

## CERTAIN RELATIONS BETWEEN MOTORCYCLE TESTS FOR ASSESSMENT OF COORDINATION AND EXPLOSIVE POWER WITH THE MEASURES OF THE SUCCESSFUL PERFORMANCE OF THE GYMNASTIC ELEMENT UPRISE FORWARD TO SUPPORT L-SIT ON RINGS

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### **Abstract**

*For achieving the objectives of this research, a research procedure was conducted on a sample of 68 respondents, male students from the first year at the age of 18 years +/- 6 m. at the Faculty of Physical Education, Sports and Health in Skopje, Republic of Macedonia. A total of 20 manifest motor variables were applied to the selected sample of respondents, of which twelve (12) for assessment of coordination (coordination of whole body, coordination of legs, coordination of rapid complex movements and reorganization of dynamic stereotype), as well as eight (8) explosive power assessment tests (type of jumps and type of ejection). The evaluation of the technical performance of the gymnastic element uprise forward to support L-sit of the gymnastic equipment rings was performed by 4 qualified judges who are well acquainted with the subject of evaluation. A regression analysis was used to determine the relationships between motor tests to assess coordination of separate body parts and the explosive strength type of jumps and ejection. In the regression analyzes, the tests of coordination and explosive strength were used as a predictor, and the gymnastic element uprise forward to support L-sit of the circles was taken as a criterion. The predictors showed a statistically significant impact on the criterion.*

**Keywords:** *gymnastics, coordination, explosive strength, regression analysis*

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### **Introduction**

Motor skills are one of the basic factors in solving the problems in sports, which as a segment of the anthropological status of the individual are constantly in the focus of interest of many of our and foreign experts. In order to be able to monitor, evaluate and predict success in a particular sport, it is necessary to know which part of the anthropological status of the person, i.e. which factors largely determine success in a particular sport.

As for sports gymnastics, in our area in the current research there are not enough relevant attempts from different aspects (morphological, motor, cognitive, cognitive, sociological ...) that define the anthropological status of gymnasts, as well as the factors that exist and are responsible for the development of top gymnasts who will achieve top sports results. In fact, most of the research of a similar nature referred to the study, research of only one segment or group of several segments of the anthropological status of gymnasts as a predictor of success in sports gymnastics (O. Mitevski 2000, Pop Petrovski V. 1999, K. Spasovska 2008,2013, 2020, Petkovi E.2013).

Knowing the complexity and specificity of the device and taking into account that fast and complex tasks are performed, as well as the knowledge from previous research that very little attention is paid to the elements of rings, we decided on the part of the engine that covers coordination and explosive power. But here also we did not analyze the whole area of coordination and explosive power, but decided to study only a certain segment of these two areas separately, hoping that this way we will get more specifically which of the tests of coordination and explosive power, as segments of motor skills of personality are important in the process of learning the gymnastic element uprise forward to support L-sit of the rings.

So, the purpose of this paper is to determine the relationships between the results of motor tests intended for the assessment of individual segments of coordination and explosive strength with the successful technical performance of the gymnastic element in the uprise forward to support L-sit of the rings.

## Material & methods

The research was conducted on a sample of 68 respondents, male students aged 18 years +/- 6m. from the first year at the Faculty of Physical Education, Sports and Health-Skopje.

The prediction system consists of a total of 20 manifest motor variables of which twelve (12) for the assessment of coordination of individual body parts (coordination of the whole body (3), coordination of the legs (3), coordination of rapid complex movements (3) and reorganization of dynamic stereotype (3)), as well as eight (8) tests for estimating explosive power (type of jumps (3) and type of ejection (5)).

The following tests were used to assess coordination:

Coordination of the whole body: 1. Movements on the floor (MKOPOD), 2. Movement in the air (MKOVOZ), 3. Crossing of parallel bars (MKOPPP).

Coordination of legs : 4. Skip of horizontal rope (MKNPHJ), 5. Climbing and descending the Swedish stairs (MKNKSS), 6. Side steps (MKNCVS).

Coordination of fast complex movements: 7. Crossing and skipping (MKBPIP), 8. Climbing and descending bench and ripstool (MKBKSKR), 9. Bending Eight (MKBOSN).

