STUDIA UBB EDUCATIO ARTIS GYMN., LXIV, 3, 2019, pp. 23 - 36
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.64(3).19

THE EFFECTS OF ADDITIONAL PHYSICAL ACTIVITY PROGRAMMES ON MOTOR AND HEALTH RELATED COMPONENTS IN CASE OF STUDENTS IN 6TH GRADE

LUKÁCS NORBERT CSABA [1,2*], HANȚIU IACOB [1]

ABSTRACT. Introduction. According to a Eurydice report, in EU member states there are differences regarding the number of physical education classes held throughout a school year. Considering the number of EU physical education and health classes, in 2016, out of the total of 28 member states, Hungary occupied the 1st place and Romania the 21st place. **Aims of the Research.** This research aims to analyze the effects that additional physical activity programmes have on motor and health related components of students in 6th grade. **Subjects and Methods.** The research was performed on a sample group of 55 subjects, students in 6th grade, from two schools from Oradea, the additional programme using exercises and games with themes from handball, basketball, rugby-tag and badminton. We used two test batteries (EUROFIT and NETFIT) by which we measured the motor and health related components of physical fitness of the subjects involved in the research. The data was statistically analyzed using the SPSS software, version 20.0. In order to test the normality of the distribution of the data we used the Kolmogorov-Smirnov and Shapiro-Wilk tests, and to compare the mean values we used parametric and non-parametric tests, depending on the distribution: paired sample t-test or Wilcoxon signed-rank test. We also calculated the effect size (Cohen's d or eta-squared) with a confidence interval of 95%. Using the ANOVA analysis of variance, we calculated the variation between the scores and the mean values of the groups involved in the research. **Results**. Regarding the motor parameters with a normal distribution, the paired sample t-test shows that in case of experimental group A (EGA), after 7 months of additional physical activity, significant differences were recorded for 6 out of the 9 assessed parameters (plate tapping (PT), standing broad jump (SBJ), handgrip test (HT), sit-ups (STU), endurance shuttle run (ESR), paced push-ups (PPU)), while in case of experimental group B (EGB), the differences were recorded for 7 parameters (PT, SBJ, HT, sit-and-reach (SAR), shuttle run (SR), ESR, PPU, and in case of the control group (CG), for 5 parameters PT, SBJ, HT, ESR and trunk extension (TE). **Conclusions.** In EGA, in case of the nine assessment tests, the number of students located within the

[1] Babeș-Bolyai University, Doctoral School of Physical Education and Sports
[2] Partium Christian University
** Corresponding author: lukacs.csaba@partium.ro*

health zone increased by 5, in EGB this number increased by 13, and in the CG, by 3 subjects. We can establish that from this point of view the most efficient programme was the one applied to EGB.

Keywords: *motor components, health related components, physical fitness, adipose tissue, 6th grade.*

REZUMAT. ***Efectul unui program suplimentar de activităţi fizice asupra componentelor motrice şi de sănătate ale elevilor din clasa a VI-a.*** **Introducere.** Potrivit unui raport Eurydice, în statele membre ale UE sunt diferenţe privind numărul lecţiilor de educaţie fizică practicate într-un an şcolar. În anul 2016, din totalul de 28 de state membre Ungaria a ocupat locul I iar România locul 21 privind numărul lecţiilor de educaţie fizică şi de sănătate UE. **Scopul cercetării.** Scopul acestei cercetări l-a constituit analiza efectului unui program suplimentar de activităţi fizice asupra componentelor motrice şi de sănătate ale elevilor de clasa a VI-a. **Subiecţi şi metode.** Cercetarea a avut loc pe un eşantion de 55 de subiecţi, elevi de clasa a VI-a la două şcoli orădene, programul suplimentar utilizând exerciţii şi jocuri cu teme din handbal, baschet, rugby-tag şi badminton. Au fost folosite două baterii de teste (EUROFIT şi NETFIT) cu ajutorul cărora au fost măsurate componentele motrice şi cele de sănătate ale fitnessului fizic al subiecţilor. Datele au fost analizate statistic cu ajutorul programului SPSS, varianta 20.0. În vederea testării normalităţii distribuţiei datelor s-a utilizat testele Kolmogorv-Smirnov şi Shapiro-Wilk, iar pentru compararea mediilor s-au folosit teste parametrice sau nonparametrice, în funcţie de distribuţie: t-testul pentru eşantioane pereche sau testul Wilcoxon al rangurilor pereche. De asemenea, s-a calculat mărimea efectului (d a lui Cohen sau eta^2), cu un interval de încredere de 95%. Cu ajutorul analizei de varianţă ANOVA s-a calculat variaţia dintre scoruri şi pe cea dintre mediile grupelor incluse în cercetare. **Rezultate**. Referitor la parametrii motrici cu distribuţie normală, testul-t pentru eşantioane pereche ne arată că la GEA, după 7 luni de activităţi fizice suplimentare au fost înregistrate diferenţe semnificative la 6 din cei 9 parametri evaluaţi (AP, SL, DM, RTA, CNR şi FR), la GEB la 7 parametrii (AP, SL, DM, FT, CNA, CNR şi FR), iar la GC la 5 parametrii (AP, SL, DM, CNR şi ET). **Concluzii.** La GEA la cele nouă teste evaluate a crescut numărul de subiecţi din zona de sănătate cu 5, la GEB cu 13, iar la GC cu 3 subiecţi. Putem afirma că din acest punct de vedere cel mai eficient program a fost cel aplicat subiecţilor din GEB.

