



EFFECTIVENESS OF THE “IAAF KIDS' ATHLETICS PROJECT” IN LEVELLING CHANGES OF GENERAL PHYSICAL PERFORMANCE AMONG BOYS OF EARLY SCHOOL AGE

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Abstract

The study presents the results of general physical performance among 3rd grade pupils at an elementary school on Ďumbierska street in Banská Bystrica. Results were gained through the application of selected tests and EUROFIT and UNIFIT [5; 2]. The experimental group consisted of 16 subjects (boys), aged 8 – 9 years, who attended athletics preparation within the "IAAF Kids' Athletics" program. The control group accounted for 18 subjects (boys) of the same age. The research period lasted nine mesocycles from 15th October 2014 to 17th June 2015. All the results obtained in the input and output measurements were mutually compared and evaluated using statistical methods. The output measurements in the experimental group compared with the control group experienced statistically significant changes at $p \leq 0.05$ in all tests performed. Effect size was confirmed in tests on two medium effects and two large effects.

Key words: IAAF Kids' athletics, general physical performance, early school age (early childhood), test battery EUROFIT and UNIFIT.

Introduction

Physical development and motor performance are inextricably linked with the implementation of physical activity. Movement as a living manifestation of a lasting connection and transformed into all functions of the human body and its decline and restrictions that have emerged in recent decades, has been expressed in strongly negative terms. There is evidence that lack of physical activity acts as one of the most important factors causing various health problems such as cardiovascular disease and musculoskeletal weakening suffered by a large percentage of the population. [4] This indicates that physical activity is one of the main basic stimulators in a child's development on the condition that physical activity is not excessive. The child should establish a positive relationship with physical activity and sport in general because thanks to physical activities they consolidate their health and create a healthy lifestyle which is vital for the appropriate

functioning of the human body. The author states that in regular-training, boys relative VO₂max values rise, while in regular-training of girls these values stagnate [1].

The author reports that, from the first years of education, children are already creating the necessary conditions for carrying out physical activities, yet boys dominate in acquiring these skills [14]. According to [7] the adaptation of motor activity in one of the starting points of training, thereby establishing the ability of a child's body to correspond with the outside environment through the stimulus of homeostasis and influence the number of reactions induced in the body. According to [3] increasing levels of physical and sports performance through a high proportion of versatility in sports training contribute to emotional satisfaction. Physical ability in children is most often manifested by subjective factors, such as greater fatigue resistance, improved movement patterns, greater agility and so on. [12]. On the basis of these characteristics, the ratio of general and special

sports preparation in the early stages ranges from 80 % : 20 % [4; 10].

Athletics provides a broad space for development of coordination abilities, which play a significant role in the development of the basic functions of human motion. Athletics Training also uses means which enable a feel for proper conduct [6]. IAAF Kids' Athletics is a project that provides a broad space for development of coordination abilities to significantly participate in the development of the basic functions of human motion. The principal motor manifestations of Athletics include elementary physical activities such as running, jumping, throwing, and combinations thereof. The contribution of athletics to the development of fundamental motor skills is indisputable. Athletics for children may make use of unconventional and interesting techniques with which children have the opportunity of trying out various athletics disciplines in a fun and playful way [8; 9; 11].

AIM

The aim of the study was to detect changes of the level of general physical performance among boys of early school age (early childhood) who attended the athletics preparation within the project Kids' Athletics over nine mesocycles.

METHODS

Participants were 3rd grade boys attending the elementary school on Ďumbierska street in Banská Bystrica. The experimental sample consisted of students in III. C. classes who attended a class focusing on athletics training during the school year of 2014/2015. The experimental set featured 16 subjects (boys) aged 8 – 9 years, with an average age of 8.56 ± 0.34 year at the beginning of the experimental period. The control group also accounted for pupils of the third year of primary school on Ďumbierska street in Banská Bystrica. The control group consisted of students from III. B. class, who did not attend the athletics class during the school year 2014/2015. The group consisted of 18 subjects (boys) aged 8 – 9 years,

with the observed average age of 8.75 ± 0.28 year at the beginning of the experimental period. Therefore, the control group on the days of observation was compared with the older experimental group of about 0.19.

