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Factorial Structure of Karate Elements in Sport Fight and Their Influence on the Achievement Effects on Karate Sportsmen (Cadets) From R.Macedonia

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Abstract: The research has been done on 30 participants - top male karate competitors, cadets from Macedonia. The subject of this research represents karate elements which are most used in the karate fighting; the basic aim is to establish the structure of the karate elements that are used in karate fighting, and their influence on the achievement effects. In the research, 36 variables were used: 4 anthropometric variables, 4 variables for the estimate on the explosive strength, 4 variables for the estimate on the segmented velocity, 12 variables of the karate elements used in the karate fighting and 12 variables for the estimate on the specific karate abilities in 3 motor space: 4 variables for the estimate on the specific karate coordination, 4 variables for the estimate on the specific karate precision and 4 variables for the estimate on the specific karate balance. In this study, the interconnection between variables, the influence of the factors and determination of the influence on the system of predictor variables on the system of karate elements variables used in the karate fighting (criteria) have been researched . From the given results, the existence of groups (different spaces) of the variables and the influence of the predictor variables on the criteria variable have been determined.

Key Words: specific karate abilities, specific karate coordination, specific karate precision, specific karate balance.

Introduction

The existence of karate as a martial art presents a measure for self-defense based on some principles and ground rules. Its practice demands great physical and mental discipline. Studies on karate help with the growth of a strong personality of the person and sense of self-respect. The karate, as an ancient martial art, with the evolution and changes of the training condition, became a karate sport. The tendency of achieving better results leads to the implementation of new measures and methods and also to the updating of the existent. The process of achieving higher sport results is more and more based on scientific researches and methods, establishment of the factors that have influence on the achieving success and higher sport results. The value of these researches in the area of karate sport mostly consists of finding and establishing of the most economical and effective factors which are significant for achieving high sport results, with the revealing of the structure of the personality and finding the suitable measurement instruments. The fast development of the karate sport is enabled by the better material conditions for training, development of the technical devices; the training process is run by competent person, planning and programming of the appropriate trainings and also timely selecting the young categories for this sport. Because of the different, unanticipated and various situations which can occur in the sport battle there should be completeness of the all parts which are included in the battle. Because of that, from the first start of the training process, the process should be directed towards forming, developing and improving of the anthropological, motor dimensions, and also on the situational karate techniques and specific karate elements.

The subject and basic aim of this research

The subject of the research

The karate sport comes from a group of sports which have enormous influence on the transformation of the human personality, completely. With an everyday practice, in a long time period, it can have influence on the optimal growth of the sportsmen, improving the structure of the psychosomatic status, the anthropometric and motor dimensions of the karate sportsmen, enabling the leading and controlling of the congenital reflexive movements, thus having a significant influence on all of the spaces (conative, cognitive, sociological, psychological an etc.). Because of the specificity of this sport that is determined by explosive and complicated movements, there is a need for constant implementing of new researches that will apply on the structure of the karate elements. From the already mentioned, the subject of this research presents the karate elements which are frequently applied in time of performing a karate fight by karate male cadet competitors.

The basic aim of the research

Analyzing the referent researches, together with the establishing of the subject, we came to the discovery that there is a need for larger number of information which will enable the practice with better support for successful matter. From that as a basic aim of this study, the next will be the establishing the structure of the karate elements which are performed in time of the sport fighting.

Methods

Sample of participants

This research is applied on stratified sample of participants, karate-competitors, males, cadets and juniors. The total coverage is 30 competitors from the karate clubs in Macedonia.

Measurement techniques

In the first phase the participants were taped while performing specific karate elements on the state and official competitions, electoral tournaments for compositing the national representation. The participants were divided according to the age and weight categories (determined by the rules of WKF) in sport battle (kumite). In the second phase, the same participants were covered individually with anthropometric measures and tests for evaluating the specific karate abilities, and the same was performed in their clubs.

