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NON – FORMAL PHYSICAL EDUCATION INFLUENCE ON HEALTH RELATED PHYSICAL FITNESS OF CHILDREN

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Abstract. *The aim of this study was to develop and implement curriculum of non-formal physical education in school and assess its effectiveness for health related physical fitness of 11-13 year old children. The research was conducted in two stages. In the first stage 51 11-13 year old children participated in a quasi-experiment for two years. Pupils were organized into E (experimental) and C (control) groups. Both groups shared the duration (1 hour) and frequency (twice a week) but were different in their education curriculum. In the second stage 72 pupils (groups A and B) attended in the research from the same schools. The curriculum of the group A was modified and differed from group E, group B - the same as group C. In both stages the focus groups performed four physical fitness tests and BMI was calculated. Group E girls' indices of three tests and boys' indices of all four tests were significantly ($p<0.05$) higher than young adolescents' from group C. Group A girls' flexibility and aerobic endurance as well as boys aerobic endurance were higher ($p < 0.05$) than pupils from group B. Results suggest that the individualized, diverse, 11–13 years old children hobbies, needs, abilities, physical and functional powers answering non-formal curriculum, which expands knowledge and develops new skills and when various child-activating teaching methods and forms are used, positively influence their health related physical fitness.*
Keywords: *children, physical fitness; non – formal physical education.*

Introduction

Physical fitness conveys many health benefits across the physical, psychological, and intellectual domains. Despite evidence highlighting the positive health effects of physical fitness (Ahlqwist, Hagman, Kjellby-Wendt & Beckuhg, 2008; Mikkelsson et al., 2006; Sacheck & Hall, 2014), children's physical fitness is insufficient (Cerero, Lopez, Suarez-Llorca, Andreu-Cabrera & Rojas, 2011; Gruodytė – Račienė et al., 2017) and has a tendency to decline year by year (Brunet, Chaput & Tremblay, 2007; Fu, Guo & Zang, 2012; Семенов,

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2014; Синявский, Власов & Сергеев, 2009). If this general negative trend continues, it will compromise the well-being of future adults and create a serious economic burden on the society (Venskunas, Emeljanovas, Mieziene & Volbekiene, 2016). Furthermore, there is a common agreement that two components can be recognised in physical fitness – one mainly related to health and the other related to motor skills that pertain more to performance (Fu, Guo & Zang, 2012; Graham, Holt/Hale & Parker, 2007; McArdele, Katch & Katch, 2007). Current discussions of physical fitness are commonly set in a health-related context. Health-related physical fitness (HRPF) components include cardiorespiratory fitness, muscular strength and endurance, flexibility and body composition (Gallahue & Ozmun, 2006; Gruodytė – Račienė et al., 2017; Mikkelsson, et al., 2006).

Physical education lessons (formal education) can result in increasing HRPF, but, as noted Rainer, Griffths, Cropley, and Jarvis (2015), although schools must be realistic in that physical activity recommendation for children's cannot be met through physical education alone. Outside the formal educational are implemented non-formal education programs, which are planned and designed to improve children's skills and competencies (Committee on Culture and Education European Parliament, 1999). The effectiveness of non-formal physical education (NFPE) usually is measured by analyzing its impact on physical activity (Gortmaker et al., 2012; Lubans & Morgan, 2008), while a little part of the previous literature has regularly focused on the influence of NFPE curriculum on 11-13 year old children health-related physical fitness.

Wanless et al. (2014) implemented 12-week after-school running program for elementary pupils in grades 3 through 6. Program design which was based upon a series of progressive walking/jogging workouts as well as physical activity centred games and activities improved aerobic capacity of the pupils. Carrel et al. (2011) investigated the effects of a 9-month after-school physical activity program on body composition and cardiovascular fitness of elementary school children. The curriculum was modified to encourage student participation. Competitive games were de-emphasized and replaced with lifestyle-focused activities. The activities encouraged physical fitness and fun, and full group participation. These findings suggest that modifications of school physical education curricula and after-school programs toward a fitness emphasis may be an effective vehicle for increasing physical activity and improving cardiovascular health for all children.

