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Police Officers' Motor Abilities and Their Link to Martial Arts Achievements

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Purpose:

The objective of this paper is to determine the link between police officers' motor abilities and their achievements in the martial arts.

Design/Methods/Approach:

The research involved a sample of 140 police officers employed by the Ministry of Internal Affairs of the Republic of Croatia.

The sample of criterion variables involves evaluating five groups of elements that are used to assess the quality of performing martial arts elements: N1 – strikes and blocks; N2 – judo falls and throwing; N3 – arrest techniques; N4 – defence against an unarmed attacker; and N5 – defence against an armed attacker. The quality of a performance was evaluated by three kinesiologists who are martial arts instructors.

The sample of predictor variables involves 17 tests for assessing motor abilities and one test for assessing functional abilities.

Findings:

Regression analyses revealed a significant correlation between the predictor variables and each of the five criterion variables. The link between the police officers' achievements in the martial arts and their motor abilities was defined according to the following variables: side steps, standing long jump, throwing a 3-kg medicine ball, push-ups in one minute, overhand grip pull-ups on a bar, and squats in one minute.

Value:

It may be concluded from the research results that attention should be paid in the martial arts training of police officers to developing and improving their coordination, agility, as well as their explosive and repetitive strength.

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Keywords: police, police officers, self-defence, motor abilities, Croatia

Povezanost motoričnih sposobnosti policistov in njihove uspešnosti pri borilnih veščinah

Namen:

Namen prispevka je ugotoviti povezanost motoričnih sposobnosti policistov z njihovo uspešnostjo pri borilnih veščinah.

Metode:

Raziskava je izvedena na vzorcu 140 policistov Ministrstva za notranje zadeve Republike Hrvaške.

Vzorec kriterijskih spremenljivk vključuje 5 skupin elementov, ki se uporabljajo za ocenjevanje kakovosti izvedbe elementov borilnih veščin: N1 – udarci in blokade; N2 – judo padci in meti; N3 – tehnike za privedbo; N4 – obramba pred neoboroženim napadalcem; N5 – obramba pred oboroženim napadalcem. Kakovost izvedbe elementov so ocenjevali trije kineziologi, inštruktorji borilnih veščin.

Vzorec neodvisnih spremenljivk vključuje 17 testov za oceno motoričnih sposobnosti in 1 test za oceno funkcionalnih sposobnosti.

Ugotovitve:

Z regresijsko analizo so bile ugotovljene pomembne korelacije med neodvisnimi in kriterijskimi spremenljivkami. Povezanost med uspešnostjo pri borilnih veščinah in motoričnimi sposobnostmi policistov se kaže v naslednjih spremenljivkah: koraki v stran, skok v daljino z mesta, met 3 kg medicinske žoge, sklece v eni minuti, zgibi na prečki in počepi v eni minuti.

Pomembnost prispevka:

Iz rezultatov raziskave lahko zaključimo, da je treba med treningom borilnih veščin pri policistih posvečati pozornost tudi razvoju in izboljšanju koordinacije, agilnosti, eksplozivne in repetitivne moči.

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Ključne besede: policija, policisti, samoobramba, motorične sposobnosti, Hrvaška

1 INTRODUCTION

Good knowledge of legal regulations applying to the use of coercive measures, a good physical condition, good knowledge of special police skills and the successful realisation of police tactics are a guarantee of the safe conduct of any police task (Zorec, Flander, Čoh, Bračič, & Ribičić, 2010).

Police officers often rely on knowledge of martial arts and skills while performing their duties in situations involving breaches of the public order or when they are under attack (Kosanović, 1988). Police officers with good knowledge of self-defence skills are able to cause minimal or negligible injury to themselves and the person being acted upon by applying coercion (Anderson, Plecas, & Segger, 2001; Bonneau & Brown, 1995; Hoffman, 2012; Osborn, 1976; Suminski, 2005). Martial arts are attributed with primary importance in the execution of all police tasks. They are an integral part of police officers' lives and a necessary means in their work.

