

УСТАНОВЯВАНЕ НА ЛАТЕНТНАТА СТРУКТУРА НА МОРФОЛОГИЧНИТЕ ХАРАКТЕРИСТИКИ И ДВИГАТЕЛНИТЕ СПОСОБНОСТИ И ТЕХНИТЕ ЗАВИСИМОСТИ С ПОСТИЖЕНИЯТА В ТЛАСКАНЕТО НА ГЮЛЕ

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ESTABLISHMENT OF THE LATENT STRUCTURE OF MORPHOLOGICAL CHARACTERISTICS AND MOTOR ABILITIES AND THEIR RELATIONS WITH THE SHOOT-PUT PERFORMANCE

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On 125 subjects, students at the Faculty of Physical Culture in Skopje, of male gender, has been conducted investigation with aim of establishing the latent structure and the relations between the systems of morphological and motor variables as predictors about the shot-put performance criterium.

Three morphological and three motorcar factors were extracted using Gutman-Kaiser criteria and orthogonal varimax rotations. Generally it was obtained that morphological and motor variables exert multiple as well as partial influence on the shot-put performance.

1. Introduction

Second year students at the Faculty of Physical Culture at the athletics colloquium take five athletic disciplines – 100m, long jump, shot-put performance, high jump and 1500m running (male students) and 800m female students. For all disciplines we have standards for grades from 5-10. The total grade of the colloquium is accounted in the general success in athletics.

From our experience we can state that the colloquium is very hard and intense for the students. That is why we have conducted this research where we have applied multivariate methods so that we could conclude which elements are to be used in the preparation practice for every discipline, so that on their trainings they could do exercises that will have effect on the shot-put performance.

2. Work Methodology

In the research procedure in addition to descriptive statistics two multivariate methods are used: regression and factor analysis, which we want to establish morphological and motor variables prediction on the criterion – shot-put with and especially the effect of latent factors on the success on shot-put.

2.1. Sample test student

The sample test student is isolated from the second year student population at the Faculty of Physical Culture in Skopje, aged 20-21 of male gender.

2.2. Sample variables

2.2.1. Sample morphological variables

- A) Longitudinal skeleton dimensionality
 - 1. Body height (ABH)
 - 2. Leg length (ALL)
 - 3. Arm length (AAL)
- B) Transversal body dimensionality
 - 1. Shoulders width (ASHW)
 - 2. Hip width (AHW)
- C) Mass and body volume
 - 1. Body weight (ABW)
 - 2. Forearm scope (AFS)
 - 3. Brachium (upper arm) scope (ABS)
 - 4. Lower leg scope (ALLS)
 - 5. Upper leg scope (AULS)
- D) Subcutaneous fat tissue
 - 1. Back skin fold (ABSF)
 - 2. Stomach skin fold (ASSF)
 - 3. Upper arm skin fold (AUASF)
 - 4. Lower leg skin fold (ALLSF)

2.2.2. Sample motor variables

1. Long jump from the spot (MLJS)
2. Three step jump from the spot (MTSJS)
3. Three step jump with stronger leg (MTSJSL)
4. Three step jump with weaker leg (MTSJWL)
5. 30m sprint (MS30m)
6. Throwing medicine ball from lying position – 3kg (MTMBLP)
7. Throwing ball above the head – 6kg (MTBAH)
8. Alabak test (MAT)
9. Jump from the spot with a flop (MJSF)
10. Push ups on the ground (MPUG)
11. Push ups on parallel bars (MPUPB)
12. Deep forward bend on a bench (MDFBB)
13. Leg musculature Swedish chest (MLMSC)
14. Stomach musculature (MSM)
15. Bench press 50 kg for 20 sec (MBP)
16. Elevating on horizontal bar for 20 sec (MEHB20)

Table 1

Factor matrix morphological variables

Varijabli	F – 1	F – 2	F – 3
1.AVIS	.14	(.91)	.20
2.ADNO	.09	(.91)	-.01
3.ADRU	.14	(.90)	.09
4.AŠRA	.01	(.67)	.52
5.AŠKO	.49	(.66)	.07
6.ATT	.50	.53	(.61)
7.AOPL	.40	.14	(.79)
8.AONL	.42	.06	(.80)
9.AOPK	-.13	.10	(.44)
10.AONK	.40	.17	(.68)
11.AKNL	(.78)	.15	.41
12.AKNT	(.87)	.15	.26
13.AKNN	(.92)	.11	.14
14.AKNP	(.82)	.18	.32

2.3 Criteria variable

The criteria variable in our research is a result for shot-put performance.

3. Result and discussion

In the research firstly descriptive statistics for morphological and motor variables has been done, where we have established that there is a difference amongst morphological variables, as well as that there is a

difference in the test student capabilities also shown by the distribution of results in skewness and kurtosis, as well as the standard deviation coefficient from median value.

Subsequently to that the factor analysis is applied, used for extracting latent factors according to Gutman-Kaiser criterion in morphological and motor variables and after that we have established the effect of the isolated factors like predictive criterion – shot-put.