Sample of variables

In the research, total of 36 variables were applied, from which: 4 anthropometric variables, 4 variables for evaluating the explosive strength, 4 variables for evaluating segmented velocity (frequency of the movement), 12 variables from karate elements which are applied in sport karate battle and 12 variables for evaluating the specific karate abilities grouped in 3 motor spaces presented with: 4 variables for evaluating the specific karate coordination, 4 variables for evaluating specific karate precision and 4 variables for evaluating specific karate balance.

Statistical methods for evaluation of the data

The data from this research based on the characteristic and the size of the selected sample is processed with various package programs. At first, the original data was stored in the matrix of data in Excel, and after that the statistical parameters were evaluated with the program Statistic for windows 6.0. and the statistical program package SPSS. For the needs of this research, the following measures were calculated: Mean, SD-standard deviation with minimal value of 1/3 from the value of the mean, Min.-minimal result, Max.-maximal result, Skewness, Courtosis, K-S-Collmogorov-Smirnoff which determines the normal distribution of the results, Matrix of intercorelation - which determines the intercorelation of the applied variables, Factor analysis- the aim is, from the number of the interconnected manifest variables, condense and reduce the smaller number of each relatively independent latent variables which can explain the mutual relation of the analyzed manifest variables. H-firs main component-explains the bigger part of the total variance, lambda-characteristically mathematical root which explains the mutual variance of every isolated main component, h^2-comunality-size of the explained part of the total variance of every variable.

Results and discusion

Basic descriptive statistical parameters

From the results given in table 1, we can conclude that the distribution of the anthropometric variables, motor variables and variables of specific karate abilities are within the borders of normal distribution of the results, but in the variables applied in karate battle there is derogation from the normal distribution of the results. The values of protruding of the Gaus curve (Skewness) are in the span of moderate symmetry (+1) in the more of the variables, with exception of the variables KNUNT=1.34, KNUNG=1.53, KKNPU=4.28, KOB=2.29, KOBKN=2.07 KPGC=2.77, SOHMG=1.64, TSHUSHMG=1.38, which show the concentration of the results in the smaller values. The values of the Gaus Curve (Kurtosis) are platocurtic which show bigger determination of the results, while there is exception in the variables KKNPU=18.77, KOB=6.38 KOBKN=3.60, KPGC=9.24, where it can be noticed the leptokurtic of the curve, bigger concentration of the results around their mean. The distribution of the results of the variables, given from Colmogorov-Smirnof, shows that the value of all of the examined variables does not derogate from the basic distribution of the results.

Tab 1. Descriptive Statistics (Matrica kadeti)

	Valid N	Mean	Min.	Max.	Std. Dev.	Skewn.	Kurt.	K-S
ATT	30	62,00	38,00	80,00	10,50	-0,27	-0,34	0,09
ATV	30	170,30	150,00	180,00	7,43	-1,10	1,11	0,14
ADRAKA	30	83,53	71,00	91,00	5,06	-0,71	0,21	0,11
ADNOGA	30	98,71	83,50	108,50	4,99	-0,66	2,09	0,10
MSMD	30	195,00	160,00	223,00	15,59	-0,01	-0,26	0,10
MSMV	30	41,10	31,00	50,00	4,17	-0,29	-0,01	0,19
MTVS20	30	3,21	2,97	3,65	0,17	0,78	0,07	0,15
MUNMG	30	9,43	8,00	11,00	0,68	0,61	0,24	0,34
MTRSR	30	69,50	29,00	88,00	12,41	-0,96	2,47	0,15
MTNSR	30	46,10	36,00	54,00	4,47	-0,71	-0,17	0,20