However, data with a focus on all HRPF components development through NFPE are lack. Such data are even more limited from longitudinal studies. The following research question was formulated in the present study: What curriculum of NFPE in school can positively influence 11-13 year old children's health related physical fitness?

The aim of this study was to develop and implement curriculum of non-formal physical education in school and assess its effectiveness for health related physical fitness of 11-13 year old children.

Methods

Participants

This article presents a part of study, which was implemented in 2006–2013. Overall 1364 5–6 grade pupils and teachers from five Lithuanian towns, located in different regions of the country, took part in research.

Quasi-experiment was carried out in Klaipeda - the third largest city in Lithuania and it was conducted in two stages. In the first stage (academic years 2007−2009) 63 fifth grade student, who took part in NFPE in school, from four schools, were invited to participate in a quasi-experiment. Children were assigned to one of two groups: pupils from two schools were assigned to experimental (E) and pupils from two other schools were assigned to control (C) groups.

Results were analysed only those participants who participated in NFPE permanently for two years. Participants with a physical disability that restricted their ability to implement educational programme, were not eligible to participate in quasi-experiment. 51 young adolescents (50.2% boys) two years took part in a quasi-experiment. At baseline, mean age of the participants was 11.3 years (SD = 0.26). In the experimental group were 29 (62.1% boys), control – 22 (50.0% boys) pupils.

In the second stage (academic year 2012−2013) attended 72 sixth graders (M_{age} = 13.00 years, SD = 0.33; 52.2% boys) who second year took part in NFPE in school from the same schools who participated in quasi-experiment (Group A: n = 46, 54.3% boys; Group B: n = 26, 46.2% boys) (see Figure 1).

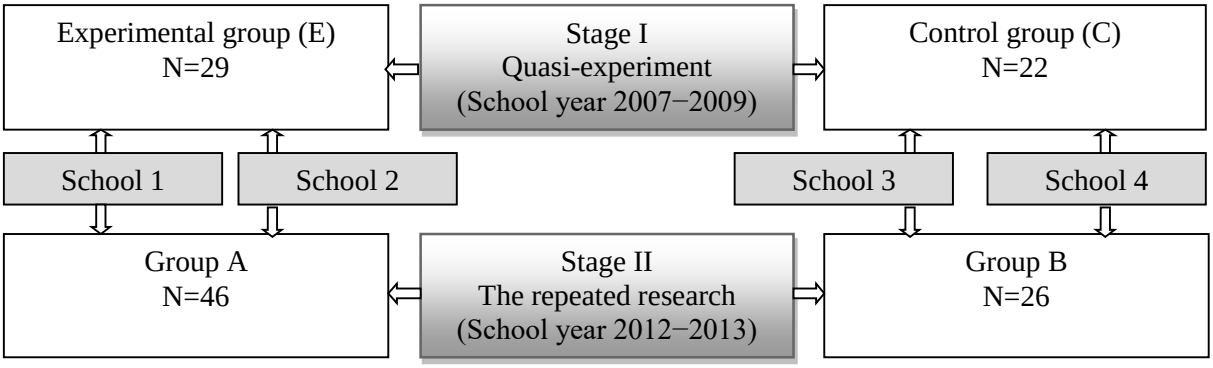

Figure1 ***Distribution of young adolescents who participated in the research***

Instruments

In the first stage at the beginning (2007-10), in the middle (2008-05) and at the end (2009-05) of the quasi - experiment the HRPF components, that is body composition, flexibility, muscular strength and endurance, and cardiorespiratory fitness, of all study participants were assessed by the physical fitness tests described below.

Body mass index of the participants were calculated from their respective height and weight using the relation = weight/height^2. *Height* was measured using roller height meter (Seca, model 206, Germany). The height meter was mounted on the wall and the participants stood erect, barefooted, and looked straight ahead. Before being measured or weighed, pupils were asked to remove their shoes and outer clothing, such as jackets. Height was measured to the nearest half centimetre. *Weight* was measured to the nearest 0.1 kilogram using a calibrated scale (Seca, model 709, Germany) that was zero balanced before each student was weighed.

