PHYSICAL FITNESS OF PUPILS OF SPORTS CLASSES WITH A SPORTS ACROBATICS PROFILE -A TWO-YEAR STUDY

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Abstract

The pre-school period is very important in early specialization disciplines (such as various forms of gymnastics). A wisely directed training process during this period ensures the prolongation of development and stabilization in shaping the child's motor skills. In order for gymnasts to perform a variety of gymnastic elements and routines effectively and accurately, the optimal level of their physical fitness is essential. The research material consists of the results of a two-year study of girls and boys aged 7-9. A total of 253 pupils took part in the study. It involved 167 pupils of general classes (75 girls and 92 boys) and 86 pupils from sports classes - sports acrobatics classes (50 girls and 36 boys). As part of the study, 3 series of measurements were carried out, covering the 2-year period of early childhood education (grades 1-3 of primary school). The girls and boys from sports classes (aged 7, 8, 9) obtained, on average, better results than their peers from general classes in the tests of physical fitness (except for the dynamometric force of the right and left hands). In the teams of both genders (aged 7, 8 and 9), the greatest differences in the level of development of features were noted in flexibility, arm strength and agility. In the subsequent series of studies, the differences in the level of physical fitness between the teams of sports and general classes deepened. In each section of the study, the increase in a given motor feature was greater in the teams of sports classes than in general (except for the dynamometric force of the right and left hands).

Keywords: *acrobatic gymnastics, sports classes, physical fitness, development.*

INTRODUCTION

The development of motor features is closely related to the stage of biological development, gender and individual somatotype. It takes place under the influence of physical effort of systematically increased intensity. A classic example of this type of load is sports training. In the first stage, it is general development, and then usually specialized, i.e., aimed at achieving the highest possible efficiency in shaping one or more motor features most desirable for a specific sports discipline or phase of the training cycle (Krawczyński, 2019).

The younger school period (ages from 7 to 11-12) is particularly important in early specialization disciplines such as swimming or various forms of gymnastics, including sports acrobatics (Osiński, 2019). A wisely directed training process during this period ensures the prolongation of development and stabilization in shaping the child's motor skills.

Schools with sports classes play an important role in the Polish system of sports training of children and adolescents. Children with potential predispositions and motor skills are qualified for sports training

in sports acrobatics within sports classes. The basic criterion here is good health (determined on the basis of internal medicine tests and medical interview) (Polish Gymnastics Federation, 2017). A candidate for the first sports class (of a sports acrobatics profile) does not need to have previous experience in sports. The predisposition to practise sports acrobatics is determined on the basis of the visual assessment of the child's body structure and basic physical fitness tests (which may defer depending on the location and school)(Hes, 2017). Having been enrolled in such classes, pupils follow an extended physical education program where classes are conducted with a given sports discipline in mind.

According to the Regulation of the Minister of National Education of 27th March 2017 on sports branches and schools as well as sports championship branches and schools (Polish Journal of Laws of 2017, Item 59), the compulsory weekly number of hours of sports activities in sports departments and schools is at least 10 hours, while in sports championship schools it is 16 hours. The number of these hours is determined by the school head in agreement with the governing body on the basis of the school's sports training program.

It is worth noting that in non-sport (the so-called 'general') classes, pupils only have 3 hours of physical education per week.

Gymnastic sports are sports disciplines requiring complex techniques, as well as comprehensive general and special preparation from their practitioners. A top-class practitioner must master the control of their own body, which cannot be achieved without a high degree of training in motor skills such as: strength, flexibility, agility, speed (Polish Gymnastics Federation, 2017).

A characteristic feature of school sports acrobatics training classes at the stage of early school education (grades 1-3 of primary school) is their complexity, taking into account the harmonious development of the whole organism and the simultaneous shaping of various motor skills, so indispensable when beginning to teach basic acrobatic elements. During these classes, a lot of strength exercises (overhangs, supports, with external resistance), as well as flexibility, jumping and balance exercises are used. During the entire training process, careful attention is paid to the consistency in enforcing the technical correctness of the elements trained and performed. The training program includes the acquisition of the basic elements such as: forward and backward flip, handstand, headstand, side flip, forward flip, single flip forward and backward. Basic trampoline and path jumping as well as team exercises are also introduced. The classes are aimed at developing interest in sports and this is often achieved through play-like forms of movement. To determine the child's predisposition to engage in sports competition, however, various forms of competition are introduced (Walczak, 2012; Polish Gymnastics Federation, 2017).