Cuvinte cheie: *componente motrice, componente de sănătate, fitnessul fizic, ţesut adipos, clasa a VI-a.*

Introduction

Hallal, Andersen, Bull, Guthol, Haskell, Ekelund, & Group, (2012) found that a quarter of the population of the European Union member states was not sufficiently active from physical point of view, and an OECD report (2012) specified that only one in five children was regularly performing physical exercises of moderate or high intensity level.

In 2010, in Romania, 73.2% of the boys and 88.1% of the girls with ages between 11-17, were not achieving the physical activity levels recommended by WHO. In Hungary, insufficient physical activity levels were encountered in 74.4% of the cases among boys and 86.5% among girls (WHO, 2015).

Certain researches revealed that during adolescence there are factors which may be associated with physical activity levels in a positive manner: personal efficiency in breaking one's own barriers (Trost, Pate, Saunders, Ward, Dowda, & Felton, 1997), perception regarding physical activity and sports (Sallis, Prochaska & Taylor, 2000), positive attitude towards physical education classes (US Department of Health and Human Services, 1996).

According to Kent, quoted by Epuran (2013, p. 139) "physical education is any planned programme of motor activities which helps individuals develop and control their own bodies (...) is a process by which adjustments and acquisitions are gained as a result of the physical activities".

Ceaușescu (2002, p. 112) quotes Godin who in his paper *Raising Children in the Age of School*, recommends:"more physical exercise between the ages of 12 – 15 and less intellectual activity: if we don't do it, students do it on their own, unsystematically and sometimes falling into excess (...) from the ages of 9 – 10, the way children play becomes more structured and more abstract, the groups of playing children now have an order".

Regarding the quality of physical education the United Nations Educational, Scientific and Cultural Organization (2015) presents the orientations which the decisive factors must have, proposing that the actual time of performing physical education and sports classes in schools to be at least 120 – 180 minutes / week, not including the time spent in locker rooms or the time needed to get to the designated areas.

According to a Eurydice report, there are differences between the EU member states regarding the number of physical education classes performed throughout a school year. The average is around 50 – 80 classes/year or 1.5 - 2.5 classes/week (Toussaint & Rocha, 2015). In 2016, considering the number of physical education and health classes, out of the total of 28 EU member states, Hungary was number 1 and Romania was on the 21st place. Physical education

and health class means "sports, physical activity to improve health by traditional games, gymnastics, swimming, athletics, dance or other activities which develop physical and social competences (skills, coordination, psychomotor development and cooperation) and an active and healthy lifestyle" (CCE, 2016, p. 8).

In the 2015-2016 school year, in Romania the curriculum for 5th – 8th grades stipulated physical education and sports as a distinct curricular area, with two classes per week in the common schedule for 5th-7th grades and one class for children in the 8th grade. According to the Educational Framework Plan N. 3590 from April the 5th, 2016, starting with the 2020-2021 school year the number of physical education classes will increase to two classes/week for children in 8th grade as well.

