

EFFECTS OF VARIOUS GROUP FITNESS PROGRAMS ON MOTOR SKILLS OF THE SEVENTH GRADE ELEMENTARY SCHOOL FEMALE STUDENTS

(Preliminary communication)

Aleksandra Sibinović¹ and Sanja Mandarić²

¹*"Vožd Karadjordje" Elementary school, Leskovac, Serbia*

²*University of Belgrade, Faculty of Sport and Physical Education, Belgrade, Serbia*

Abstract

Group fitness programs are available to any individual, aimed at preserving health, improving cardiac efficiency and muscle strength, or physical condition. The main objective of this study was to determine the effects of programmed instruction high-low and step aerobics on motor skills of seven grade elementary school female students. The survey was conducted on a sample of 75 seventh grade female students of "Vožd Karadjordje" elementary school from Leskovac, who were divided into two experimental groups (N = 50) and a control group (N = 25). The effects of the program high-low and step aerobics followed in the area of motor abilities (11 variables). The experimental factor was a separately programmed instruction high-low and step aerobics, for eight weeks, three times a week and realized within the curriculum of regular physical education classes. The control group attended the program content of physical education classes in the seventh grade prescribed by the Curriculum, Ministry of Education, Science and Technological Development of Republic of Serbia. Once realized the experimental program, there was a statistically significant difference in most of the motor variables. The results showed that the program high-low and step aerobics, contributed the improvement of motor skills of students in most of the studied variables, compared to students in the control group. The results point to the positive aspects of group fitness program to preserve the proper growth and development of children and their recommendation that could be reliable basis and recommendation of modern physical education teaching.

Keywords: *physical education, high-low aerobics, seventh grade elementary school students, experimental group, control group, content of physical education, initial and final measurement, experimental factor, univariate analysis of variance, proper growth and development of children, Tukey post hoc test, step aerobics*

INTRODUCTION

During the last few centuries, there have been rapid changes in the living environment of a man who was unable to be involved in their progress and development. Lack of movement, disturbed hormone balance with a high calorie diet are risk factors for early death and chronic non-contagious diseases that have serious and lasting effects on human health and quality of life. The human body by its very nature is not created for sitting but for movement. On the other side we live in a modern society where the sitting posture is a predominant way of life, even the meaning of life. The sudden and rapid technical and technological development with a tendency of lasting expansion reduces further the need for daily caloric consumption, and reduces the need for physical activity. The result of all this is reflected in the rapid pace of life and the lack of free time and motivation to exercise some forms of physical activity required to maintain the physical fitness necessary for a healthy life. The survey results indicate that approximately 60-70% of the population of developed countries is characterized by a lower degree of physical activity recommended in order to maintain health and energy balance (Sport Council and Health Education Authority, 1992; World Health Organization, 1995; US Department of Health and Human Services, 1996).

Unfortunately, even within the school population it was recorded the same trend of reduced physical activity and the

increase in overweight and an increased number of postural disorders and deformities that can leave permanent consequences on the health status in later period of life. The reasons for this situation, on the one hand can be explained by the negative impact of "sitting posture" lifestyle (Mitić, 001), and on the other side of the current state of physical education in our school system.

The place and role of physical education in the school system is of huge importance because it contributes to the universal development of personality, influences the development of movement competence and self-esteem, acquisition of the necessary knowledge, values and attitudes necessary for a healthy lifestyle, which confirms the famous latin phrase of Roman poet Juvenal: "Healthy mind in a healthy body" (lat: "Mens sana in corpore sano") quoted by many philosophers and educators up to these days. According to Fairclough, Stratton, & Butcher, (2008) schools or classes of physical education play a key role in promoting healthy forms of physical activities (neither the competence nor the excessive and obsessive exercising is stressed) since the children spend 45 % time of a day in school.