It should be remembered that an optimal level of physical fitness is essential for all gymnasts in order to be able to effectively and accurately perform a variety of elements and routines (Kiuchukov et al., 2019). Shaping the technique and economy of movement should be based on solid foundations. Hence, taking care of the participant's good motor preparation at all stages of the training, combined with impeccable technical preparation, increases the chance of achieving success (Polish Gymnastics Federation, 2017).

In order to determine the level of physical fitness and to monitor training processes various types of physical fitness tests are used. One of the most popular and widely used in school practice is the general physical fitness test (ICSPFT) (Dobosz, 2012).

The aim of the research was to compare the motor development of students attending sports classes (the sports

acrobatics profile) against their peers who followed the basic physical education program. A different level of physical activity shall undoubtedly differentiate the examined students in terms of the level of development of motor skills. Still, this paper presents the scale of this phenomenon. It shows in which motor features the differences between students of acrobatic and general classes are the greatest and in which they are the smallest. Attempts are also made to answer the questions whether the differences on the level of development of individual motor skills were deepening year by year, and thus, what motor features are influenced by the acrobatic training the most in the initial stage of training.

It should also be borne in mind that physical fitness tests are also very useful as "measures of health" in assessing pupils biological development as well as their quality of life. Their use allows for a significant deepening of the developmental diagnosis and determining the adaptation abilities of not only a healthy child, but also one with various deviations in health to the living conditions and functioning of the child at school. (Jopkiewicz & Suliga, 2011).

METHODS

The research material consists of the results of a two-year study of girls and boys aged 7-9. A total of 253 pupils took part in the research. The research involved 167 pupils from general, non-sports classes (75 girls and 92 boys) and 86 pupils from sports classes with a sports acrobatics profile (called sports classes at work)(50 girls and 36 boys). In general classes, there is a basic physical education curriculum, while in sports classes pupils follow an extended physical education program and have more training classes per week.

The study involved the purposeful selection of the research group. Schools from Western Poland towns and cities where sports acrobatics classes are conducted were selected. The research was conducted in schools in Zielona Góra, Sulechów, Jawor and Poznań. In the sports classes examined, the weekly number of hours in sports acrobatics was 10 hours. Moreover, students from these classes had 2 hours of physical education with a teacher of early childhood education in order to implement the requirements of the core curriculum. In general (non-sports) classes, students completed 3 hours of physical education with a teacher of early childhood education.

Additionally, in sports classes, 68% of girls and 72% of boys participated in additional (extracurricular) sports activities, while in general classes, 35% of girls and 40% of boys did so.

The calendar age was calculated for each of the respondents using the decimal system (Drozdowski, 1998). As part of the research, 3 series of measurements were carried out, covering the 2-year period of early childhood education (grades 1-3 of primary school). The research was conducted in September 2017, when pupils attended the first year of primary school, then in September 2018 (in the second year of primary school) and again in September 2019 (at the beginning of the third year of primary school).

Selected physical fitness tests from the International Physical Fitness Test (ICSPFT) were used to assess the motor development of the studied teams (Dobosz, 2012). Measurements of the physical fitness of the examined pupils were made in the sports hall in the morning, strictly according to specific test instructions, following the same sequence. They concerned the following trials:

a) agility (determined by the time shuttle run 4x10m),

b) explosive strength of the lower limbs (determined by the distance standing broad jump),

c) abdominal muscles strength. (measured by the number of torso bends while lying down in 30 seconds),

d) arms strength (time determined by the time a pupil hangs on the bar on bent arms- bent arm hang),

e) right and left hand force- hand grip (measured with a hand dynamometer)

f) flexibility (determined by the forward lean of the torso).

The research concept was approved by the Bioethics Committee at the Regional Medical Council in Zielona Góra (Bioethics Committee Resolution No. 17/82/2017 of 17th July 2017).

The collected material was then statistically processed. The arithmetic means (M), standard deviations (SD) and ranges of variation (min-max) for motor features were calculated. The level of the examined features of the girls and boys from sports classes was compared against the background of their peers from general classes aged 7, 8 and 9. To determine the significance between the mean values of the studied features, pupil's t-test was used (Arska- Kotlińska et al., 2002). Due to the fact that the results of the performed tests of motor fitness are expressed in different units, it was necessary to standardise them with the Mollison index for the set of general classes. It is assumed that the value of the Mollison index above 0.5 is treated as a large difference, and above 1 as a very large difference (Drozdowski, 1998).