By improving martial arts techniques, police officers positively transform their anthropological features, develop their sense of ethics in treating and belonging to a group and to society as a whole. The structure of the techniques helps develop effective and efficient motor action skills. The educational value of martial arts lies in the development of habitual, conscious every-day improvement of the skills and

enhancing one's motor and functional abilities. The aforementioned facts point to the inestimable effect of exercise on police officers' health (Smith & Tooker, 2005; Tooker and Cashwell, 2008). The educational value of the martial arts is also reflected in the formation of new motor skills. The forming of new motor skills is a relevant contribution to awareness of motor skills and an unavoidable part of general culture (Oreb, 1992).

Police training involves programmes for developing and maintaining general physical fitness, learning and applying martial arts and skills, learning how to handle firearms, driving official police vehicles, and other necessary programmes. The high level of ability and knowledge that is developed and maintained during such police training is essential for the safe and successful work of police officers (Anderson et al., 2001; Bawah, 2013; Beck, 2012; Strating et al., 2010). General physical fitness refers to the process of ensuring the balanced and versatile development of all functional, motor and morphological characteristics. It is aimed at improving the condition of all topological body regions, the efficiency of all organs and organ systems, increasing functional and motor skills while considering sensitive development phases and strengthening any weak parts of the locomotor system (Milanović, 2013). The structure of motor abilities is made up of quantitative (intensity, strength, speed, endurance and mobility) and qualitative (coordination, agility, balance and accuracy) motor skills (Meinel & Schnabel, 2007; Metikoš, Gredelj, & Momirović, 1979).

The objective of this paper is to determine the connection between the motor skills of police officers and their achievements in the martial arts, in particular for police tactics, i.e. tactics of police behaviour in situations requiring the use of coercive measures and repelling of direct physical attacks.

2 DESCRIPTION OF THE METHODS, SAMPLE AND INSTRUMENT USED

The research involved a sample of 140 male subjects, namely police officers employed by the Ministry of the Internal Affairs of the Republic of Croatia.

Table 1: Test subject sample – male police officers

Test subjects = 140	Arithmetic mean	Standard deviation
Age, years	39.21	5.20
Height, cm	178.32	6.12
Weight, kg	90.72	12.68

The test subjects were physically healthy, meaning they had passed the medical evaluation for authorised officials. They were informed of the aims and contribution of the research, as well as the fact their participation in it was voluntary. Subjects were able to leave the research protocol at any moment without consequences. The data were collected by martial arts instructors working at the Police Academy of Croatia's Ministry of the Interior.

3 PROCEDURE

The sample of predictor variables is made up of 17 tests for assessing motor abilities and one test of functional abilities.

Motor abilities were measured by the following tests: overhand grip pull-ups on a bar (ZGIB), forward bends lying on the back in one minute (MFETRB), push-ups in one minute (MFESKL), squats in one minute (MFECUC), push-ups on ring grips (SKLRUC), squats with a weight equalling 75% of own weight (CUC75), running 60 metres (T60M), forward bends on a bench (MRETRB), throwing a 3-kg medicine ball lying on the back (MFEBML), standing long jump (MFESDM), side steps (MAGKUS), figure of eight with a bend (MAGOSS), straddle seated forward bend (MFLRAZ), forward bend on a bench (MFLPRE), flex with a stick (MFLISK), foot tapping against the wall (MBRTNZ), and hand tapping against the table (MBRTRS) (Metikoš, Hoffman, Prot, Pintar, & Oreb, 1989).

Functional abilities were measured with a 1,500-m running test (T1500M). The set of predictor variables also includes the variable "subject's age" (DOB), in accordance with the international biological programme (Lohman, Roche, & Martorell, 1988).

