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EXTRA-CURRICULAR PHYSICAL ACTIVITY EFFECT ON GIRLS WITH POOR PHYSICAL FITNESS

INTRODUCTION

Physical activity is suggested to be an essential part of everyday life, especially during growth and rapid development of school-aged children. The benefits of physical activity (PA) are numerous: it has a positive effect on the prevention of various diseases in schoolchildren (Rankinen, Bouchard, 2002) and on their cognitive development (Burdette, Whitaker, 2005); it increases self-esteem and controls the levels of anxiety and stress (Dunn et al., 2001; O'Neal et al., 2000; Taylor, 2000), normalizes the state of mind (Burdette, Whitaker, 2005), and positively affects the level of physical fitness (PF) (Malina et al., 2004; Dencker et al., 2006). Despite all these health benefits many children all over the world did not meet these guidelines (Katzmarzyk, Craig, 2006; Lamprecht et al., 2008; Samdal et al., 2007; Riddoch et al., 2004).

It is well known that girls are less physically active than boys, and that affects their involvement in extra-curricular physical activities (McKenzie et al., 2000). Girls experiencing insufficient physical activity in childhood and adolescence are also at a greater risk to be less physically active in adulthood (Wallace, 2003; Ridgers et al., 2006).

Although physical activity and physical fitness relationship studies indicate an optimal rate of physical activity for school-aged children to be 3-4 hours daily, Helasoja et al. (2003) stated that more than 60 percent Lithuanians prefers to have sedentary leisure time activities. Especially alarming is the prevalence of insufficient physical activity among schoolchildren (Biddle et al., 2004).

The documents determining the activities of physical education (PE) teachers in Lithuania suggest that schoolchildren who are less physically fit and/or of poor health should be attended carefully, and their inclusion into PE classes and extra-curricular activities should be ingeniously performed by the PE teacher. The same imperatives are accentuated by PE professionals in other countries, too, although it should be

noted that curriculum implementation difficulties arise when girls are mentioned (Wechsler et al., 2000; Gibbons, Humbert, 2008).

Schools should provide and ensure all the potentials of comprehensive education for schoolchildren. Extra-curricular education is one of the purposeful activities aiming to develop personal, socio-educational, and professional competencies of schoolchildren who have chosen art, sport, technology, healthy lifestyle or similar activities. In many countries the promotion of PA during an extra-curricular education is in focus; Lithuania is no exception (BHFNC – Physical Activity, Sport & Education, 2007).

Although physical activity and physical fitness of schoolchildren in Lithuania have been studied previously (Helasoja et al., 2003) and a tendency of physical activity to affect physical fitness change was determined (Mikaitienė, Volbekienė, 2002; Volbekienė et al., 2008), the research data on the influence of extra-curricular physical activity on schoolchildren with poor physical fitness has not been found.

Aim

The aim of this study was to determine whether extra-curricular physical activity produces an effect on pupils with poor physical fitness.

MATERIALS AND METHODS

The initial sample consisted of 208 fifth- and sixth-grade schoolgirls (average age: 11 ± 0.5 and 12 ± 0.5 years old, respectively). At the beginning of the experiment the PF level of the girls was assessed. Only the girls with poor PF level ($n = 82$) were included in the study. These girls were divided into two groups: an experimental (E) group ($n = 42$), and a control (C) group ($n = 40$) (Fig. 1). The E group girls had two extra-curricular physical activity classes weekly for 9 months. During each class the girls played active games (~45 min.) and had exercises improving their physical fitness (~25 min.). The C group girls had no extra-curricular physical activity loads, i.e. they had only two PE lessons weekly. The PE classes and extra-curricular training sessions were performed by the same teacher.

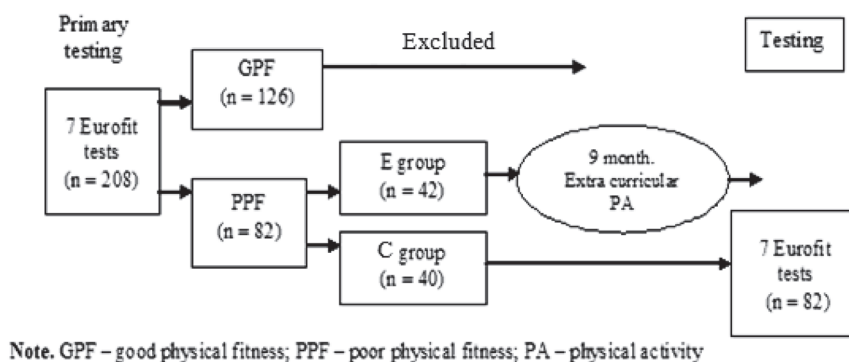


Fig. 1. Mean (\pm SD) characteristics of the study subjects ($n=80$)