The research period followed lasted nine mesocycles as from 15th September 2014 to 17th June 2015. The period of the experiment was to develop fitness and coordination abilities, and general physical performance of students using a variety of games and exercises. Athletics classes were held at the school gym 2 times a week for 60 minutes, a total of 60 times during the reporting period. Admission testing was done at the beginning of the experimental period. An experimental set of input tests was conducted on 22nd September 2014, finishing at the end of the reporting period on 10th June 2015. An admission test of the control group was conducted on 24th September 2014 and the output at the end of the period 12th June 2015.

We used the following UNIFIT and EUROFIT test batteries to detect the level of general physical abilities and the effect of the IAAF Kids' Athletics project [5; 2]:

1. Sit-and-reach test (EUROFIT)
2. Standing long jump (EUROFIT)
3. Sit-ups in 30 s (EUROFIT)
4. Flexed arm hang (EUROFIT)
5. Shuttle run 4 x 10 meters (UNIFIT)
6. Endurance shuttle run (EUROFIT)

Attended and completed training load was evaluated according to the general and specific training indicators (Table 1). The following general training indicators were chosen: speed exercises, endurance exercises, exercises for coordination, strengthening exercises, locomotive games, and gymnastics. We applied the following indicators in special training preparations focusing on the running drill technique, the jump technique, and the technique of throws and shots.

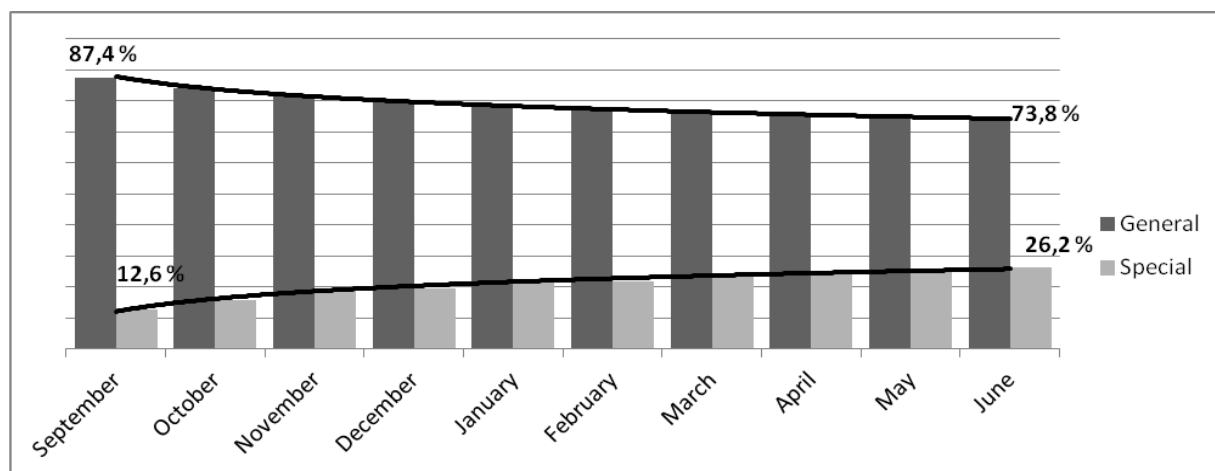
A clearer view is provided in is Figure 1, which shows an increasing difference in the amount of load in general and specialized training indicators.

Table 1. Totals of the volume of load in general and special training indicators of the experimental group

Month (training) / Indicators	SE	EE	EC	SE	LG	G	RT	ST	TTS	General / Special content (min) (%)
September (3)	16	24	12	5	45	30	10	5	4	132 / 19 87.4% / 12.6%
October (8)	66	58	52	27	69	33	25	24	9	305 / 58 84.1% / 15.9%
November (8)	69	46	43	45	60	38	27	22	20	301 / 69 81.3% / 18.7%
December (6)	62	38	45	37	42	23	24	20	16	247 / 60 80.5% / 19.5%
January (6)	42	63	33	21	51	42	40	16	15	252 / 71 78.1% / 21.9%
February (7)	72	44	58	31	45	36	32	26	22	286 / 80 78.2% / 21.8%
March (7)	48	67	34	25	54	48	43	25	19	276 / 87 76.1% / 23.9%
April (7)	53	63	38	27	52	42	44	22	21	275 / 87 75.9% / 24.1%
May (7)	44	64	32	23	54	49	46	25	22	266 / 93 74.1% / 25.9%
June (3)	10	23	13	7	24	27	16	12	9	104 / 37 73.8% / 26.2%
Total	482	490	360	248	496	368	307	197	157	2444 / 661 78.9% / 21.1%