The criterion set of variables included the evaluation of five groups of police officers' techniques achieved in the practical part of the examination in martial arts. The following groups of techniques were evaluated:

Table 2: Evaluated groups of techniques

Group	Group elements
N1	postures, movements, strikes, kicks, hand blocks, leg blocks
N2	judo falls, judo throws, holding techniques, joint locking techniques, choking techniques
N3	arrest techniques: key lock on the elbow from the front, key lock on the elbow from the back, breaking passive resistance on the stomach, breaking passive resistance on the back
N4	defences against an unarmed attacker: defences against strikes, kicks, throwing, choking, grabbing
N5	and defences against an armed attacker: defences against an attack with a baton, defences against knife attacks, defences against gun attacks

Techniques of the first group (N1): Movement structures are of a polystructural, acyclic type and consist of strikes and kicks, feinting, hand and leg blocks, parallel and diagonal postures, rectilinear movements and circular movements.

Techniques of the second group (N2): Judo techniques are performed in direct contact with an opponent and their purpose is to symbolically overcome and control the opponent. During a sports fight, this symbolic overcoming may be performed using one of four groups of techniques: throwing (nage-waza), choking (shime-waza), joint blocking (kansetsu-waza), or hold down (osae-komi-waza) (Sertić & Lindi, 2003).

Techniques of the third group (N3): Arrest techniques are used for breaking active and passive resistance while simultaneously controlling the opponent at a maximal level. Normally they finish with the use of handcuffs and arrest. Most arrest techniques are based on joint blocking and are combined with various forms of pronating and supinating a wristlock and gripping (Kosanović, 1988).

Techniques of the fourth group (N4): Defences against an unarmed attacker entail an attacker's actions arranged in advance and the defence reactions of the person being attacked, where all attacks differ in their structure (strikes, kicks, throws, grabs, grips, choking).

Techniques of the fifth group (N5): Defences against an armed attacker entail an attacker's actions arranged in advance and the defence reactions of the person under attack during which the attacker uses their arms (baton, knife, gun).

The collection of the data for this research took 30 weeks. Each police officer was evaluated at the end of a three-week martial arts seminar. Each day, apart from the first three days, the police officers were trained for 90 minutes in fighting techniques prescribed by the Martial Arts and Skills Curriculum of the Ministry of Internal Affairs of the Republic of Croatia. During the first three days the officers' motor and functional abilities were tested.

4 DATA PROCESSING

Data were analysed with the program Statistica 7.0 for Windows (2004; StatSoft, Inc., Tulsa, OK, USA). The Kolmogorov-Smirnov test (K-S) was used to test for the normality of the distribution of the results. To measure the reliability of the multiparticle tests Cronbach's alpha coefficients were calculated, which also represent the evaluators' objectivity measures, while homogeneity measures represent the correlations between individual measurement items (ICC). The procedure aimed at ensuring reliability was applied to the variables presented in Table 3. The relations between motor and functional abilities from one side and the five criterion variables from the other side were determined using regression analysis. A total of five regression analyses were applied (forward stepwise) to calculate multiple correlations (R), determination coefficients (R^2), standard errors of multiple correlation (Std. Err.), unstandardised partial regression coefficients (B), standard errors B (Std. Err. B), standardised regression coefficients (Beta), t-test (t), level of statistical significance of results (Sig.) and the range of values of the unstandardised regression coefficient (B) in a 95% confidence interval (95% CI).

5 RESULTS

The K-S test analysis shows that the distributions of all measured variables do not differ significantly from a normal distribution. Average results in the zone of lower values are present in the following tests: overhand grip pull-ups on a bar (ZGIB) and push-ups on ring grips (SKLRUC) (Table 4). While performing these tests, the subjects were lifting their own body weight (relative strength) so subjects whose body mass index exceeded the upper limit of normal body mass (≥ 25.0) achieved lower results. The body mass index (BMI) 28.52 ± 3.72 kg/m^2 indicates being overweight (World Health Organisation, 2012).