MTRFR10	30	55,90	38,00	68,00	8,30	-0,23	-0,76	0,10
MTNFR10	30	38,33	29,00	46,00	4,35	-0,64	-0,01	0,17
KNUR	30	18,20	0,00	37,00	**10,68***	0,10	-1,10	0,11
KN2UR	30	4,17	0,00	13,00	**3,48***	0,78	-0,22	0,20
KKNRNNR	30	1,13	0,00	4,00	**1,22***	1,06	0,28	0,28
KNUNT	30	5,93	0,00	24,00	**5,57***	**1,34**	2,37	0,17
KNUNG	30	2,53	0,00	11,00	**3,01***	**1,53**	1,80	0,20
KKNPU	30	0,10	0,00	2,00	**0,40***	**4,28**	**18,77**	0,53
KOB	30	3,63	0,00	19,00	**4,07***	**2,29**	**6,38**	0,23
KOI	30	4,67	0,00	13,00	**3,31***	0,58	0,02	0,16
KOBKN	30	0,63	0,00	4,00	**1,16***	**2,07**	**3,60**	0,37
KPGC	30	4,47	0,00	30,00	**6,29***	**2,77**	**9,24**	0,24
KPKC	30	0,40	0,00	2,00	**0,56***	1,04	0,18	0,39
KKAZNA	30	1,03	0,00	2,00	**0,81***	-0,06	-1,45	0,22
SHC	30	1,59	1,25	2,13	0,23	0,20	-0,37	0,07
SHMG	30	4,49	3,47	6,09	0,65	0,55	-0,05	0,13
TSHUSHC	30	2,70	1,28	4,83	0,86	0,57	0,07	0,12
TSHUSHMG	30	4,34	3,29	6,68	0,72	**1,38**	2,87	0,14
URMSR	30	6,50	5,00	7,00	0,63	-0,89	-0,13	0,35
URMFR	30	6,30	5,00	7,00	0,70	-0,50	-0,78	0,27
UNMSR	30	5,93	3,00	7,00	1,20	-0,89	-0,29	0,25
UNMFR	30	5,27	2,00	7,00	1,44	-0,80	0,10	0,20
SOHMG	30	6,26	1,69	19,22	**4,10***	**1,64**	2,65	0,22
SZHMG	30	2,41	1,07	4,69	**0,95***	0,64	-0,28	0,13
SOHMAG	30	3,86	1,30	7,78	**1,83***	0,76	-0,24	0,11
SZHMAG	30	1,90	0,90	2,83	0,48	-0,10	-0,31	0,10

Factorial analysis

In table 2 the results shown are from the factorial analysis of the applied variables, in non rotated matrix. The characteristically mathematical root and the explained variance of the motor manifestation variables from the part of the significant main components in the space from the first row are given in table 3. The applied Gutman-Caiser criteria extracted 5 significant latent dimensions, which seems to be enough for explication of the variability and co variability of the manifest variables applied on the sample of karate sportsmen. From the heights of the projections of the manifest variables of the first main component in non rotated factorial matrix we can conclude that the more of the variables have a significant, but moderate to higher projections, which might mean that the given factors are with higher correlations and that the isolating of the factors from the higher row is justified. The value of the communality is high, which means that the system of the factors is defining the variability and co variability of the manifest variables very well.

Tab 2. Factor Loadings (Unrotated) (Matrica kadeti)
Extraction: Maximum likelihood factors (Marked loadings are > ,500000)

