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DETERMINATION AND ANALYSIS OF THE MEASURING CHARACTERISTICS DEGREE IN SITUATION-MOTOR TESTS WITH FREESTYLE WRESTLERS

(Original scientific paper)

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Abstract

This research was realized on a sample of 102 male subjects - freestyle wrestlers aged 18 to 28. 12 situation-motor tests (tasks) were applied on the sample. The acquired data were processed following a number of methodological-statistic procedures. In order to determine the factor validity the Hotelling method of the main components was used, while the reliability was determined on the basis of several coefficients: Spearman – Brown coefficients of reliability SB1 and SB2, Cronbach-α index of generalization. The results indicate that most of the tests applied show satisfactory degree of measured characteristics. Satisfactory degree of factor validity was determined with the tests: "left-right bridge-rotation", "same leg defense and attack", coordination without a dummy", "first no partner situation test", second no partner situation test", complex situation test with a partner", "Schulter", "Grind", "left-right aufriser", "bridge pirouette", "both legs defense in 10 seconds", "vault and return to upright position". Satisfactory coefficients of reliability were determined for the tests: "bridge and return to upright position", "leg defense and attack", "Schulter", "Grind", "both legs defense in 10 seconds" and "second situation test with a partner".

Keywords: *wrestlers of male gender, sporting training process, Kolmogorov-Smirnoff method, factor validity, coefficients of reliability, Hotelling method of the main components, sporting training process.*

INTRODUCTION

The sporting shape of the freestyle wrestlers is determined, above all, by testing and by analysis of the results of the different types of tests, such as the tests for the estimation of the anthropometric measurements, situation tests, basic motor skills tests, functional and psychological tests (cognitive and conative tests), motivational tests and tests for technical and tactical readiness.

Hierarchy-wise tests for situational capabilities and technical and tactical readiness are considered to be the most important parameters in achieving the highest sporting results. Hence it is possible to state that the information on the degree of the measuring characteristics in the situation-motor tests are of special interest for the process of rationalization and efficiency in the process of selection, following and control of the transformational processes, the planning and the programming, the forecasting of the results, as well as for all the other necessities in the sporting training process.

The above mentioned findings initiated the need for a research in order to confirm the measuring characteristics of the situation-motor tests, the choice of which was made with an intention to cover a greater part of the hypothetical structure of the wrestling in a sitting and ground position. Besides this, most of the situation-motor tests have been applied in other researches the goal of which was to determine the relations with some basic motor tests and abilities, and at the same time many of the tests have been widely applied in practice, above all, to monitor and control the situation-motor abilities.

All of the above mentioned findings, as well as the realization that in our country there have not been sufficient number of researches dealing with the issue of determining and comparing the measuring characteristics of the situation-motor tests, only contributed to further confirming the necessity to determine the degree of the measuring characteristics of the twelve situation-motor tests with the freestyle wrestlers, and based on the findings to make a choice and to standardize the tests, which will be of multi-practical significance.

METHODS

The basic goal of the research is to determine the primary measuring characteristics (factor validity and reliability) of the situation-motor tests with the freestyle wrestlers.

The research was carried out on a sample of 102 subjects, freestyle wrestlers, of male gender aged 18 to 28. The sample of subjects was composed based on the following criteria:

1. Active and continuous wrestling practice for minimum of five years;
2. Inclusion the system of competitions;
3. Training practice minimum four to five times a week;
4. On the day of the measurements to be healthy with no physical injuries.

Twelve situation-motor tests were applied on the subjects: "left-right bridge rotation", "bridge pirouettes", leg defense and attack", "coordination without a dummy", "first no partner situation test", "second no partner situation test", "Schulter", "Grind", "left-right aufriser", "both legs defense in 10 seconds", "bridge and return to upright position", " complex situation test with a partner".

The first eleven of the applied manifested situation-motor tests (tasks) are of composite (three items) character, while the last one, the twelfth one, was applied with a single repetition (one-item).

