PREDICTIVE VALUES OF MORPHOLOGICAL AND MOTORIC SYSTEM FOR SELECTION IN SPRINT

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Summary
There are some difficulties in the process of selection in athletics, especially in sprint since the dominant skill is speed, which is in a large correlation with genetics. Timely and proper selection is in a causal connection with the age which makes adequacy of that kind of methodological procedure even more difficult. Wishing to give a small contribution at choice for adequate tests for the purpose of selection, a research was realized during which some appropriate and responsible tests for sprint running were applied. In that way, some predictive values for a successful selection were acquired.

Key words*: selection, training process, sprint, prediction*

Introduction
Results development in athletics include, besides modern training technology, the results coming from different studies, plans, programming and they are included in the different age categories athletes' training control itself, too. Unfortunately, some specific studies from this field find, in a very difficult manner, its application in the process of training at schools. The main reason for such a kind of situation is probably the lack of a system or a systematic orientation and organization of a professional work in the field of athletics. The contribution to this can also be found in the modest program of scientific and professional studies and a certain deficit in the number of professionalists being engaged in the mentioned problem area. Just because of the mentioned reasons we feel obliged not to neglect certain studies and knowledge, especially when it comes to the selection of young people for sport that is athletics. Regarding the previously mentioned, we can freely say that the problem of selection is a very complex issue which has already been studied enough and which is always in.

The subject of research
The subject of this research was to set relations, in other words the influence by some motoric indicators defined as specific motor tests on the motoric tests being responsible for the speed of running of children of male and female sex in Vojvodina. In this matter, the study was reduced to only a few characteristic variables for estimation of motoric abilities.

Aim
The study aims were as follows: 1) to define connection between anthropometrical and motoric variables being treated as a system of predictor variables in the sample of testees aged 11 - 12, 2) to define the size of influence by predictor variables on criterion variables in the whole sample and then on the sub-samples with the pupils of male and female sex, 4) to define the importance of prediction of the system of predictor variables on each of the criterion variables (running lengths 30m and 300m) According to the aims of the study, the two hypothesis referring, in the first place, to the whole sample of testees and then to sub-samples of male and female sex were defined: H1 – influence of the predictor system of variables on prediction of success in running at 30 meters was different than zero, H2 – influence of the predictor system on prediction of success in running at 300 meters was different than zero. The errors at rejection of the set hypothesis were fixed at P=.05.

Methods
The sample of testees consisted of 646 pupils from grades V and VI from primary schools at the territory of AP Vojvodina, aged 11-12. The whole sample of testees was divided into two sub-samples regarding the sex of testees: 344 male pupils and 302 female pupils. The sample of variables was designed in a way that it could present information on anthropometric characteristics and motoric abilities. The whole sample of variables was divided into two sub-samples: predictor and criterion. Predictor variables: body height (cm) – TELVIS, body mass (kg) – TELMAS, standing long jump with joined legs (cm) SKUDAM, standing long jump using take-off leg (cm) – SKUDMO, standing triple jump(cm) – TROSHS, scissors style high jump (cm) – SKVMAK. Criterion variables: running 30 m (sec) - TR30MT, running 300 m (sec) - TR30M. The method of data processing was used according to subject and aim.

The central and dispersion variables were calculated for all the variables and they are as follows: arithmetic mean, standard deviation, standard error of arithmetic mean and minimal and maximal result. The importance of deviation of the noted distribution of the normal one was tested by the Kolmogorov-Smirnov's test. The regression analysis was applied for defining the influence and connection between criterion and predictor system variables.

Results and discussion

The results of the study were presented by the order of data processing and they were interpreted according the aims and hypothesis of the study.

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We apply basic parameters of functions of variables distribution for the whole sample and both of the sub-samples. In inspection of the table 1, it can be seen that the average value for the body height of the whole sample and the sub-sample with boys was about the same (152.8 and 152.4), whereas the girls were approximately taller. The standard deviation for all of the three groups has about the same value (8.37 8.57 8.12). The average value of body mass showed that girls have bigger body mass on average for 1 kg, which was expected due to the fact that they have bigger body mass, too. The standard deviation showed that all three groups indicated the same values, which is the proof of homogeneity.

