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Original scientific paper

THE EFFECT OF MOTOR SKILLS IN THE SUCCESS OF SPRINT RUNNING

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Abstract

Introduction: The aim of this research is to prove the connection between motor skills as a predicative system in the resulting efficiency in the disciplines of sprint running in 30 and 80 meters as situational-motor variables in the system criteria. Methods: The research was conducted based on a sample of 170 male testers aged 14 years ± 6 months, students of the "Naim Frashëri" and "Bajram Shabani" primary schools in Kumanovo. There were 15 variables used in this research, of which: 13 variables for judging motor skills, and 2 variables for judging situational-motor skills. Results: From the proof of the individual effect of the motor skills on the success of 30 to 80 meter running, the interpreted results bring us to the conclusion that: between the predicative system and criteria variables of runs from 30 to 80 meters, there are connections with important statistical impact, with a trust level of Q-0.0000. As far as the individual effect of predicative variables is concerned, in the criteria variable for the 30 meter running, important statistical connection was noticed in the variable of *taping with the hand in wall (MTHW)* this variable represents the set of tests for judging the segmental speed, and the variable figure of eight agility *(MFEA)*, this variable represents the set of tests used to judge agility. Meanwhile, as far as the individual impact of predicative variables is concerned, at the criteria variable of the 80 meter running, important statistical connection was shown by the *taping with the hand in wall (MTHW)* variable, the figure of eight agility *(MFEA)* and the t-test variable (MTT). Conclusion: Judging by this, we can come to the conclusion that the variables for judging segmental speed and judging agility, have a huge statistical effect, because of that, the same variables can be put into practice for the development of motor skills of short trail runners.

Keywords: motor skills, situational-motor, correlation, impact, sprint run

1. Introduction

The monitoring and evaluation of anthropometric parameters and motor abilities in children is an integral part of the process of physical education in schools. Motor abilities showcase an integrated result of body functions included in physical activity and can be used to evaluate the efficiency of physical education as well as measure the health adaptability of students, with the condition that those measurements should be believable and be standardized like the battery of Eurofit tests (Adam et al, 1988). The simultaneous evaluation and following of motor abilities will offer more correct information on the process of growth in children. A characteristic of sprint runs is that the movements are done with maximum intensity and the perfection of these techniques is much harder than runs in medium or long trail runs. The achievement of good result

in sprint runs is dependent on the explosive force and neuromuscular agility of the athlete (Newotn and Kreamer, 1994). A lot of authors have come to the conclusion that motor abilities and functional abilities are determining when it comes to the achievement of good results in sprint runs (Homenkov, 1997; Brown, Ferrigno & Santana, 2000; Markovic, et al. 2007; Przulj et al. 2011; Iseni et al. 2015). Explosive force, speed, agility and flexibility are crucial abilities that can improve the performance of sprinters. (Radic & Naumovski, 1997, Radic & Simeonov, 2006, 2009, Iseni, Radic & Simeonov, 2015). Performance in the 100 m sprint is influenced by a multitude of factors including starting strategy, stride length, stride frequency, physiological demands, biomechanics, neural influences, muscle composition, anthropometrics, motor abilities and environmental conditions (Aditi & Robert, 2011). Achieving good results in sprint runs depends on the strength of the runner and the speed of the neuro-muscular reaction (Asllani, 2003, 2016).

The primary aim of this research is to prove the impact of motor and situational-motor abilities in the results of sprint runs in 30 and 80 meters in students aged 14. The results of the research on the impact of motor and situational-motor abilities on sprint runs have high theoretical and practical value in the training process, since we expect new scientific information on the value of motor abilities from this research, in particular the tests on the evaluation of segmental speed, tests for the evaluation of explosive force and agility, tests which impact the efficiency of sprint runs more than anything.

2. Research methodology

The subjects of this research are some motor abilities in students aged 14.

