was done with the aim of defining quantitative changes that took place at two time points. Indicates that variables for balance estimation (flamingo), long jump (explosive power), lying sit (repetitive hull power), then variable 10x5 statistically significantly changed. The author also concludes that both boys and girls have the capacity to balance at both ages (Kuchuk, 2006). On a sample of 255 boys 11-14 years, significant transformations of motor abilities and degree of adaptation of movable structures were influenced by the programmed work. The highest degree of transformation in the area of basic motor abilities occurred in the long-range jump and hand tapping variability, and it can be concluded that the greatest increase in the value of motor abilities occurred in those motor skills whose development is mainly influenced by endogenous factors (Jašarević i Jašarević, 2006).

In his master's thesis on the sample of 82 handball players, 11-14 years, he tried to determine the qualitative and quantitative changes in the basic situational motor skills created under the influence of the three-month program of handball. The handball program of the 52 training units produced statistically significant changes in the treated areas (Lakota, 2006).

In his work: "Qualitative changes in motor status after a special kinesiology program for children aged 9-10 years", they found that the programmed three-hour training for seven and seven months caused positive effects on improving motor skills, which were included in the testing (Skender et al., 2007). On a sample of 146 male students, transformation processes were established under the influence of programmed physical and health education classes of 69 classes per elementary motor, situational and motor skills and functional abilities of students of the eighth grade. A system of variables of 8 tests for basic motor abilities and 9 tests for the assessment of specific motor abilities was used, and one test for the evaluation of functional abilities. It was found that programmed teaching has a positive influence on improving basic motor, situational and functional abilities between two measurements (Hadžikadunić, 2007). In his work: "A discriminatory analysis of the motor and functional abilities of sports-active and inactive students", on a sample of 64 students, divided into two sub-assemblies (sportively active and inactive students), the author established the existence of a difference between two sub-classes. The results of the study show that sports active students are better in tests for estimating explosive power, segmental velocity, vital lung capacity, and systolic and diastolic blood pressure (Batričević, 2008). In his paper: "The Impact of Experimental Treatment on Some Motor Performance of Fourth-Grader Students", on a sample of 104 students, the treatment applied changes in motor skills in tests for estimating the segmental velocity of the limbs, explosive forces.

The kinesiological treatment did not cause changes in the flexibility and static strength variables, which are influenced by the longitudinal dimensionality of the skeleton, that is, the static strength test is too heavy for the selected sample (Nikolić et al., 2008). In his paper "Structural changes in sports games in the teaching of physical education" on the sample of 152 pupils conducted the content of sports games in the teaching of physical education for the duration of one school year. By applying the treatment, the level of structural changes in basic and specific motors was attempted.

The results of this program have shown a general and systematic reconstruction of general and specific motor abilities, therefore the transformation process is responsible, although not in all situations to the same extent. The worst effects were recorded in the case of football (Mladenović, 2008). In the study of changes in pupils aged 11 years under the influence of the experimental program of sports games compared to the standard bodybuilding program, the sample was made up of 252 male students who were divided into a control group and experimental group. A system of 33 variables (12 morphological and 21 for estimation of motor and functional abilities) was used. The experimental program was saturated with the contents of sports games. The results show that the morphological system contributes to the equal differentiation of the group, while the experimental group showed better results in the motor space, of 14 variables that showed a statistically significant difference in 13 variables, the experimental group was better (Malacko and Pejić, 2009). In a study conducted on 153 subjects, 48 respondents participated in regular physical education with 2 hours of instruction, (the first experimental group E1), 56 subjects participated in regular physical education with 2 classes, plus the third extra hour per week second experimental group E2), with which professors of physical and health culture worked, and 49 respondents participated in regular physical education classes with class teachers, 2 lessons per week (control group - K).

There were statistically significant changes in motor abilities in the final relative to the initial measurement in experimental groups relative to the control. On the basis of the obtained results it can be assumed that proper methodological design of teaching work (physical exercise means, load, methods for the development of certain abilities forms and forms of work etc.) have had positive effects on motor skills when it comes to girls of third grade primary school (Džibrčić et al., 2011). In the conducted research, anthropometric measures and motor abilities were assessed on a sample of 47 third-grade students who are engaged in additional physical activity or training in basketball in the section of the school sports society and who participate only in the regular teaching of physical and health culture. The results showed that

students exercising additional physical exercise have significantly better results in motor skills, as well as a noticeable increase in muscle mass. The results of the t-test in the area of motor abilities show significant differences that occur in variables for estimating explosive (MSD), repetitive (MPT), and static power (MIV) for the benefit of students who exercise physically. Similarly, statistically significant differences were found in the flexibility assessment (MPR) and the simple movement rate (MTR) variable. A statistically significant difference was not found in the co-evaluation assessment variable (MPN), although there is a numerical difference in the results of the polygon backlash test for the benefit of additional physical activity students (Gašparić, 2015). The results of the research (Badrić et al., 2015) show that after the training process lasting 8 weeks, statistically significant changes were made in the motor skills of girls who were engaged in additional extracurricular activity in the school sports society. Similar results in their research were obtained (Zukolo, 2007; Milanović et al., 1994; Blašković et al., 1993). Girls progressed most in tests to assess explosive power and flexibility, but also significantly reduced agility performance. The results of this study show that significant differences appear in these abilities, while the differences in the coordination area are minimal. Additional physical activity in the work of a school sports society significantly influences the increase in motor skills.

