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Differences in the Quality of Movement Functionality between Judokas, Karatekas, and Non-Athletes

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Abstract

Judo and karate are polystructural acyclic sports, which require development of a great number of human abilities and characteristics. Although both are martial arts, they differ greatly in the requirements and quality of performance of individual movements. The aim of this study was to determine the differences in the quality of performing movements between karatekas, judokas and non-athletes. The respondents were 60 young people (14.1 - 14.6 years), 20 of which belonged to the group of "judokas", 20 to the group of "karatekas" and 20 to the group of "non-athletes". All individuals were physically and mentally healthy, and were fit to undergo testing. The sample of variables consisted of 7 tests, which belong to the Functional Movement Screen (FMS) method of testing the movement functionality. By using the ANOVA test, in 4 variables showed up statistically significant difference ($p<0.05$). Group of non-athletes has the lowest values in all tests, especially in deep squat, active straight-leg raise, and rotary stability. Judokas performed the lowest values in the shoulder mobility test. The main conclusions of this paper are that training content should be specific to sports, and sports (in this case martial arts) have a positive effect on the development of the locomotor system, which could be useful for properly perform basic movements which humans use in everyday life.

Keywords: *Functional Movement Screen, Martial arts, Judo, Karate, Non-athletes*

Introduction

The impact of sports on our health has been one of the most important research topics in the field of kinesiology for a long time. The effects of engaging in various sports on physiological and morphological changes in humans are well known thanks to a great number of studies that have been carried out in recent years. However, some authors (Winberg & Gould, 1995; Saint-Phard, Van Dorsten, Marx, & York, 1999) state that the differences between athletes and non-athletes have not been fully explored. Some authors (Butt, 1987; Cox, 1994) state that athletes have some physiological characteristics that completely differentiate them from non-athletes. On the other hand, it has been proved that people who are not engaged in sport more difficulty maintain a proper body posture than athletes do (Baghbani, Woodhouse, & Gaeini, 2016). All these facts, proved by relevant research, show the positive effects that sports have on human body.

The importance of mobility and flexibility in sports has already been proved (Bompa, 1999; Malacko, & Radjo, 2004; Milanovic, 2013; Bjelica, Georgijev, & Muratovic, 2012). This motor ability plays a major role in performance and in martial arts such as judo and karate. Although these two sports differ significantly in movement structures, both belong to acyclic polystructural sports in which the goal is the symbolic destruction of the opponent (Radjo, Kajmovic, & Kapo, 2001; Kajmovic, Radjo, & Mekic, 2011; Kapo, 2012). A high level of motor skills is necessary for the successful performance of techniques in both judo and karate, where flexibility also plays a significant role in reaching succes in these disciplines. One way to diagnose the state of flexibility and possible limitations in performing the full range of motion is to screen the movement functionality.

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Functional Movement Screen is a testing protocol used to identify constraints or asymmetries in 7 fundamental steps. These steps are of great importance to the functionality of a person's movements. Functional Movement Screen is becoming increasingly popular in the fields of sports medicine and sports performance (Janiciki, Switzler, Hayes, & Hicks-Little, 2017).

This protocol is designed to give clear and visible performances of the locomotor system by bringing a person into extreme positions where weaknesses and lack of balance become visible due to the lack of necessary mobility and motor control. The idea originated in 1995 when there was no suitable instrument for assessing movement asymmetries in normal motion.

It is noticeable that even the athletes who perform certain activities at a very high level have difficulties performing these basic movements. Functional Movement Screen test allows the trainer to begin the process of regaining movement functionality with individuals who have been diagnosed with pathology (Bardennett, Micca, DeNoyelles, Miller, Jenk, & Brooks, 2015). The goal of Functional Movement Screen test is not to identify orthopedic problems but, as a predictor of injury, to detect limitations or asymmetries in healthy individuals (Kiesel, Plisky, & Voight, 2007; Fuller et al., 2017). Tests that can predict injury in different populations (athletes and non-athletes) are very important because of the role they can play in primary prevention (Cosio-Lima et al., 2016).