Sit and reach (lower back flexibility). The sit and reach was scored at the most distant point (in cm) reach on ruler with the fingertips. A sit and reach box was specially constructed box with the measuring scale where 23 cm is at the lever of the feet. Each participant was given two trials and the best result was chosen. The student removed his/her shoes before sitting at the test apparatus with the knees fully extended.

Sit ups in 30 seconds (abdominal muscle strength and endurance). The sit ups test was scored as the number of sit-ups performed within 30 s period. The adolescent lay down on a mat with knees bent at right angles and hands behind the head. The ankles were firmly held by a partner for support and maintaining the count. The student elbows touched knees during the execution of the test.

Flexed-arm hang (upper body strength and endurance). Flexed arm hang was scored the total time is seconds. The participant climbs the ladder to a height so that the chin is level with the bar. Grasp the overhead bar using an overhand grip (palms facing away from body), with the hands at shoulder width apart. On the command, "ready, go," the student removes their feet from the ladder, and timing starts. The student should attempt to hold this position for as long as possible. Timing is stopped when the student's chin falls below the level of the bar or the head tilts backward to enable the chin to stay level with the bar.

Standing long jump (explosive leg power). Standing long jump was scored the longest distance jump in centimetres. The participant stands behind a line marked on the ground with feet slightly apart. A two foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The student attempts to jump as far as possible, landing on both feet without falling backwards. Two attempts are allowed.

1 mile walk/run (cardiorespiratory endurance). 1 mile walk/run was measured in minutes. The participants were instructed to try to keep a steady

speed and finish run as fast as possible. Walking was permitted when the student could not continue running.

During the second stage the pupils of six grades performed the same measurements as their colleagues four years ago.

Procedures

All children attended Physical education lessons (formal education) 2 times per week. The curriculum was carried out under the Lithuanian general education programs. NFPE in school were held at the end of formal education. Both experimental and control groups shared the duration (1 hour) and frequency (twice a week), but were different in their curriculum. *Experimental group (E)* worked under the curriculum developed by us. Curriculum was grounded in pedagogical and non-formal education literature review, children's needs (672 11-13 year old children took part in questionnaire) and opinion of pedagogues (20 teachers were interviewed) (see Table 1).

Table 1 **Basic Principles of Curriculum**

Source	Basic principles of curriculum
Pedagogical literature review	Integral development of whole the qualities of body, will and mind: incorporating the three domains of learning: cognitive (intellectual), affective (social/emotional) and kinaesthetic (physical).
	Learning is both an individual and a cooperative activity.
	Diversity of educational content
	Every individual have the possibility of practising sport, without discrimination of any kind.
Non-formal education literature review	Principles particularly important for non-formal education: voluntarism, accessibility, individualization, relevance, integrity and positivity.
	Young adolescents activating learning methods: discussions, case analysis, ,,Mind hedgehog", arguments ,,Pros and cons", ,,Brainstorm", learning in groups, etc.
	Various, children hobbies, need, abilities answering content.
11–13 years old children needs	Interesting and useful physical activities.
	Physical and functional capacity corresponding load.
	Safe psychological environment.
Pedagogues opinion	Regular, safe, enjoyable, familiar and unfamiliar physical activities.
	Variety of learning forms: contests, quizzes, trips and excursions, projects, intra-school and inter-school competitions.

In our developed and implemented programme 85% of NFPE curriculum was formed of sessions (content included various sport and cooperative games, adventurous activities, athletics, gymnastics and outdoor activities) and 15% - sport and wellness events (intra-school and inter-school competitions, sport and wellness festivals, contests, quizzes).

Each session was split into 3 parts: (1) a warm –up exercise (10 min), which included exercises for major muscle groups; (2) the main part of the session (40 min), which included exercises to improve various physical qualities; and (3) the final part (10 min) which included flexibility and strength exercises.

