

AN ATTEMPT AT EVALUATION OF MOTOR PREDISPOSITIONS
OF 11-12 YEAR OLD BOYS VERSUS ENROLMENT
IN SPORTS TRAINING PROGRAMMES
OR PARTICIPATION IN THE MOTOR RECREATION PROCESS

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СПРОБА ОЦІНИТИ РУХОВІ СХИЛЬНОСТІ ХЛОПЦІВ ВІКОМ 11-12 РОКІВ У ПОРІВНЯННІ З УЧАСТЮ У СПОРТИВНО-ТРЕНУВАЛЬНИХ ПРОГРАМАХ ЧИ РЕКРЕАЦІЙНО-ОЗДОРОВЧОМУ ПРОЦЕСІ Олександр СТУЯ (Кафедра фізичного виховання та фізіотерапії (Польща))

Анотація. У дослідженні було протестовано 438 хлопців віком 11-12 років за допомогою бігу коротку дистанцію у порівнянні із витривалістю. Перевірку було проведено із метою оцінювання схильностей хлопців до швидкості та витривалості, а також з метою виявлення найслабшого, щоб надалі спрямувати його до занять рекреаційними та компенсаторними вправами. Лише у 11 хлопців (2,51 %) було виявлено схильність до швидкості, тоді як у 7 із них (1,59 %) було виявлено схильність до витривалості. У значної кількості хлопців (23 хлопці- 5,02 %) виявлено дуже низький рівень цих здібностей.

Ключові слова: рухові здібності, тести, схильність, спорт, рухове відновлення.

Introduction. A symptomatic manifestation of the adaptation to a specific physical effort is observed in training children and youth. In the performance of training or recreation activity the young body has to be prepared for a concurrent participation in two principal tasks: in the process of development and maturation, and in adjusting to the applied load, be that training process or leisure activity. A rational training programme lasting for a number of years should account optimally for relations holding between these factors.

The necessity to understand individual functional abilities of an athlete's body becomes more important if training loads are to be responded to properly, as well as his factual abilities resulting from predisposition to effort, both inborn and acquired ontogenetically.

It is known that abilities to perform time-trial efforts or of an endurance character are consequent upon the genetic composition of muscle fibre (7). Individuals who have a predominance of fast twitch fibres [FT] will be characterised by inborn abilities to perform efforts of short duration and of considerable intensity, whereas those who have slow twitch fibres [ST] will display a predisposition to perform endurance efforts.

Time-trial efforts are at a cost of anaerobic transformations whose efficiency is determined by the activity of such enzymes as myosin ATPase, creatinine kinase, hexokinase, and activities of other glycolytic enzymes [1, 2, 4] whose high activity is characteristic of fast twitch muscles. The energetic cost of endurance efforts is paid chiefly at the expense of aerobic metabolism dependent on mitochondrial enzymes, whose high activity is characteristic of slow twitch fibres [10]. Therefore, the knowledge of the composition of muscle fibres might prove to be a valuable indicator in determining abilities to perform time-trial or endurance physical efforts.

Hsu et al. [3] in their research performed on army recruits who were subjected to biopsies of the lateral great muscle (*m. vastus lateralis*) found out that individuals showing a predominance of FT fibres were characterised by a lower efficiency and lower tolerance to carry out hard work.

On account of the fact that the most precise method of muscle biopsy is practically unavailable because of its high cost and ethical issues as well, another simple and non-invasive method allowing to find out whether the subjects are FT or ST ones had to be considered.

One of such methods is a "Sprint versus Endurance" test proposed by Popiginis et al. [8] which allows to determine inborn predispositions to perform efforts of a sprint or endurance character.

Objective. The objective was to determine sprint or endurance predispositions of 438 young (11-12 year old) boys, and to point out those who did not show a pronounced gene expression, while their low motor ability qualified them to take part in a compensatory recreation exercises.

Material and research method. The research was carried on 438 boys aged 11-12, from schools in Giuszczyca, Waibrzych and Tarnyw Opolski [5, 6]. The subjects had not practiced literally any sport while their physical activity had chiefly been limited to physical education classes and back yard games. Their average age was 11 years and 4 months, the average body weight was 44,8 kg, the average body height was 158.2 cm.

The Sprint versus Endurance test, worked out by Schele and Kaiser and modified by Popiginis et al. [7, 8] was applied in the research. In accordance with the test assumptions given by its authors, the method based on it, in an indirect manner allows to identify individuals who have a predominance of fast twitch [FT] muscle fibres, and who are characterised by inborn predispositions to perform efforts of short duration and high intensity, or who have of slow twitch [ST] muscles predominant, predisposing him to efforts of extended duration of low intensity.