Legend: SE – speed exercises
 EE – endurance exercises
 EC – exercises for coordination
 SE – strengthening exercises
 LG – locomotive games
 G – gymnastics
 RT – running technique
 ST – jumping technique
 TTS – technique of throws and shots

Figure 1. Load volume of general and specialized training indicators



To determine the statistical significance level of somatic parameters and the development of general physical performance and motor abilities, a paired t-test was used with both the experimental and control group; to compare values between files an unpaired t-test was used. We worked with our chosen significance level of $p \leq 0.05$. When evaluating and interpreting the results the methods of logical induction, deduction; methods of analysis, synthesis and comparison were applied. To check the effect of action we used the effect size when we worked and compared with the Cohen's number.

At the beginning of the application period, we also investigated in the experiment the value of the underlying somatic parameters, such as body height and body weight. In the input measurement we recorded the experimental group subjects with an average height of 137.35 ± 3.59 cm. We recorded an average body weight of 29.37 ± 3.62 kg. In the output measurements, we found an average increase in height in subjects to 141.8 ± 3.77 cm (3.24%), and a body weight of 31.58 ± 3.32 kg (7.52%). From the data received, we calculated the body mass index (BMI). During input measurement, we calculated a BMI value of 15.57 and during output measurement in the experimental group, we calculated a value of 15.71 (0.91% difference).

In the input measurement we recorded the control group of subjects with an average body height 136.50 ± 3.40 cm. We recorded an average body weight of 30.75 ± 3.23 kg. In the output measurements, we found an average increase in height in subjects to 140.79 ± 4.49 cm (3.14%), and a body weight of 31.74 ± 3.62 kg (3.22%). From the data obtained by somatometry we calculated the body mass index (BMI). During input measurement we calculated a BMI value of 16.48 and during output measurement we calculated the control group value of 16.00 (down 2.88%).

At the end of the experimental period, we found a difference in somatic parameters between the experimental and control groups. The experimental group was observed as having a higher body height of 1.01 cm (0.71%) than in the control group. The control group was conversely recorded as having slightly higher

body weight of 0.16 kg (0.51%) in the experimental set. The control group was compared to the experimental group finding a 1.86% higher BMI.

Results

Table 2 presents the level of general physical performance which was monitored in the input and output measurements of the experimental sample who attended the athletics preparation within the project IAAF Kids' Athletics.

In the test, sit-and-reach, focusing on the articular mobility of the body, we registered the improvement of the experimental group from the input measurement 19.7 cm to 21.1 cm in the output measurement, an increase of 1.4 centimeters (7.11 %).

In the test standing long jump with a local focus on the explosive power of the lower limbs, we recorded the longest trial in 162 cm versus 167 cm in output measurements. In the input measurement, subjects achieved an average performance of 130 cm; measurements in output increased 4.1 centimeters (3.15 %) to 134.1 cm.

In the test sit-ups in 30 s, aimed at dynamic and endurance strength of abdominal and hip-thigh muscles, in the experimental group, the average input power was 16.6 correct executions of drills for 30 seconds; the output performance was equal to 18.9 repetitions for 30 seconds, an improvement on the average performance of drills of about 2.3 (13.86 %).

The flexed arm hang test focused on a static muscle strength and endurance of upper limbs: we found significantly positive changes. While at input measurement in the experimental group we found the value of the average performance of 13.86, the output value was of 16.62, which is a significant increase of 2.79 (20.17 %).

In the shuttle run 4 x 10 meters to determine the running speed of a change of direction, we recorded the input measurements in average values of 14.02. In output measurements we recorded a value of 12.77. The results can be perceived positively in an improvement of 1.25, which is 8.93 %.

The endurance shuttle run is another test in which we observed improvement in average results. At the beginning of the experimental

period, we recorded the input measurements: an average value of 27.8 sections. After completion of the research in the output measurements we recorded an average of 32.7 sections performed, an increase of 4.9 sections (17.63 %). The largest number of sections was recorded in the output value measurements and represented value 59.