During the sessions were not only educated the physical qualities, but also provide the knowledge and integrally formed attitudes of physical activity and physical fitness. The content was diverse and answered children needs, abilities, physical and functional development. Pedagogues were systematically consulted. The curriculum correction was done on the basis of the monitoring classes, discussing with pupils and pedagogues, and analysing results.

Control group (C) worked according to NFPE programs developed by teachers and approved by school principals. The curriculum was oriented to preparation for two competitions: relays "Brave, strong, quick" and "Quadrate".

In the second stage (academic year 2012−2013) the 6th grades from the same four Klaipeda city comprehensive schools participated in the research. Was formed groups A and B.

Group A: after implementing quasi - experiment in schools, where experimental educational programme was practiced, the curriculum was modified. The curriculum was oriented towards preparation for competitions and only partly corresponded to children's' needs, abilities, physical and functional powers. The traditional physical education methods and forms usually were applied.

Group B pedagogues implemented the same curriculum as group C in academic years 2007−2009.

Statistical analysis

Descriptive statistics were calculated (including means (M) and standard deviation (SD)) for each physical fitness component. Dependent t test was used to assess differences between two related groups. Independent t test was used to examine test differences between two independent (E and C), (A and B) groups. For all the tests, statistical significance was set at $p<0.05$. All statistical analyses were performed with the Statistical Package for Social Sciences (SPSS) (version 20.0 for Windows).

Research ethics

The study was approved by Klaipeda University Education Science Doctoral Committee and Department of Physical Education. For all participants was clarified that participation in a research study is voluntary and they may freely withdraw at any time without any type of penalty. After being informed about the nature and steps of the study verbal consent was obtained from all participants**.** Written voluntary consent was provided by all their parents and/or guardian.

Results

Descriptive statistics were used to describe the basic features (M and SD) of the data in a study. Table 2 presents research I (2007-10), II (2008-05) and III (2009-05) HRPF results of groups E and C. Table 3 presents repeating research (2013-05) HRPF results of groups A and B. Descriptive statistics presented in Table 2 revealed that in two academic year period groups E results of HRPF improved, however not all results of group C changed positive.

Table 2 ***Descriptive characteristics and statistical differences between Experimental (E) and Control (C) groups***

Variable	Research number and date	Girls					Boys				
		Group E (n = 11)		**Group C** (n = 11)		**p**	**Group E** (n = 18)		**Group C** (n = 11)		**p**
		M	**SD**	**M**	**SD**		**M**	**SD**	**M**	**SD**	
Height (cm)	Research I	150.59	8.84	149.73	6.31	0.795	148.86	6.90	150.73	6.51	0.477
	Research II	153.41	8.54	153.00	6.50	0.901	152.25	7.11	154.55	8.18	0.432
	Research III	159.64	7.55	158.55	7.05	0.730	158.78	8.73	161.55	8.17	0.404
Weight (kg)	Research I	45.05	6.47	40.36	6.50	0.106	44.02	16.32	39.50	7.41	0.397
	Research II	46.38	6.84	42.55	7.09	0.211	47.56	16.79	42.77	8.63	0.391
	Research III	50.91	5.59	49.10	7.23	0.517	50.66	19.33	47.05	8.57	0.565
BMI (kg/m^2)	Research I	19.90	2.65	17.93	2.07	0,066	19.52	5.06	17.27	2.10	0.175
	Research II	19.69	2.22	18.11	2.35	0.120	20.20	5.05	17.75	2.14	0.141
	Research III	20.01	2.12	19.56	2.93	0.682	19.78	5.56	17.90	1.86	0.291
Sit and reach (cm)	Research I	22.45	4.34	20.18	4.49	0.242	15.94	5.91	17.00	4.49	0.615
	Research II	24.27	6.31	18.91	6.16	0.057	16.83	6.82	15.36	3.64	0.457
	Research III	27.00	5.16	17.82	5.10	0.001*	19.94	4.71	13.82	5.23	0.005*
Flexed-arm hang (s)	Research I	6.11	4.78	7.44	6.21	0.576	16.11	12.40	14.55	9.05	0.720
	Research II	9.86	10.57	16.60	17.18	0.281	14.46	11.98	18.31	16.87	0.518
	Research III	10.44	8.70	12.72	15.75	0.677	18.38	14.01	8.41	3.87	0.010*
Sit ups in 30 sec (n)	Research I	24.55	3.42	23.00	3.72	0.322	26.11	4.48	28.00	2.61	0.216
	Research II	26.45	3.70	21.82	5.27	0.028*	26.28	5.37	25.00	3.26	0.432
	Research III	28.64	2.58	23.55	3.75	0.002*	28.33	3.94	24.09	5.05	0.029*

