SELECTION OF CHILDREN FOR RUNNING BASED ON FUNCTIONAL INDICATORS

Ilona Mihajlović[1], **Miloš Petrović**[1], **Ivan Djinic**[2]
[1]*Faculty of Sport and Physical Education, Novi sad, Serbia*
[2]*Elementary school „Vuk Karadzic", Badovinci*

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Abstract
Selection includes designed, directed and unified process of assessment and establishing, as well as selection, extraction, election, identification and classification based on certain qualities and quantities. This research was done in order to implement the selection of children properly and successfully and to help selecting children for successful engagement in the running events of aerobic-anaerobic type, which makes the problem of this research. The aim of the research is to determine the impact of functional abilities on the performance of children in the 600m running, and to use certain parameters in the selection of children. The research sample consisted of 83 seventh grade students of an elementary school in Novi Sad, aged 13-14. By the modifications of Bergman Harvard step test and spirometry five predictor variables were obtained and their influence on the result of the 600m running was established. A high system correlation of predictor variables and criterion variables at the level of p = .00. is obtained by regression analysis, which means that these tests can be used for selection of children for running aerobic-anaerobic type with a high probability of good predictions.
Key words: *selection, athletics, running, functional abilities*

INTRODUCTION

Identifying talents is not a new concept, and the beginnings of research on talent date back to 70's of the twentieth century (Bompa, 2000). In sport, as a rule, it is insisted on the development of dominant biomotoric dimension to its relative maximum (Bjelica, 2008).

The selection includes designed, directed, unified process of assessment and establishing as well as selection, extraction, election, identification and classification based on certain qualities and quantities. The greater the meaning of heritage for a specific motor ability, the sharper selection criteria have to be applied (Miljus, 2002). This is proving relevant psycho-physical characteristics and their mutual relations in young population for a particular activity. The age of children has to be taken into account. In this approach one should think of the possibility of disparity between the chronological and biological age of children, and specific age periods should not be ignored (De Vris, 1976). It is important that sports potential is discovered as early as possible and that it is monitored continuously in order to achieve top results (Bompa, 2000).

Functional skills are an important biological basis, primarily speaking of the condition of cardiovascular, respiratory and neuromuscular potential (Stojanovic, 2008). Various physical changes in the body result from physical load, where there is a multiple increase of metabolic processes, and along with that comes an increase in the work of specific organs and organ systems (Djurdjevic, 1981). Adaptation of the organism as a whole to systematic physical load is achieved by increasing the functional possibilities of all the organic systems and the cardiovascular system in particular (Đurašković, 2002). Maximum intake of oxygen is a good measure of functional working efficiency of the body and it changes the frequency of the heart. In addition to other indicators, they are commonly used to assess adaptation of the body to physical efforts (Medved, 1987).

The possibility of selection of children for running, based on functional abilities, was researched in this paper. The research was done in order to implement the selection of children properly and successfully and to help selecting children for successful engagement in the running events of aerobic-anaerobic type, which makes the problem of this research. The aim of the research is to determine the impact of functional abilities on the performance of children in the 600m running, and to use certain parameters in the selection of children.

METHODS

The research sample consisted of 83 seventh grade students of the elementary school of "Jovan Popovic" in Novi Sad, aged 13-14. The applied system of variables is divided into predictor and criterion system. The variables were obtained by using the following tests: Bergman modification of the Harvard step test, which is carried out by climbing on a 40cm-high bench for a period of 3 min at a speed of 30 climbing / min. Three variables that make the pulse measured 1.5 min (P1), 2.5 min (P2) and 3.5 min (P3) after the load were obtained in that way. An index (INDX) was also obtained, as a reflection of functional capacity, calculated according to the following formula:

$$INDX = \frac{\text{test duration in sec} \times 100}{2\,(P1 + P2 + P3)}$$

Based on measurements of respiratory capacity by spirometry one more variable rating of functional ability (SPIR) was obtained. The criterion variable was the result of running test at 600 meters (T600). The obtained data were subjected to mathematical and statistical data processing. Central and dispersion statistics were presented. Regression analysis was applied in order to determine the predictor system impact on the criterion variable.

