MEASURE CHARACTERISTICS OF MOTOR TESTS FOR ASSESSING RHYTHMIC STRUCTURE AND EXPLOSIVE STRENGTH WITH KARATE ATHLETES AND NON-ATHLETES AT THE AGE OF 12

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Abstract

The research was conducted on a sample of 200 male entities aged 12. The sample was divided into two subsamples. The first sub-sample consisted of 100 karate-athletes and the second sub-sample consisted of 100 pupils from primary school in Skopje. In order to determine and compare their measure characteristics, the entities were tested by three tests of composite character (performed repeatedly for 4 times each): one for estimating the rhythmic structure, and two tests for the explosive power. The data is calculated by the basic statistic parameters, and the measure characteristics are determined by: Pearson's coefficient of correlation, Hotelling's factor analysis, Chronbach's coefficient, Spearman-Brown's coefficient of reliability and mean correlation. The three applied tests show satisfactory measure characteristics, mainly in validity and reliability, with the karate-athletes and the school-boys. Apart from the other relations, it is determined that with the karate-athletes the tests of non-rhythmic hand tapping and standing long jump differ in respect of higher value of the measure characteristics, whereas regarding the test of 20 meter high start running, the data obtained for the two groups is of maximum identity.

Key words: *validity, reliability, coefficient of generalization, composite motor tests.*

INTRODUCTION

Knowledge about level of development of motor abilities can be observed by evaluation of different manifestation that is registered with appropriate motor tests that are called motor instruments. Because, motor abilities tests are measured indirectly, complete measure method must be standardize, and motor tests (measure instruments) has to distinguish with satisfied measure characteristics like: validity, reliability, sensitivity, objectivity and similar. In that case results that are received from one exemplar of investigated in some motor ability can be comparing with the results that are figured for another exemplar of investigated, in same ability.

With a goal to realize methodologically as much as it's possible correct investigations, the applied measure instruments have to be with satisfactory measure characteristics for registration and measuring of manifestation of human motor abilities. Some measure instruments that has shown good and for other population or exemplar. Especially when we talk about examined persons from different age, from different sex and other characteristics. According to this established problem of investigation, there is need for permanent checking or measure characteristics of tests. In that direction Kostovski (2004) realized investigation for establishment at measure characteristic of the tests. In that direction Kostovski perform investigation for establishment at measure characteristics at some standards and specific motor tests to karate athletes from different chronological age. For the needs of this investigation has been used 26 (twenty six) bio motorize more-item tests grouped in six motor space, with goal to be figured their measure characteristics. In this investigation has to be used 10 (ten) new constructed tests, 8 (eight) modified and 8 (eights) standard tests for evaluation at latent motor dimension. Battery of motor tests is used at stratified exemplar from examine karate- athletes from different age. Exemplar of examined persons which number is 404 karate athletes, split in four sub exemplars, each of them consist from 100 examinants, according to their chronological age and age categorization in karate sport(pioneers, young cadets, cadets and junior-senior). For each sub-exemplar of examined particularly, has been figured out measure characteristics at biometric test characteristics for karate athletes.

Based at these opinions, this investigation is realized with basic goal to be figured, analyze and compare measure characteristics at three motor tests, from which one is used for

evaluation at rhythmic structure and two tests for evaluation at explosive strength between 12 years age karate athletes and pupils from male sex.

METHOD

Participants

The research was conducted on a sample of 200 male entities aged 12. The sample was divided into two subsamples. The first sub-sample consisted of 100 karate-athletes, members of karate clubs from Skopje, and the second sub-sample consisted of 100 pupils from three primary schools from Skopje. All participants were psychophysically healthy during the research and regularly attended the physical education classes and trainings in their clubs.

Instruments

Three composite motor tests were applied in the research: "non-rhythmic hand tapping" (RSNUR), for evaluation of motor ability of rhythmic structure, "standing long jump" (ESSDM) for evaluation of explosive power, and "20 meter dash from high start stance" (EST20), also, for evaluation of explosive power.