The following Eurofit tests were used for the assessment of the following health-related physical fitness components of the study subjects (Eurofit, 1993) before and after the 9 month extra-curricular physical activity programme: *20 m endurance shuttle run test* – to measure endurance of cardio- and respiratory systems; *sit-and-reach test* – to measure flexibility; *bent arm hang* and *sit-ups tests* - to measure muscular strength and endurance. Performance (skill)-related fitness components were assessed with: *plate tapping test* - to measure speed of limb movement; *standing broad jump test* – to measure explosive strength; and *10 x 5 m shuttle run test* - to measure speed/agility.

Statistical analysis was performed with *MS Excel* in *STATISTICA* programmes. In order to compare the data, the mean (\bar{x}) and the *standard deviation* (SD) were calculated. Parametrical *t-test* criterion for dependent and independent samples was used to evaluate the differences and the reliability of value differences. The level of significance was set at $p<0.05$.

RESULTS

The results of health-related physical fitness in experimental and control groups are presented in Table 1. The results of applying extra-curricular physical activity have demonstrated certain health related physical fitness improvements of girls with poor physical fitness. Results of cardio- and respiratory systems endurance before the experiment in both groups were not significantly different ($p>0.05$). After the experiment the results of cardio- and respiratory systems endurance in both groups improved ($p<0.05$). Flexibility results in both groups did not differ significantly before and after experiment ($p>0.05$), but a tendency of improvement in flexibility was identified in experimental group. The mean result of *bent arm hang* test of E

group girls before the experiment was 49.6 s; after the experiment the mean result was significantly better – 77.2 s, however, the change was not statistically significant ($p > 0.05$). Before the experiment, the girls performed in average 19.3 (E group) and 13.7 (C group) sit ups in 30 seconds; after the experiment, only E group girls results were statistically improved ($p < 0.05$).

Table 1. Health-related physical fitness components results in experimental and control groups before and after experiment ($\bar{x} \pm SD$)

Group	Fitness component and tests	Result before experiment	Result after experiment	T test; p level
Experimental (n = 42)	Endurance of cardio- and respiratory systems - 20 m endurance shuttle run (min)	2.2 ± 0.92	3.5 ± 1.1	t = 3.65; p < 0.05
	Flexibility - sit-and-reach test (cm)	21.2 ± 4.26	23.7 ± 4.44	t = 1.65; p > 0.05
	Muscular strength and endurance - bent arm hang (ms)	49.6 ± 22.10	77.2 ± 23.09	t = 1.42; p > 0.05
	Muscular strength and endurance - sit-ups tests (t/30s)	19.3 ± 3.62	22.5 ± 3.07	t = 2.41; p < 0.05
Control (n = 40)	Endurance of cardio- and respiratory systems - 20 m endurance shuttle run (min)	1.8 ± 1.12	3.1 ± 1.43	t = 3.57; p < 0.05
	Flexibility - sit-and-reach test (cm)	17.1 ± 6.48	17.9 ± 8.27	t = 1.25; p > 0.05
	Muscular strength and endurance - bent arm hang (ms)	43.2 ± 17.63	64.6 ± 20.25	t = 2.01; p > 0.05
	Muscular strength and endurance - sit-ups tests (t/30s)	13.7 ± 7.87	17.4 ± 7.46	t = 1.64; p > 0.05

After the implementation of extra-curricular physical activity classes for 9 months, out of performance(skill)-related fitness components, the explosive power and limb movement speed has been improved ($p < 0.05$), and a tendency of speed and agility improvement was identified ($p > 0.05$) (Table 2).