The 7 movements of Functional Movement Screen test are: Deep squat, Crossing the barrier, Lunge, Active lifting of the outstretched leg in recumbence, Hull stability push-ups assessment, Shoulder mobility, Rotatory stability. (Cook, Burton, Hoogenboom, & Voight, 2014; Cook, Burton, Hoogenboom, & Voight, 2014a)

The aim of this research is to test the functionality of the movement of judokas, karatekas and amateur sportsmen, analyze and draw conclusions about how different sports contribute to the development of movement functionality, and present the specific effects of sports.

Methods

Data in this research was collected using the experimental method, and the research itself, according to the time criterion, is defined as transversal (one measuring point).

Three groups of subjects were involved in this study, and the total number of examinees was 60.The first subsample consisted of 20 judokas, the second subsample consisted of 20 karatekas, and the third subsample consisted of 20 non-athletes (Table 1). The age of the participants was 14.3 years ± 0.22 on average.

Table 1. Physical characteristics of the participants.

Variables	Judokas (n=20)	Karatekas (n=20)	Non-athletes (n=20)
Age	14.1	14.2	14.6
Body height	171.4	164.8	169.5
Body weight	65.7	58.6	58.5

All subjects were physically and mentally healthy and able to undergo testing and analyze the results obtained by testing movement functionality. Before the start of testing every respondent has been informed about the aim of the study. Protocol of study has been explained and every test has been demonstrated. All respondent gave their signature of approval with the possibility of giving up at every moment of testing.

Respondents from the first two groups (judokas and karatekas) have participated in the training process for at least 4 years and have at least 75% training access.

For the purposes of this study, the following 7 variables of Functional Movement Screen test method were evaluated: deep squat, hurdle step, in-line lunge, active straight-leg raise, the trunk stability push-up, rotary stability, shoulder mobility.

The quality of movement performance is evaluated with a score of 1-3, where 1 - the movement was performed completely incorrectly, 2 - the movement was performed with little difficulty and 3 - the movement was performed correctly. Each movement was evaluated 3 times, and the average value in the form of a mode (the most frequent rating) was used as the final grade (Cook et al., 2014; Cook et al., 2014a).

The statistical package SPSS v20 will be used for statistical data processing. Descriptive statistics, discriminatory measurements and a statistical significance test will be used to process the data.

Univariate analysis of variance (ANOVA) and LSD post hoc test were used to analyze differences between groups, and the significance of this test has been determined at the alpha level of $p<0.05$.

Results

Table 2. shows the values of the parameters of descriptive statistics for the group of "judokas". It is noticeable that the skewness parameters in the 3th, 4th and 6th variables are above the normal value of this indicator. Also, the Kurtosis parameters for the 3th and 4th variables are above the normal values.

Table 2. Descriptive statistics of ''judokas'' group

Variables	Range	Min	Max	Mean	SD	Skewness		Kurtosis	
						Statist.	SD	Statist.	SD
Deep squat	1.00	2.00	3.00	2.50	.512	.000	.512	-2.235	.992
Hurdle step	1.00	2.00	3.00	2.30	.470	.945	.512	-1.242	.992
In-line lunge	1.00	2.00	3.00	2.90	.307	-2.888	.512	7.037	.992
Active straight-leg raise	1.00	2.00	3.00	2.90	.307	-2.888	.512	7.037	.992
The trunk stability push-up	1.00	2.00	3.00	2.55	.510	-.218	.512	-2.183	.992
Rotary stability	1.00	2.00	3.00	2.80	.410	-1.624	.512	.699	.992
Shoulder mobility	2.00	1.00	3.00	2.35	.670	-.549	.512	-.548	.992

Note: Min - the level of lowest score; Max - the level of the highest score; Mean - arithmetic mean; SD - standard deviation.

Table 3. shows the values of descriptive statistics parameters for the group of "karatekas". Speaking of data distribution, the values of Skewness for the 3th and 4th variables are slightly above normal values (as in the group "judokas"). On the other hand, all Kurtosis values are within normal values.