Description of the tests

Test for evaluation at motor ability rhythmic structure, "non-rhythmic hand tapping" (RSNUR), it's performing at this way: Examined person seats at the chair, which is put on at the middle of the desk or in continuation at the line that separate the desk at two equal halves. The hands are so located on that way that the left hand is located at the left half, and the right hand is located at the right half of the desk. The width of the hands is determinate with the width of the shoulders of examined. At sign of the examined person he perform the test: 2 kicks with left hand at left half of the desk, 2 kicks with the right hand through the left hand at the left half of the desk, with right hand once you touch the body, you descend the right hand at right half of the desk and it is located at start position. It's counted the correct and properly performed cycles in period of 20 seconds. Time starts to be measured in sign for starting, and finishes to be measured after passing 20 seconds. The test for evaluation at explosive strength "standing long jump" (ESSDM) is performed at this way: Test is performed in hall in which examined regularly held their trainings or education for physical culture, and are dressed in sportswear. Examined person is possessing with its shoulder and coxes joint (from the side at better hand) along the wall. Foots are put at in width of coxes. Examined rise his hand (with prostrated fingers) that is closer to the wall and touch the desk while the measure notice the high. From the start position examined with maximal strength simultaneous with both legs reflected in high level and touch the plank with top of the fingers from the hand that is closer to the wall with highest point of the jump. Previously are wetted the fingers with the rag to be able to leave print at the plank because of easier seeing the result. It is scripting the difference in centimeters between the high of the touch in halt position and highest point in jump. It is scripting the results of all performs.

Test for evaluation at explosive strength "20 meter high start running" (EST20), it is performed on this way: Test is performed in hall in which regularly examined maintains its trainings or outside at open space in sportswear, minimal dimension 30/2 meters. At 20 meters from the start position is established line that signs the goal. Both lines between are parallel and long are 1,5 meters. Start position of examined is in high start behind the start line. The task of examined is after the sign of examined maximally quickly to pass the space between both lines. The task is finished when examined with chests pass the goal. Accessory investigator stands 1 meter behind the examined, gives sign for start and control if the examined makes some excess. Examined stands in line at the goal, measure the time and registered. It is measuring the time in 1/10 parts from the second from the given sign for start until the moment when examined with chests will pass the vertical (imagined line). Tests are implemented according to the description and recommendation that are shown in Metikoš and collaborators (1989). For pointed tests figured for satisfactory measure characteristics to mentioned authors and Kostovski, Ž. (2004).

Methods for data processing

For received data for every of implemented tests and for every particle separately basic statistic parameters were calculated: arithmetic mean, standard deviation, minimal result, maximal result, skewness, kurtosis and Kolmogorov-Smirnov test. For evaluation at

validity of the tests, between particles (repeating, items) for each of the implemented tests is calculated coefficient of correlation, and with Hotelling method at main components according to Guttman – Kajzer criteria are figured important characteristic radix (or for more important are treated those ones whose values are equal or bigger from 1.00), projection at particles at first main component – F and communalities – h^2. This method is implemented for figuring at factor validity of the tests.

Each particle at every implemented test for every sub exemplar particularly was analyzed. With goal to be figured reliability as one of basic measure characteristics beyond the validity were measured: Cronbach's index of generalization, Spearman- Brown's coefficient of reliability (SB2) and average coefficient of correlation between the exemplars.

RESULTS AND DISCUSSION

Basic statistical parameters

According to the results from the basic statistic parameters that are shown in table 1, can be noticed that examined pupils managed numeric better results from karate athletes in test "non-rhythmic hand tapping" (RSNRH). That is in relation with arithmetic mean, so and the values at minimal and maximal result. According to the established results for skewness and kurtosis, and for both groups examined persons this test present easy motor task for realization, or performance. In karate athletes can be noticed leaving the results from normal distribution only in first particle, but in pupils, in firsts and in second particle. Similar situation is in second test "standing long jump" (ESSDM). In relation with value of arithmetic middle, in all particles pupils managed numeric better results from karate athletes. It can be noticed that results of the pupils are more homogenous. Also just like in motor tests present easy motor task for realization. In all four particles and in karate athletes and in pupils is figured normal distribution of the results.

