

The Structure of Specific Motor Abilities on Youth Female Volleyball Players

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The Structure of Specific Motor Abilities on Youth Female Volleyball Players: *The research has been made to a example of 72 female examinees members of youth volleyball teams in Macedonia, from 14 to 15 years old. In the research were implement 18 variables to estimated specific motor abilities. In aim to obtain the structure of specific motor abilities it was implement component factor analysis. After the results we concluded that there were four latent factors: factor of agility, factor of explosiveness of the extremities, factor of frequent hand speed and factor of repetitive strength of the body and the hands.*

Key word: *volleyball, specific motor abilities, component factor analysis.*

INTRODUCTION

The physical development is a process of changes of morphological and functional features of the organism. It is closely related to age, gender, health status, hereditary factors, living conditions, etc. Obtaining information on motor skills, which are largely genetically pre-disposed, is of great importance to give proper direction to children in an adequate sports branch. Realizing the importance of information on motor abilities, this research will determine their structure with young volleyball players in the Republic of Macedonia.

EXPOSITION

Methods

The research was conducted on a sample of 72 volleyball players, members of the youth teams, participating in the 2008/2009 national championship of Macedonia. The survey included female players between 14 – 15 years of age, originating from several cities: Skopje, Veles, Strumica, Prilep, and Tetovo.

The research applied a system of 18 variables to estimate the specific motor abilities, as follows: 1.Reach height at spike 2.Reach height at block 3.Standing long jump 4.Throwing medicine ball from chest from place 5.Throwing medicine ball overhead with jump 6.Handgrip strength test 7.Sit-ups in 30 seconds 8.Back extension in 30 seconds 9.Push-ups with knees on the floor 10.Hand tapping 11.Double hand tapping 12.Foot tapping against the wall 13.20 meters sprint 14.Japan test 15.T – test 16.Sitting on the ball 17.9-3-6-3-9 meters fast running and 18.9 meters backward fast running.

These tests are used in large number of researches by many authors. However, this individual research includes tests applied by several authors: reach height at spike, reach height at block, throwing medicine ball from chest from place, throwing medicine ball overhead with jump and 9 meters backward fast running from author Milenkoski (1999)⁶, Japan test, sitting on the ball and 9-3-6-3-9 meters fast running from the authors Bachmann, Edi & Martin (1992)⁷, standing long jump, hand tapping, double hand tapping and foot tapping against the wall form the authors Katić, Grgantov & Jurko (2006)⁸, T – test from the authors Vanderfort & al. (2004)⁹ and 20 meters sprint, handgrip strength, sit – ups, back extension and push-ups with knees on the floor form the EUROFIT kids program.

⁶Milenkoski, J. Relations and difference of some cognitive, specific motor abilities, conative characteristics and...(1999)

⁷Bachmann, Edi & Martin (1992). 1000 Exercises et jeux de volleyball. Paris.

⁸Katić & al. Motor Structures in Female Volleyball Players(2006)

⁹Vanderford & al. Physiological and Sport-Specific Skill.....(2004)

The interrelationship of the applied system of variables is determined with the inter-correlation matrix, and its factorization is performed with Hotelling's method of main components.

In addition, the number of significant principal components is determined by Kaiser-Guttman's criterion according to which as significant is taken every possible component having calculated characteristic root greater than or equal to 1. Significant principal components are transformed with orthogonal varimax and parallel direct oblimin projections.

Results and discussion

Index of adequacy of correlation matrix, presented in table 1 is good (.762), which means it is adequate for factorization.

Table1.
Kaiser-Meser-Olkin's Coefficient of Adequacy of the Correlation Matrix

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.762
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According to the Hotelling method, Table 2 presents the factor matrix (FACMAT) of applied specific-motor variables, communalities (h^2), significant characteristic roots (LAMBDA), percentage of total explained variance (TARG%), orthogonal VARIMAX and parallel Direct Oblimin rotation, which is evident that the applied system of variables formed five significant main components explaining a total of 67.73% of the variability of research space.