Standing long jump (cm)	Research I	149.45	19.61	155.45	21.96	0.507	156.17	21.90	170.45	10.36	0.053
	Research II	155.27	16.93	159.91	22.50	0.591	163.17	19.99	171.36	8.97	0.144
	Research III	166.55	22.38	162.09	20.47	0.631	177.22	21.66	161.82	24.52	0.103
1 mile walk/run (s)	Research I	685.09	60.26	694.55	74.55	0.747	591.94	68.48	598.64	38.09	0.769
	Research II	638.09	45.34	695.36	109.77	0.134	564.17	66.70	695.40	74.11	0.036*
	Research III	582.36	67.82	694.82	153.82	0.044*	532.39	76.49	700.03	153.05	0.015*

*BMI = body mass index; M = mean; SD = standard deviation; *p<0.05*

Dependent t test revealed that during one academic year (2007−2008) group E girls significantly improved abdominal muscle strength and endurance, $t(10) = -2.313$, $p < 0.05$ and cardiorespiratory endurance, $t(10) = 5.663$, $p < 0.001$. Group C girls significantly improved upper body strength and endurance, $t(10) = -2.236$, $p < 0.05$. Results of other HRPF components did not significantly change over the first quasi-experiment year.

Over two curriculum implementing years, group E girls significantly improved their indices of flexibility, $t(21) = -4.048$, $p < 0.01$; abdominal muscle strength and endurance, $t(21) = -4.451$, $p < 0.01$; explosive leg power, $t(10) = -2.892$, $p < 0.05$ and cardiorespiratory endurance, $t(10) = 9.270$, $p < 0.001$. Dependent t test revealed that during two years significantly increased group C girls BMI, $t(10) = -3.228$, $p < 0.01$. Other differences were not significant.

Table 3 **Descriptive characteristics and statistical differences between of A and B Groups (research date: May 2013)**

Variable	Girls					Boys				
	Group A (n = 20)		**Group B** (n = 12)		**p**	**Group A** (n = 26)		**Group B** (n = 14)		**p**
	M	**SD**	**M**	**SD**		**M**	**SD**	**M**	**SD**	
Height (cm)	162.15	6.42	165.08	8.43	0.398	160.42	8.42	163.13	9.48	0.391
Weight (kg)	52.70	10.41	52.58	13.31	0.779	50.40	9.63	49.21	9.52	0.730
BMI (kg/m^2)	20.21	3.52	19.08	3.58	0.381	19.54	2.71	18.33	2.62	0.181
Sit and reach (cm)	25.62	4.61	19.94	4.23	0.001*	18.81	6.47	17.34	7.42	0.418
Flexed-arm hang (s)	8.51	6.72	8.84	9.61	0.901	11.81	9.84	15.63	10.05	0.276
Sit ups in 30 seconds (n)	22.81	4.56	23.14	2.52	0.726	22.81	4.52	23.14	2.53	0.726
Standing long jump (cm)	145.05	23.93	160.29	20.60	0.060	175.29	22.21	173.50	13.05	0.799
1 mile walk/run (s)	634.78	66.76	693.70	73.5	0.021*	596.48	90.18	649.02	121.86	0.003*

*BMI = body mass index; M = mean; SD = standard deviation; *p<0.05*

E group boys' HRPF data showed that over one academic years (2007−2008) significantly increased BMI, $t(17) = -2{,}179$, $p < 0.05$; explosive leg power, $t(17) = -4.292$, $p < 0.001$ and cardiorespiratory endurance, $t(17) = 3.981$, $p < 0.01$. Dependent t test indicated that significantly increased group C boys' BMI, $t(10) = -2.506$, $p < 0.05$ and decreased abdominal muscle strength and endurance, $t(17) = 2.331$, $p < 0.05$. More significant differences did not reveal.