Studies conducted with the school population, indicate that the level of physical activity declines with the age and that this tendency is particularly observed among female adolescents (Kimm et al., 2001; Nader, Bradley, Houts, McRitchie, & O'Brien, 2008; Lazarevic, Radisavljević, &

Milanović, 2008), together with the fact that the elementary school students during their physical education classes show only a part of their psycho-physical potential and achieves results below their potentials on the one hand (Maksimović, 2000). On the other hand, the physical education classes are not able to respond to the problems posed by modern habits of children due to ineffectiveness, inefficiency and obsolescence of organizational forms in the existing school system conditions (Maksimović, 2000; Zrnzević, N., & Zrnzević, J., 2015).

In further development of the modern school system of education, in order to improve and develop physical education classes together with the usage of modern technology and theoretical knowledge, appeared the idea of possible application of group fitness programs, which have great popularity in the recreational training. Keeping in mind the possibilities and conditions of the school environment two fitness programs high-low and step aerobics were chosen.

High-low aerobics has its basis in a dance aerobics (Aerobic Dance). The main feature of this exercise program is the application of the basic forms of motion related to the dance steps, which can be performed in static position, but also in movement (in space), in different directions, different time duration (pace, rhythm, duration), determined by music, all with the aim of developing aerobic fitness exercisers (Mandarić, 2003; Mandarić, Kocić, & Milinković, 2010).

The step aerobics is characterized by the use of steps, with alternating steps up and down using different forms of movement. This program primarily affects the development of cardiovascular and respiratory system with the involvement of large muscle groups, muscles of the lower extremities, *m. quadriceps femoris*, extensor muscles of the hip joint, muscle of hamstring leg, then the muscles of the arms in the shoulder belt. The step aerobic program is characterized by a moderate intensity of exercise and moderate energy consumption. (Mandarić, 2003; Sekulić, Rausavljević, & Zenić, 2003; Cvetković, 2007)

The studies of group fitness programs indicate their positive impact on all components of psychosomatic status and recommend them as a reliable basis for modern physical education teaching (Popov, 1995; Mandarić, 2003; Gra-ssi, Turks, & Sforza, 2006; Viskić-Štalec, Štalec, Katić, Podvorac, & Katović, 2007; Cvetković, 2007; Sibinović, 2010).

The subject of the study is the impact of conducting high-low and step aerobic physical education classes on the motor skills of the seventh grade female students in elementary school. The aim of the research was to determine the effects of conducting high-low and step aerobic physical education classes on the motor skills of the seventh grade female students in elementary school.

METHODS

In this survey, an experimental method was applied with initial and final measurement and experimental factor that was implemented in the curriculum of the regular physical education classes of the seventh grade female students of "Vožd Karadjordje" primary school in Leskovac, Serbia. The female students were divided into three groups: two experimental and one control. The experimental group (E1) attended the high-low aerobic based classes while the experimental group (E2) attended the step aerobic based classes. For the purposes of carrying out the survey, high-low and step aerobic choreographies were designed (each time), which consisted of the application of

different movement forms that were performed in the movement steps of low and high intensity-changing, unchanging and neutral steps and implementation of step by step aerobic benches. High-low and step aerobic classes by its structure did not differ from the physical education classes.

Each class was divided into introductory-preparatory, main and final part. The introductory-preparatory part of the class consisted of exercises which aimed to prepare those muscle groups that will be most involved in the main part (exercises with small amplitude motion, light stretching exercises, moderate pace of work and simple coordination exercises). In the main part of the class the aerobic choreography and strength training were realized, and in the final part of the class the stretching exercises of those muscles groups that were most involved in the main part of the class. The control group (K) attended regular physical education classes (courses of volleyball and athletics), determined by the Curriculum of Physical Education, Ministry of Education, Science and Technological Development of Republic of Serbia.

The sample

The research was done on the sample of seventh grade students (N=75), from Primary school "Vožd Karadjordje" in Leskovac, average age 13 years, divided into three groups. The first experimental group (E1) consisted of 25 female students, the second experimental group (E2) also consisted of 25 female students, as well as the control group (K).