RESULTS

The Girls

The girls from sports classes in all series of measurements were, on average, shorter than their peers from general classes, with statistically insignificant differences (Table 1). In the examined girls from sports classes, the annual increase in body height amounted to 5.71 cm (between 7-8 years of age) and 5.96 cm (between 8-9 years of age), while in their peers from general classes it was 5.12 cm (aged 7-8) and 5.81 cm (aged 8-9). During the 2-year observation period, the height gain in the acrobats was 11.67 cm, compared to 10.93 cm in the non-training girls.

With regard to body weight, it was noted that the girls from sports classes, in each series of measurements (ages 7, 8, 9) were on average lighter than their peers from the general classes (Table 1). From year to year, these differences deepened. In the examined girls, in the first series of measurements (age 7), there were no statistically significant differences between the average body weight, while in the second (age 8) and the third series (age 9), statistical significance was noted at the level of $p< 0.05$. In the girls from sports classes, the annual weight gain in the first period of the study was 2.81 kg, and 3.11 kg in the girls from general classes. In the second series of tests, the acrobats gained 3.26 kg on average, while their non-training peers 4.04 kg. During the 2-year follow-up period, in the girls from sports classes the increase in their body weight was 6.07 kg, and 7.15 kg in their peers.

The girls from sports classes in all series of measurements (ages 7, 8 and 9) obtained on average better results in tests of agility, arm strength, explosive strength of the lower limbs, flexibility and strength of abdominal muscles compared to their non-training peers (general classes); they fared worse in the test of dynamometric force of the right and left hands (Tables 2-4). Statistically significant differences between the compared features were noted in agility (at age 7, 8 and 9), arm strength (at age 7, 8 and 9), flexibility (at age 7, 8 and 9), strength of the abdominal muscles (at ages 8 and 9) and the explosive power of the lower limbs (at age 9).

Table 1
Numerical characteristics of the height and weight of the examined girls.

Feature	Age	Sports classes (n=50)		General classes (n=75)		d
		M	SD	M	SD	
Body height	7	122.39	4.92	123.69	6.39	-1.30
	8	128.10	5.11	128.81	6.62	-0.71
	9	134.06	5.43	134.62	6.73	-0.56
Body mass	7	23.99	4.58	25.70	5.39	-1.71
	8	26.80	4.80	28.81	5.92	**-2.01***
	9	30.06	5.28	32.85	6.52	**-2.78***

*p<0.05

Table 2
Numerical characteristics of the motor features of the examined girls aged 7.

Variables	Sports classes (n=50)				General classes (n=75)				p
	M	SD	min	max	M	SD	Min	max	
4x10m shuttle run	14.01	0.96	12.09	16.93	14.46	1.02	12.52	17.23	**-0.46***
Bent arm hang	6.60	8.04	0.00	36.00	3.80	3.87	0.00	18.00	**2.79***
Standing long jump	117.00	13.59	88.00	149.00	114.98	16.00	87.00	158.00	2.02
Bend trunk	9.62	5.49	-5.00	19.00	2.40	5.86	-7.00	17.00	**7.22****
Hand grip (R)	8.65	1.72	5.50	12.60	8.68	1.97	5.40	13.50	-0.03
Hand grip (L)	8.31	1.58	5.50	13.10	8.51	1.78	5.30	12.70	-0.20
Sit ups	13.60	4.26	2.00	19.00	12.24	3.98	1.00	20.00	1.36

*p<0.05, **p<0.01

Table 3
Numerical characteristics of the motor features of the examined girls aged 8.

Variables	Sports classes (n=50)				General classes (n=75)				p
	M	SD	min	max	M	SD	min	max	
4x10m shuttle run	13.35	0.92	11.30	15.34	14.03	1.05	12.25	16.72	**-0.68****
Bent arm hang	9.26	9.02	0.00	36.00	5.35	4.18	0.00	20.70	**3.91****
Standing long jump	128.48	13.89	99.00	165.00	123.69	17.13	93.00	167.00	4.79
Bend trunk	12.30	5.08	2.00	24.00	3.79	6.21	-8.00	19.00	**8.51****
Hand grip (R)	9.53	1.75	6.50	13.70	9.73	2.11	5.80	14.90	-0.20
Hand grip (L)	9.17	1.64	6.80	13.10	9.44	1.90	5.70	13.80	-0.27
Sit ups	16.66	3.88	4.00	23.00	14.93	3.71	1.00	21.00	**1.73***

*p<0.05, **p<0.01

Table 4
Numerical characteristics of the motor features of the examined girls aged 9.