Over two years group E boys' flexibility, $t(17) = -4.614$, $p < 0.001$; abdominal muscle strength and endurance, $t(17) = -3.688$, $p < 0.01$; explosive leg power, $t(17) = -9.171$, $p < 0.001$; cardiorespiratory endurance, $t(17) = 9.204$, $p < 0.001$ were improved significantly. Group C boys BMI changed significantly, $t(10) = -2.308$, $p < 0.05$. Other results of this group boys slightly went down.

The results of independent t test indicated that there were no significant differences between HRPF at the beginning of the quasi-experiment. After one year of intervention group E girls' abdominal muscle strength and endurance was significantly better than group C girls', $t(20) = 2.389$, $p < 0.05$. Were not significant differences between other HRPF indices. After two years of the quasi-experiment, comparing the results of groups E and C girls', was established significant differences of flexibility, $t(20) = 4.200$, $p < 0.001$; abdominal muscle strength and endurance, $t(20) = 3.709$, $p < 0.01$ and cardiorespiratory endurance, $t(20) = -2.219$, $p < 0.05$.

Comparing groups E and C boy' results of HRPF was established that after the first intervention year group E boy' results of cardiorespiratory endurance, were significantly better than group boys', $t(27) = -2.313$, $p < 0.05$. More significant differences did not reveal. The results of the research III of groups E and C boys' significantly differ in flexibility, $t(27) = 3.261$, $p < 0.01$; upper body strength and endurance, $t(27) = 2.293$, $p < 0.05$; abdominal muscle strength and endurance, $t(27) = 2.529$, $p < 0.05$ and cardiorespiratory endurance, $t(27) = -3.163$, $p < 0.05$.

During repeating research, which was carried out after four years (2013), it was estimated that group A girls' flexibility, $t(32) = 3.7$, $p < 0.01$ and cardiorespiratory endurance, $(31) = -2.440$, $p < 0.05$ as well as boys cardiorespiratory endurance, $t(32) = -3.220$, $p < 0.01$ were significantly higher than of children from group B.

Discussion

In this study we aimed to assess the effectiveness of developed and implemented non-formal physical education curriculum for health related physical fitness of 11-13 year old children.

One of HRPF components is body composition. World health organization (WHO, 2015) declares that worldwide obesity has more than doubled since 1980.

42 million children under the age of 5 were overweight or obese in 2013. Julia, Van Weissenbruch, Prawirohartono, Surjono, and Delemarre-van de Waal (2008), Raustorp (2010) with the longitudinal researches estimated that the weight of young adolescents increases during the last years. By the data of Gao, Oh, and Shehg (2011) a fifth (20.5%) of 11 years old children have overweight, though 23.7% - obesity. Tutkuvienė and Jakimavičienė (2004) designate that BMI of 11−12 year old boys fluctuate a little, though the bigger change happens at the age of 12−13 years. 11−12 and 12−13 year old girls BMI grows similarly. Growth reference data for 5–19 year old children, offered by WHO (2016), indicate that BMI of 11−13 years old children gradually increases.

Carrel et al. (2011) implemented fitness-oriented program for 9 months (the entire school year): competitive games were de-emphasized and replaced with lifestyle-focused activities (walking, games, station-based activities and snowshoeing). Researchers have identified that school based fitness programs can significantly improve body composition in children. Our research show, that during two academic years, BMI increased remotely only between group's E girls and boys. These differences in group C were significant ($p < 0.05$). The bigger changes of girls' BMI were determined in the second research year, though this index for boys mediates both the first and second year. After four years it was determined that BMI indices of young adolescents are very similar to the research performed in 2009. Group A results did not differ significantly from group B, $p > 0.05$.