Table 3: Basic descriptive parameters of motor variables

Variables	A. mean	*SD*
Overhand grip pull-ups	4.21	2.95
Forward bends lying on the back in one minute	40.45	8.01
Push-ups in one minute	33.50	9.37
Squats in one minute	48.44	6.05
Push-ups on ring bars	5.56	4.86
1,500-m running (sec)	475.50	57.82
Squats with a weight of 75% of own weight	22.39	10.81
60-m running (sec)	9.01	0.66
Forward bends on a bench	18.04	8.08
Throwing a 3-kg medicine ball lying on the back (cm)	713.19	92.20
Standing long jump (cm)	206.99	22.76
Side steps (sec)	9.28	1.03
Figure of eight with a bend (sec)	18.67	1.49
Straddle seated forward bend (cm)	58.65	10.95
Forward bend standing on a bench (cm)	34.28	5.19
Flex with a stick (cm)	112.98	11.92
Foot tapping against the wall (no. of repetitions)	29.66	3.01
Hand tapping against the table (no. of repetitions)	39.59	3.70

Testing the normality of the distribution of the criterion variables showed they were normally distributed. Such normality of distribution may be explained by the fact that the sample was properly selected and that the subjects were rated in a quality manner by the evaluators.

For the purpose of assessing reliability and the level of objectivity, Cronbach's reliability coefficients were calculated. The homogeneity measure is represented by the correlations between the ratings of the three evaluators (ICC). The total average correlation of the three evaluators' ratings is $R = 0.71$ ($p < 0.05$) (Table 4). The coefficient of the integral average correlation R of 0.71 indicates that 50.0% of the information is shared between them.

Table 4: Correlations between the evaluators' ratings

	$R = 0.71$	$p < 0.05$
Groups of techniques	**Homogeneity ICC**	**Reliability Cronbach's alpha**
N1	0.79	0.92
N2	0.70	0.87
N3	0.75	0.90
N4	0.68	0.87
N5	0.63	0.84

R – coefficient of integral average correlation (total average correlation between evaluators), p – level of significance, ICC – correlations between evaluators' ratings (homogeneity measure)

For the purpose of determining the relationships between the group of predictor variables and each criterion variable the forward stepwise regression analysis was applied. The first predictor variable obtained makes the greatest contribution to explaining the criterion variable, followed by the next greatest variable up to the last predictor variable whose beta coefficient is statistically significant.

The interclass correlation coefficients (ICC) of motor tests that were conducted four times, at the level of $p < 0.05$, are presented in Table 5.

Table 5: Motor test interclass correlation coefficients (ICCs)

Motor test	ICC
MFEBML	0.93
MFESDM	0.98
MAGKUS	0.90
MAGOSS	0.96
MFLRAZ	0.99
MFLPRE	0.96
MFLISK	0.96
MBRTNZ	0.94
MBRTRS	0.93

The regression analysis results (Table 6) show a statistically significant correlation ($R = 0.61$) between the group of predictor variables and the *first criterion variable N1*. The group of predictor variables explains 37% (R^2) of the criterion variable ($p < 0.01$).

A significant contribution to explaining the correlation between the group of predictor variables and the N1 criterion variable is made by the standing long jump (MFESDM) (Beta = 0.22), subject's age (DOB) (Beta = -0.27), push-ups in one minute (MFESKL) (Beta = 0.26), throwing a 3-kg medicine ball (MFEBML) (Beta = 0.22) at the level of statistical significance $p < 0.05$.

The regression analysis results of the group of predictor variables and the *second criterion variable N2* (Table 7) show a statistically significant correlation ($R = 0.58$). The group of predictor variables explains 33% (R^2) of the total variance at

the level of significance $p < 0.01$. The predictors making the greatest contribution to explaining the criterion variable are side steps (MAGKUS) (Beta = -0.34), overhand grip pull-ups on a bar (ZGIB) (Beta = 0.17), throwing a 3-kg medicine ball (MFEBML) (Beta = 0.20) and squats in one minute (MFECUC) (Beta = 0.16) at the level of statistical significance $p < 0.05$.

The correlation between the predictor group of predictor variables and the *third criterion variable N3* (Table 8) is of middle strength ($R = 0.66$). The predictor group of predictor variables explains 43% (R^2) of the total variance at the level of statistical significance ($p < 0.01$). The greatest contribution to explaining the criterion variable was made by the following predictors: side steps (MAGKUS) (Beta = -0.35), squats in one minute (MFECUC) (Beta = 0.23), throwing a 3-kg medicine ball (MFEBML) (Beta = 0.23) and overhand grip pull-ups on a bar (ZGIB) (Beta = 0.19) at the level of statistical significance $p < 0.05$.