RESULTS AND DISCUSSION

Table 1 presents the descriptive statistics. Based on the minimum and maximum values of the functional abilities of boys, the value of the coefficient of variation indicates the homogeneity of the total sample for all indicators. Reduced skewness values indicate that the distribution is positively asymmetric, which means that the distribution curve of the results tend to smaller values, ie. to have more smaller values compared to the normal distribution for most indicators (P1, P2, P3, SPIR).

Negative kurtosis values indicate that the curve is flattened with the indicators P1, P2, INDX, SPIR. The distribution of values generally moves within the normal distribution for indicators P1, P2, P3, while the distribution of values deviates from the normal distribution for indicators INDX and SPIR.

Table 1. Central and dispersion statistics of the distribution functions of variables

	AM	SD	min	max	CV	sk	ku	p
T600	140.42	18.87	107.5	198.5	13.44	.75	.40	.149
P1	137.85	16.34	102.0	168.0	11.85	-.27	-.73	.389
P2	115.23	13.02	86.0	140.0	11.30	-.26	-.41	.389
P3	100.17	10.74	70.0	124.0	10.73	-.63	.11	.116
INDX	25.80	2.93	21.2	32.6	11.34	.74	-.34	.019
SPIR	3778.3	515.61	2700.0	4800.0	13.65	-.06	-.84	.091

AM – arithmetic mean, SD – standard deviation, min – minimum result, max – maximum result, CV – coefficient of variation, sk – skewness, ku – kurtosis, p – distribution of results

Table 2. Statistics (independent) of multiple regression of boys' functional variables in relation to the 600 m running (T600)

	R	BETA	p
P1	.464	.538	.110
P2	.545	1.018	.012
P3	.602	1.452	.002
INDX	-.539	9.543	.020
SPIR	-.637	-.017	.000

R – correlation, BETA – regression coefficient, p – level of importance

As shown in the table, it can be seen that there is a correlation between the 600 m running and almost all the indicators individually. The increase of the value P2 affects the increase of the value of running the 600m (p = .012), which means that the 1018 regression coefficient significantly differs from zero, while the correlation is .545. Also, the growth of the value P3 affects the increase of the 600m running value (p = .002), shown with the regression coefficient and correlation of .602. These results tell us that with the increasing values of pulse we expect numerically higher values of the 600m running, and that also means a worse result. Namely, the higher the heart rate of a student, the less prepared the body for a relatively long run. However, the growth of the values of functional ability index (INDX) affects the reduction of the value of running the 600m (p = .02). A negative correlation is obtained (-. 539), which means that with those students who have a better index of functional abilities the running values are lower, ie. they are better (faster) at running the given distance. The same situation is with the indicators of spirometry (SPIR), where it can be seen that the increase of spirometry values affects the decrease of running the 600m values, with statistical significance (p = .00). There is also a relatively high negative correlation between spirometry and running (-. 637), so that it can be concluded that those students who had a better breathing capacity, had lower values of running the 600m, ie.they were running faster.

Table 3. Analysis of multiple regression variance

F	p
23.034	.000

free member	multiple correlation	DELTA
-377.264	.774	12.329

From table 3 it can be concluded that the observed functional variables of predictor system affect the 600 m running. Multiple correlation is .774, which means that the system of predictor variables explained 13% of common variance between the predictor system and the criterion variable, which is statistically significant p = .00. Having established the connection between the 600m running and functional abilities, and statistical significance obtained, we can say that the applied system of functional variables gives a prognosis, a prediction of running the 600m effectivness.The step tests correlation with VO2max was also established by other authors (Liu & Lin, 2007) determining pulse correlation (1-1,5 min, 2-2.5 min, 3-3,5 min), measured three times after the load on the benches of different heights, with a value of oxygen consumption, measured on a treadmill. Fairbanks (1995) finds that the step tests are easily applied. He also proves correlation with oxygen consumption measured by a direct method on a treadmill. Step tests are very suitable for children because physical work to "failure" (direct measurement of VO2max), is neither applicable, nor allowed for children.