Research studies show that the phase of early adolescence is favorable for flexibility training. Frolov and Frolov (2009) grounding the results of longitudinal research, performed from 1985, of 1−11 grades pupils physical fitness, state, that in fifth grade pupils' flexibility indices increases significantly. Винокурова and Сахарова (2007) agree with these propositions and emphasize that training pupils flexibility in 5−6'th grades the significant positive changes can be reached. Барабаш (2007) indicates that the age of 11−12 years is especially beneficial for training girls flexibility.

Investigating young adolescents flexibility was established, that group E results during two years of quasi - experiment increased significantly ($p < 0.01$): the difference of girls flexibility indices between I and III were 4.6 cm, $p < 0.01$, boys' – 4.0 cm, $p < 0.01$. The flexibility indices of group C of both sexes at the end of the research were worse than at the beginning. The assumption, that the flexibility in control group was not trained enough, can be done.

The research performed after four years revealed, that flexibility results of group A young adolescents were worse, though group B were better than in 2009. However the indices of group A pupils remain higher than group B, though group A and B girls flexibility results differed significantly, $p < 0.05$.

Valuing the physical fitness the component of muscle strength and endurance is very important. The muscle strength and endurance in our research was valued by tests *Sit-ups* and *Flexed arm hang*. The indicators of test *Sit-ups* reflect abdominal muscle strength and endurance. The scientists point, that abdominal muscle strength and endurance indices increase in early adolescence, but there is no united opinion about the sensitive periods. Malina, Bouchard, and Bar-Oras (2004) denote that girls natural growth of abdominal muscle strength and endurance gradually increases till age of 14 and then stabilizes, boys – gradually increases from 6 to 13 years, and later the sudden spurt displays. By the data of Матыцин (2002), the indices of test *Sit-ups* especially grow up at age of 11 and 13 for girls and at 13 for boys. However, Yagüe and De La Fuente (1988) accent, that the jump of abdominal muscle strength and endurance indices happens earlier than height spurt, i.e. for girls till 11−12 years, for boys till 13−15 years old. Our research results basically coincide with the received data of Гаврилов, Малинин, and Савенко (2007), Blauzdys and Bagdonienė (2007) and confirm the proposition that this period is favorable for training abdominal muscle strength and endurance: the indices of abdominal muscle strength and endurance of experimental group young adolescents improved similarly the first and second year, and during two academic years the changes of group E girls and boys test *Sit-ups* indices were significant ($p < 0.01$). Noteworthy, that the indices of experimental group abdominal muscle strength and endurance were significantly ($p < 0.05$) better than young adolescents from control group.

The results of group A abdominal muscle strength and endurance in 2013 were worse than sixth graders at quasi - experiment four years ago. The indices of group B remained similar. Comparing groups A and B results, it was determined that the indicators of group A both sexes abdominal muscle strength and endurance were better than group B pupils, $p > 0.05$.

Only one test, i.e. *Flexed arm hang*, indices increased in E girls and boys groups during two years of quasy-experiment, however the significant differences did not show up. After four years the results of group A young adolescents upper body muscle strength and endurance were worse than pupils who participated in quasy-experiment. The indices of group C young adolescents were a little higher. Malina, Bouchard, and Bar-Oras (2004) affirm that upper body muscle strength and endurance at this age increases a little. These propositions are based by positive, but statistically not significant alternation of Lithuanian 5−6th grades pupils (Gruodytė-Račienė et al., 2017) and the same age test indices by Blauzdys and Bagdonienė (2007).

The explosive leg power was estimated using test „Standing long jump". Malina et al. (2004) indicate that explosive leg power of both sexes till 14 years old gradually increases. Матыцин (2002) maintains that the biggest jump of this test indices occurs at the age of 7−9 and 14 years old for girls, 9−11 and 14 years

old for boys. Yagüe and De La Fuente (1998) using the data of longitudinal research draw a conclusion that the jump of explosive leg power indices coincides with height spurt. However the scientists' conclusions about the periods favorable for explosive leg power training are quite contradictory, though all the researchers indicate that it grows at this age.