Variables	Sports classes (n=50)				General classes (n=75)				p
	M	SD	min	max	M	SD	min	max	
4x10m shuttle run	12.73	0.83	11.37	15.00	13.60	0.87	11.97	15.80	**-0.87****
Bent arm hang	11.43	11.64	0.00	49.00	6.10	4.44	0.00	18.00	**5.33****
Standing long jump	140.68	15.95	118.00	176.00	133.49	17.02	102.00	177.00	**7.19***
Bend trunk	14.42	5.33	3.00	25.00	4.80	6.99	-11.00	22.00	**9.62****
Hand grip (R)	11.08	2.24	7.50	17.80	11.31	2.57	6.80	17.70	-0.24
Hand grip (L)	10.64	2.06	7.50	15.30	10.98	2.34	7.20	17.70	-0.33
Sit ups	18.92	3.30	9.00	25.00	16.73	3.63	2.00	23.00	**2.19****

*p<0.05, **p<0.01

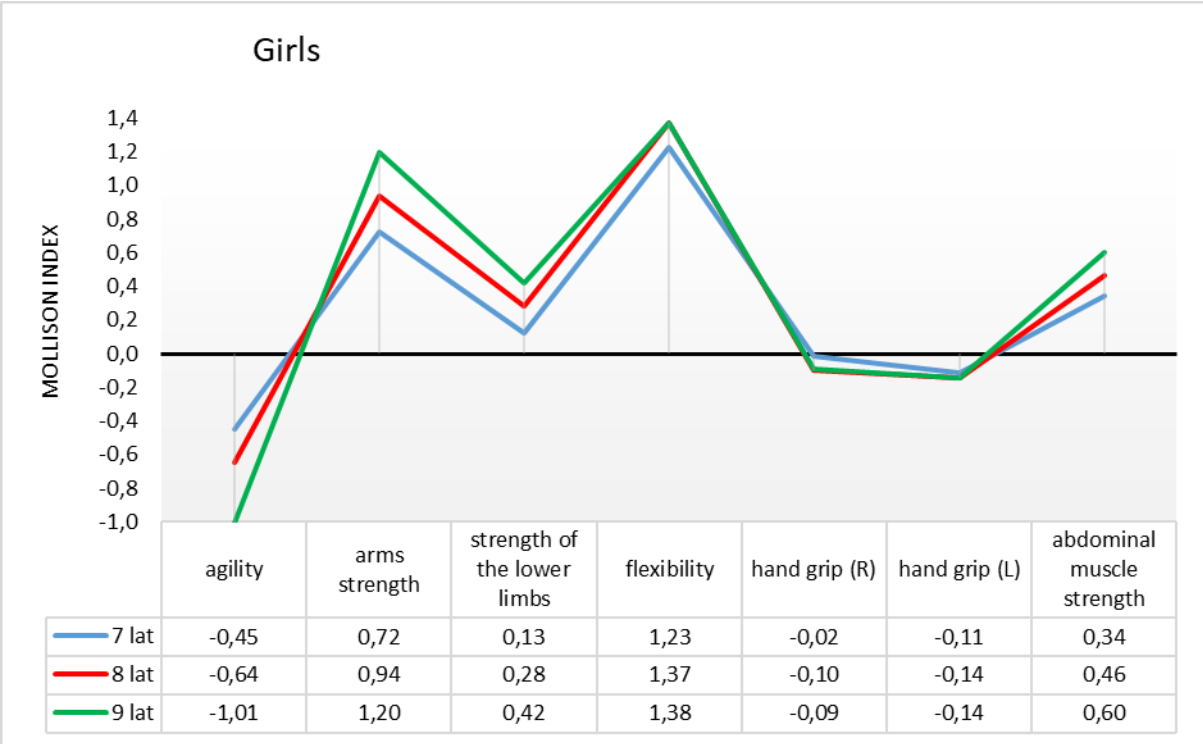


Figure 1. Normalized values of motor characteristics of the examined girls aged 7-9.

The normogram shows that the greatest differences in the level of development of motor skills of the examined girls aged 7, 8 and 9 were found in the area of flexibility (Mollison index value >1), arm strength and agility. In each successive series of measurements, the differences grew larger. The differences in the level of development of explosive strength of the lower extremities and strength of the abdominal muscles also deepened. The smallest differences in the level of development of

motor skills were observed in the dynamometric strength of the right and left hand (Figure 1).