Some previous research has found that transformational changes in motor skills in older girls who attend more primary school are emerging, while this research has shown that obvious differences are with nine-year-old girls. The results of the research Nićin (2000) and Petković (2007) show that additional physical activity increases the positive effects of both physical development and basic-motor abilities. From the obtained results, it is concluded that for more substantial transformations in the motor space, additional content is needed outside the teaching, assuming that the transformation of basic motor skills is greater when the higher level of motor knowledge is higher. The results show that additional involvement in kinesiological activity, and in this case it is basketball, with the regular teaching that forms the basis of all organizational forms of work in this area, ensures significant transformational effects. This affirms the value of sports in its best form, which is preparation. Kinesiological contents are also shown here as a powerful generator of human adaptability as a self-improvement system. In this case, this is a school sport, which, considering the trends in the reduction of the standard of citizens, must be counted. School sport is the only choice for a large part of the population, and society should take responsibility for making exercise available to every child regardless of the material status of the parents. The results of the study show that after a training exercise lasting 8 weeks, statistically

significant changes in the motor skills of girls who were involved in additional extracurricular activity in the school sports society were created (Badrić et al., 2015).

On a sample of 106 5th grade female students, aged 10 to 11 years, the respondents tried to determine the effects of regular and modified physical education classes by applying contents from sports games (basketball, volleyball and handball) for one semester to changes in basic motor skills in fifth grade elementary school female students. 15 motor variables were used to assess basic motor skills. Descriptive statistics and a T-test were used to determine changes in basic motor skills. The results of the study at the descriptive level showed noticeable differences between the same groups in the final compared to the initial measurements. Based on the results of the t-test for the control and experimental groups, it can be concluded that there were statistically significant changes in values on all variables of basic motor in the final compared to the initial measurement. The analysis of the results of the T-tests shows that the groups differ from each other in the initial measurement in only one variable of basic motor, MTAPN, and this difference is statistically significant in favor of the control group. In the final measurement, there are no significant differences between the control and experimental groups in the average values of all variables of basic motor skills (Nikšić et al., 2019).

CONCLUSION

This research was conducted with the aim of determining the partial changes (differences) of basic-motor abilities created under the influence of a four-month program of basketball, volleyball and handball in the pupils of the fifth grades of primary school. The sample of respondents included 106 pupils in the class, aged 10 to 11 years, clinically and mentally healthy, and with no pronounced morphological and locomotor impairments. The sample of respondents was divided into two subgroups, an experimental group (53 pupils), who carried out physical education classes according to the modified plan and program of sports games (basketball, volleyball and handball) for a semester and a control group (53 pupils) who attended regular classes from physical education according to the current curriculum. The variables used in this study consisted of 15 motor variables and variables for estimating the frequency of the movement (Taping Hand - MTAP; Taping Leg - MTAPN; Taping Legs on the Wall - MTAPNZ); variables for assessing flexibility (Stick turn - MFLISK; MFESDM; MFESUM; High Jump 20m - MFE2OV), variables for the estimation of the repetitive power (Test (MBFDS; laying-sit - MRCLDM; 40 seconds squash test - MFRDC; Push-ups - MFRSKL) and variables for assessing coordination (Steps aside - MAGKUS; Magnetic Test - MAGTUP; Polygon Background - MRGEPOL).

Descriptive statistics and discriminatory analysis were used to determine changes (differences) in basic-motor abilities. The results of the study at the descriptive level showed certain differences between the groups in the final versus the initial measurements. Based on the results of the discriminatory analysis, it can be concluded that the greatest relative contribution has the variables MTAPN - Taping the leg and MFRSKL - Push-ups, and the smallest MFESUM - High jump and MPD - Turning to the right. Other variables give relatively moderate contributions to the accomplished discriminatory function. Centroid values are higher than in the baseline motor situation in the initial measurement, which is also expected from the canonical correlation coefficient (which is higher in the final measurement). Also, the differentiation models were statistically significant in the final versus the initial measurement where they were not statistically significant, as shown by Willks Lamda results and the Hi-square for initial measurement. According to these results, it can be concluded that there has been divergence in the latent structure of the discriminatory function in both groups, which can most likely be a consequence or effect of the program itself. For this reason, it can be concluded that there are more and more significant possibilities for distinguishing groups in the final measurement. Applied programs, i.e. a regular program of physical and health education, as well as an amended program of sports games (basketball, volleyball and handball) for a period of one semester, have influenced the transformation of basic and motor skills. This confirms that regular teaching of physical and health culture can lead to positive transformations, which points to the need to innovate curricula and adapt to the same needs of the population concerned, in order to achieve even greater changes in basic-motor skills, as well as the overall anthropological student status.

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