The first main component has a characteristic root LAMBDA (λ)=6.19 and its share in the total explained variability is 34.41% (TARG%=34.41). The second main component with a characteristic root LAMBDA (λ)=2.29 in the total explained variability participates with 12.75% (TARG%=12.75). The third and fourth main component have characteristic root LAMBDA (λ)=1.44 and (λ)=1.24 and its share in the total explained variability is 7.99% and 6.92% (TARG%=7.99 and 6.92). The fifth significant main component has a characteristic root LAMBDA (λ)=1.02 and in the total explained variability has a share of 5.67% (TARG%=5.67).

The result of performed Direct Oblimin rotation of the initial coordination system of applied variables, in order to get to a much simpler structure of the latent specific motor space, are also five latent factors.

The first factor (**F1**) significant projections retained variables: Sitting on the ball (SEDT), Japan test (JAPT), T - test (TETS), 9-3-6-3-9 meters fast running (BRTR), 9 meters backwards fast running (BRN9) and 20 meters sprint (BR20). Saturations of all the variables to F1 is high and negative, ranging from (-. 60) to (-. 79). From here the latent factor can be defined as **agility**.

Significant projections to the second factor (**F2**), retained variables: Reach height at spike (DOFS), Reach height at block (DOFB), Throwing medicine ball overhead with jump (IMNG), Throwing medicine ball from chest from place (IMOG) and Handgrip strength test (MSUR) with high and positive saturation of (.56) to (.90), thus it can define as **explosiveness of the extremities**.

Significant projections to the third factor (**F3**) maintained: Hand tapping (TAPR) and Double hand tapping (DTAPR) with very positive saturations (.84) and (.78), whereas the same can be defined as **frequent hand speed**.

In regards to the fourth factor (**F4**), significant projections held variables: Sit-ups in 30 seconds (PODT) and Push-ups with knees o the floor (SKPK) with high and positive

saturations (.83) and (.76). Herewith, we can define this factor as **repetitive strength of the body and the hands**.

The fifth latent factor (F5) saturated with the variables Foot tapping on the wall (ТАНС) (-.73) and Back extension in 30 sec. (ISPT) (-.63) cannot be logically interpreted.

Observing the magnitude of vectors of applied specific motor variables i.e. communalities (h^2), we can say that of all the variables that define the first factor (F1), the biggest factor validity have variable TETS ($h^2 = .76$), the second factor (F2) largest factor validity has variable DOFS ($h^2 = .87$), the third factor (F3) TAPR variable ($h^2 = .71$), while for the fourth factor (F4) the biggest factor validity has variable PODT ($h^2 = .73$).

Table2.
Component factor matrix of variables to estimate specific motor abilities and its