The boys

In contrast to the female teams under study, the boys from sports classes were, on average, taller than their peers from general classes, with statistically insignificant differences (Table 5). In the examined boys from sports classes, the annual increase in body height was 5.87 cm (between 7-8 years) and 5.96 cm (ages 8-9), while in peers from general classes it was 5.38 (the ages of 7-8) and 5.78 cm (the ages of 8-9). During the 2-year observation period, the height gain in the acrobats was 11.83 cm, while in the boys from general classes it was 11.16 cm.

With regard to body weight, it was noted that the boys from sports classes, in each series of measurements (between 7-9 years), are on average lighter than their peers from general classes (Table 5). From year to year, these differences deepened, and statistically significant differences between average body weights were recorded in the third series of measurements (age 9). In the boys from sports classes, the annual weight gain in the first period of the study was 2.85 kg, while it was 3.94 kg in the boys from general classes. In the second series of tests, the acrobats gained 4.05 kg on average, while their non-training peers put on 4.54 kg. During the 2-year observation period, the weight gain of the boys from sports classes was 6.9 kg, and of their peers - 8.48 kg.

The team of the boys from sports classes in all series of measurements (the ages of 7, 8 and 9) obtained on average better results in tests of agility, arm strength, explosive strength of the lower limbs, flexibility and strength of abdominal muscles, while worse in the dynamometric force of the right and left hands as compared to their non-training peers (general classes) (Tables 6-8). Statistically significant differences between the compared features were noted in arm strength (ages 7, 8 and 9), flexibility (ages 7, 8 and 9), agility (ages 8 and 9), explosive strength of the lower limbs (ages 8 and 9) and the strength of the abdominal muscles (age 9).

A graphic image of the values of the normalized motor features of the examined boys is presented in Figure 2.

Table 5
Numerical characteristics of the height and weight of the examined boys.

Feature	Age	Sports classes (n=36)		General classes (n=92)		d
		M	SD	M	SD	
Body height	7	125.77	6.43	125.65	5.18	0.12
	8	131.64	6.79	131.03	5.22	0.60
	9	137.60	6.92	136.81	5.31	0.80
Body mass	7	25.21	4.31	25.68	3.64	-0.47
	8	28.06	4.66	29.62	4.60	-1.56
	9	32.11	5.13	34.16	5.24	**-2.05***

*p<0.05

Table 6
Numerical characteristics of the motor features of the examined boys aged 7.

Variables	Sports classes (n=36)				General classes (n=92)				p
	M	SD	min	max	M	SD	min	max	
4x10m shuttle run	13.81	1.00	12.10	16.00	14.17	0.93	12.22	16.63	-0.36
Bent arm hang	7.00	6.46	0.00	22.00	3.95	3.90	0.00	20.00	**3.05****
Standing long jump	126.50	16.72	87.00	148.00	121.33	13.88	95.00	167.00	5.17
Bend trunk	4.19	6.21	-8.00	19.00	-1.88	4.84	-10.00	10.00	**6.07****
Hand grip (R)	8.86	1.83	6.20	12.50	8.96	1.77	5.40	13.50	-0.09
Hand grip (L)	8.57	1.68	5.40	12.70	8.64	1.61	5.30	12.70	-0.07
Sit ups	13.92	4.36	2.00	21.00	12.65	3.25	0.00	17.00	1.26

*p<0.05, **p<0.01

Table 7
Numerical characteristics of the motor features of the examined boys aged 8.