	Fac 1	Fac 2	Fac 3	Fac 4	Fac 5	h^2
ATT	-0,77	0,36	0,13	-0,12	-0,01	0,88
ATV	-0,92	0,01	0,14	-0,05	-0,03	0,93
ADRAKA	-0,91	0,32	-0,11	0,04	0,06	0,92
ADNOGA	-0,73	-0,19	0,41	0,04	0,11	0,90
MSMD	-0,54	0,24	-0,03	0,20	-0,21	0,86
MSMV	-0,14	-0,25	-0,25	-0,03	0,17	0,83
MTVS20	0,38	-0,07	0,06	-0,71	0,19	0,87
MUNMG	-0,25	-0,20	0,03	0,50	-0,10	0,79
MTRSR	-0,61	-0,26	-0,29	-0,13	0,41	0,89
MTNSR	-0,32	-0,53	-0,41	-0,04	-0,18	0,87
MTRFR10	-0,35	-0,63	-0,45	-0,09	0,33	0,90
MTNFR10	-0,56	-0,37	0,01	-0,07	-0,13	0,82
KNUR	-0,23	0,11	0,13	-0,51	-0,22	0,87
KN2UR	-0,14	-0,07	0,09	-0,61	-0,29	0,79
KKNRNNR	0,21	-0,24	-0,26	-0,12	-0,40	0,79
KNUNT	-0,25	0,10	-0,34	0,07	-0,29	0,70
KNUNG	0,39	-0,09	-0,31	-0,15	0,07	0,82
KKNPU	-0,09	-0,11	0,09	0,06	-0,23	0,72
KOB	-0,30	-0,13	-0,25	-0,38	-0,26	0,77
KOI	-0,33	-0,03	-0,06	-0,17	-0,57	0,88
KOBKN	-0,25	-0,04	-0,27	-0,10	-0,30	0,82
KPGC	0,39	0,23	0,07	0,04	0,09	0,78
KPKC	0,06	-0,21	0,40	0,11	0,04	0,82
KKAZNA	0,06	0,38	-0,18	0,13	-0,03	0,76
SHC	0,25	0,48	-0,18	-0,07	0,06	0,83
SHMG	0,34	0,35	-0,28	-0,13	0,12	0,84
TSHUSHC	0,46	0,60	-0,08	0,03	0,06	0,87
TSHUSHMG	0,40	0,63	-0,52	-0,02	0,00	0,90
URMSR	-0,10	-0,05	0,06	-0,24	-0,13	0,81
URMFR	-0,51	-0,17	-0,22	-0,21	-0,20	0,87
UNMSR	-0,19	-0,36	0,15	0,18	-0,36	0,87
UNMFR	-0,33	-0,07	-0,06	-0,34	-0,55	0,85
SOHMG	0,04	-0,30	-0,18	0,43	-0,06	0,79
SZHMG	-0,15	-0,43	-0,03	0,31	-0,21	0,80
SOHMAG	-0,08	-0,25	-0,56	0,26	-0,39	0,86
SZHMAG	-0,15	-0,22	-0,11	0,48	-0,16	0,83
Expl.Var	6,02	3,33	2,20	2,60	2,14	
Prp.Totl	0,17	0,09	0,06	0,07	0,06	

Tab 3. Eigenvalues (Matrica kadeti)

Extraction: Maximum likelihood factors

	Eigenvalue	% Total	Cumulative
1	6,02	16,73	16,73
2	3,33	9,25	25,99
3	2,20	6,12	32,10
4	2,60	7,21	39,31
5	2,14	5,95	45,26*

Tab 4. Factor Loadings (Varimax normalized) (Matrica kadeti)
Extraction: Maximum likelihood factors (Marked loadings are > ,500000)