In order to increase the time spent practicing physical activities and health levels among school children in Hungary, according to Law no. 97, Paragraph 6, in the 2012-2013 school year, 5 physical education classes per week were implemented into the programme for children in 1st, 5th and 9th grade. The number of physical education classes increased every year for the rest of the grades as well, thus by the 2015-2016 school year all students in Hungary had 5 physical education classes every week, a frequency similar to subjects like mathematics and mother tongue.

In 2013, the Cooper Institute from U.S.A. signed a partnership agreement with the Hungarian School Sport Federation regarding the implementation of a national test battery for assessing the physical fitness of students. The *National Student Fitness* Test (NETFIT) test battery was created based on the model of FITNESSGRAM. The aerobic fitness, skeletal muscle fitness and flexibility are measured by 7 motor tests and based on age and gender; the results of the subjects are categorized in two or three action zones (health zone, zone that needs progress, and zone that needs continuous progress - high risk of developing diseases).

According to the study performed by Lukács & Hanţiu (2017) on a sample group of 934 students (474 from Bihor County, 460 from Hajdú-Bihar county), which used the EUROFIT and NETFIT test batteries for assessing the subjects, there is a direct relation between the levels of somatic and motor characteristics of a student and the number of physical education and sports classes from the common schedule of the curriculum. The students who attended four or five classes a week (the ones from Hajdu-Bihar county, Hungary) had higher average values of motor component levels, and the number of those located within the health zone was higher compared to the students from Bihor county who attend only one or two classes a week.

Aims of the Research

Our study aims to find out the somatic and motor responses to additional physical activity in case of a sample group of students in the 6th grade from Oradea, by implementing additional physical activities within two optional sports programmes, with two classes per week, for a period of 7 months.

Hypotheses of the Research

This study starts off with the following hypotheses:

- Supplementing the number of hours of physical activity for students in 6th grade by an intervention programme which uses exercises within optional sports programmes, results in the increase of motor and health related component values of physical fitness;
- The additional physical activity programme will result in an increased number of students in the health zone;
- By supplementing the weekly physical activity, the percentage of adipose tissue will decrease for subjects participating to the study.
-

Subjects and Methods

The research was performed as part of the doctoral degree studies, between October 2015 – May 2016 on a sample group of 55 students from three classes in 6th grade (36 girls and 19 boys), divided into three groups: two experimental groups and one control group. The 1st experimental group included 18 subjects (5 boys and 13 girls), the 2nd experimental group was made up of 17 subjects (8 girls and 9 boys), and the control group had 20 subjects (15 girls and 5 boys).

Two test batteries were used (EUROFIT and NETFIT) with which we measured the motor components and the health related physical fitness of the subjects. The EUROFIT test battery is made up of nine motor tests: sit-and-reach (SAR), Flamingo balance test (FB), bent arm hang (BAH), standing broad jump (SBJ), sit-ups (STU), handgrip (HT), plate tapping (PT), 10 x 5 meter shuttle run (SR) and endurance shuttle run (ESR). The NETFIT test battery assesses the aerobic fitness, skeletal muscle fitness and flexibility, being made up of seven motor tests: endurance shuttle run, paced sit-ups (PSU), trunk extension (TE), paced push-ups (PPU), handgrip, standing broad jump, flexibility test (FLT). Three tests are similar for both test batteries.

The data was statistically analyzed using the SPSS software, version 20.0. In order to test the normality of the distribution of the data we used the Kolmogorv-Smirnov and Shapiro-Wilk tests, and to compare the mean values we used parametric and non-parametric tests, depending on the distribution: paired sample t-test or Wilcoxon signed-rank test. We also calculated the effect size (Cohen's d or eta-squared) with a confidence interval of 95%. Using the ANOVA analysis of variance, we calculated the variation between the scores and the mean values of the groups involved in the research.

Performing this study required going through the following steps:

- choosing the sample group (control group / two experimental groups) and the place where the study was going to take place;
- choosing the methods and means of research;
- planning the activities depending on the schedule of the class in question;
- recording the results obtained at the pre-tests and post-tests;
- statistical analysis of the obtained results;
- drawing up conclusions based on the results;
- using the results in conferences / seminars / round tables.