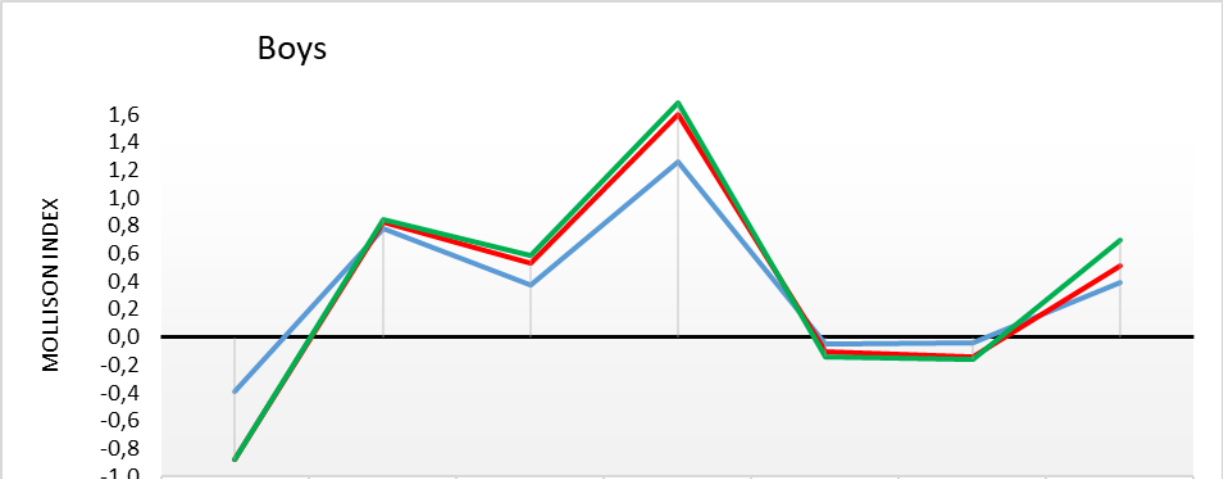
Variables	Sports classes (n=36)				General classes (n=92)				p
	M	SD	min	max	M	SD	min	max	
4x10m shuttle run	13.08	0.86	11.40	15.10	13.69	0.69	11.74	15.40	**-0.61****
Bent arm hang	10.83	8.25	0.00	31.00	6.03	5.82	0.00	30.00	**4.80****
Standing long jump	138.08	17.98	97.00	172.00	130.51	14.15	103.00	165.00	**7.57***
Bend trunk	6.42	5.99	-4.00	19.00	-0.77	4.48	-10.00	10.00	**7.19****
Hand grip (R)	9.80	1.84	6.80	13.00	10.00	1.86	5.80	14.90	-0.20
Hand grip (L)	9.38	1.69	7.00	14.00	9.63	1.75	5.60	13.80	-0.26
Sit ups	17.08	3.71	9.00	24.00	15.41	3.24	5.00	21.00	1.67

*p<0.05, **p<0.01

Table 8
Numerical characteristics of the motor features of the examined boys aged 9.

Variables	Sports classes (n=36)				General classes (n=92)				p
	M	SD	min	max	M	SD	min	max	
4x10m shuttle run	12.51	0.83	11.00	14.50	13.36	0.96	11.30	16.47	**-0.85****
Bent arm hang	13.13	11.16	0.00	50.00	6.82	7.45	0.00	49.00	**6.31****
Standing long jump	150.17	17.79	118.00	183.00	140.43	16.70	105.00	178.00	**9.73****
Bend trunk	8.28	5.38	-1.00	19.00	0.21	4.80	-10.00	12.00	**8.07****
Hand grip (R)	11.23	2.27	7.60	16.00	11.55	2.18	7.00	17.80	-0.32
Hand grip (L)	10.83	2.02	7.90	16.50	11.15	1.98	7.00	17.60	-0.32
Sit ups	19.39	3.10	14.00	25.00	17.24	3.09	9.00	23.00	**2.15****

*p<0.05, **p<0.01



	agility	arms strength	strength of the lower limbs	flexibility	hand grip (R)	hand grip (L)	abdominal muscle strength
7 lat	-0,39	0,78	0,37	1,26	-0,05	-0,04	0,39
8 lat	-0,88	0,82	0,54	1,60	-0,11	-0,15	0,52
9 lat	-0,88	0,85	0,58	1,68	-0,15	-0,16	0,69

Figure 2. Normalized values of motor characteristics of the examined boys aged 7-9 years.

The normogram shows that the greatest differences in the level of development of motor skills of the examined boys aged 7, 8 and 9 are in flexibility, arm strength and agility. With the consecutive year of research, the differences in the level of development of flexibility and strength of arms deepened. In the case of agility, the differences deepened after the first year of research and remained at the same level in the following year. The differences in the level of development of explosive strength of the lower extremities and strength of the abdominal muscles also deepened. The smallest differences in the level of development of motor skills were observed in the dynamometric strength of the right and left hand (Figure 2).

DISCUSSION

In the first series of studies (in the baseline studies, age 7), the girls and boys from sports classes obtained on average better results in the tests of physical fitness as compared to their peers from general classes (except for the dynamometric force of the right and left hand). It is related to enrolment in sports classes. In most sports schools, fitness tests are carried out to assess who qualifies for a class with a sports profile. Statistically significant differences between the compared features were noted in agility (the girls), arm strength (the girls and boys) and flexibility (the girls and boys). In the subsequent series of studies (age 8), the differences in the level of physical fitness between the teams of sports and general classes deepened. After two years of observation (age 9), both the girls and the boys showed statistically significant differences between the groups of sports classes and the general groups in all tests of physical fitness (except for the dynamometric force of the right and left hand). Obviously, this is related to the increased number of hours of sports activities of students from sports classes as compared to general classes. Researchers indicate a strong correlation between the number of training hours per week and the results of physical fitness tests (Fransen et

al., 2012; Russo et al., 2021). An increased number of training sessions per week is associated not only with better overall physical fitness, but also influences the shaping of sport-specific features (Opstoel et al., 2015).