The aim of this research is to prove the connection and effect between motor abilities as a predicative system and the success of sprint runs in 30 and 80 meters as a system criterion.

The sample of this research was taken from the student body of primary schools "Bajram Shabani" and "Naim Frashëri" - Kumanovo. The sample of entities is made up of 170 male students.

In this research a total of 15 variables were used: 13 variables for the evaluation of motor abilities and 2 variables for the evaluation of situational-motor abilities. The variables for motor abilities by number: 1. *Taping with the feet* (MTF)**,** 2. *Taping with the hand* (MTH)**,** 3. *Taping with the feet in wall* (MTFW) 4. *Raising the body from a laying position* (MRBLP30"), 5. *Raising the body from the Swedish arch* (MRBSA30"), 6. *Squats* (MSQU)**,** ***7.*** *Pushups* (MPU), 8. *Sit & Reach* (MSR), *9. Splits (MS), 10. Flash with stick (MFS), 11. Eight by titling (MET),* 12. *10x5- agility* (M10X5), 13. *Agility T- Test* (MT-TEST) and the situational-motor abilities by number: 14. *30 meter run* (MRU30m) and 15. *80 meter run* (MRU80m). Motor variables are chosen as representatives of the size of the motor in the second line research (Kurelic et al., 1975) and EUROFIT test (Adam et al., 1988).

In order to prove the effect motor abilities as a system criterion, the regressive analysis (or analysis of effect) was used, that is part of the multivariable group of analyses. For the processing of results the statistical application SPSS 22.0 was used.

3. Results

Table 1. Basic statistical parameters of motor and situational-motor abilities

	N	Min.	Max.	Mean	Stan. Dev.	Skew	Kurt
TF	170	18.00	33.00	26.3118	2.89099	-.208	-.246
MTH	170	16.00	42.00	29.5294	4.05024	-.136	.518
MTFW	170	12.00	32.00	24.7412	3.72471	-.490	.117
MRBLP30"	170	10.00	33.00	22.2706	4.10625	-.152	.605
MRBSA30"	170	8.00	45.00	31.6412	6.66844	-.949	1.737
MSQU	170	4.00	220.00	40.1765	27.15643	3.336	17.745
MPU	170	.00	54.00	15.4260	9.35520	.959	1.259
MSR	170	3.00	37.00	21.0376	6.52437	-.005	-.299
MS	170	127.00	207.00	171.6941	14.28836	-.290	.112
MFS	170	49.00	173.00	94.5118	21.37084	.388	.187
MET	170	16.20	25.56	20.1383	1.83394	.639	.208
M10X5	170	13.40	27.40	20.3926	2.19856	.396	.124
MTT	170	6.88	12.06	8.4292	1.00525	1.036	1.367
MRU30m	170	4.00	6.20	4.8526	.49753	.267	-.613
MRU80m	170	9.50	16.20	11.6748	1.37368	.622	.111
Valid N (listwise)	170						

On the 1st table, the values and primary indicators in males aged 14 were reflected, those values and indicators are: the minimal result, the maximal result, the arithmetic mean as a central indicator, the standard diversion as a primary dispersive indicator, and the primary indicators in the form of a distribution curve, the asymmetry of the curve (Skewnees) as well as the kurtosis of the curve (Kurtosis).

The primary indicator on the dispersion of results is the standard dispersion. The values of standard dispersion are of a low level in almost all the variables, which means that we are talking about homogenous results, aside from the MSQUA (squats), MPU (pushups), MS (splits), and MFS (Flash with stick) variables, in which the results are of a higher level, which means we are talking about heterogeneous result, respectively, results which have a higher variability. The asymmetry of the curve is small in almost all of the variables, in some, even with negative value. The value of the kurtosis in the curve in most variables is under 2.75, so all of these values are with a platykurtic character, which means that the results are scattered on the arithmetic mean.