From the acquired results, we can conclude that the best average performance improvement was observed in the endurance test flexed arm hang, which was an increase of 20.17 %. Other significant positive changes were observed in the endurance shuttle run where there was a mean increase of 17.63 %.

Table 2. General physical performance input – output in the experimental group

	SRT (cm)	SLJ (cm)	SUT (n)	FAH (s)	4 x 10 m (s)	ESR (n)
INPUT						
X	19.7	130	16.6	13.83	14.02	27.8
SD	1.83	11.92	3.47	7.38	1.55	7.5
Max	30	162	22	26,6	17.39	51
Min	12	81	8	2,6	11.25	11
OUTPUT						
X	21.1***	134.1***	18.9***	16.62*	12.77**	32.7***
SD	1.58	11.74	3.59	7.64	1.54	7.28
Max	32	167	25	28.3	16.32	59
Min	13	86	12	5.3	10.64	15
MEAN CHANGE	1.4	4.1	2.3	2.79	-1.25	4.9
	7.11 %	3.15 %	13.86 %	20.17 %	-8.93 %	17.63 %
Cohen's d	0.82	0.34	0.65	0.37	0.81	0.66

Legend: SRT – Sit-and-reach test
SUT – Sit-ups in 30 s
4 x 10 m – Shuttle run 4 x 10 meters
SD – standard deviation
n – number
** p < 0.01

SLJ – Standing long jump
FAH – Flexed arm hang
ESR – Endurance shuttle run
X – mean
* p ≤ 0.05
*** p < 0.001

In the test sit-and-reach focusing on the articular mobility of the body, we have seen an improvement in the control group from the input measurement 17.67 cm to 18.25 cm in the output measurement, an increase of 0.58 centimeters (3.30 %).

In the standing long jump test for local focus on the explosive power of the lower extremities, average power in the input measurements reached 136.92 cm; measurements in the output was increased by 4.5 cm (3.29 %) to 141.42 cm.

In the sit-ups in 30 s test aimed at dynamic and endurance strength of abdominal and hip-thigh muscles, the control group reached an

average input measurement of 16.67 correct executions of repetitions for 30 seconds; the output power was equal to 17.75 repetitions for 30 seconds, an improvement on the average performance exercises by 1.08 (6.5 %).

In the flexed arm hang test focused on static muscle strength and endurance of the upper limbs, we registered the value of the average performance of 14.98 seconds; the output was valued at 17.97 seconds, which is a significant increase on the 2.99 (19.98 %).

Input measurements for the shuttle run of 4 x 10 meters for detecting the running speed of a change of direction were recorded at an average

value of 14.22 seconds; research measurements recorded values of 12.69 seconds. In the results, we can conclude positively with an improvement of 1.53, accounting for 10.75 %.

In the input measurements for the endurance shuttle run, we observed an average value of 23.67 run sections; at the end of the research, we observed in the output measurements approximately 25.75 sections run, an increase of 2.08 sections (8.8 %).

The overall changes for the set of all experimental performed tests revealed a statistically significant positive change at $p \leq 0.05$. In the standing long jump and endurance

shuttle run tests, we can conclude statistical significance even at a much lower level of significance.

Statistically significant positive changes occurred in the the control group in four out of six performed tests at $p \leq 0.05$. In the sit and reach test and the test sit-ups in 30 s no statistically significant changes occurred.

Analysis of our results from selected tests indicates [13] that the project "Kids' Athletics" recorded positive performance increases and improved general physical performance.

Table 3. General physical performance input – output in the control group

	SRT (cm)	SLJ (cm)	SUT (n)	FAH (s)	4 x 10 m (s)	ESR (n)
INPUT						
X	17.67	136.92	16.67	14.98	14.22	23.67
SD	4.19	20.39	6.50	11.65	2.91	13.08
Max	24	155	24	43.4	19.1	50
Min	10	82	1	1	12.3	7
OUTPUT						
X	18.25	141.42***	17.75	17.97**	12.69***	25.75**
SD	3.83	19.25	5.66	12.10	2.73	13.76
Max	24	160	24	46.1	16.5	55
Min	11	90	4	3.4	10.4	9
MEAN CHANGE	0.58 3.30 %	4.5 3.29 %	1.08 6.5 %	2.99 19.98 %	-1.53 -10.75 %	2.08 8.8 %
Cohen's d	0.14	0.35	0.18	0.25	0.54	0.15