Reorganization of dynamic stereotype: 10. Long jump backwards (MRSDNA), 11. Polygon backwards (MRPONA), 12. Climbing and descending stairs backwards (MRKSSN).

The following tests were used to assess the explosive power:

Type-jumps: 1. Long distance jump (MESSDM), 2. Up-down-far jumps (MESGDD), 3. 20m running from high start (MES20M).

Ejection type: 1. Throwing a medicine ball from lying on your back forward with your hands (MESFMNR), 2. Throwing a medicine ball from lying on your back with your feet (MESFMNN), 3. Throwing a bag from a support folded forward, hands in armature (MESPVNU), 4. From support supported ejection of bag forward with feet, arms in support (MESPVNP), 5. From support supported ejection of bag forward with feet, with hands holding for ripstool (MESPVNR).

The technical performance of the gymnastic element naupor in front of the circles - KRNVP is taken as a criterion variable.

It is necessary to mention that the evaluation of the gymnastic element was performed by 4 qualified judges with a standardized criterion adapted and harmonized with the way of evaluation during the regular classes and with certain parts of the rulebook for evaluation in men's sports gymnastics that applies to the competitions.

The basic statistical indicators are used for processing the obtained data: arithmetic mean (X), standard deviation (SD), coefficient of variability (KV%), lower and upper limit of the range in which the results move (Min - Max). The normality of the distribution of the results from the applied variables was checked by the method of Kolmogorov and Smirnov. The influence of the predictor system on the criterion variable was determined by regression analysis.

## Results

Table 1 gives the basic statistical parameters of the motor variables for coordination and explosive power. In the interest of space they are not interpreted.

Table 2 shows the results of the regression analysis for the impact of some motor variables to assess coordination as a predictor system on the KRNVP- uprise forward to support L-sit of circles variable.

The applied predictor coordination system significantly and highly (0.66) is related to the criterion variable KRNVP- uprise forward to support L-sit (tab. 2). The predictive coordination system can predict the successful performance of the criterion variable. Changes in the successful performance of the criterion variable are explained by 44% of the predictive coordination system.

The criterion variable has a significant and low partial coefficient with the predictor for reorganization of the dynamic stereotype MRSDNA (0.26) - long jump backwards. This coordination test can be used to predict the success of the KRNVP criterion - uprise forward to support L-sit.

The review of the results in Table 3 shows that the correlation of the overall system of motor variables for estimating explosive power and the successful performance of the gymnastic element KRNVP – uprise forward to support L-sit of rings is  $RO = 0.68$  which explains the common variability between the predictor system and the criterion variable. 47% ( $\Delta = 0.47$ ). Such a correlation is at the level of  $Q = 0.00$ .

Significant and low partial regression coefficients of the criterion are with the explosive power estimator predictor, type of jump MESGDD (0.38) -jumps, up, down, far and with the variables for estimation of explosive power, type of ejection MESFMNR (-0.27) throwing a medicine ball from lying on your back

forward with your hands and MESFMNN (0.37) - throwing a medicine ball from lying on your back backwards with your feet.

With these explosive power-type tests of jumping and throwing with the hands and feet, the success of the criterion can be predicted.

Tab.1 results from the basic statistical indicators for motor variables for coordination and explosive power