After applying factor analysis and extracting the factor structure of morphological and motor variables, relation amongst morphological and motor predictive variables was independently applied.

4. Conclusion

The factor matrix on table 1 shows us that the three extracted Varimax factors that we can define as:

1. Factor is the factor of subcutaneous fat tissue, where four morphological variables are saturated.

Table 2

Factor matrix motor variables

Varijabli	F – 1	F – 2	F – 3
1.MSDM	(.78)	.25	.35
2.MTIM	(.90)	.24	.24
3.MTJN	(.93)	.13	.17
4.MTSN	(.92)	.06	.16
5.MS30m	(.48)	-.07	-.14
6.MBMLP	.15	(.90)	-.05
7.MBKIG	.16	(.93)	.16
8.MTA	(.55)	.60	.10
9.MSMU	(.69)	.36	.15
10.MSKT	.11	.41	(.77)
11.MSNR	.21	.15	(.86)
12.MDRK	.37	-.13	(.56)
13.MLMŠ	.38	.38	(.63)
14.MTM	.52	-.08	(.58)
15.MBP	.17	(.73)	.31
16.MZV20s	.32	-.09	(.75)

2 Factor is named as factor of longitudinal and transversal skeleton dimensionality, where five morphological variables are saturated.

3 Factor is the factor of mass and body volume, where five morphological variables are included.

With factor analysis of motor variables with Varimax solution three latent factors are extracted, which we have defined as:

Table 3

Regression analysis of morphological variables

Varijabli	BETA	St. Err Of BETA	B	St. Err of B	T – test (110)	p - level
Konstanta			3.14	3.78	.83	.41
1.AVIS	-.10	.21	-.01	.03	-.46	.65
2.ADNO	-.15	.16	-.05	.05	-.97	.33
3.ADRU	.42	.17	.09	.04	2.47	.01
4.AŠRA	.05	.13	.02	.06	.39	.69
5.AŠKO	-.26	.13	-.13	.06	-1.99	.05
6.ATT	.04	.24	.00	.03	.15	.88
7.AOPL	.13	.18	.07	.09	.72	.47
8.AONL	.10	.18	.04	.07	.53	.60
9.AOPK	-.02	.08	-.00	.01	-.22	.83
10.AONK	-.01	.13	-.00	.03	-.08	.93
11.AKNL	-.21	.20	-.05	.05	-1.04	.30
12.AKNT	.12	.20	.06	.10	.63	.53
13.AKNN	-.25	.21	-.12	.10	-1.21	.23
14.AKNP	.55	.20	.10	.04	2.73	.01

RO = .51 D(RO) = .26 F-test = 2.83Q(F) = .00

Table 4

Regression analysis of motor variables

Varijabli	BETA	St. Err of BETA	B	St. Err of B	T – test (108)	p - level
Konstanta			4.11	2.87	1.43	.15
1.MSDM	.20	.20	.01	.01	1.01	.31
2.MTIM	-.49	.36	-.01	.01	-1.35	.18
3.MTJN	1.43	.59	.04	.02	2.42	.02
4.MTSN	-.83	.44	-.02	.01	-1.88	.06
5.MS30m	.04	.09	.13	.34	.39	.70
6.MBMLP	-.38	.19	-.25	.12	-2.04	.04
7.MBKIG	.49	.23	.34	.16	2.15	.03
8.MTA	-.32	.16	-.02	.01	-1.97	.05
9.MSMU	.17	.14	.01	.01	1.22	.22
10.MSKT	.15	.15	.01	.01	.99	.33
11.MSNR	.01	.16	.00	.03	.06	.96
12.MDRK	-.18	.11	-.04	.02	-1.73	.09
13.MLMŠ	-.14	.15	-.02	.02	-.95	.34
14.MTM	-.18	.14	-.03	.02	-1.33	.19
15.MBP	.23	.14	.05	.03	1.61	.11
16.MZV20s	-.09	.13	-.04	.06	-.68	.49

RO = .50 D(RO) = .25 F-test = 2.23Q(F) = .01

1 Factor is the factor of explosive power, speed and readiness to jump of the lower extremities.

2 Factor is the factor of explosive power of the arms and shoulder zone.

3 Factor is the factor of the repetitive power of the arms, shoulder zone and the elasticity.

Table 3 demonstrates the regression of morphological variables as a system to a criterion, where we can see

that morphological variables as a system have prediction in establishing the criterion in shot-put performance. We can also conclude that the structure of morphological variables besides having an effect as a system also has an individual effect on length of shot-put.

On Table 4 we can see the regression of motor variables, from which we can see that the structure of motor variables has statistically significant effect on the criterion – shot-put. Besides having an effect as a system also has an individual effect on the criterion.

From the analysis of factor and regression matrixes where morphological and motor variables are analyzed, we can conclude that the applied variables have significant effect on shot-put performance, which means that students that we train for the colloquium should employ this battery of motor tests so that they can successfully pass the athletics disciplines.

5. Literature

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