	Fac 1	Fac 2	Fac 3	Fac 4	Fac 5	h^2
ATT	**0,83***	-0,01	0,04	-0,17	0,20	0,88
ATV	**0,81***	0,29	0,24	-0,03	0,26	0,93
ADRAKA	**0,90***	-0,10	0,25	0,05	0,21	0,92
ADNOGA	**0,65***	**0,55***	0,16	-0,04	-0,02	0,90
MSMD	**0,56***	-0,04	-0,06	0,23	0,25	0,86
MSMV	-0,02	0,04	0,41	0,06	0,02	0,83
MTVS20	-0,42	-0,03	0,10	**-0,72***	-0,02	0,87
MUNMG	0,19	0,25	0,03	**0,52***	-0,02	0,79
MTRSR	0,38	0,09	**0,75***	-0,04	0,00	0,89
MTNSR	-0,06	0,21	**0,53***	0,24	0,43	0,87
MTRFR10	-0,04	0,20	**0,88***	0,12	0,06	0,90
MTNFR10	0,30	0,41	0,33	0,07	0,32	0,82
KNUR	0,18	0,07	-0,06	-0,45	**0,38**	0,87
KN2UR	-0,00	0,16	0,01	-0,49	**0,47**	0,79
KKNRNNR	-0,40	0,01	0,02	0,10	**0,42**	0,79
KNUNT	0,16	-0,19	0,08	0,23	**0,39**	0,70
KNUNG	-0,45	-0,24	0,15	-0,06	-0,00	0,82
KKNPU	0,03	0,19	-0,09	0,10	0,17	0,72
KOB	0,07	0,02	0,26	-0,17	**0,53***	0,77
KOI	0,17	0,13	-0,08	0,03	**0,65***	0,88
KOBKN	0,09	-0,05	0,13	0,08	**0,45**	0,82
KPGC	-0,21	-0,22	-0,26	-0,07	-0,25	0,78
KPKC	-0,04	0,39	-0,15	0,00	-0,21	0,82
KKAZNA	0,09	-0,40	-0,15	0,10	-0,01	0,76
SHC	-0,04	**-0,52***	-0,18	-0,12	-0,07	0,83
SHMG	-0,20	**-0,53***	-0,05	-0,15	-0,08	0,84
TSHUSHC	-0,14	**-0,59***	-0,39	-0,10	-0,21	0,87
TSHUSHMG	-0,18	**-0,87***	-0,15	0,00	0,02	0,90
URMSR	0,03	0,10	0,01	-0,19	0,20	0,81

URMFR	0,27	0,11	0,33	-0,02	**0,47**	0,87
UNMSR	0,02	0,45	-0,05	0,28	0,26	0,87
UNMFR	0,13	0,15	-0,03	-0,13	**0,69***	0,85
SOHMG	-0,15	0,11	0,12	**0,51***	-0,03	0,79
SZHMG	-0,04	0,36	0,12	**0,43***	0,15	0,80
SOHMAG	-0,17	-0,11	0,23	**0,55***	0,45	0,86
SZHMAG	0,05	0,15	0,05	**0,56***	0,05	0,83
Expl.Var	4,13	3,35	2,71	2,76	3,35	
Prp.Totl	0,11	0,09	0,08	0,08	0,09	

The orthogonal varimax solution (table 4) comes to knowledge from the next structures, which satisfy the conditions of the simplicity of the structure, with exeption of one manifets variable that has a projection with closer values of more than one latent dimension. The first latent dimension (F1) includes satisfying and higher projection of the measures of the body dimensions. The structure of this latent dimension includes the variables of body weight, body height, arm length, leg length and jump from place in distance which comes from the smallest projection from this factor. We can consider the same, factors such as a factor of longitudinal dimension of the skeleton (FLDS). The second latent factor (F2) constitutes higher values of the variability of the specific karate coordination in which structures are constituted: shihon cuki, shihon mae geri, tate shuto uke shihon cuki, tate shuto uke shihon mae geri. Here, we can also add the variable leg length with moderate value, but the same is constituted in the first factor with higher projection. We can also define the given factor as a factor of specific karate coordination (FSKK). The third latent factor (F3) can be defined as the factor with higher and moderate projections of the variables taping with arm in sagital space, taping with leg in sagital space and taping with arm in frontal space, and it can be defined as a factor of segmented velocity or frequency of movement (FSB). The fourth latent factor (F4) can be defined as a factor of specific karate balance, in which structure includes the variables standing with open eyes hikijashi mae geri, standing with closed eyes hikijashi mae geri, standing with open eyes hikijashi mavashi geri and standing with closed eyes hikijashi mavashi geri represented with moderate projections of the same, such as the variables running on 20m with higher start and stroke with leg towards mae geri from kneeling which belongs to the space of explosive speed (FSKR). The fifth latent factor (F5) is defined by moderate projections of the variables stroke with arm and defense with block and defense with extracting such as the variable stroke with leg to the target in frontal space and his functional interpretation could be in the direction of karate strokes with arm and defenses (FKO).