Table 4. shows the values for the group of "non-athletes ". It

Table 3. Descriptive statistics of "karatekas" group

Variables	Range	Min	Max	Mean	SD	Skewness		Kurtosis	
						Statist.	SD	Statist.	SD
Deep squat	1.00	2.00	3.00	2.60	.502	-.442	.512	-2.018	.992
Hurdle step	1.00	2.00	3.00	2.60	.502	-.442	.512	-2.018	.992
In-line lunge	1.00	2.00	3.00	2.80	.410	-1.624	.512	.699	.992
Active straight-leg raise	1.00	2.00	3.00	2.80	.410	-1.624	.512	.699	.992
The trunk stability push-up	1.00	2.00	3.00	2.60	.502	-.442	.512	-2.018	.992
Rotary stability	1.00	2.00	3.00	2.75	.444	-1.251	.512	-.497	.992
Shoulder mobility	.00	3.00	3.00	3.00	.000	.	.	.	.

is noticeable that the skewness parameters in the 6th variable are above the normal. The Kurtosis parameters for all variables are within normal values.

Based on Table 5, which shows the results of the ANOVA test, it is noticeable that in 4 variables exist statistically significance between some groups, even at the value of p <0.01. These 4 variables are: deep squat, active straight-leg raise, rotary stability, and shoulder mobility.

Table 6. shows the results of the LSD post hoc test. This test

Table 4. Descriptive statistics of "non-athletes" group

Variables	Range	Min	Max	Mean	SD	Skewness		Kurtosis	
						Statist.	SD	Statist.	SD
Deep squat	2.00	1.00	3.00	2.05	.604	-.012	.512	.189	.992
Hurdle step	1.00	2.00	3.00	2.40	.502	.442	.512	-2.018	.992
In-line lunge	1.00	2.00	3.00	2.65	.489	-.681	.512	-1.719	.992
Active straight-leg raise	1.00	2.00	3.00	2.50	.512	.000	.512	-2.235	.992
The trunk stability push-up	2.00	1.00	3.00	2.20	.695	-.292	.512	-.734	.992
Rotary stability	2.00	1.00	3.00	2.35	.587	-.212	.512	-.552	.992
Shoulder mobility	2.00	1.00	3.00	2.70	.571	-1.845	.512	2.861	.992

Table 5. Differences in tested variables analyzed by using ANOVA test

Variables		Sum	Df	Mean Square	F	Sig.
Deep squat	Between the groups	3.433	2	1.717	5.842	.001*
	Within the groups	16.750	57	.294		
	Total	20.183	59			
Hurdle step	Between the groups	.933	2	.467	1.928	.015
	Within the groups	13.800	57	.242		
	Total	14.733	59			
In-line lunge	Between the groups	.633	2	.317	1.890	.016
	Within the groups	9.550	57	.168		
	Total	10.183	59			
Active straight-leg raise	Between the groups	1.733	2	.867	4.940	.001*
	Within the groups	10.000	57	.175		
	Total	11.733	59			
The trunk stability push-up	Between the groups	1.900	2	.950	2.858	.007
	Within the groups	18.950	57	.332		
	Total	20.850	59			
Rotary stability	Between the groups	2.433	2	1.217	5.137	.001*
	Within the groups	13.500	57	.237		
	Total	15.933	59			
Shoulder mobility	Between the groups	4.233	2	2.117	8.180	.001*
	Within the groups	14.750	57	.259		
	Total	18.983	59			

Note: Sum - Measure of variation or deviation from the mean; Df - Degrees of freedom; Mean Square - Represents the variation between the sample means and is used to determine whether factors (treatments) are significant; F - Values of F test; Sig - Statistical significance; * - Statistical significance at level of p<0.05.

shows more clearly where are differences between groups, and in which variables. Thus, the differences are noticeable in following variables: deep squat, active straight-leg raise, the trunk stability push-up, rotary stability, and shoulder mobility.