The sample of variables

Starting from the aim and purpose of the research the following motor skills were examined, with the choice of measuring instruments based on the data of domestic and foreign authors. Measurement technique is applied from the battery Eurofit tests for school children. From motor skills the following variables were used: hand tapping, test for assessing the arm gestures speed (TAPR); bend in sit movement, test for assessing the body mobility (DUBPR); standing long jump, test for assessment of explosive leg strength (SDM); lying-sit, dynamic power of abdominal, thigh muscles (LESED); the folding endurance test for the evaluation of static strength of arms and shoulders (ZGVIS); pin running 10x5 m, test for the evaluation of the running speed with the change of direction (TR - 10x5 m);

Since the Eurofit battery tests for young do not have tests of coordination assessment, in the research, in order to assess this area, the following variables from the general coordination were applied: eight with bending down (Eight); side steps (KorSt) from space coordination in rhythm: drumming feet and hands (BubNR); nonrhythmic drumming (NrBub) and bounces to the rhythm (PosRit).

Statistical data analysis

All the data obtained from the research were analyzed using descriptive and comparative statistical methods. From the area of descriptive statistics representative central and dispersible parameters were determined: the arithmetic mean - M and standard deviation - SD, while the space of comparative statistical procedures to determine the existence of significant statistical difference between the groups at the initial and final measuring univariate analysis of variance (ANOVA) with repeated measurements. To test the difference between the initial and final measurements within one group the steam T - test was used, and for comparison of individual groups in the initial and final measure-

ment the Tukey post hoc test was applied. Statistical data analysis was performed using the statistical program SPSS.

RESULTS

Based on the results of descriptive statistics (arithmetic mean and standard deviation), in Table 1., it can be seen that in the experimental group (E1, E2) after eight weeks (24 hours) of experimental program of high-low and step aerobics it was noticed the improvement in results in all variables of motor skills at the final measuring. The female student control group (K) indicates a certain improvement in the following variables of motor movements on the final measurement: hand tapping (TAPR), bending in sitting movement (DUBPR), the folding endurance (ZGVIS), eight (EIGHT), side steps (KORSTR), drumming feet and hands (BUBNR) nonrhythmic drumming (NRBUB) hops in a rhythm (POSRT).

Based on the results of the analysis of variance (ANOVA) with repeated measurement of the F test and the significance level (p) variables related to the motor skills shown in Table 1., and based on the t-test results showed that there was a statistically significant difference in the level of significance 0.05 and 0.001 between the initial and final measurements in the experimental groups (E1, E2) and control (K) groups after the application of the eight-week program of experimental high-low and step aerobics. Within the control subjects (K) groups, the t-test of motor abilities indicate that there was a statistically significant difference in

individual variables on the initial and final measurement. Statistically significant differences in the following variables were noticed: hand tapping, eight with bending, non-rhythmic drumming, bounces to the beat. For other variables in the motoric movements: a low forward bend, standing long jump, lie to sit, the folding endurance, running 10x5 m and drumming the feet and hands, were not observed statistically significant differences. The subjects of the control group who attended the physical education classes have improved the frequency of hand movements, the general coordination and coordination in the rhythm, while for the variables that assess flexibility, explosive strength, muscle repetitive potential, muscular endurance and agility, there was not noticed any progress in the area of research.

At the female student (E1) group that attended the high-low aerobics classes, a better results were noticed with statistical significance in most examined variables of the motoric space: taping hand, bend in sit, long jump, lie-sit, eight with bending, steps in side, feet and hands drumming, nonrhythmic drumming, bounces to the beat. It was not observed a statistically significant improvement of variables in folding endurance and running 10 x 5 m variables from space muscular endurance and agility. At female students of (E2) group attending step aerobics classes, the results of t-test of motor abilities indicate that there was a statistically significant difference between the initial and final measuring in all tested variables of the motor skills.