Table 2. The Correlations Between Motor Variables and Situational-Motor Variables

Correlation

	MTF	MTH	MTFW	MRBL3	MRBS3	MSQU	MPU	MSR	MS	MFS	MET	M10X5	MTT	MRU30	MRU8
MTF	1														
MTH	.517**	1						.245**							
MTFW	.549**	.534**	1					.253**							
MRBL	.337**	.281**	.279**	1				.229**							
MRBS	.093	.125	.031	.154*				.027							
MSQU	.179*	.051	.142	.076	.107	1									
MPU	.269**	.270**	.328**	.407**	.146	.089	1								
MSR	.281**	.245**	.253**	.229**	.027	.115	.258**	1							
MS	.326**	.289**	.294**	.301**	.060	.110	.236**	.314**	1						
MFS	-.191*	-.234**	-.143	-.189*	-.085	-.255**	-.178*	-.206**	-.228**	1					
MET	-.352**	-.250**	-.367**	-.359**	-.024	-.224**	-.307**	-.290**	-.382**	.322**	1				
M10X5	-.334**	-.245**	-.300**	-.190*	-.067	-.334**	-.220**	-.253**	-.357**	.266**	.532**	1			
MTT	293**	-.358**	-.324**	-.199**	-.086	-.243**	-.210**	-.262**	-.180*	.330**	.484**	.373**	1		
MRU3	-.424**	-.324**	-.434**	-.386**	-.078	-.204**	-.368**	-.337**	-.382**	.276**	.508**	.388**	.424**	1	
MRU8	-.436**	-.350**	-.474**	-.358**	-.085	-.204**	-.325**	-.304**	-.371**	.259**	.507**	.372**	.476**	.866**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In the next tables the correlations of motor and situational-motor variables are reflected and analyzed. The correlations are tested for two levels of believability p=0.01 and p=0.05. The highest value of correlations was shown between the variables: 30 meter run (MRU30m) and 80 meter run (MRU80m), correlations where their coefficients had important statistical values were seen between the: taping with feet (MTF) variable which is connected with the taping with feet in the wall (MTFW) variable, which has a value of -424**, and 80 meter run (MRU80m) with a value of -436**, then between the taping with hand (MTH) variable, which is connected to the (MTFW), (MRU30m) and (MRU80m) variables, and also between the eight by titling (MET) variable, which has a connection with the T-test (MTT) variable, 10x5 agility test M10X5) variable, (MRU30m) and (MRU80m) variables, and between the (MTT) variables and (MRU30m) and (MRU80m) variables. Other coefficient values are low correlations and some with unimportant correlations.

Table 3. The Linear Regression of the Variable MRU30m (The Summary Model)

The Summary Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.661[a]	.437	.390	.38880	.437	9.259	13	155	.000

a. Predictors: (Constant), MT-TEST, MRBLP30", MS, MSQU, MPU, MSR, MFS, MTF, MRBSA30", M10X5, MTH, MTFW, MET

Table 4. Regression analysis of variable MRU30m (Coefficients)

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.916	.814		6.041	.000
	MTF	-.016	.014	-.093	-1.158	.249
	MTH	.006	.010	.050	.628	.531
	MTFW	-.023	.011	-.170	-2.060	.041
	MRBLP30"	-.015	.009	-.124	-1.742	.084
	MRBSA30"	.000	.005	.004	.060	.952
	MSQU	-.001	.001	-.030	-.454	.651
	MPU	-.006	.004	-.104	-1.490	.138
	MSR	-.005	.005	-.065	-.971	.333
	MS	-.004	.002	-.102	-1.451	.149
	MFS	.001	.002	.032	.482	.630
	MET	.051	.023	.186	2.229	.027
	M10X5	.010	.017	.045	.591	.556
	MTT	.071	.037	.144	1.924	.056

a. dependent variable: MRU30m

From the 3rd table, we can see multiple correlations between the dependent variable (criteria): 30 meter run (MRU30m) and all the other independent variables (predicative) it's got a statistical significance of R=(0.661), which explains the common variability of around 43.7% (R-0.437), while the other percentage of 56.3% of the explanation of the variability of common variables of the criteria variable (MRU30m) belongs to the other anthropological characteristics which are not researched on this work (like the other motor, anthropometric, functional, conative, cognitive and

social variables.) The value of the F test is 9.259, while the believability level is p= 0.000 which shows that the value of variability between and inside the group when it comes to the variance of multiple regression has differences with statistical significance.