Table 6. Differences between groups in tested variables analyzed by using the LSD post hoc test

Variables	(I) Group	(J) Group	Mean (I-J)	SD	Sig.	95% Confidence interval	
						Upper	Lower
Deep squat	Non-athletes	Judokas	-.450	.171	.001*	-.793	-.106
		Karatekas	-.550	.171	.001*	-.893	-.206
	Judokas	Non-athletes	.450	.171	.001*	.106	.793
		Karatekas	-.100	.171	.056	-.443	.243
	Karatekas	Non-athletes	.550	.171	.001*	.206	.893
		Judokas	.100	.171	.056	-.243	.443
Hurdle step	Non-athletes	Judokas	.100	.155	.052	-.211	.411
		Karatekas	-.200	.155	.020	-.511	.111
	Judokas	Non-athletes	-.100	.155	.052	-.411	.211
		Karatekas	-.300	.155	.006	-.611	.011
	Karatekas	Non-athletes	.200	.155	.020	-.111	.511
		Judokas	.300	.155	.006	-.011	.611
In-line lunge	Non-athletes	Judokas	-.250	.129	.006	-.509	.009
		Karatekas	-.150	.129	.025	-.409	.109
	Judokas	Non-athletes	.250	.129	.006	-.009	.509
		Karatekas	.100	.129	.044	-.159	.359
	Karatekas	Non-athletes	.150	.129	.025	-.109	.409
		Judokas	-.100	.129	.044	-.359	.159
Shoulder mobility	Non-athletes	Judokas	.350	.160	.003*	.027	.672
		Karatekas	-.300	.160	.007	-.622	.022
	Judokas	Non-athletes	-.350	.160	.003*	-.672	-.027
		Karatekas	-.650	.160	.000*	-.972	-.327
	Karatekas	Non-athletes	.300	.160	.007	-.022	.622
		Judokas	.650	.160	.000	.327	.972
Active straight-leg raise	Non-athletes	Judokas	-.400	.132	.001	-.665	-.134
		Karatekas	-.300	.132	.003	-.565	-.034
	Judokas	Non-athletes	.400	.132	.001*	.134	.665
		Karatekas	.100	.132	.045	-.165	.365
	Karatekas	Non-athletes	.300	.132	.003*	.034	.565
		Judokas	-.100	.132	.045	-.365	.165
The trunk stability push-up	Non-athletes	Judokas	-.350	.182	.006	-.715	.015
		Karatekas	-.400	.182	.003*	-.765	-.034
	Judokas	Non-athletes	.350	.182	.006	-.015	.715
		Karatekas	-.050	.182	.079	-.415	.315
	Karatekas	Non-athletes	.400	.182	.003*	.034	.765
		Judokas	.050	.182	.079	-.315	.415
Rotary stability	Non-athletes	Judokas	-.450	.153	.001*	-.758	-.141
		Karatekas	-.400	.153	.001*	-.708	-.091
	Judokas	Non-athletes	.450	.153	.001*	.141	.758
		Karatekas	.050	.153	.075	-.258	.358
	Karatekas	Non-athletes	.400	.153	.002*	.091	.708
		Judokas	-.050	.153	.075	-.358	.258

Note: * - Statistical significance at level of $p<0.05$.

Discussion

By using the univariate analysis of variance (ANOVA), and analyzing obtained results it is evident that in 4 variables exist statistically significant difference between groups. Thus, those were following variables: deep squat, shoulder mobility, active straight-leg raise and rotary stability.

However, it is much more important to determine the differences between groups for each variable where exist statistical significance, and that was possible by using the LSD post hoc test. Thus, the quality of movement performance between karate and judokas differs statistically only in the shoulder mobility test ($p < 0.01$), in favor of karatekas. It is important to say that the structures of the movements performed by the judokas in the shoulder joint are much more complex compared to the movements performed by the karatekas. However, this fact can explain the difference between judokas and karatekas, since the levers and throws performed on this joint can leave a negative mark, which is later manifested when performing the movement functionality test in that joint. This thesis has not been scientifically confirmed, so it should be considered as a hypothesis.

Non-athletes statistically significant differ from karatekas in 4 tested variables of Functional Movement Screen test: deep squat, active straight-leg raise, the trunk stability push-up, and rotary stability. The group of karatekas has better results in all the above mentioned variables than the non-athletes group. This is proof that karate positively affects the movement functionality of these body parts.

Judokas and non-athletes statistically differ in 2 variables: active straight-leg raise and rotary stability.