The basic descriptive statistic parameters were calculated: arithmetic mean (X), standard deviation (SD), maximum result (MAX), minimum result (MIN), skewness, elongation and kurtosis, and for the testing of the normality of the distribution of the results the Kolmogorov-Smirnoff (K-S) method was used. In order to determine the factor validity of the basic motor tests the following indicators were calculated: the Pierson's coefficient of the correlation between the particles (R) of the tests, the coefficient of determination (SMC) which is treated as a lower limit of reliability, the Hotelling method of the main components (H), characteristic roots (l), percentages (%) of the valid variant and the cumulative percentage (Cum %) of the same variant. The number of the significant main components was determined with the Kaiser-Guttman criteria, according to which all the characteristic roots that have equal or bigger values than 1.00 are considered to be statistically significant. In order to determine the reliability of the basic motor tests several coefficients of reliability were calculated: Spearman-Brown coefficient of reliability- SB1 and SB2, as well as Cronbach-a index of generalization.

RESULTS AND DISCUSSION

The data obtained from the applied Colmogorov-Smirnoff method (table 1) point out that the results from the 12th tests applied four tests: "Schulter", "Grind", "both legs defense" and the "complex situation test with a partner" show statistically significant inclination from the normal distribution on the level of 1%.

The results of the calculated elongation or the kurtosis showed normal distribution, i.e. these tests showed leptokurtosis.

The results for the skewness for the following tests: "left-right bridge rotation", "Schulter" and "complex situation test with a partner", showed positive asymmetry, whereas for the other tests normal symmetry, i.e. the values of the skewness approximated to .00.

The presented results, especially the ones regarding the degree of normal\distribution of the results of the applied manifested situation-motor tests (tasks), satisfy the necessary methodological and statistical criteria for the application of the other intended statistical procedures for this research.

The data of the Kolmogorov-Smirnoff (KS) procedure, shown in table 2, indicate that three out of twelve situation-motor tests (tasks), in all the particles, do not deviate statistically significant from the normal distribution on the level of 1%. Three tests: "left-right bridge rotation", "coordination without a dummy", and the "second no partner situation test" have no statistically significant normal distibution only in one of its particles; one test-"aufriser left-right" shows no normal distribution in two of its particles, while the results of the eight other tests : "Schulter", "Grind" and "both legs defense" do not show normal distribution of their particles.

The analysis of the results on the calculated asymetry- skewness, and the kurtosis show that the test values largely coincide with the data from the Kolmogorv-Smirnoff procedure. There is slightly more positive asymetry of the particles in the "Schulter" , "Aufriser left-right", "coordination without a dummy", "first no partner situation test", "second no partner situation test" and the "complex situation test with a partner"; and there is a slightly more negative asymetry of the particles in the "left-right bridge rotation", and "bridge pirouette".

According to the values of the arythmetic mean of the particles, in most of the tests it is noticeable that they have the tendency of improvement, which leads to the conclusion that the subjects got better and better which new task, which again points out that the execution of the treated tests are affected by the process of education.

The coefficients of the correlation amongst the particles for each separate test are positive and statistically significant with a medium-high and a high level of interconnection, that ranges from .22 to .98. Thus, for example, the intercorrelation of the particles was mostly evident in "aufriser left-right" (.81 to .90), while in the tests: "left-right bridge rotation" (.37 to .82), PVOZ (.47 to .65),"first no partner situation test" (.44 to .81) the values are the lowest, i.e. the structure was the least cosistent.

When using the factorisation of the particles (for each test) one main component was isolated which pointed to the fact that there is one mutual subject of measurement.

The characteristic roots, in the greater number of

the tests, explain for the higher percentage of the overall variant, which indicates a relatively high homegeneity of the test particles. The highest projections of the first main component shows the third particle of the test ”leg defence and attack” (.96) , as well as the first and the third particle of the test ”coordination without a dummy” (.94).

The coefficients of determination of the applied particles of the tests are mainly consistent with the coefficients of their intercorrelations, i.e. satisfactory coefficients of determinations have been calculated for the greater number of the test particles.

The tests ”bridge and return to upright position”, ” leg defense and attack”, ”Schulter”, ”Grind”, ”both legs defense”, ”second situation test with a partner”, have all satisfactory coefficients of reliability (SB1, SB2 i Crombach-a), whereas the tests “left-right bridge rotation”, “bridge pirouette”, aufriser left-right”, “coordination without a dummy”, “first no partner situation test” are characterized by unsatisfactory reliability.