At the beginning of the experiment, all students presented medical certificates. The children took part in the research based on their own free consent. During the experiment, the quantity of the performed work was designed for both experimental groups according to our own planning, the work chart being as it follows:

Experimental group A (EGA)	Pretesting	Additional programme	Posttesting
Experimental group B (EGB)	Pretesting	Additional programme	Posttesting
Control group (CG)	Pretesting	Without additional programme	Posttesting

The initial testing was performed between October the 23rd – 25th, 2015, and the final testing between May the 23rd – 27th, 2016, the monitored indicators being measured each time by the same person, using the same equipment.

The activities within the research were performed within two weekly optional sports programmes with durations of 60 minutes each. The activities of experimental group A included specific exercises, dynamic games and bilateral games from two well-known sports (handball and basketball), and the activities of experimental group B, included exercises taken from two other sports (rugby-tag and badminton).

The organizing part, the warm up and the exercises / dynamic games took up approximately 50% of the duration of the class, and the rest consisted of bilateral games specific to the sports mentioned above.

The optional sports programmes had the following structure:

1. Warm up (12-15 minutes)
2. Fundamental part (45-50 minutes)
3. Closing part (3-5 minutes)

The sports games used during the experiment were chosen based on the following criteria: the content of the physical education programme of the school, the technical-material base of the school and the popularity of the sports within the educational institution.

The alternative sports games used during the experiment were chosen based on certain criteria similar to the ones used for choosing the sports.

Some of the exercises and games with themes taken from basketball were described by Roman (2000), others by Ciorbă (2006), and some were created based on our own experience. Every session, besides the above enumerated exercises / games, we also organized bilateral games with / without a theme.

According to Roman (2008), in order to learn a game through playing there are more versions of exercises from handball that can be used. Besides the exercises recommended by the author, the following versions were used: 1:1 (with small goals), 2:2 or 3:3 (to exercise counter attack and phases I and II of defense), 4:4 (exercising by going from defense to attack) or games with equal number of players of 5:5 or 6:6 all over the playing field.

Some of the exercises and games of badminton that were used, were described by Stănescu (2010), and others were used and taken over from badminton classes. There were also organized simple / double games between girls / boys or mixed ones with / without themes.

Some of the rugby-tag exercises and games that we used were described by Mitrea (2013), and others were used within other rugby-tag classes. Besides the enumerated exercises / games we organized games with / without themes.

Results

Following the analysis of the obtained results, we found that 65.45% of the total sample group were girls and 34.55% were boys, the average age of the girls being 12.23 (±0.60) years, and the average age of the boys 12.05 (±0.61) years.

Using the Kolmogorov-Smirnov test (Table 1) we checked the normality of the distribution of the anthropometric and motor data obtained by applying the two test batteries, and the results for the following variables were below

the threshold of 95%: body mass, BMI, flamingo balance test, bent arm hang, shuttle run 10x5 and paced push-ups. For these variables, the data does not have a normal distribution, so the next tests are going to be nonparametric tests.

By comparing the mean values of the anthropometric variables with normal distribution – height and adipose tissue – we found that there are no differences between the subjects of the three groups (Table 2).

In addition, there were no differences between the mean values of weight and BMI variables (χ^2 = ,398, df = 2, p = ,819 for BMI, respectively $\chi 2$ = 1,322, df = 2, p = ,516 for weight).

Seeing the data from tables 3 and 4, which contain the analysis of variance of the scores registered at the initial testing of the motor parameters, as well as the multiple comparisons – Bonferroni test – of the results registered in case of the three groups involved in this study, we found that although in case of some variables significant differences were registered, the effect size (Eta^2) is small, fact which allows us to state that the three groups were approximately equal (homogenous) at the beginning of the study.

Table 1. Testing the normality of the distribution of the anthropometric and motor data at the initial testing (N=55)

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistically	df	Sig.	Statistically	df	Sig.
Height	,073	55	,200*	,987	55	,793
Body mass	,177	55	,000	,908	55	,000
BMI	,191	55	,000	,874	55	,000
Adipose tissue	,082	55	,200*	,968	55	,143
FB1	,120	55	,046	,947	55	,017
PT	,073	55	,200*	,958	55	,051
SBJ	,075	55	,200*	,973	55	,259
HT	,063	55	,200*	,984	55	,655
STU	,127	55	,027	,972	55	,221
PSU	,078	55	,200*	,978	55	,426
BAH	,238	55	,000	,790	55	,000
SR	,174	55	,000	,894	55	,000
SAR	,126	55	,029	,963	55	,087
FLT	,086	55	,200*	,972	55	,231
ESR	,102	55	,200*	,966	55	,121
TE	,099	55	,200*	,981	55	,552
PPU	,107	55	,174	,931	55	,004