Changes in the level of motor performance can be explained by functional (increased recruitment of motor units, increased neuromuscular control) as well as structural aspects (increased muscle hypertrophy) (Behringer et al., 2011; Legerlotz et al., 2016) However, there is little evidence of muscle hypertrophy in children as a result of resistance training, so it is assumed that the increase in strength and the level of development of other motor features is caused by the adaptation of the nervous system rather than by hypertrophic factors (Faigenbaum at al., 2009). Such adaptation involves changes in motor unit coordination, firing and recruitment, and these are the crucial factors in movement optimization.

In the examined teams of both the sexes aged 7, 8 and 9, the greatest differences in the level of development of features were noted in flexibility, arm strength and agility (Figures 1-2). Although acrobatic training affects the harmonious and smooth development of motor skills (Lyulina, Zakharova & Vetrova, 2013), the authors note that acrobatic exercises require, in particular, strength, flexibility, balance, agility and control. Research among young gymnasts shows that they are characterized by great flexibility, strength, agility and jumping abilities (Vandorpe et al., 2011; Bencke et al., 2002; Carrick et al., 2007) and, as researchers point out, the development of strength and flexibility may allow contestants to perform complex gymnastic jumps (Leone, Lariviere & Comtois, 2002).

In each section of the study, the increase in a given motor feature was greater in the teams of sports classes than in the general ones. The exception is the dynamometric force of the right and left hands (hand grip). It should be stressed that the arm strength, in which the sports teams achieved much better results, was determined by the time of hanging on the bar on bent arms. The body weight of the respondents is not without significance here (relative strength). As indicated by Major (1996), gymnasts are among the strongest athletes when measuring strength in relation to body weight. It is attested by their ability to lift, move and hold their own body in various positions (Werner, 1994). In turn, the dynamometric force of the right and left hands (hand grip) is referred to as the absolute strength. From the results of research by other authors (Osiński, 2003; Raczek, 2010), it is evident that absolute strength is strongly correlated with body weight. Thus, the team members from general classes, who are on average heavier than their peers from sports classes, obtained better results in the dynamometric tests, and worse in the test of hanging on the bar. But this phenomenon can also be attributed to the leading role of the nervous system in the development of strength in children. It can be assumed that the results of the motor skills tests of the studied acrobats are caused to a greater extent by the adaptation of the nervous system than by the increase in muscle mass.

Participation in organized, regular sports activities influences the development of motor (physical) abilities of children (Torrance et al., 2007; Chalcarz et al., 2008; Wilk & Eider, 2014). According to Kiuchukov (2019) and co-authors, artistic gymnastics improves all health aspects of physical fitness and has a positive effect on the physical development of children. According to the authors, male and female gymnasts obtained better results in most of the international physical fitness tests carried out against standards for their age categories (Kiuchukov et al., 2019). According to the authors, the use of complex acrobatic exercises for the physical development of children aged 5-7 has a positive effect on sports performance, increases physical preparation and functional condition. In addition, the level

of physical preparation is characterized by a smooth increase in physical characteristics (Lyulina, Zakharova & Vetrova 2013). It is important from the point of view of proper development to focus on the comprehensive development of all motor skills and the acquisition of new motor skills during the period of progressive development, and to avoid unilateral motor activity (typical for specialist training in most sports). From the perspective of child's development, gymnastics is a key physical activity as it is characterized by a great variety of movements (Novak et al., 2008; Nilges-Charles, 2008; Ávalos Ramos et al., 2014).

Sports acrobatics is one of the disciplines that harmoniously develops the whole organism, but martial arts can also be included here (Jasiński et al., 2002; Paszkiewicz vel Pipilewicz, 2019). As reported in Paszkiewicz vel Pipilewicz's work (2019), boys and girls, after a year of regular karate training, show more physical fitness than their non-training peers. The difference increases significantly after the second year of training. Among karate practitioners there was a significant progress compared to the previous year in each of the fitness tests carried out, while among the untrained pupils there was a minimal regression in general fitness (Paszkiewicz vel Pipilewicz, 2019).