The execution of the situation-motor tests (tasks) is simple, easily comprehensible (for the treated subject) and it does not require special equipment. Another positive point is that it is not time consuming, which shows that these are all very objective, economical and practical measuring instruments.

Table 1. Basic statistical parameters of the applied basic situation-motor tests: minimum results (MIN), maximum results (MAX), standard deviation (SD), Kolmogorov-Smirnoff method (KS), skewness (skew), kurtosis (kurt).

	Tests	Statistical parameters						
		X	SD	MIN	MAX	SKEW	KURT	KS
1.	Bridge rotation	31.09	4.30	16.37	43.71	2.05	-.38	
2.	Bridge pirouette	54.70	7.48	29.85	70.44	.52	-.37	
3.	Bridge and return to upright position	23.09	4.32	15	34	-.32	.40	
4.	Same leg defense and attack	21.27	3.78	14.85	32.14	.09	.67	
5.	Schulter	15.39	2.29	11	24	2.52	1.27	*
6.	Grind	21.95	2.62	17	28	-.29	.68	*
7.	Both legs defense	25.47	3.02	18	31	-.37	-.45	*
8.	Aufriser left-right	6.49	.79	5.34	8.90	1.52	1.17	
9.	Coordination without a dummy	33.45	4.26	25.33	46.08	.40	.91	
10.	First no partner situation test	28.24	3.14	21.87	37.56	.54	.63	
11.	Second no partner situation test	14.83	1.80	11.66	19.93	.59	.67	
12.	Complex situation test with a partner	38.27	3.25	34.46	53.92	7.41	2.38	*

*Table 2. Basic statistical parameters of the distribution of the results, factorization and coefficients of reliability of the particles (n) of the “Left-right bridge rotation” **“Bridge pirouette”***

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	10.86	1.41	8.00	15.48	8.44	-1.69	*	(.67)			.90
2.	10.08	1.31	7.34	14.39	9.54	-1.57		.82	(.70)		.93
3.	10.31	1.57	1.03	14.02	10.81	-2.26		.37	.47	(.22)	.68
λ=2,13		PCT(%)=71,13		SB1=.77		SB2=.79		Cronbach α=.78			

*The particles of the motor tests that show statistically significant deviation from the normal distribution are marked by an asterisk (*)

** SMC in all the tables of this type are shown in brackets in the main diagonal of the correlation matrix

"Bridge pirouette"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	18.46	2.75	18.9	26.00	1.13	-.11		(.74)			.94
2.	18.92	3.62	17.4	23.68	11.07	-2.36		.81	(.66)		.88
3.	18.22	2.66	16.7	22.75	13.88	-2.32		.69	.54	(.47)	.83
	λ=2,36	PCT(%)=78,70			SB1=.84		SB2=.86	Cronbach α=.86			

"Bridge and return to an upright position"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	7.47	1.58	3	12	.39	.36	*	(.73)			.93
2.	7.65	1.48	5	11	-.25	.43	*	.86	(.84)		.97
3.	7.97	1.55	5	12	-.37	.15	*	.75	.86	(.74)	.93
	λ=2,64	PCT(%)=88,15			SB1=.91		SB2=.93	Cronbach α=.93			

"Same leg defense and attack"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	7.40	1.62	4.87	10.75	-.76	.21		(.72)			.93
2.	7.14	1.62	4.75	10.90	.38	.85		.81	(.82)		.95
3.	6.19	1.30	4.59	10.49	.43	.84		.84	.90	(.85)	.96
	λ=2,70	PCT(%)=90,06			SB1=.92		SB2=.95	Cronbach α=.94			

"Schulter"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	4.88	.89	3	8	1.18	.83	*	(.70)			.93
2.	5.26	.74	4	8	1.71	1.00	*	.81	(.80)		.95
3.	5.25	.79	4	8	3.20	1.38	*	.81	.88	(.81)	.95
	λ=2,67	PCT(%)=89,03			SB1=.91		SB2=.94	Cronbach α=.93			