Table 1. Basic statistical parameters

		X	min	Max	S	skew	kurt	K-S
Athletes	RSNRH1	7.17	1	15	2.76	.53	.18	*
	RSNRH2	8.15	1	14	2.99	.06	-.70	
	RSNRH3	8.71	1	15	2.75	.08	.07	
	RSNRH4	8.93	1	15	2.83	.06	.01	
Athletes	ESSDM1	139.73	62	208	28.89	-.31	1.02	
	ESSDM2	139.20	68	210	28.83	-.43	.52	
	ESSDM3	140.43	63	207	30.05	-.56	.37	
	ESSDM4	140.71	67	210	29.52	-.54	.52	
Athletes	EST201	4.69	3.01	6.59	.66	.50	.71	
	EST202	4.68	3.02	7.00	.69	.61	2.25	
	EST203	4.76	3.28	6.91	.70	.73	1.05	
	EST204	4.76	3.33	7.00	.74	.93	1.20	*
Non-athletes	RSNRH1	8.02	4	16	2.57	.87	.39	*
	RSNRH2	8.85	4	17	2.88	.71	-.12	*
	RSNRH3	9.42	5	16	2.62	.40	-.67	
	RSNRH4	9.73	4	18	2.70	.35	.20	
Non-athletes	ESSDM1	147.1	82	186	19.96	-.67	.69	
	ESSDM2	150.67	86	191	18.78	-.63	.68	
	ESSDM3	151.02	96	192	20.26	-.49	.03	
	ESSDM4	152.72	99	189	19.10	-.65	.39	
Non-athletes	EST201	4.39	3.60	6.50	.45	1.49	4.09	
	EST202	4.44	3.75	6.90	.48	2.09	6.75	*
	EST203	4.46	3.53	7.10	.47	1.99	9.08	
	EST204	4.44	3.78	7.00	.46	2.20	8.63	*

From the received results for basic statistic parameters for the test "standing long jump" (ESSDM), it is repeated the situation that numeric higher values are results at the pupils in comparison with karate athletes. In this test it is possible to constitute that for treated examined presents easy motor tasks for realization. Results in both groups are homogenous.

Statistically important relieving of the results from normal distribution is noticed in the fourth particle in karate athletes as measure characteristic, for three implemented tests for each sub exemplar is figured satisfactory sensitivity.

Validity and reliability of the applied motor tests

In table 2 are shown figured Pierson's coefficients of the correlation between particles separately for each tests and for every exemplar examined. Generally can be constate that between all particles and (between four items) in every motor tests particularly and for every sub- exemplar is figured significant correlation. In karate athletes are figure the following coefficients at correlation: a) in test "non-rhythmic hand tapping" (RSNRH) from .76 to .84, in test "standing long jump" (ESSDM) from .92 to .97 and in test for "20 meter high start running" (EST20) from .77 to .87; while in pupils: a) in test "non-rhythmic hand tapping" (RSNRH) from .56 to .80, in tests "standing long jump" (ESSDM) from .82 to .90 and in tests "20 meter high start running" (EST20) from .79 to .86

Table 2. Pearson's coefficients of correlation

Athletes				Non-athletes			
	RSNRH2	RSNRH3	RSNRH4		RSNRH2	RSNRH3	RSNRH4
RSNRH1	.78	.78	.76	RSNRH1	0.73	0.61	0.57
RSNRH2		.83	.84	RSNRH2		0.79	0.73
RSNRH3			.82	RSNRH3			0.80
	ESSDM2	ESSDM3	ESSDM4		ESSDM2	ESSDM3	ESSDM4
ESSDM1	.95	.95	.92	ESSDM1	0.90	0.83	0.83
ESSDM2		.97	.95	ESSDM2		0.87	0.89
ESSDM3			.97	ESSDM3			0.89
	EST202	EST203	EST204		EST202	EST203	EST204
EST201	.78	.82	.77	EST201	0.86	0.81	0.80
EST202		.83	.79	EST202		0.79	0.81
EST203			.87	EST203			0.85

Table 3. Hotelling's procedure

Athletes			Non-athletes		
	F1	h^2		F1	h^2
RSNRH1	.80	.67	RSNRH1	0.82	0.67
RSNRH2	.88	.78	RSNRH2	0.92	0.85
RSNRH3	.87	.76	RSNRH3	0.91	0.83
RSNRH4	.86	.76	RSNRH4	0.88	0.77
Lambda	3.40		Lambda	3.12	
%	85.11		%	78.04	
	F1	h^2		F1	h^2
ESSDM1	.94	.91	ESSDM1	0.94	0.88
ESSDM2	.97	.95	ESSDM2	0.96	0.93
ESSDM3	.98	.97	ESSDM3	0.95	0.90
ESSDM4	.96	.94	ESSDM4	0.95	0.90
Lambda	3.85		Lambda	3.61	
%	96.32		%	90.23	