When we look at the variables in which non-athletes differ from athletes (in this case karatekas and judokas), it is noticeable that this difference is primarily caused by the structure of the sports themselves. Deep squat movement presents a problem for many non-athletes, since the "neglected" and inflexible tendons and muscles do not allow proper movement. A great number of non-athletes have shortened Achilles tendons, which results in the improper performance of this movement. Also, sports such as karate and judo require athletes to have a high level of muscle and tendon flexibility, which is very significant in reducing the risk of injury. Therefore, the results of athletes in the variable active straight-leg raise are primarily due to the greater flexibility of the biceps femoris (hamstring) of those who exercise in comparison with those who do not. Shoulder mobility is a variable whose results differ from the abovementioned. In this variable, karatekas achieved the best result, followed by non-athletes, and the worst results had group of judokas. It is assumed that the shoulder join of judokas loses its mobility by the long-term of doing this sport, because judo is a sport in which judokas are in constant contact (guard) during the shoulder girdle muscles are under relatively long and heavy load. Another possible reason is that a large number of levers and judo throws being performed over the shoulder part of the body. Although lever techniques are not allowed in competitions at this age, they are applied through the training process, which leaves a mark on the connective tissue of the shoulder girdle muscles. On the other hand, it is evident that in karate do not exist movements which in long term limit the mobility in the shoulder joint, and all exercises in this sport which are used to strengthened shoulder girdle muscles positively affect the coordination ability and performance of movements in this joint. Both karate and judo are acyclic sports, which means that the positions of the body cannot be predicted with great precision. Therefore, during these activities, the body is put into a great number of new positions, which are very unusual for non-athletes. The basis of safely performing torso rotations is a strong musculature that will support those movements. The results in the rotary stability test show that the judokas achieved the best result. They are followed by karatekas, while the worst results were achieved by non-athletes. These results are not surprising, given that judo is a sport that requires different forms of torso rotations, while coping with external resistance during throws and falls, and a judoka is therefore expected to have the strongest muscles that perform torso rotations.

Thus, in this study, as also confirmed in study conducted by Boguszewski, Jakubowska, Adamczyk, & Bialoszewski (2015), non-athletes has the lowest values in all tests. That were especially evident in deep squat, active straight-leg raise and rotary stability, while judokas had the lowest values in variable shoulder mobility, what consider usuall for these type of athletes (Ciz, Štefanovský, Matejová, & Lopata, 2017; Šimenko, 2019).Although karate and judo belong to the same group of sports, this research has proved that they can have different effects on the movement functionality of individual joints (especially the shoulder mobility). Therefore, it is not the same for people (especially for children) to do any kind of sport, because it is evident that they differently affect the development of the human body. This research is also another piece of evidence that specific training content, that determines the structure of the sport, should be used for karate and judo, and that the structure of training units cannot be identical.

On the other hand, generally speaking, if the "karate" and "judo" groups are combined into one group of athletes, the benefits of exercising on the movement functionality are evident. The group of "non-athletes" achieved the worst results in almost all variables, which indicates the importance of exercise for the proper development of the locomotor system. Thus, conducting the Functional Movement Screen test method allows trainers to be aware of the importance of the implementation of individual training type, to improve the movement patterns of athletes (Boguszewski, Jakubowska, Adamczyk, & Bialoszewski, 2015).

Therefore, the basic conclusions of this paper are that training content should be specific to a sport, and that doing sports (in this case martial arts) has a positive effect on proper performing basic movements which humans use in everyday life.

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Conflict of Interest
The authors declare that there are no conflicts of interest.

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References

Baghbani, F., Woodhouse, L.J., &Gaeini, A.A. (2016). Dynamic Postural Control in Female Athletes and Non athletes After a Whole-Body Fatigue Protocol. *Journal of strength and conditioning research*, *30*(7), 1942–1947. doi:10.1519/JSC.0000000000001275

Bardenett, S.M., Micca, J.J., DeNoyelles, J.T., Miller, S.D., Jenk, D.T., & Brooks, G.S. (2015). FUNCTIONAL MOVEMENT SCREEN NORMATIVE VALUES AND VALIDITY IN HIGH SCHOOL ATHLETES: CAN THE FMS™ BE USED AS A PREDICTOR OF INJURY?. *International journal of sports physical therapy*, *10*(3), 303–308.

Bjelica, D., Georgiev, G., & Muratovic, A. (2012). Basic motor abilities of young handball players from Montenegro. *Sport Science, 5*(1), 71-76.