The data of our research confirms the propositions of scientists, that explosive leg power index of 11−13 years old young adolescents increase. It was determined that in many cases, the significant ($p < 0.05$) changes show up in the second research year and this endorsed the proposition of Yagüe and Fuente (1998), that explosive leg power indices jump coincides with height spurt. During the first experimental year, the explosive leg power indices of group's E girls (11−12 years old) increased averagely 5.8 cm, during the second year (12−13 years old) – 11.3 cm, boys – respectively 7.0 cm and 14.1 cm. The significant result alternation changes in control groups were not estimated, though group C boys standing long jump indices even got worse during the second research year.

Many scientific researchers also prove the positive explosive leg power alternation of young adolescents, only the quantitative expression is different in the particular researches. Vinokurova and Sacharova (Винокурова, Сахарова, 2007) fulfilled the pedagogical experiment and revealed that 5th and 6th grades pupils' indices of standing long jump mediated fractionally. Купцов, Шинкаренко, and Перфильева (2008) appointed that indices of standing long jump of 12−14 year old girls in experimental group increased 19.4%. In experiment done by Malacko and Pejčić (2009), where educational content basis was composed of various sport games, the indices of standing long jump of 11 years old boys in experimental group increased 10.2 cm, in control group – 7.5 cm in one academic year.

The research, implemented in 2013, revealed, that explosive leg power of groups A and B are similar, the results did not differ significantly, $p>0.05$. Compared to 2009 year research results, it was determined that only group's B boys results increased, the indices of explosive leg power were worse in other groups.

The other component of physical fitness is the cardiorespiratory endurance, which according to NASPE (2005) is considered as the leading physiological indicator of good health and physical condition. Karoblis (2005) accents that if the aerobic abilities are not trained till pubescence, then later it is practically impossible to enlarge the indices of cardiorespiratory endurance till proper value. Gallahue and Ozmun (2006) indicate, that the age of 11−13 years is very conductive to train aerobic fitness. Considering the conclusions and guideline of scientists, the special regard in experimental programme was devoted for enlarging the aerobic fitness of young adolescents. Received research data validates the efficiency of used means: in experimental groups of both sexes

pupils' indices of cardiorespiratory endurance significantly ($p < 0.001$) increased and were significantly ($p < 0.05$) better than the control groups. The attention should be fixed on, that the cardiorespiratory endurance indices of group C girls and boys during two academic years decline. This point, that the training of cardiorespiratory endurance was not sufficient in control groups.

After four years the alternation tendencies of cardiorespiratory endurance were the same as the other physical qualities: young adolescents completed the distance of 1610 meters slower than in 2009. The results of test 1610 meters run/walk of group A girls and boys, who participate in NFPE in school, were significantly better ($p < 0.05$) than the pupils of group B.

Strengths and Limitations

NFPE curriculum is grounded not only in literature analysis, but also following 11-13 year old children's questionnaire surveys and interviews with teachers' data. After four years in the same educational institutions, working for the same pedagogues and the involvement of the same age pupils was implemented repeated research. According to the study results it can be assumed that other factors - the educational environment and the teacher's personality - had no significant impact on 11-13 year old children physical fitness changing.

The research has some limitations. First of all, the educational institutions, from which children participated in the quasi-experiment, were selected not in random order, but in criterion order. Besides, only small part of pupils participated in NFPE in school, therefore the sample size in groups E, C and B were little. Despite all these limitations, our research revealed, that qualitative characteristic of non-formal physical education curriculum is very important factor for increasing 11-13 year old children's physical fitness.

Conclusion

Results suggest that the individualized, diverse, 11-13 years old children hobbies, needs, abilities, physical and functional powers answering non-formal curriculum, which expands knowledge and develops new skills and when various child-activating teaching methods and forms are used, positively influence their health related physical fitness.

Conflicts of interests

The authors declare that they have no competing interests.

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