"Grind"

n	X	SD	Min	Max	Kurt	Skew	KS	R i SMC			H1
								1	2	3	
1.	6.98	1.12	5	9	-.83	.43	*	(.65)			.91
2.	7.38	.98	5	10	.39	60	*	.79	(.67)		.92
3.	7.59	.81	6	10	-.10	.44	*	.67	.69	(.51)	.87
	λ=2,43	PCT(%)=81,02			SB1=.82		SB2=.88	Cronbach α=.88			

"Both legs defense"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	8.00	1.12	6	11	-.38	.04	*	(.57)			.88
2.	8.72	1.15	6	11	.01	-.34	*	.74	(.69)		.93
3.	8.75	1.08	6	10	.26	-.87	*	.65	.76	(.60)	.89
	λ=2,44	PCT(%)=81,17			SB1=.83		SB2=.88	Cronbach α=.88			

"Aufriser left-right"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	2.87	0.30	1.50	3.15	.71	.75		(.60)			.90
2.	2.26	0.26	1.72	3.12	2.29	1.30	*	.76	(.63)		.91
3.	2.55	0.23	1.62	2.78	3.00	1.59	*	.61	.66	(.46)	.85
	λ=2,35	PCT(%)=74,83		SB1=.80		SB2=.86		Cronbach α=.86			

"Coordination without a dummy"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	11.67	1.20	9.64	17.01	1.71	1.17		(.81)			.94
2.	10.62	2.06	6.99	15.89	6.10	-1.14		.49	(.25)		.72
3.	10.71	1.81	8.70	17.00	1.86	1.26	*	.90	.49	(.80)	.94
	λ=2,27	PCT(%)=75,73		SB1=.83		SB2=.83		Cronbach α=.81			

"First no partner situation test"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	9.25	1.79	7.45	13.40	.26	.67		(.66)			.91
2.	9.45	1.61	7.10	13.28	.80	.68		.81	(.66)		.91
3.	8.81	1.79	7.32	11.87	12.72	-2.42		.44	.46	(.23)	.71
	λ=2,16	PCT(%)=72,03		SB1=.80		SB2=.80		Cronbach α=.79			

"Second no partner situation test"

n	X	SD	Min	Max	Kurt	Skew	KS	R and SMC			H1
								1	2	3	
1.	5.48	0.73	3.89	7.39	.20	.64		(.53)			.87
2.	4.68	0.52	3.75	6.48	.27	.35		.70	(.65)		.92
3.	4.44	0.55	3.87	6.87	1.92	1.00	*	.68	.77	(.64)	.91
	λ=2,43	PCT(%)=80,89		SB1=.82		SB2=.88		Cronbach α=.87			

Complex situation test with a partner"

n	X	SD	Min	Max	Kurt	Skew	KS
1.	38.67	3.10	34.46	53.92	7.41	2.38	

The analysis of the reliability of the situation tests:"bridge and return to upright position", "bridge pirouette"," same leg defense and attack","one leg maneouvre", all coincide with the results of the study done by Dimkov and Gligorov (1997), in terms of showing satisfatory coefficients of reliability, whereas the test"both legs defense and counter-attack" show unsatisfactory reliability and sensitivity in the study done by Dimkov and Gligorov (1997).

The study done by Gontarev and Gligorov (1998) determined satisfactory coefficients of reliability of the situation tests: " bridge pirouette", "aufriser left-right", "first no partner situation test", "left-right bridge rotation", while the rest of tests showed unsatisfactory coefficients of reliability. The test "leg defense and attack" showed satisfactory coefficients of reliability in both studies.

CONCLUSIONS

Based on the results acquired from the research the following conclusions were drawn:

1. Most of the tests applied showed satisfactory degree of the measuring characteristics;
2. Satisfactory degree of factor validity was determined in the following tests: "left-right bridge rotation", "same leg defense and attack", "coordination without a dummy", "first no partner situation test", "second no partner situation test", " complex situation

test with a partner", "Schulter", "Grind", "aufriser left-right", "bridge pirouette", " both legs defense in 10 seconds" and "bridge and return to upright position".

3. Satisfactory coefficients of reliability were determined in the following tests: "bridge and return to upright position", "same leg defense and attack", "Schulter", "Grind", " both legs defense", second situation test with a partner".

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