Note: a. Lilliefors Significance Correction, *, This is a lower bound of the true significance, Flamingo balance test (FB), Sit-and-reach (SAR), Shuttle run 10x5 m (SR), Standing broad jump (SBJ), Handgrip test (HT), Plate tapping (PT), Sit-ups (STU), Bent arm hang (BAH), Endurance shuttle run (ESR), Paced sit-ups (PSU), Trunk extension (TE), Paced push-ups (PPU), Flexibility test (FLT), Handgrip test (NETFIT),

Table 2. ANOVA analysis at the initial testing for the anthropometric data with normal distribution (height and adipose tissue)

ANOVA								Multiple Comparisons – Bonferroni test				
Dependent Variables		Sum of Squares	df	M S	F	Sig.	Eta²	(I) Group	(J) Group	Mean dif. (I-J)	Std. Error	Sig.
Height	Between Groups	207,907	2	103,95	2,470	,094	0,087	EGA	EGB	3.832	2.194	.260
	Within Groups	2188,138	52	42,08					CG	-.639	2.108	1.000
	Total	2396,045	54					EGB	CG	-4.471	2.140	.125
AT	Between Groups	256,895	2	128,45	1,589	,214	0,058	EGA	EGB	1.54477	3.040	1.000
	Within Groups	4202,602	52	80,82					CG	-3.55611	2.921	.687
	Total	4459,496	54					EGB	CG	-5.10088	2.966	.274

Note: AT = Adipose tissue, SS = sum of squares, df = degree of freedom, MS = mean square, F = Anova ratio

Table 3. Initial testing – Comparing the means in case of motor parameters without normal distribution –Kruskal Wallis Test (N=55)

	Dependent variable [a,b]									
	FB	Eta squared η^2	STU	Eta squared η^2	BAH	Eta squared η^2	ESR	Eta squared η^2	SAR	Eta squared η^2
χ^2	3,105	.075	2,641	.046	2,949	.076	1,221	.009	1,993	.035
Df	2		2		2		2		2	
Asymp. Sig.	,212		,267		,229		,543		,369	

Note: a. Kruskal Wallis Test, b. Grouping Variable: Group

At the end of the intervention programme, we performed the same measurements as the ones we did at the initial testing, the obtained data being compared with the ones registered at the beginning of the research using the adequate tests depending on the type of distribution. According to Table 5, in case of the experimental groups (EGA and EGB), for the variables without normal distribution, the Wilcoxon test indicates that there were significant differences registered for body mass, body mass index, PSU test and endurance shuttle run test, and in case of the flamingo balance test and sit-ups, these differences were not significant. In case of the control group (CG), significant differences were registered for body mass and BMI, a natural change considering that the subjects were in their period of growth and development.

Table 4. ANOVA analysis of the motor results at the initial testing for motor parameters with normal distribution (N=55)