Comparing own results to the percentile grids of physical fitness tests (ICSPFT) developed by Dobosz for the Polish population (2012), it was noted that girls and boys from acrobatic classes achieved good results in most of the trials. Particularly good results were achieved in the test of flexibility (9-year-old girls> 97th percentile, 9-year-old boys> 90th percentile), agility (9-year-old girls around the 10th percentile, 9-year-old boys within the 10-25th percentile) and explosive strength of the lower limbs (9-year-old boys and girls within the 75-90th percentile). Compared to the Polish population, the acrobats obtained worse results in the dynamometric force of the right and left hand. Against the general background of the population, girls and boys from general classes obtained good results in tests of explosive strength of the lower limbs (9-year-old boys and girls around the 75th percentile) and agility (9-year-old girls around the 25th percentile, 9-year-old boys within 25-50 percentile), while the worse (below the 50th percentile) results were obtained in the trials of hand grip, strength of the abdominal muscles, and arm strength. Flexibility scores were near or above the 50th percentile (Dobosz, 2012).

Numerous authors point to the negative phenomenon of decreasing the level of physical fitness (Przewęda & Dobosz 2003; Szklarska et al., 2004; Tomkinson et al., 2013). The secular trend of the development of somatic features is accompanied by the negative trend in the development of motor skills. A lot of studies, however, do not confirm the unequivocal direction of changes in individual motor features (Radziewicz-Gruhn et al., 2014; Asienkiewicz, 2015; Lopes et al., 2018).

Numerous observations indicate a decline in the level of aerobic motor skills. According to Tomkinson and Olds (2007), the efficiency of children is reduced by approx. 0.36% annually. Similar results were obtained by Tambalis and co-authors (2011) among the Greeks, Craig and co-authors (2012) in Canadian children, Ekblom with his team (2011) in the Swedish population, Freitas and co-authors (2017) among Portuguese children. In contrast to aerobic motor skills, Tomkinson (2007) observed an improvement in the results of anaerobic tests. It turned out that despite the increasing numbers of overweight and obese children, they obtained better results in terms of strength (approx. 0.03% per year) and speed (0.04% per year) in the years 1958-2003.

In the light of the research results and opinions of many teachers, trainers and parents, the number of hours of physical education in the initial years of primary school is insufficient. In the Polish education system, children in grades 1-3 of primary schools have 3 lessons of physical

education per week. How do 135 minutes of physical activity a week correspond to the WHO recommendation of 60 minutes a day? (WHO, 2010). It is different in sports classes. Their pupils are offered a minimum of 10 lesson hours of sports activities thus satisfying the WHO recommendations regarding the hourly amount of physical activity.

Nowadays, pupils are less and less likely to undertake spontaneous physical activity. Children are rarely observed playing tag in the yard or turning over beats, and the school does not provide a minimum of physical activity. Therefore, teachers, trainers and instructors are faced with an extremely important task to encourage school children and youth to participate in organized sports and recreational activities.

CONCLUSIONS

Acrobatic training significantly influenced motor skills development. The girls and boys from sports classes (aged 7, 8, 9) obtained on average better results than their peers from general classes in the tests of physical fitness (except for the dynamometric force of the right and left hand, which is strongly correlated with body weight). In the groups of both sexes (aged 7, 8 and 9), the greatest differences in the level of development of motor skills were noted in flexibility, arm strength and agility. In each section of the study (7-8-, 8-9- and 7-9-year-olds), the percentage increase in the tested motor characteristics was greater in the groups of sports classes than in the general ones (except for the dynamometric force of the right and left hands). Therefore, it is justified to conduct athletic training as part of sports classes already in the early stages of primary school (in gymnastics).

Health and development values of physical activity, and especially that of organized forms of systematically conducted sports activities, remain the flagship argument for undertaking it at an increasingly younger age. Therefore, it is important to increase the duration of physical education classes in grades 1-3 of primary school.

LIMITATIONS

The limitation of this study lies in the fact that in individual acrobatic classes from different Polish towns and cities, sports training is somewhat different, as is the enrolment in these classes. It is obvious that in large cities, where "acrobatic traditions" are more established, the selection is greater, while in smaller locations, where there are relatively fewer children, the selection is more gentle. The limitations of this study is also the small number of boys, so the research should be extended to more sports schools from other regions of the country as well. It also seems justified to carry out a larger number of series of studies that would show the development of physical fitness of the studied students over a longer period of time.

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