Conclusion

The research has been done on 30 participants - top male karate competitors, cadets from the representation of Macedonia. The subject of this research is the karate elements which are most used in the karate fighting; the basic aim is to establish the structure of the karate elements that are used in karate fighting. From the given results of this research, we can conclude:

- Establishing the structure of the elements, which are used in karate fighting for the asge category cadets, which is defined by the next latent factors:

1. Factor of longitude dimensional of the skeleton

2. Factor of specific karate coordination
3. Factor of segmented velocity
4. Factor of specific karate balance and

Factor of strokes with arm and defenses

Literatura

1. Koropanovski, N., Dopsaj, M., Jovanovic, S. (2008). Characteristics of pointing actions of top male competitors in karate at world and europian level. *Brazilian Journal of biometricity Vol 2, Issue 4*; 241-51.
2. Kostovski, Ž. (2004). Merni karakteristiki na nekoi standardni i specifično motorički testovi primeneti kaj karate sportisti od različna hronološka vozrast *(Doktorska disertacija),* Fakultet za fizička kultura, Skopje.
3. Kostovski, Ž., Georgiev, G. (2009). Mjerne karakteristike nekih motoričkih testova za procjenu ritmičke strukture i eksplozivne snage kod karate sportista i ucenika uzrasta od 12 god. *Sport spa Vol 6,* Issue 2: 37-42.
4. Kostovski, Ž. (2010). Factor structure of some specific and basic motor tests for assesment of the motor abilities of karate athletes at the age of 12 to 14 years old Alfa Univerzitet, Beograd.
5. Kostovski, Ž., Čupina. S., & (2010) Structure of some specific and basic motor tests for assesment of the motor abilities of karate athletes at the age of 16 to 18 years old, Sport i zdravlje, Tuzla.
6. Metikoš, D., Prot, F., Hofman, E., Pintar, Ž. i Oreb, G. (1989). *Merenje bazičnih motoričkih dimenzija sportaša.* Zagreb: Fakultet za fizičku kulturu Sveučilišta u Zagrebu.
7. Malacko, J., Popovic, D., (1997). Metodologija kinezioloških antropoloških istrazivanja, Fakultet fizičke culture, Priština.

Faktorska struktura karate elemenata korištenih u sportskoj borbi kod vrhunskih karatista (kadeta) iz r.Makedonije

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Sažetak: Istraživanje je sprovedeno na uzorku od 30 ispitanika, vrhunskih karate sportista takmičara, muškog pola, kadeta članova reprezentacije Makedonije u karateu. Predmet ovog istraživanja predstavljaju karate elementi koji najčešće se primenjuju za vreme izvođenja karate borbe, a kao osnovni cilj je utvrđivanje strukture karate elemenata. U istraživanju bili su primenjene ukupno 36 varijabli od kojih: 4 antropometriskih varijabli, 4 varijable za procenu eksplozivne sila, 4 varijable za procene segmentarne brzine (frekvencija kretanja), 12 varijabli karate elemenata koji se primenjuju u sportskoj karate borbi i 12 varijabli za procenu specifičnih karate sposobnosti grupisane u 3 motorička prostora: 4 varijable za procenu specifične karate koordinacije, 4 varijable za procenu specifične karate preciznosti i 4 varijable za procenu specifične karate ravnoteže. Rezultate koje su dobijeni u ovo istraživanje ukazuju da postoji grupisanje po prostorima na tretiranih varijabli.

Ključne reči: specifične karate sposobnosti: specifična karate koordinacija, specifična karate preciznost i specifična karate ravnoteža.