ANOVA								Multiple Comparisons - Bonferroni				
		Sum of Squares	df	Mean Square	F	Sig.	Eta²	(I) Group	(J) Group	Means Dif. (I-J)	Std. Error	Sig.
PT	Between Groups	18,842	2	9,421	5,440	0,007	0,17	EGA	EGB	0,88781	0,44506	0,154
	Within Groups	90,051	52	1,732					CG	-0,53778	0,42755	0,642
	Total	108,893	54					EGB	CG	-1,42559*	0,43412	0,006
SBJ	Between Groups	516,489	2	258,245	0,501	0,609	0,02	EGA	EGB	148,693	767,503	1,000
	Within Groups	26.780,420	52	515,008					CG	-552,778	737,306	1,000
	Total	27.296,909	54					EGB	CG	-701,471	748,632	1,000
HT	Between Groups	24,491	2	12,246	0,64	0,531	0,02	EGA	EGB	-152,549	147,950	0,922
	Within Groups	995,151	52	19,138					CG	-131,167	142,129	1,000
	Total	1.019,642	54					EGB	CG	0,21382	144,313	1,000
FLT	Between Groups	183,196	2	91,598	1,992	0,147	0,07	EGA	EGB	313,072	229,317	0,534
	Within Groups	2.390,731	52	45,976					CG	-124,722	220,295	1,000
	Total	2.573,927	54					EGB	CG	-437,794	223,679	0,167
SR	Between Groups	3.020,075	2	1.510,037	15,130	0,000	0,37	EGA	EGB	-582,353	337,864	0,272
	Within Groups	5.189,671	52	99,801					CG	11,80000*	324,570	0,002
	Total	8.209,745	54					EGB	CG	17,62353*	329,556	0,000
TE	Between Groups	147,326	2	73,663	3,328	0,044	0,11	EGA	EGB	0,96405	159,122	1,000
	Within Groups	1.151,110	52	22,137					CG	-283,889	152,861	0,207
	Total	1.298,436	54					EGB	CG	-380,294	155,209	0,053
PPU	Between Groups	337,551	2	168,775	3,594	0,035	0,12	EGA	EGB	-6,00327*	231,767	0,037
	Within Groups	2.442,086	52	46,963					CG	-424,444	222,648	0,186
	Total	2.779,636	54					EGB	CG	175,882	226,069	1,000

Note: SS = sum of squares, df = degree of freedom, MS = mean square, F = Anova ratio

Table 5. Comparing the means of paired variables without normal distribution (N=55)

		Statistical Test [a,b]					
Group		G2 - G1	BMI2 - BMI1	FB2 - FB1	PSU2 - PSU1	PT2 - PT1	ESR2 - ESR1
EGA	Z	-3,578[c]	-2,334[c]	-1,889[c]	-2,162[c]	-1,808[c]	-2,635[d]
	Sig. (2-tailed)	.000	.020	.059	.031	.071	.008
EGB	Z	-3,622[c]	-3,528[c]	-,105[d]	-3,581[c]	-,450[c]	-2,769[d]
	Sig. (2-tailed)	.000	.000	.916	.000	.653	.006
CG	Z	-3,922[c]	-3,922[c]	-1,446[d]	-,112[c]	-,056[d]	-1,045[c]
	Sig. (2-tailed)	.000	.000	.148	.910	.955	.296

Note: a. Group, b. Wilcoxon Signed Ranks Test, c. Based on negative ranks, d. Based on positive ranks.

Regarding the motor parameters with normal distribution, the paired sample t-test shows that in case of EGA, after 7 months of additional physical activity, significant differences were registered for 6 out of the total of 9 assessed parameters (PT, SBJ, HT, STU, ESR and PPU), in case of EGB, for 7 parameters (PT, SBJ, HT, SAR, SR, ESR and PPU), and in case of the CG these differences were registered for 5 parameters (PT, SBJ, HT, ESR and TE).

Table 6. Paired sample t-test for motor parameters with normal distribution based on the groups (N=55)

Pair	EGA (N=18)				EGB (N=17)				CG (N=20)			
	t	df	Sig. (2-tailed)	d	t	Df	Sig. (2-tailed)	D	t	df	Sig. (2-tailed)	d
PT1 - PT2	4,251	17	,001	1.00	4,707	16	,000	1.142	4,750	19	,000	1.06
SBJ1 - SBJ2	-5,915	17	,000	-1.39	-4,919	16	,000	-1.193	-2,810	19	,011	-0.63
HT1 - HT2	-5,176	17	,000	-1.22	-6,001	16	,000	-1.455	-8,723	19	,000	-1.95
STU1 - STU2	-3,005	17	,008	-0.71	-1,554	16	,140	-0.377	,800	19	,433	0.18
SAR1 - SAR2	-1,325	17	,203	-0.31	-5,951	16	,000	-1.443	,413	19	,684	0.09
SR1 - SR2	1,146	17	,268	0.27	-2,893	16	,011	-0.702	,773	19	,449	0.17
ESR1 - ESR2	-4,823	17	,000	-1.14	-4,500	16	,000	-1.091	-3,918	19	,001	-0.88
TE1 - TE2	-1,110	17	,282	-0.26	-1,353	16	,195	-0.328	3,959	19	,001	0.89
PPU1 - PPU2	-2,787	17	,013	-0.66	-2,964	16	,009	-0.719	1,226	19	,235	0.27

Discussions

The statistical analysis of the obtained data, performed for the subjects involved in the study after completing the additional physical activity programme, shows that for certain motor parameters significant differences were registered in case of all the groups involved in the study, including the subjects of the control group, but in case of the subjects of the experimental groups the number of motor parameters with significant differences, is higher. Thus, for EGA significant increase was registered for 8 parameters, for EGB for 9 parameters, and for the CG only for 5 parameters.