		X	SD	KV	Min	Max	Skew	Kurt	K-S
1	MKOPOD	11,08	1,34	12,09	7,65	13,84	0,00	-0,22	
2	MKOVOZ	4,14	0,50	12,07	2,31	5,27	-0,63	1,78	
3	MKOPPP	10,40	3,45	33,17	5,26	21,65	0,87	0,87	
4	MKNPHJ	17,37	5,29	30,45	8,66	31,40	0,62	0,05	
5	MKNKSS	13,04	1,90	14,57	9,40	21,38	1,40	4,51	
6	MKNCVS	18,20	1,46	8,02	15,35	21,53	0,17	-0,56	
7	MKBPIP	15,78	2,61	16,53	11,05	24,08	0,86	1,23	
8	MKBKSKR	16,89	2,63	15,57	12,21	21,73	-0,08	-0,89	
9	MKBOSN	16,97	0,91	5,36	14,95	19,31	0,33	0,10	
10	MRSDNA	1,42	0,20	14,08	1,04	1,89	0,28	-0,65	
11	MRPONA	9,47	1,57	16,57	6,62	15,15	0,60	1,30	
12	MRKSSN	6,61	1,79	27,08	3,90	14,91	1,95	7,32	
13	MESSDM	2,39	0,15	6,27	2,02	2,68	0,08	-0,61	
14	MESGDD	4,54	0,56	12,33	3,00	6,00	-0,28	0,38	*
15	MES20M	3,54	0,36	10,16	3,15	5,66	3,92	19,84	*
16	MESFMNR	8,85	1,06	11,97	6,62	12,01	0,27	0,58	
17	MESFMNN	3,89	0,70	17,99	2,80	5,57	0,41	-0,70	
18	MESPVNY	4,41	0,68	15,41	3,16	6,08	0,40	-0,36	
19	MESPVNP	4,76	0,85	17,85	3,17	7,80	1,17	2,41	
20	MESPVNR	4,62	0,79	17,09	2,78	6,91	0,17	0,49	

Tab.2 Results from regression analysis of the KRNVP criterion - uprise forward to support L-sit of the prediction coordination system

Variables	R	Part-r	BETA	t-test	Q
MKOPOD	-0.45	-0.10	-0.12	-0.74	0.46
MKOVOZ	-0.37	-0.16	-0.16	-1.18	0.24
MKOPPP	-0.45	-0.23	-0.28	-1.73	0.09
MKNPHJ	0.22	0.01	0.01	0.11	0.91
MKNKSS	-0.21	0.12	0.13	0.93	0.36
MKNCVS	-0.14	-0.03	-0.03	-0.23	0.82
MKBPIP	-0.28	0.16	0.18	1.21	0.23
MKBKSKR	-0.33	-0.21	-0.20	-1.62	0.11
MKBOSN	-0.18	0.21	0.20	1.61	0.11
<b>MRSDNA</b>	0.49	0.26	<b>0.26</b>	1.97	<b>0.05</b>
MRPONA	-0.37	-0.09	-0.10	-0.70	0.49
MRKSSN	-0.41	-0.15	-0.17	-1.12	0.27
Delta	RO	DF 1	DF 2	F	Q
0.44	0.66	12.00	55.00	3.54	<b>0.00</b>

From the frequency of the results (Table 4) it is noticed that 33 respondents (48.53%) were evaluated with grades from 7.00 to 7.99 which means that the respondents achieved good success. This means that almost half of the selected sample of respondents mastered this element and performed it with a little help from the assistant or alone, but with reduced amplitude and without rhythm. In such conditions the motor tests for coordination and explosive power get a significant impact.

Tab. 3 Results of regression analysis of the criterion KRNVP- uprise forward to support L-sit of the predictive system for explosive power

Variables	R	Part-r	BETA	t-test	Q
MESSDM	0.28	0.12	0.11	0.94	0.35
MESGDD	0.46	0.44	0.38	3.72	0.00
MES20M	-0.24	-0.16	-0.12	-1.21	0.23
MESFMNR	-0.05	-0.30	-0.27	-2.41	0.02
MESFMNN	0.41	0.41	0.37	3.42	0.00
MESPVNY	0.29	0.20	0.22	1.58	0.12
MESPVNP	0.29	-0.08	-0.09	-0.58	0.56
MESPVNR	0.24	0.10	0.13	0.76	0.45
Delta	RO	DF 1	DF 2	F	Q
0.47	0.68	8.00	59.00	6.46	0.00

Tab.4 Frequency of ratings for the element KRNVP- uprise forward to support L-sit

Ocenki	F	%	Kumulativno %
5.00-5.99	2	2.94	2.94
6.00-6.99	20	29.41	32.35
7.00-7.99	33	48.53	80.88
8.00-8.99	8	11.76	92.64
9.00-10.00	5	7.36	100

## Discussion

In order to get a clearer picture of the obtained partial effects on the specific tests for coordination and explosive power, we will perform a brief analysis of the element.