	F1	h^2		F1	h^2
EST201	.82	.71	EST201	0.93	0.87
EST202	.85	.74	EST202	0.93	0.87
EST203	.90	.83	EST203	0.93	0.86
EST204	.86	.77	EST204	0.93	0.86
Lambda	3.43		Lambda	3.46	
%	85.74		%	86.57	

In table 3 are shown received results from Hoteling method by which it's figured factor validity particularly for each tests and for every exemplar examined. For each of treated motor tests for every exemplar examined it's figured that particles (items) in test has unique subject of measuring and high projections of unique isolated main component (latent dimension, factor), and it is explained total variability and it's expressed high. It in first two tests "non-rhythmic hand tapping" (RSNRH) and "standing long jump" (ESSDM) is with higher values in karate athletes in relation with exemplar pupils, but in third tests "20 meter high start running" (EST20) value with treated examined is almost identical.

Table 4. Coefficients of reliability

Athletes			Tests	Non-athletes		
□	SB2	IK		□	SB2	IK
.94	.94	.80	RSNRH	.91	.91	.71
.99	.99	.95	ESSDM	.96	.96	.87
.94	.95	.81	EST20	.95	.95	.82

In table 4 in which are shown values of coefficients of reliability: Cronbach alpha coefficient of generalizability (□), Spearman–Brown coefficient (SB2) and average coefficient of correlation (IK), can be noticed and conclude for three implemented tests in both groups of exemplars-karate athletes and pupils are figured high and significant coefficient at reliability. This coefficient in first two tests "non-rhythmic hand tapping" (RSNRH) and "standing long jump" (ESSDM) are with higher values in karate athletes than in pupils, and in third test "20 meter high start running" (EST20) value between treated groups and examined is almost identical.

CONCLUSION

From realized study with exemplar of 200 examined persons from male sex at age of 12 years, from which 100 examined karate athletes and 100 examined pupils from three basic schools from Skopje, at which have been implemented three motor tests from composite character, with goal to be figured their measure characteristics, we can conclude:

1. For three implemented motor tests are figured satisfactory measure characteristics and in both groups examined (karate athletes and pupils).
2. For tests "non-rhythmic hand tapping" (RSNUR) and "standing long jump" (ESSDM) are figured numeric higher coefficients of validity and reliability in karate athletes, then in test "20 meter high start running" (EST20) received results in both groups are almost equal.
3. As recommendation, three tests are suggested for using in investigation from motor space as tests with satisfactory validity, reliability, sensitivity, practical and economically and it's suggested they to implement with two repeating of tasks (instead 4 items to be consisted from 2 items).

LITERATURE

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MJERNE KARAKTERISTIKE NEKIH MOTORIČKIH TESTOVA ZA PROCJENU RITMIČKE STRUKTURE I EKSPLOZIVNE SNAGE KOD KARATE SPORTISTA I UČENIKA UZRASTA OD 12 GODINA

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Sažetak

Istraživanje je realizovano na uzorku od 200 ispitanika muškog pola uzrasta od 12 godina, koji je bio podijeljen na dva subuzorka. Prvi subuzorak je činilo je 100 karatista, a drugi 100 učenika šestog razreda osnovnih škola iz Skoplja. Na njima su primjenjena tri testa kompozitnog karaktera (koji su ponavljani po četiri puta) - jedan za procjenu ritmičke strukture i dva testa eksplozivne snage sa ciljem da se utvrde i uporede njihove mjerne karakteristike. Prikazani su osnovni statističkim parametari, a mjerne karakteristike su utvrđene Pirsonovim koeficientom korelacije, Hotelingovim postupkom faktorske analize kao i Kronbahovim α koeficientom, Spirman-Braunovim koeficientom SB2 i prosječnom korelacijom. Za sva tri primjenjena testa kod karatista i kod učenika su utvrđene zadovoljavajuće mjerne karakteristike, prije svega valjanost i pouzdanost. Između ostalih relacija utvrđeno je da kod karatista testovi neritmičko udaranje rukom i skok udalj s mjesta se odlikuju sa višim vrijednostima utvrđenih mjernih karakteristika, dok u testu trčanje na 20 metara visokim startom, dobijeni rezultati između obe grupe su maksimalno identične.

***Ključne riječi**: validnost, pouzdanost, koeficijent generalizabilnosti, kompozitne motoričke testove.*

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