Table 1: Central and dispersive parameters

Variable		X			S			Sx			Min.			Max	
	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf
TELVIS	152.8	152.4	153.2'	8.37	8.57	8.12	.32	.46	.46	124	124	133	179	179	179
TKLMAS	44.2	43.8	44.6	10.03	10.08	9.98	.39	.54	.57	23	25	23	81	81	80
SKUDAM	157.9	163.2	151.8	20.04	20.59	17.58	.78	1.11	1.01	105	106	105	220	220	190
SKUDMO	146.4	150.1	142.3	18.09	18.93	16.15	.71	1,02	.92	85	100	85,	195	195	190
TROSMS	478.4	492.7	462.0	47.84	49.80	30.68	1 .88	2.80	2.28	193	193	350	670	670	580
SKVMAK	93.4	96.4	90. 1	12.84	12.71	12.17	.50	.68	.70	40	50	40	150	150	125
TR30MT	5.79	5.67	5,92	.55	.52	.56	.21	.28	.32	4.10	4.10	4.80	8.40	8.00	8.40
TR30M	60.99	57.58	64.87	8.57	7.63	7.91	3.37	4.11	4.55	41.00	41.00	49.00	90.00	90.00	90.00

(applied variables in the whole sample (Ws), the sub-sample with male sex (Sm) and the sub-sample with female sex (Sf)

Table 2. Regression analysis (criterion 30 m run)

Variable	R			PART-R			BETA			P			(Q) BETA		
	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf
TELVIS	.04	-.01	.03	.04	.04	.06	.05	-.02	.05	.93	-.26	.58	.35	.78	.56
TELMAS	-.04	.00	-.06	.04	.03	.04	-.07	.01	-.11	4.31	.17	-1.39	.19	.86	.16
SKUDAM	.01	.01	.02	.02	.01	.02	.03	.04	.07	.62	.58	.84	.54	.55	.39
SKUDMO	-.10	-.11	-.09	.02	.02	.03	-32	-.40	-.28	-5.35	-5.15	-2,98	.00	.00	.00
TROSMS	.00	.00	.00	,01	.00	.01	.01	.08	.06	.27	1.11	.69	.79	.26	.48
SKVMAK	-.08	-.10	-.02	.02	.02	.03	-.18	-.26	-.05	-4.02	-4.55	-.25	.00	.00	.45
DELTA	.16	.26	.05	.											
Ro	.40	.51	.22												
Q	.00	.00	.00												

(Analysis for the whole sample (Ws), the male sex (Sm), and the female sub-sample (Sf).)

Table 3: Regression analysis (criterion 300m run)

Variable	R			PART-R			BETA			P			Q (BETA)		
	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf	Ws	Sm	Sf
TELVIS	1.30	1.30	.48	.59	.75	.83	.12	-.00	.05	2.19	-.08	.58	.03	.93	.55
TELMAS	-.81	.07	-.95	.46	.57	.65	-.09	.00	-.11	-1.75	.12	-1.46	.08	.90	.14
SKUDAM	-.01	-.38	1.13	.26	.30	.40	-.00	.10	.25	-.05	-1.29	2.82	.95	.19	.00
SKUDMO	-.94	-1.06	-1.30	.29	.33	.44	-.20	-.26	-.26	-3.26	-3.18	-2.91	.00	.00	.00
TROSMS	.02	.30	.11	.10	.11	.16	.01	.20	.05	.22	2.69	.66	.82	.00	.50
SKVMAK	-2.04	-1.39	-1.99	.30	.37	.42	-.30	-.23	-.30	-6.83	-3.73	-4.72	.00	.00	.00
DELTA	.17	.16	.12												
Ro	.41	.40	.34												
Q	.00	.00	.00												

(Analysis for the whole sample (Ws), the male sex (Sm), and the female sub-sample (Sf))

The variables used to evaluate explosive strength (SKUDAM and SKUDMO) indicated that the boys were physically stronger, which was also expected. The girls did not have such a good explosive strength in comparison with the boys as well as in comparison with the whole sample. The insufficient strength of legs muscles was especially expressed in comparison with the boys in the variables TROSMS (462.0, 492.7, 4t8.4) and SKVMAK (90.1, 96.4, 93.4). But, the standard deviations showed a larger degree of homogeneity in the group with female testees.

The variables for evaluation of the running speed at 30 m showed that the best results were found in at the testees with sub-sample of males (5.67), as well as the best group homogeneity S=.52. The average value in evaluation of speed endurance in running of 300m for the whole sample amounted 60.99 seconds and the standard deviation was 8.57. The male testees showed better results on average than female ones. At the end of this presentation of the displayed table, it is necessary to point out and emphasize that all the comments while making a comparison (better, weaker, etc.) were only the presentation of quantity differences but not statistical ones.