Table 1. Results of descriptive statistics, analysis of variance (ANOVA) and t-test of motor skill of control (K) and experimental (E1, E2) groups at initial and final measurement (N=25) Tukey post hoc test

Variables	Initial measurement			Final measurement			F	p
	Group	M	SD	M	SD			
TAPR	K	16.82	2.30	15.69*	1.22	47.52	<0.0001***	
	E1	15.16	1.40	14.29**	1.40			
	E2	18.68	3.39	18.68***	3.39			
DUBPR	K	25.84	5.92	26.12	6.68	43.87	<0.0001***	
	E1	24.56	7.08	26.62**	8.11			
	E2	24	7.22	26.08***	7.11			
SDM	K	146.44	22.51	146.04	21.85	76.67	<0.0001***	
	E1	142.68	26.29	150.24***	24.51			
	E2	122.04	16.78	137.04***	19.63			
LESED	K	17.92	4.03	17.52	4.47	59.74	<0.0001***	
	E1	16.64	4.54	19.52***	3.56			
	E2	15.76	3.36	18.08***	2.31			
ZGVIS	K	11.63	11.54	17.28	14.96	26.31	<0.0001***	
	E1	9.95	11.38	11.58	10.19			
	E2	11.63	11.54	17.28***	14.96			
TR10x5 m	K	23.62	3.19	23.32	3.18	22.59	<0.0001***	
	E1	24.69	3.25	24.01	3.71			
	E2	23.92	1.77	22.12***	1.89			
EIGHT	K	24.57	2.14	22.69	1.67	98.38	<0.0001***	
	E1	22.91	3.26	21.09**	2.95			
	E2	25.16	4.11	21.58***	2.07			
KORST	K	14.94	1.38	13.87	1.33	137.5	<0.0001***	
	E1	15.39	2.01	14.13***	1.31			
	E2	15.97	1.26	14.34***	1.66			
BUBNR	K	10.16	3.59	10.96	3.35	67.75	<0.0001***	
	E1	8.8	3.77	11.00**	4.46			
	E2	9.16	4.78	11.96***	4.33			
NRBUB	K	10.24	4.41	11.60	4.53	127.25	<0.0001***	
	E1	12	3.50	13.84***	3.65			
	E2	10.72	4.95	13.04***	4.99			
POSRT	K	11.16	5.58	13.92	6.12	75.05	<0.0001***	
	E1	12.36	6.02	17.04**	4.48			
	E2	10.68	7.35	15.48***	4.80			

A statistically significant difference at the level of: * p <0.05; ** P <0.01; *** P <0.001

Table 2. Results of the variance analysis (ANOVA) of motor skills in control (K) and experimental groups (E1, E2) groups in the initial measurement

Variables	Initial							
	MK	ME1	ME2	F	P	T E1-E2	T E1-K	T E2-K
TAPR	18.68	15.16	16.82	19.35	< 0.0001***	2.5***	1.6	1.9*
DUBPR	25.84	24.56	24.00	0.1	0.959824	0.6	1.3	1.8
SDM	146.44	142.68	122.04	6.24	0.000646**	20.6**	3.7	2.4**
LESED	17.92	16.64	15.76	0.47	0.703896	0.7	1.3	2.2
ZGVIS	13.20	9.95	11.63	4.46	0.005612	1.7	3.6	1.6
TR 10x5m	23.62	24.69	23.85	1.17	0.325306	0.8	1.0	0.2
EIGHT	25.16	22.91	24.57	2.93	0.037506*	3.1*	1.6	1.2
KORST	15.97	15.39	14.94	12.48	< 0.0001***	0.5	0.6	2.3***
BUBNR	10.16	8.8	9.16	0.22	0.882301	0.4	1.4	1
NRBUB	10.24	12.00	10.72	1.17	0.325306	2.0	1.7	0.5
POSRIT	11.16	12.36	10.68	0.66	0.578656	1.7	1.2	0.4

A statistically significant difference at the level of: * p <0.05; ** P <0.01; *** P <0.001

Table 3. The results of analysis of variance (ANOVA) of motor skills in control (K) and experimental (E1, E2) groups at the final measurement