Legend: SRT – Sit-and-reach test
SUT – Sit-ups in 30 s
4 x 10 m – Shuttle run 4 x 10 meters
SD – standard deviation
n – number
** $p < 0.01$

SLJ – Standing long jump
FAH – Flexed arm hang
ESR – Endurance shuttle run
X – mean
* $p \leq 0.05$
*** $p < 0.001$

Conclusion

The results of this study document changes in the level of general physical performance among third grade pupils of elementary school on Ďumbierska street in Banská Bystrica, who attended classes with a focus on athletic improvements. Applying the project "IAAF Kids' Athletics" showed a positive increase in average

performance in all tests performed. Based on the evaluation of the results obtained by means of statistical methods, we can say that in all performed tests statistically significant positive changes occurred at $p \leq 0.05$. In the standing long jump and endurance shuttle run tests, we can conclude statistical significance even at a much lower level of significance. In the control group significant positive changes at $p \leq 0.05$

occurred in four out of the six tests conducted statistically. In the sit and reach and the sit-ups in 30 s tests there was no statistically significant occurrence.

In terms of size effects, significant changes were recorded since the four tests conducted during sit-ups in 30 s, and the endurance shuttle run yielded a medium effect, while the sit-and-reach test, and the shuttle run of 4 x 10 m yielded a large effect. Thus, we can conclude statistically significant differences between files and it is unlikely that the observed effect size is significant only due to statistics.

In the sport training of children we recommend at the pre-treatment stage of the

sport the maintaining of the ratio of general and special training at 70 % – 80 % : 30 % – 20 % thus avoiding early sports specialization.

Our study confirmed that trainings realized two times a week over nine months can be a sufficient period within which to register and monitor the changes in the level of general physical performance. We predict that we can reach and improve a more significant increase in the level of general physical performance through the application of the project for a period longer than nine mesocycles.

BIBLIOGRAPHY

1. Armstrong N. (2002). Aerobic fitness and anaerobic performance during childhood and adolescence. *Acta Kinesiologicalae Universitatis Tartuenssis* vol. 9: 13-19.
2. Brown J. (2001). Sports talent: How to identify and develop outstanding athletes. *Champaign, IL: Human Kinetics*.
3. Corbin C.B., Pangrazi R.P. (2003). *Guidelines for Appropriate Physical Activity for Elementary School Children*. VA: NASPE Publications.
4. Čillík I. (2004). *Športová príprava v atletike*. Banská Bystrica.
5. Čillík I. et al. (2014). General physical performance and physical development of the first grade pupils attending primary schools in Banská Bystrica. Hradec Králové.
6. Doležajová L., Košťál J., Lednický A. (2009). Vplyv športovej špecializácie na úroveň a zmeny koordinačnej výkonnosti 11 – 15 ročných športovcov. *Studia sportiva* vol. 3: 43- 53.
7. Fransen J. et al. (2012). Differences in physical fitness and gross motor coordination in boys aged 6 – 12 years specializing in one versus sampling more than one sport. *Sports Science*. vol. 30: 79-86.
8. Gozzoli CH., Locatelli E., Massin D. et al. (2002). IAAF Kids' Athletics a team event for children. *International Association of Athletics Federations*.
9. Gerstner M. (2010). Schülergerechte Leichtathletik als Wettbewerbsform in Schule und Verein: KIDS CUP. Hamburg.
10. Kampmiller T. et al. (2000). *Teória a didaktika atletiky II*. Bratislava.
11. Malek A. (2008). IAAF Kids' Athletics School & Youth Programme. Oslo.
12. Sabau E., Niculescu G., Gevat C. et al. (2013). Perceptual-motor Development of Children in Elementary School. *Procedia – Social and Behavioral Sciences*. vol. 114: 632-636.
13. Švachová S. (2013). Vplyv projektu "Atletika pre deti" na zmeny úrovne všeobecnej pohybovej výkonnosti detí v mladšom školskom veku. Kraków.
14. Wiart L., Darah J. (2001). Review of four tests of gross motor development. *Developmental Medicine & Child Neurology*. vol. 43: 279-285.

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