From individual predicative variables (table 4), the variable of the agility T-test (MTT) has the effect with the most statistical significance, with a positive value of the standardized coefficient beta 0.186 and with a believability level of 0.027, the value of this parameter shows us positive impact of the agility test on the value of time in the 30 meter run test, which means that the slower that the agility test is done with the students, the slower they will run the aforementioned distance. Another value with high statistical significance, but with a negative coefficient is the taping with the feet in wall (MTFW) variable, with value of the beta coefficient at -170 and the level of believability at 0.041, the value of this parameter shows us the negative impact of the mobility test on the time it took to test the 30 meter run, which means that the faster the mobility test is done by a student, the faster they will run the aforementioned distance. The other values of beta standardized coefficients were statistically insignificant and for that reason will not be commented on.

Table 5. The Linear Regression of the variable MRU80m (The Summary Model)

Summary Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	df2	Sig. F Change
1	.674[a]	.454	.408	1.05657	.454	9.901	13	155	.000

a. Predictors: (Constant), MT-TEST, MRBLP30", MS, MSQU, MPU, MSR, MFS, MTF, MRBSA30", M10X5, MTH, MTFW, MET

Table 6. Regression analysis of variable MRU80m (Coefficients)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.838	2.212		5.353	.000
	MTF	-.042	.038	-.088	-1.119	.265
	MTH	.015	.027	.044	.559	.577
	MTFW	-.088	.030	-.235	-2.888	.004
	MRBLP30"	-.034	.023	-.103	-1.465	.145
	MRBSA30"	-.002	.013	-.009	-.149	.881
	MSQU	-.002	.003	-.031	-.481	.631
	MPU	-.008	.010	-.051	-.751	.454
	MSR	-.005	.014	-.023	-.346	.730
	MS	-.010	.007	-.105	-1.515	.132
	MFS	.001	.004	.008	.127	.899

	MET	.142	.062	.190	2.301	.023
	M10X5	.007	.047	.012	.155	.877
	MTT	.294	.101	.215	2.911	.004

a. dependent variable: MRU80m

By table 5 we can see the multiple correlations between the dependent variable (criteria): the 80 meter run (MRU80m) and all the other independent variables (predicative) is with a statistical significance of R=(0.674), which gives us the common variability of around 45.4% (R==0.454), while the other percentage of 54.6% of the explanation of the variability of common variables of the criteria variable (MRU80) belongs to the other anthropological characteristics which haven't been researched on this work (like the other motor, anthropometric, functional, conative, cognitive and social variables.) The value of the F test is 9.901, while the believability level is p= 0.000 which shows that the value of variability between and inside the group when it comes to the variance of multiple regression has differences with statistical significance.

From individual predicative variables (table 6), the variable of the agility T-test (MTT) has the effect with the most statistical significance, with a positive value of the standardized coefficient beta 0.215 and with a believability level of 0.004, and the eight by titling (MET) variable, with a value of 0.190 and a believability level of 0.023. The values of this parameters show us positive impact of the agility test on the value of time in the 80 meter run test, which means that the slower that the agility test is done with the students, the slower they will run the aforementioned distance. Another value with high statistical significance, but with a negative coefficient is the taping with the feet in wall (MTFW) variable, with value of the beta coefficient at -235 and the level of believability at 0.004, the value of this parameter shows us the negative impact of the mobility test on the time it took to test the 90 meter run, which means that the faster the mobility test is done by a student, the faster they will run the aforementioned distance. The other values of beta standardized coefficients were statistically insignificant and for that reason will not be commented on.