These tests can be used to form a battery of tests for a successful selection. However, this battery can also contain other tests, which have shown validity and high correlation with runnings, from other researches (Mihajlovic, 1996).

CONCLUSION

From the above it can be concluded that the tests, which gave us this system of predictor variables can be used in the selection of children ie. selection for running aerobic-anaerobic type (in this case the 600m running), and they will help us with great probability to choose students who can achieve good results in these disciplines.

On the occasion of selection, the indicator of a certain distance results is not sufficient. Some children enter the training system early, and the measurement results of running do not reliebly show if they are talented or if it is a result of training process, and why they have specific indicators. This fact must not be ignored. Similarly, it may happen that a talented child fails to make adequate achievement when the results of running are measured . In order to avoid misconceptions, it is important to determine predisposition, create the right selection based on well selected, exactly determined and valid battery of tests.

REFERENCES

1. Bompa, T. (2000). *Periodization and methodology of training*. Zagreb: Croatian Basketball Federation.
2. Bjelica, D. (2008). Above-threshold performance in top sport. *Latest in practice*. XX, (6), 135-141.
3. De Vris, H. (1976). *Physiology of physical effort in sport and physical education*. Belgrade: The Board of Physical Culture of Serbia.
4. Đurđević. V. (1981). *Athlete's heart*. Belgrade: IGRO "Sports Book".
5. Đurašković. R. (2002). *Sports Medicine*. Niš: S.I.I.C.
6. Fairbanks. E.J. (1995). Stepping - an old form of exercise newly discovered. *Strength & Conditioning Journal*. (17-6), 65-71.
7. Liu, C.M., Lin, K.F. (2007). Estimation of VO2max: a comparative analysis of post-exercise heart rate and physical fitness index from 3-minute step test. J *Exerc Sci Fit*. (L 5-2), 118-123.
8. Medved, R. (1987). *Sports Medicine*. 2. renewed and updated edition. Zagreb: Yugoslav Medical Publication
9. Mihajlović, I. (1996). *Relations of anthropometric characteristics, motor and functional abilities of children selected for athletics with the 30m running results*. Master thesis, Novi Sad: Faculty of Physical Education
10. Stojanović, T., Milenkoski, J., Karalić, T. (2008). Comparative analysis of aerobic ability of the volleyball pioneer selection of Serbia in the period from 2000. - 2004. Journal of Anthropological Society of Serbia. (43), 238-244.

SELEKCIJA DJECE ZA TRČANJA NA OSNOVU FUNKCIONALNIH POKAZATELJA

Sažetak

Selekcija podrazumjeva osmišljeni, dirigovani, jedinstveni proces procjene i utvrđivanja, kao i odabir, izdvajanje, izbor, identifikacija i klasifikacija na bazi određenih kvaliteta i kvantiteta. Istraživanje je realizovano da bi se selekcija djece realizovala pravilno i uspješno i da pomogne u izboru djece za uspješno bavljenje disciplinama trčanja aerobno-anaerobnog tipa, što čini i problem ovog istraživanja. Cilj istraživanja je utvrđivanje uticaja funkcionalnih sposobnosti na uspješnost djece u trčanju na 600m, a radi primjene određenih parametara prilikom selekcije djece. Uzorak istraživanja činilo je 83 učenika sedmih razreda osnovne škole u Novom Sadu, uzrasta 13-14 godina. Od Bergmanove modifikacije Harvard step testa i spirometrije dobijeno je pet prediktorskih varijabli čiji se uticaj utvrđivao na rezultat trčanja 600m. Regresionom analizom dobijena je visoka povezanost sistema prediktorskih varijabli i kriterijske varijable na nivou p= .00. što znači da ove testove sa velikom verovatnoćom dobre predikcije možemo koristiti za selekciju djece za trčanja aerobno-anaerobnog tipa.

Ključne riječi: *selekcija, atletika, trčanja, funkcionalne sposobnosti*

Correspodence:
Ilona Mihajlović, PhD
University of Novi Sad
Faculty of sport and physical education
Tel. 00 381 (0)21 450 188
Mob. 00 381 (0)62 244 021
e-mail: icuka@nscable.net