It's worth mentioning that in case of the subjects of the CG, 4 out of the 5 parameters that registered significant increase, registered significant increase in case of the subjects of the experimental groups as well, thus we can say that these differences of the measured values may be caused by other things than the influence of the additional physical activity programme.

Regarding the number of subjects located within the health zone after supplementing the physical activity classes, we find that the results are different for each group depending on the tested variable (Table 7). Thus, in case of EGA for the two assessed tests the number of subjects within the health zone increased by 5, in case of EGB by 13, and in case of the CG by 3 subjects. We can establish that from this point of view the most efficient programme was the one applied to EGB.

Table 7. Classification of subjects into action zones at the initial and final testing

Variable	EGA (N = 18)						EGB (N =17)						CG (N = 20)					
	HZ			NP+NCP			HZ			NP+ NCP			HZ			NP+NCP		
	IT	FT	Dif.	IT	FT	Dif.	IT	FT	Dif.	IT	FT	Dif.	IT	FT	Dif.	IT	FT	Dif.
BMI	15	13	-2	3	5	2	13	11	-2	4	6	2	14	10	-4	6	10	4
AT	11	11	0	7	7	0	11	12	1	6	5	-1	10	9	-1	10	11	1
SBJ	13	16	3	5	2	3	12	13	1	5	4	-1	16	16	0	4	4	0
HT	15	16	1	3	2	-1	15	17	2	2	0	-2	17	17	0	3	3	0
PSU	16	16	0	2	2	0	8	14	6	9	3	-7	16	15	-1	4	5	1
FLT	5	3	-2	13	15	2	2	3	1	15	14	-2	2	3	1	18	17	-1
ESR	17	18	1	1	0	-1	15	17	2	2	0	-2	8	14	6	12	6	-5
TE	9	11	2	9	7	-2	12	12	0	5	5	0	10	14	4	10	6	-4
PPU	10	12	2	8	6	-2	12	14	2	5	3	-2	12	10	-2	8	10	2
Total			+5			+1			+13			-15			+3			-5

Conclusion

The performed study allows us to formulate the following conclusions:

a) Supplementing the number of physical activity classes for students in 6th grade by activities organized in schools within optional sports programmes using exercises and dynamic games with technical elements from handball, basketball, rugby-tag and badminton, resulted in the increase of the motor components and health related physical fitness, the hypothesis being therefore accepted.

b) Based on the paired sample t-test applied for EGA, the mean values obtained at 9 out of the total of 13 motor tests (FB, PT, SBJ, HT, STU, PSU, SR, ESR and PPU) presented significant differences ($p < 0.05$). In case of EGB, the mean values of 9 of the initial tests (IT) and final tests (FT) out of the total of 13 motor tests (PT, SBJ, HT, PSU, SR, SAR, FLT, ESR, PPU, BAH), had a significant difference ($p < 0.05$).

c) Supplementing the number of physical activity classes in case of EGA resulted in the increase of the number of students located within the health zone. Practicing sports games proposed within the optional sports programmes in schools contributed to the improvement of the components of health related physical fitness; at 5 motor tests the number of those located within the HZ at the IT increased, and at one test (PSU) there were no differences compared to the initial testing.

d) In case of EGB practicing sports games within the optional sports programmes improved the components of health related physical fitness for 6 motor tests, the number of those located within the HZ at the FT increased compared to the IT (ESR – by one student, TE – by three students, PPU – by three students, HT – by three students, SBJ – by one student, FLT – by one student). The hypothesis was accepted.

Conflicts of interests

The authors declare that there is no conflict of interest.

Acknowledgements

The present research paper is part of the doctoral thesis. Both authors have equally contributed to the elaboration of research design, data collection and writing research paper.