Variables	Final							
	MK	ME1	ME2	F	P	T E1-E2	T E1-K	T E2-K
TAPR	15.69	14.92	15.65	4.89	0.003310**	1.3**	1.4**	0.5
DUBPR	26.12	26.62	26.08	4.46	0.005612	1.6	0.5	0.3
SDM	146.04	157.24	137.04	13.24	0.0001*	2*	2.4*	0.9
LESED	17.52	19.52	18.08	9.98	0.1851*	0.7	2*	0.5
ZGVIS	13.22	11.58	19.28	5.92	0.000948*	6.2*	1.6	6.3*
TR10x5 m	23.32	24.01	23.16	3.14	0.008865	0.8	0.7	0.3
EIGHT	22.69	21.09	21.58	2.74	0.047532*	1.8	2.2*	4*
KORST	14.34	14.13	13.87	1.79	0.154237	0.2	0.1	0.8
BUBNR	10.96	11.00	11.96	3.23	0.025802*	2*	1	2.4*
NRBUB	11.60	13.84	13.04	2.82	0.043020*	0.8	2.4*	3.1*
POSRIT	13.92	17.04	15.48	1.89	0.136424	1.6	3.1*	1.6

A statistically significant difference at the level of: * p <0.05; ** P <0.01; *** P <0.001

Based on the results of the descriptive statistics (arithmetic mean) of motor skills shown in Table 2. it can be concluded that the experimental group (E1, E2) at the initial measurement achieved better results in the measured variables, but the three variables (TR 10x5 m, and nonrhythmic drumming and hops in rhythm) compared to the control group students (K). At the initial measurement based on the results of analysis of variance (ANOVA) of post hoc test (Table 2.) it can be observed a statistically significant differences between the experimental (E1, E2) group and the control group (K) in the variables of hand tapping, standing long jump, eight with bending down the steps to the side at the level of statistical significance of 0.05, 0.01 and 0.001.

Based on the post hoc test and the level of significance (p) shown in Table 2., between the experimental (E2) and control (K) groups at the initial measurement there was observed a statistically significant differences in the following variables: hand tapping, standing long jump and step aside within the level of statistical significance of 0.05 and 0.001. Also, based on the results obtained from the experimental group (E2) and (E1) it is observed a statistically significant difference in the variables: hand tapping, standing long jump and eights with bending down to the level of statistical significance 0.05 and to 0.01. At the initial measurement between the (E1) group and (K) group there was not observed statistically significant differences between the examined variables from the motoric area.

Based on the (ANOVA), post hoc test and the level of significance (p) shown in the Table 3., between the experimental groups (E1, E2) and the control group (K) at the final measurement, there was observed a statistically significant differences in the following variables: hand tapping, standing long jump, the lie-sit, the folding endurance, eight

with bending, drumming feet and hands, and nonrhythmic drumming and hops to the rhythm on the level of statistical significance of 0.05 and to 0.01. The final measurement showed statistically significant difference between the experimental (E1) and (E2) groups in the following variables: hand tapping, the folding endurance, drumming feet and hands at the level of statistical significance of 0.05 and to 0.01. In addition, we can see statistically significant differences between the experimental (E1) group and control (K) groups in the following variables: hand tapping, standing long jump, eight with bending, nonrhythmic drumming legs and arms and horned viper in the rhythm of the level of statistical significance 0.05 and 0.01. The results indicate that there was a statistically significant difference on the final measurement between the experimental group (E2) and the control group (K) in the motor skills for the following variables: the folding endurance, eight with bending, drumming feet and hands and nonrhythmic drumming at the level of statistical significance of 0.05.

DISCUSSION

After completing the experimental procedure for a total of eight weeks of using the high-low and step aerobics it was noticed significant positive changes in motor skills from the initial to the final measurement. Taking in consideration that aerobic exercising to music is characterized by carrying out the movement and the movement of the whole body to a certain rhythm, or music, establishing a pleasant atmosphere during the exercise, analysis of selected variables of motor skills point to the fact that such a significant improvement of results is justified.

In experimental (E1) group attending high-low aerobics classes, there was no evidence of a statistically significant

changes in two motor skills variables: the folding endurance and running 10x5 m, variables responsible for muscular endurance flexor of the elbow joint and agility.