From swaying high from the end point to the swing, the body stretched or slightly bent under the influence of gravity it moves rapidly down and forward. The accelerated movement of the legs bring the body in a prone position to the front. When the legs and body are at an angle of about 45 degrees to the horizontal, the accelerated movement of the legs is blocked. It is at this point that the impact of the MESFMNN (throwing a medicine ball from lying on your back to the back of the legs) test can be seen. By blocking the legs, the accelerated movement is reactively transmitted to the lower and then to the upper torso, allowing the body to be lifted upwards. MESFMNR (throwing a medicine ball from lying on your back forward with your hands).

Swinging the legs and pulling the arms allow the shoulders to reach the height of the rings. In this position, the traction arms pass into support, and the body is in a supine position.

Probably the beginning of the performance of the element when the swing is performed in height and when the body moves in the back is the result of the influence of the test for reorganization of movements (MRSDNA-long jump backwards), and the movement of the body with larger oscillations of the center of gravity body down, up is the result of an explosive force test (MESGDD-jumps up, down, away).

Explosive and fast swing with the legs and the ability to perform all movements in synchrony and in a whole in a short time are a condition for successful performance of the gymnastic element uprise forward to support L-sit of rings.

## Conclusions

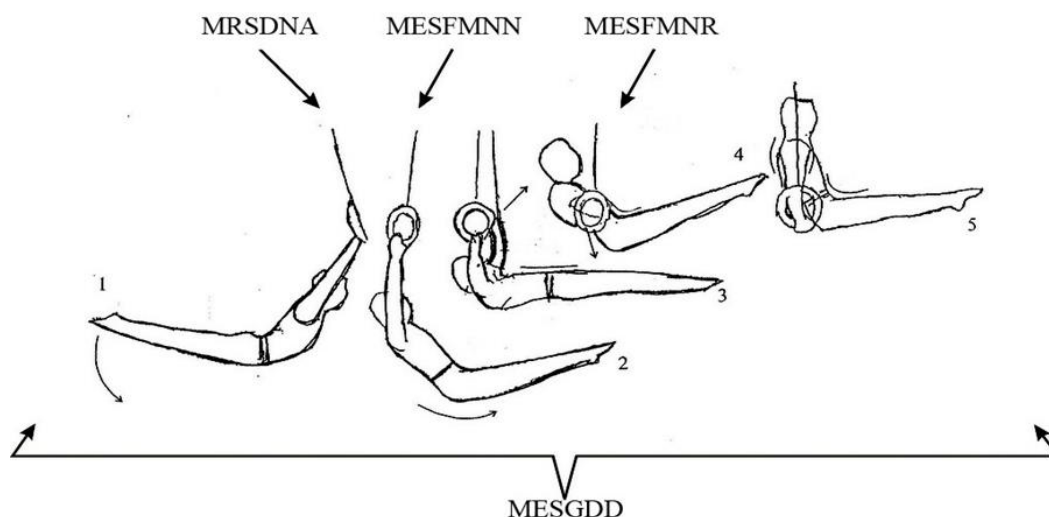
From all this we can conclude that the system of selected tests for the assessment of individual parts of coordination and for explosive power, type of jumps and ejection, changes in the successful performance of this element can be explained by as much as 91%. The criterion variable has a significant and low partial coefficient with the predictor for dynamic stereotype reorganization MRSDNA (0.26) - long jump backwards (test intended for assessment of coordination).

Significant and low partial regression coefficients of the criterion are also found in the explosive power estimator predictor, type of jumps MESGDD (0.38) - jumps, up, down, far and with the variables for estimation of explosive power, type of ejection MESFMNR (-0.2 - throwing a medicine ball from lying on your back forward with your hands and MESFMNN (0.37) - throwing a medicine ball from lying your her

back backwards with your feet. With these tests for coordination and explosive power-type jumps and throws with the hands and feet can be predicted the success of the criterion, uprise forward to support L-sit of the rings- KRNVP.

Therefore, before starting the process of learning and mastering the technique, the tests, *i.e.* motor skills that had a significant impact on the criterion, should be developed to the required level, and then to start the process of learning and mastering the technique.

Figure 1 uprise forward to support L-sit



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