	FACSMAT						VARIMAX					DIRECT OBLIMIN				
	H1	H2	H3	H4	H5	h^2	F1	F2	F3	F4	F5	F1	F2	F3	F4	F5
ДОФС	.72	.56	.09	-.17	.04	.87	-.30	.88	.09	.00	.00	.22	.85	.02	.04	.06
ДОФБ	.62	.66	.08	-.16	.11	.86	-.17	.91	.08	-.08	-.03	.09	.90	.00	.05	.13
СКДМ	.70	.06	-.04	-.33	-.09	.62	-.64	.45	.03	.01	.08	.63	.37	.07	-.08	.05
ИМНГ	.72	.32	.10	.30	-.02	.72	-.21	.63	.39	.35	-.09	.07	.56	-.09	.36	-.30
ИМОГ	.75	.28	.14	.12	.27	.74	-.24	.66	.46	.10	.14	.06	.62	.15	.45	-.02
МСУР	.18	.59	.34	.06	-.36	.62	.16	.61	-.28	.36	-.13	-.15	.65	-.11	-.31	-.38
СЕДТ	-.48	.58	.11	.22	.20	.67	.75	.22	-.06	-.16	-.16	-.79	.34	-.12	.06	.12
ЈАПТ	-.81	.11	.15	.20	-.03	.74	.73	-.34	-.28	-.02	-.08	-.69	-.22	-.07	-.18	-.06
БРТР	-.70	.27	.18	-.03	.21	.65	.70	-.10	-.26	-.27	.07	-.68	.03	.12	-.16	.23
ТЕТС	-.77	.35	.05	.05	.22	.76	.77	-.12	-.22	-.33	-.08	-.74	.02	-.04	-.10	.27
ТАПР	.23	-.31	.59	-.32	.32	.71	-.14	.08	.02	.02	.82	.06	.11	.84	-.02	.05
ДАТАПР	.02	-.42	.63	-.15	.22	.65	.01	-.13	-.01	.16	.78	-.08	-.09	.78	-.03	-.12
ТАНС	.33	-.20	.44	.28	-.43	.60	-.16	.06	-.02	.74	.16	.14	.02	.12	-.08	-.73
ПОДТ	.59	-.15	-.11	.38	.46	.73	-.22	.16	.81	.05	.10	.00	.08	.09	.83	.03
ИСПТ	.39	-.18	.28	.46	-.22	.52	-.11	.06	.28	.65	.06	.02	.00	.02	.25	-.63
СКПК	.53	-.20	-.25	.47	.24	.67	-.26	.02	.75	.16	-.11	.10	-.08	-.14	.76	-.11
БРН9	-.49	-.04	.33	.25	.09	.43	.56	-.24	-.06	.14	.17	-.60	-.15	.18	.02	-.17
БТ20	-.74	.24	.05	.17	-.04	.64	.69	-.22	-.27	-.08	-.20	-.64	-.11	-.18	-.18	.00
(λ)	6.19	2.29	1.44	1.24	1.02											
(%)	34.41	12.75	7.99	6.92	5.67											

orthogonal and parallel rotations

Based on results presented in table 3, it can be concluded that examined samples have weaker stabilized specific – motor structure with 5 latent dimensions that explain 84.56% of the total variance. Largest share, 26.67% in the total elaborated variance, has agility, 20.67% of the total elaborated variance belongs to explosiveness of hands and legs, 18% and 9.22% of the total elaborated variance belong to the repetitive strength of the body and hands and the frequent speed of the hands, respectively.

The fifth dimension, which in the total elaborated variance participates with 10% is saturated with one variable for evaluation of the repetitive strength of the body and the nerve-muscle reactivity of the legs, which points out to uncertain differentiation of these two specific – motor abilities of examinees.

Table 4 refers to conducted inspection and it presents coefficients of correlation between the latent factors and it shows that between the first (F1) and the second (F2) and the first (F1) and the fourth (F4) factor there is low statistically significant relation at the level from $Q=.05$ and $Q=.01$.

Table 3.
Characteristic roots and percentage of total elaborated variation
of significant latent factors after performed Direct Oblimin rotation

factor	LAMBDA (λ)	TARG (%)	CUM (%)
1	4.80	26.67	26.67
2	3.72	20.67	47.34
3	1.66	9.22	56.56
4	3.24	18.00	74.56
5	1.80	10.00	84.56

Table 4.
Relation of obtained latent factors

Component	1	2	3	4	5
1	1.00	.24	.13	.40	-.13
2	.24	1.00	-.07	.15	-.09
3	.13	-.07	1.00	.07	-.13
4	.40	.15	.07	1.00	-.16
5	-.13	-.09	-.13	-.16	1.00

CONCLUSIONS

The results from this research show that in the structure of specific motor abilities on youth female volleyball players existing five latent factors: factor of agility, factor of explosiveness of the extremities, factor of frequent hand speed, factor of repetitive strength of the body and the hands and fifth latent factor who cannot be logically interpreted.

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The report has been reviewed.