4. Discussion

In this research the main purpose is to verify the impact of some motor skills on the successfulness of sprint running at 30 and 80 meters. From the examination of the results, it was proved that in the performance of sprint running at 30 and 80 meters, motor variables which represent segmental strength and agility have an impact with statistically substantial significance, more specifically the variables of foot taping (MFT), t-test agility (MTT) and flexural eight (MFE). Hristo (2010) tested the importance of maximum force during a mesocycle in sprint runners in the 200 and 400 meter disciplines, and concluded that maximum force as a motor skill has no relevant significance during the preparation of sprinters in the first and second mesocycles of great importance in the third and fourth mesocycle. Zivkovic and Lazarevic (2011) determined the impact of flexibility and explosive force on the results in sprint runs, on 30 students aged 14 years, and concluded that motor tests of explosive force such as: standing long jump, standing triple jump and throwing the medical ball, as well as flexibility tests such as: deep bending in the bench, splits and stick-slip, have statistically significant importance in sprint runs at 100 and 200 meters. Iseni (2011) analyzed the impact of motor skills on sprint runs at 60, 100, 200, 300, and 400 meters, in 130

16-year-old students, and concluded that impacts with statistically significant importance on all sprint runs have motor tests of long jump (MLJ) and foot taping (MFT). Ciliik (2013) tested the impact of vertical jumps on the "Myotest" ergometer in 50 meters sprint runs, on sprinters from 5 different countries (Czech Republic, Croatia, Hungary, Slovenia and Slovakia), aged 14-15, and came to conclusion that vertical jumps have statistically significant importance in improving the results in sprint runs and also the development of explosive force in the lower limbs. Stojanovich (2014) tested the relationships and the impact of some motor skills on 60 meters sprint run, in 17-year-old women, where a total of 30 athletes participated, and concluded that an important statistical importance had the deep bending motor tests in bench - flexibility test, sitting-standing (squats) - repetitive strength test and 300 meters run as a specific motor variable. Blazevich et al. (2014) in a sample of 150 entities, of which 70 males and 80 females, conducted a research in order to verify the relationship and the impact of some motor skills and kinematic parameters on the sprint run at 50 meters, from regression analysis came to a conclusion that the most important correlation with variable criteria 50 meters run in men had the predictive variable standing triple jump (MSTJ), while in women the predictive variable countermovement jump (MCMJ). Pogat and Alhawat (2015) monitored the correlations between some biomotor variables in sprint running at 400 meters, in 25 professional sprinters aged 17-25, and concluded that motor tests such as running at 30 meters from a flying position, 60 meters from the crouch start, 300 meters and standing triple jump, have significant correlations with positive signs with running at 400 meters. Malyadi and Indah (2019) applied exercises for the development of explosive force in sprint running in 100 meters, in 14 students aged 14 years, and came to the conclusion that the program for the development of explosive force has a statistically significant impact on the outcome of sprint running in 100 meters and improving the athlete's sprint start.

5. Conclusion

Based on the achieved results, we can come to the conclusion that:

Motor abilities and situational-motor abilities when used as predicative variables in this work have important statistical significance in the criteria variables: 30 meter runs (MRU30m) and 80 meter runs (MRU80m). Based on these results we can come to the conclusion that the students of this age who possess speed and better lower limb mobility, and at the same time possess a higher level of the motor component of agility or the ability to change direction or the speed of movement quickly will achieve better results in sprint runs in 30 and 80 meters. From this we can come to the conclusion that the variables for the evaluation of segmental speed and agility have a highly statistically significant effect, so the same variables may be put into practice when it comes to the enhancement of motor abilities in short-trail runners, and other sports where sprint running is important, so we recommend sport pedagogues, trainers, and athletes who take part in these types of running, to put the uses of similar tests in their curricula, in order to improve their sport performances.

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