The applied test was composed of two run tests: a 60 m run (sprint) and the classic Cooper test (a 12 minute run or run/march). On the basis of the test results obtained from 438 boys aged 11-12, arithmetic means of the speeds measured in each run and their standard deviations were computed. This allowed to construct a special table after Matuszewicz [7], which made it possible to identify those boys who had a pronounced prevalence of either FT or ST muscle fibres. According to Popiginis [8], individuals with the highest content of FT fibres should be characterised by very good results in sprint runs, and, hence, should be within the "a" or "b" slot, at the same time poor at a long distance run. Therefore, the identification of individuals potentially good at time-trial exercise refers to the fields marked as aA, aB, bA and bB. Likewise, this applies to individuals of endurance predispositions. They should be placed in the fields: eE, eF, fE and fF.

The results entered in the fields eA, eB, fA and fB indicate the individuals displaying low speeds in the sprint run and endurance run. According to Raczek [9], Stuia [11], Wolacska [13] these individuals should be enrolled in a programme of an increased motor activity (leisure), so that their gene expression would be stimulated, and, ultimately, requested motor predispositions achieved [Table 1].

Test results

The results of the tests performed on 438 boys are presented in Table 1.

Table 1.

Identification of speed or endurance predispositions in tested 11 and 12 year olds

	A	B	C	D	E	F	
a	0	1	1	0	3	0	$\bar{x}+2s = 6.37$
b	1	6	9	26	26	0	$\bar{x}+1s = 6.37$
c	6	14	20	79	28	0	$\bar{x} = 5.55 \text{ m/sec}$
d	2	19	48	71	6	0	$\bar{x}-1s = 5.14$
e	3	10	31	9	2	0	$\bar{x}-2s = 4.73$
f	7	2	0	0	3	0	
	$(\bar{x}-2s) = 2.06$	$(\bar{x}-1s) = 2.54$	$\bar{x} = 3.02$	$(\bar{x}+1s) = 3.50$	$(\bar{x}+2s) = 4.92$		

As a result of the final classification based on the Table presented above the following have been identified:

- boys of speed predisposition: 11 boys, which makes 2.51 %;
- boys of endurance predisposition: 7 boys, which makes 1.59 %;

- boys who scored very poorly in the sprint and endurance runs: 22 boys, which makes 5.02 %;
- boys, who scored very high in the sprint and endurance runs: 29 boys, which makes 6.62 %.

Discussion. Testing by means of the Sprint versus Endurance with a view to identifying distinct motor predispositions has so far been multifarious. Nonetheless, the results obtained on such a numerous population of children ($n = 438$) are consistent with the results obtained by Makiewicz [7], Stuia [11], Szyszka et al. [12]. The percentage of distinct speed and endurance predispositions is too low to find a general use for it in the process of recruitment and selection for sports. An alarmingly high proportion of the boys subjected to the test (5.02 %) represent a very low level of abilities both as regards speed and endurance. According to the present author, and also following Raczek [9], progressive lowering of physical abilities and performance of Polish children and youth can be noticed. One of the causes of that degrading movement lies in the low effectiveness of response of the physiological motor stimulus in physical education classes, and low motor activity of school students, as the whole time devoted to it is a bare 12 to 28 % of the class duration. These classes do not lead to the development of adaptive mechanisms, at the same time blocking expression of proper genes, and in this way the growth of those types of fibre that would favour effort is curbed down. Similar observations were drawn up by Kaczor et al. [in Position 11], at the same time remarking that types with the qualities characteristic of the fields: aE, aF, bE, and bF prevail. These are fields reserved for those boys who attain result topping average ones both in sprint and the endurance run, which in the case concerned equalled only 6.62 %. The already mentioned author and co-researchers had their results, obtained in a Sprint versus Endurance test, confirmed at the molecular level achieving that by measuring the activity of skeletal muscle enzymes. Likewise, Stuia [11] in his earlier research carried on subjects already classified as speed predisposed, where he evaluated the level of a number of speed and coordination related skills. The boy subjects studied represent an extraordinarily high level of these skills and had been selected (by their coaches) to pursue a sports discipline that would match their skills; in that case it was football.

Conclusions

1. In the research on 438 boys aged 11-12, only eleven of them (2.51 %) were found to show speed related predispositions, while 7 boys (1.58 %) displayed endurance predispositions. In the present author's opinion, who has already carried out a similar research, these boys should be selected to train proper sports disciplines where the identified predispositions would play a key role.
2. A significant number of subjects (22 subjects, which constitutes 5.02 %) showed a low level of both speed and endurance related skills. These, in turn, should be advised to pursue creation and compensatory exercise.

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Annotation. In the research 438 boys aged 11-12 were tested by means of the Sprint versus Endurance method so that their predispositions to speed or endurance related efforts could be evaluated, and the weakest could be identified and henceforth directed to pursue recreation and compensatory exercise. Only 11 boys (2.51 %) were found to display speed related predispositions, while seven of them (1.59 %) showed endurance predispositions. A considerable number of the (23 boys – 5.02 %) are individuals of a very low level of these abilities.

Key words: motor abilities, tests, predispositions, sport, motor recreation