Table 2. Performance(skill)-related physical fitness components results in experimental and control groups before and after experiment ($\bar{x} \pm SD$)

Group	Fitness component and tests	Result before experiment	Result after experiment	T test; p level
Experimental (n = 42)	Explosive strength - <i>standing broad jump test</i> (cm)	157,8 \pm 2.33	168.0 \pm 2.27	t = 3.76; p < 0.05
	Speed/agility - 10 x 5 m <i>shuttle run test</i> (ms)	226.6 \pm 12.8	215.7 \pm 14.06	t = 1.23; p > 0.05
	Speed of limb movement - <i>plate tapping test</i> (ms)	134.0 \pm 2.02	118.5 \pm 1.71	t = 3.87; p < 0.05
Control (n = 40)	Explosive strength - <i>standing broad jump test</i> (cm)	142.6 \pm 4.48	151.1 \pm 4.45	t = 1.63; p > 0.05
	Speed/agility - 10 x 5 m <i>shuttle run test</i> (ms)	236 \pm 19.67	231.6 \pm 15.3	t = 0.89; p > 0.05
	Speed of limb movement - <i>plate tapping test</i> (ms)	142.1 \pm 3.16	127.4 \pm 3.72	t = 3.96; p < 0.05

According to Primary and Secondary School Curriculum (2008), it is suggested that physically less fit schoolchildren should have individual tasks to improve and maintain those physical abilities, which would help them experience success, boost motivation and self-confidence. Same issues are emphasized by foreign authors (MacQuarrie et al., 2008). Physical fitness is one of the main components of health, especially when predicting the rate of morbidity caused by various chronic diseases (Lohman et al., 2008). Although PF results may be greatly determined by genetic heredity, daily PA and health status influence them, too (Malina et al., 2004). Many studies have shown that more physically active schoolchildren have better indications of muscle, cardiovascular, respiratory and other systems than their less active counterparts (Wilmore, Costill, 1999). However, it is not known to what extent regular physical activity of schoolchildren may be related with physical fitness.

As it was expected, the PF results of both groups of girls were similar before the experiment, the differences between the means of all tests were not significant. After the experiment, the health-related physical fitness components (i.e. cardio-respiratory endurance and trunk strength) of the E group girls had significantly increased ($p < 0.05$). It concurs with other studies, which found that cardio-respiratory system and skeletal muscles adapt to a sustained regular physical activity (Poher et al., 2004; Emeljanovas, 2007).

Performance (skill)-related fitness components (i.e. the explosive power and limb movement speed) of E group girls had also improved significantly ($p < 0.05$). It supports the results of other studies (Wilmore, Costill, 1999; Emeljanovas, 2007), where PA was found to have influenced the processes of growth and development and altered the muscular capacity.

After the experiment, only limb movement speed and cardio-respiratory endurance results of the C group girls had improved significantly ($p < 0.05$). Because the results of cardio-respiratory endurance of both groups of girls have changed consistently, we may suggest that it is related with the changes caused by the natural processes of growth and maturation (Munchmeier, 2001).

Analyzing the results of our study, some questions regarding PF improvement may arise, i.e. whether the duration of the experiment was sufficient or whether the games and PF improvement exercises were appropriately chosen, etc. Nevertheless, the data of the experiment has clearly demonstrated a tendency of PF improvement.

On the other hand, the results of our study have confirmed once again the claim by other researchers, that success of physical education in many cases depends on the ability to purposefully organize and adjust the type and content of the activity (Gibbons, Humbert, 2008). In our study, the purposive extra-curricular physical activity for the girls with poor PF level had a positive effect on physical fitness, i.e. the E group girls' PF had improved to a greater extent than those of the C group.

Corresponding to the previous findings (Mikaitienė and Volbekienė 2002), that increasing PA directly affects the PF change, we may also conclude that the regular 9-month extra-curricular PA programme produced a positive effect on the physical fitness level of the schoolgirls with poor physical fitness.

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ABSTRACT

Schools provide a range of opportunities for pupils to engage in physical activity, such as break-time, travel to and from school, physical education lessons and extra-curricular clubs. The aim of this study was to determine whether extra-curricular physical activity produces an effect on pupils with poor physical fitness. In total, 82 fifth- and sixth-grade schoolgirls (11-12-year olds) with poor physical fitness were the subjects of the analysis. They were divided into two groups: an experimental group (E), the girls who had two extra-curricular classes weekly (~45 min. for active games and ~25min. to improve physical fitness), and a control group (C), without extra-curricular physical activity. After applying the extra-curricular physical activity programme for 9 months, the following improvements were identified: an explosive power and limb movement speed has increased ($p < 0.05$), and a tendency of speed and agility improvement has been noticed ($p > 0.05$).

Key words: *extra-curricular physical activity, poor physical fitness, girls*