Boguszewski, D., Jakubowska, K.L., Adamczyk, J., & Białoszewski, D. (2015). The assessment of movement patterns of children practicing karate using the Functional Movement Screen test. *Journal of combat sports and martial arts, 6*, 21-26.

Bompa, T. (1999). *Periodization: theory and methodology training*. Champaign, IL: Human Kinetics.

Butt, D.S. (1987). *Personality of the athlete.* New York: The psychology of sport.

Ciz, I., Štefanovský, M., Matejová, L., & Lopata, P. (2017). Functional movement screening of elite judokas. In M. Chren, K. Péliová, & E. Sulovská (Eds.), *Nové vedecké poznatky v gymnastike, tancoch, úpoloch, fitnes a silových športoch* (pp. 13–19). Bratislava.

Cook, G., Burton, L., Hoogenboom, B.J., & Voight, M. (2014). Functional movement screening: the use of fundamental movements as an assessment of function - part 1. *International journal of sports physical therapy*, *9*(3), 396–409.

Cook, G., Burton, L., Hoogenboom, B.J., & Voight, M. (2014a). Functional movement screening: the use of fundamental movements as an assessment of function-part 2. *International journal of sports physical therapy*, *9*(4), 549–563.

Cosio-Lima, L., Knapik, J.J., Shumway, R., Reynolds, K., Lee, Y., Greska, E., & Hampton, M. (2016). Associations Between Functional Movement Screening, the Y Balance Test, and Injuries in Coast Guard Training. *Military medicine*, *181*(7), 643–648. doi:10.7205/MILMED-D-15-00208

Cox, R.H. (1994). *Sport psychology: concepts and applications.* Dubuque: Brown and Benchmark.

Fuller, J.T., Chalmers, S., Debenedicts T.S., Townsley, S., Lynagh, M., Gleeson, C., Zacharia, A., Thomson, S., & Magarey, M. (2017). High prevalence of dysfunctional, asymmetrical, and paintful movement in elite junior Australian Football players assessed using the Functional Movement Screen. *Journal of Science and Medicine in Sport*, *20*(2), 134–138. doi:10.1016/j.jsams.2016.05.003

Janicki, J.J., Switzler, C.L., Hayes, B.T., & Hicks-Little, C.A. (2017). Correlation Between Ankle-Dorsiflexion and Hip-Flexion Range of Motion and the Functional Movement Screen Hurdle-Step Score. *Journal of sport rehabilitation*, *26*(1), 35–41. Doi:10.1123/jsr.2015-0070

Kajmovic, H., Radjo, I., & Mekic, A. (2011). *Judo: Analiza situacijske efikasnosti.* Sarajevo: Fakultet sporta i tjelesnog odgoja.

Kapo, S. (2012). *Karate pronađi svoj put.* Sarajevo: Fakultet sporta i tjelesnog odgoja.

Kiesel, K., Plisky, P.J., & Voight, M.L. (2007). Can Serious Injury in Professional Football be Predicted by a Preseason Functional Movement Screen?. *North American journal of sports physical therapy, 2(*3), 147–158.

Malacko, J., & Radjo, I. (2004). *Tehnologija sporta i sportskog treninga.* Sarajevo: Fakultet sporta i tjelesnog odgoja.

Milanovic, D. (2013). *Teorija treninga*. Zagreb: Kineziološki fakultet.

Radjo, I., Kajmovic, H., & Kapo, S. (2001). *JUDO*. Sarajevo: Fakultet za fizičku kulturu.

Saint-Phard, D., Van Dorsten, B., Marx, R.G., & York, K.A. (1999).Self-perception in Elite collegiate female gymnastics, cross-country runners and track-and-field athletes. *Mayo Clinic Proceedings, 74*(8), 770-774.

Šimenko, J. (2019). The benefits of Functional Movement Screen in judo. *Revista de Artes Marciales* Asiáticas, *14*(2s), 18-20. DOI: 10.18002/rama.v14i2s.5988

Weinberg, D.S., & Gould, D. (1995). *Foundations of sport and exercise psychology*. Champaign, IL: Human Kinetics.