REFERENCES

Babalola, J. (2011). *Effects of 8-weeks circuit training programme on physiological and performance characteristics of university racket game players*. Journal of Asian Scientific Research, 1(4): 143-149.

Barlow, SE. & Expert Committee. (2007). *Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report*. Pediatrics. 2007 Dec; 120 Suppl 4:S164-92.

CCE. (2016). *Recommended Annual Instruction Time in Full-time Compulsory Education in Europe 2015/16. Eurydice – Facts and FiPublications Office of the European Union.* Preluat de pe https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/images/0/0f/197_EN_IT_2016.pdf

Ceauşescu, N.N. (2002). *Istoria pedagogiei educaţiei fizice.* Bucureşti: Editura Lumina Lex.

Ciorbă, C. (2006). *Baschet.* Iaşi: Editura Pim.

Epuran, M. (2013). *Motricitate şi psihism în activităţile corporale – Prolegomene la o metateorie a activităţilor corporale.* Bucureşti: Editura FEST.

Hallal, P.C., Andersen, L.B., Bull, F.C., Guthold, R., Haskell, W., Ekelund, U., & Group, L.P. (2012). *Global physical activity levels: surveillance progress, pitfalls, and prospects. 380*(9838), 247-257. doi:10.1016/S0140-6736(12)60646-1

Lukács, N.C., & Hanţiu, I. (2017b, Aprilie-Iunie). *Components of health-related fitness among children in middle school within the Bihor – Hajdú-Bihar Euroregion*. Palestrica of the third millennium- Civilization and Sport, XVIII (2), 87-94.

Mitrea, D. (2013). Manualul antrenorului de rugby-debutanţi. Preluat de pe https://frr.ro/wp-content/uploads/2013/08/7.-Debutanti.pdf

Nikki, M., Gary, L. & Wayne, H. (2016). *The relationship between children's motor proficiency and health related fitness.* Journal of Paediatrics and child health. doi:10.1111/jpc.13236

OECD (2012). *Health at a Glance: Europe 2012.* (OECD Publishing). Paris. Preluat de pe http://dx.doi.org/10.1787/9789264183896-en

OMS. (2015). *Factsheets on health-enhancing physical activity in the 28 European member states of the WHO European region.* Copenhagen, UN City, Marmorvej 51, Denmark: WHO Regional Office for Europe.

Organizaţia Naţiunilor Unite pentru Educaţie, Ştiinţă şi Cultură. (2015). *Quality physical education. Guidelines for policy makers.* Preluat de pe UNESCO: http://unesdoc.unesco.org/images/0023/002311/231101E.pdf

Roman, M. (2000). *Baschet. Metodica predării tehnicii şi tacticii jocului. Curs de bază .* Braşov: Universitatea Transilvania.

Roman, C. (2008). *Optimizarea lecţiei de educaţie fizică prin jocuri de mişcare specifice handbalului.* Oradea: Editura Universităţii din Oradea.

Sallis, J., Prochaska, J. & Taylor, W. (2000). *A review of correlates of physical activity of children and adolescents*. Med. Sci. Sports Exerc.; 32:963–975

Stănescu, R.C. (2010). *Sporturi cu racheta, tenis, tenis de masă, badminton.* Editura Discobolul 2010.

Thivel, D., Isacco, L., Lazaar, N., Aucouturier J., Ratel, S., Doré, E., Meyer, M. & Duché, P. (2011). *Effect of a 6-month school-based physical activity program on body composition and physical fitness in lean and obese schoolchildren.* European Journal of Pediatrics 170(11):1435-43 DOI: 10.1007/s00431-011-1466-x

Toussaint, J.F., & Rocha, P. (2015). *EU Work plan for sport. Expert Group on Health-enhancing physical activity.* Preluat de pe http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=19860&no=1

Trost, S., Pate, R., Saunders, R., Ward, D., Dowda, M., Felton, *G.* (1997). *A prospective study of the determinants of physical activity in rural fifth-grade children*. Prev Med. 26:257–263. DOI: 10.1006/pmed.1996.0137

US Department of Health and Human Services. (1996). *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion: 234–235

Yuksel, M. F., Cengiz, A., Zorba, E. & Gokdemir, K. (2015). *Effects of Badminton Training on Physical Parameters of Players*. Anthropologist, 21(3): 542-547 (2015)