Thus, all the comparisons between the sub-samples and the total form of the sample of testees do not have either statistically significant difference or equality. The results of regression analysis of the variable TR30MT for the total sample were presented in the table 2. It can be seen from the table data that the system of predictor variables explained about 16% (DELTA= .16) of the common variance between the system and the criterion variable, that is TR30MT. Multiple correlation amounted Ro= .40.

That percent of the explained part of the common variable is statistically important, especially at the level of Q= .00. The individual relations of the predictors with the variable showed that the statistically important predictors were SKUDMO and SKVMAK, and thus they contributed the most to make the whole system of predictor variables statistically important in prediction of variables TR30MT in the whole sample.

Discussion and conclusion

The results of regression analysis in the sub-sample (table 2) showed that some similar conclusions can be made to the ones from the previous analysis. It can also be seen that the system of predictor variables explained about 26% (DELTA=0 .26) of the common variance and that the coefficient of the multiple correlation was Ro= .51. Therefore, the system of predictor variables, even at the sub-sample of male sex, can successfully predict the result of running at 30 m. The predictors SKUDMO and SKVMAK gave the largest contribution to the predictor system.

However, for the case of the sub-sample with females (table 2) and with only 50% of explained common variance between the system and the criterion variable with the multiple correlation which was Ro= .22, the system of predictor variables was statistically important, even at the level Q= .00. It is interesting that only one of the variables (SKUDMO) gave statistical importance Q (BETA) = .00. Therefore, although we can conclude that the system of predictor variables gave good prediction, we should take it with some dose of salt because the units are rather big, which indicates to some possible errors in measurement procedure. Regression analysis of the variable of running at 300m is very interested. According to the results from the table 3, we can conclude that it is possible to predict successfully the results in running at 300m. This is confirmed by the per cent of the common variance of 17% together with rather high multiple correlation Ro= .41.

The predictors TELVIS, SKUDMO and SKVMAK gave statistically important contribution in the predictor system Q(BETA) = .03, .00, .00, and therefore, the results of the total predictor system are statistically important Q= ,00 regarding the prediction of success in running at 300m. The table 3. also displayed the regression analysis of the variable of running at 300m from the sub-sample of male testees. With 16% of explanation referring to the common variance and multiple coefficient of correlation Ro= .40, the predictor system turned to be statistically important Q= ,00 for prediction of running at 300m. The largest contribution in this predictor system was given by SKUDMO, TROSMS and SKVMAK. But the worst prediction was given by the variables TELVIS (.93) and TELMAS (.90), which was expected because there was correlation between body height and body weight, and the body weight had diametrical effect in the tests of stamina. The inspection of the results of regression analysis of the variable of running at 300m in the sub-sample of female testees showed equivalent results but a little bit worse in comparison with the sub-sample of males. Namely, the prediction of results success was there explained with 12% and with the multiple coefficient Ro= .34 but also with the same statistically important system of predictor variables Q= .00. The best predictors of this system were SKUDAM, SKUDMO and SKVMAK.

On the basis of statistically important prediction of the three mentioned variables and integral participation of the rest of variables in the predictor system, we can successfully predict the results of running at 300 m. On the basis of the regression analysis results using 6 predictor and 2 criterion variables, the following can be concluded: 1. the assigned aims of study were realized completely and information of theoretical and practical importance were collected.

2. it is possible to successfully predict the results of running at 30m and 300m for the whole sample and for both of the sub-samples using the applied system of predictor variables. Therefore, the basic hypothesis can be accepted and it can be concluded that the mini battery of tests consisting of two anthropometrical variables and six motoric variables can serve as the example of one successful battery of tests in selection of boys and girls for sprint disciplines. After such or similar procedure, it is necessary to apply a training process on the part of the sample-testees whose results satisfied the appropriate criteria of motoric abilities for a specific athletics discipline.

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PREDIKTIVNE VRIJEDNOSTI MORFOLOŠKOG I MOTORIČKOG SUSTAVA ZA SELEKCIJU U SPRINTU

Sažetak

Selekcija u atletici, a posebno u sprintu, ima otežavajuće okolnosti budući je dominantna sposobnost brzina, a ona je u velikoj korelaciji sa genetikom. Pravovremena i valjana selekcija u kauzalnoj je vezi sa biološkim uzrastom što još više otežava adekvatnost tog metodološkog postupka. U želji da se dade skroman doprinos pri izboru adekvatnih testova za selekciju, izvršeno je istraživanje sa primjenom adekvatnih odnosno odgovarajućih testova za sprinterska trčanja. Tako su dobivene prediktivne vrednosti za uspješnu selekciju.

Ključne riječi*: selekcija, trenažni proces, sprint, predikcija*

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