After examining the results of the variables related to motor skills, it was concluded that systematic aerobic exercise with music, using high-low and step aerobic program, had a positive impact on the above mentioned variables and that the tasks of group fitness programs was accomplished. The obtained research results are within the scope of the results obtained by other researchers (Mandarić, 2003; Burgess, Grogan, & Burwitz, 2006; Sibinović 2010).

After examining the results of variables related to motor skills, it can be noticed that the experimental program of aerobic exercises with music according to high-low aerobics (E1), the group has largely contributed to a significant improvement in the results of statistical research variables from initial to final measurement. Statistically significant improvement in results can be seen at a variable speed hand gestures hand tapping at the final measurement in the experimental group (E1) with respect to physical education. The resulting difference can be explained by the fact that high-low aerobics music is characterized by higher beat (faster pace), and that it effected a statistically significant differences between the groups. Comparing the two models of exercises to music high-low and step aerobics, it is observed a statistically significant difference in improving the speed of hand gestures, or high-low aerobic significantly influenced the improved results. At the final measurement in the experimental group (E1) it is observed a statistically significant improvement in results in variable standing long jump compared to the control group (K). This can be justified by the fact that the standing long jump depends on coordination, since the students have made a progress in the above variables, measured progression is justified. Also, statistically significant differences were observed between the two models of exercises to music. The results indicate that the students of the experimental group (E1) have achieved more progress in comparison to the female (E2) group.

At the variable of repetitive muscular potential of female (E1) groups significantly improved results can be observed compared to physical education classes. The exercises that were done at the end of the second part of the main part of the lesson, had an impact on improving the results of repetitive muscle potential in experimental groups (E1). However, a statistically significant difference was not observed between the two models of programmed exercises of high-low and step aerobics. The obtained results in this research are within the scope of the results reached by other researchers (Zagorc, Zaletel, Černoš, & Ipavec, 2000), states that aerobic exercise with music maintains and develops the strength of the entire body associated with its constitution. On the basis of variables from space coordination it was noticed a significant improvement in coordination of (E1) group compared to physical education classes. Comparing the two programs aerobics - high-low and step aerobics, there was not observed statistically significant differences in the coordination between the aerobic exercise. The fact that the experimental program of aerobic exercises with music according to step aerobics (E2) groups significantly influenced the improvement of results examined variables from initial to the final measurement.

Statistically more significant improvement of results can be seen at the variable folding endurance in the final measurement in the experimental (E2) groups than in the control group. The research results show that there is a sta-

tistically significant improvement of the results of coordination from initial to final measuring in the experimental group (E2) compared to the control group. It can be assumed that the results from the final measuring were result of the application of choreographic movement structures packed in a movable unit and a musical phrase. The research results are within the scope of allegations of individual researchers in the field of aerobic exercises with music. Thus, Zagorc, et al., (2000) states that aerobic exercise with music develop almost all types of coordination, and that for the improvement of the results of coordination in the step aerobic is the result of applied aerobics choreography composed of a large number of climbing and descending the stair in a given rhythm and variety of motion structures in the legs and arms. The above-mentioned results of the study indicate the justification of the experimental method in physical education classes, whose objectives and tasks have their share and importance on psychological development of children, which should not be ignored.

CONCLUSION

Starting from the objective and the aim of research, the changes observed after the completion of the experimental program of group fitness program for a period of eight weeks, were statistically significant in the test area of motor abilities of the seventh grade female students of primary school.

The obtained results of the research indicate that a group fitness programs, as well as an innovative model of practice in physical education can have a positive impact on the transformation of the tested motor skills, contribute to a greater intensification of the educational process, have a positive impact on the growth, development and health of the children, practical applicability and motivation for the work of students in relation to the classical and traditional physical education, indicating the possibility of a real and meaningful application of group fitness programs in the framework of the regular physical education classes.

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Correspondence:

Aleksandra Sibinović

„Vožd Karadjordje“ Elementary school in Leskovac

St. Vidoje Smilevskog 8, 16000 Leskovac, Serbia

E-mail: sibinovic.aleksandra1@gmail.com