The regression analysis of the group of predictor variables and the *fourth criterion variable N4* (Table 9) also showed a correlation of middle strength ($R = 0.66$). The predictor group of predictor variables explains 43% (R^2) of the total variance at the level of statistical significance ($p < 0.01$). The greatest contribution to explaining the criterion variable was made by the following predictors: side steps (MAGKUS) (Beta = -0.37), throwing a 3-kg medicine ball (MFEBML) (Beta = 0.28), overhand grip pull-ups on a bar (ZGIB) (Beta = 0.18) and squats in one minute (MFECUC) (Beta = 0.16) at the level of statistical significance $p < 0.05$.

The results of the regression analysis of the predictor group of predictor variables and the *fifth criterion variable N5* (Table 10) show a statistically significant correlation ($R = 0.61$). The predictor group of variables explains 37% (R^2) of the total variance at the level of statistical significance ($p < 0.01$). The greatest contribution to explaining the criterion variable was made by the following predictors: side steps (MAGKUS) (Beta = -0.40), overhand grip pull-ups on a bar (ZGIB) (Beta = 0.25) and throwing a 3-kg medicine ball (MFEBML) (Beta = 0.19) at the level of statistical significance $p < 0.05$.

Table 6[1]: Regression analysis*

$R = 0.61$ $R^2 = 0.37$ Adj. $R^2 = 0.35$ Std. Err. est.: 0.58

$F(4.135) = 20.03$ $p < 0.01$

	Unstandardised Coefficients		Standardised Coefficients			
Model	*B*	Std. Error	Beta	*t*(135)	Sig.	95% CI (*B*)
(Constant)	1.936	.697		2.780	.006	0.559 – 3.314
MFESDM	.007	.002	.216	2.864	.005	.002 – .012
DOB	-.037	.010	-.265	-3.744	.000	-.056 – (-.017)
MFESKL	.020	.005	.255	3.614	.000	.009 – .030
MFEBML	.002	.001	.223	3.054	.003	.001 – .003

**Regression analysis of the predictor variables and the first criterion variable (N1)*

1 *Abbreviations used in Tables 6–10: R – multiple correlation, R^2 – determination coefficient, adjusted R^2 – adjusted determination coefficient, F – F-test value, p – value of the F-test significance level, Std.err. est – standard estimation error, B – unstandardised partial regression coefficient, Std. Error – standard error B, Beta – partial standardised regression coefficient, Constant (intercept) – segment on the y-axis (B0), t – t-test value of the partial regression coefficient, Sig. – t-test level of significance, 95%CI – range of value of the unstandardised partial regression coefficient (B) in the 95% confidence interval, MFESDM – standing long jump, DOB – subject's age, MFESKL – push-ups in one minute, MFEBML – throwing a 3-kg medicine ball, MAGKUS – side steps, ZGIB – overhand grip pull-ups, MFECUC – squats in one minute*

Table 7: Regression analysis of the predictor variables and the second criterion variable judo_ocj

$R = 0.58$ $R^2 = 0.33$ Adj. $R^2 = 0.31$ Std. Err. est.: 0.47

$F(4.135) = 16.82$ $p < 0.01$

Model	Unstandardised Coefficients		Standardised Coefficients			95% CI (*B*)
	B	Std. Error	Beta	*t*(135)	Sig.	
(Constant)	3.572	.677		5.274	.000	2.232 – 4.911
MAGKUS	-.189	.042	-.341	-4.459	.000	-.273 – (-.105)
ZGIB	.032	.016	.165	2.042	.043	.001 – .063
MFEBML	.001	.000	.204	2.855	.005	.000 – .002
MFECUC	.015	.007	.157	1.994	.048	.000 – .030

Table 8: Regression analysis of the predictor variables and the third criterion variable zahpr_ocj

$R = 0.66$ $R^2 = 0.43$ Adj. $R^2 = 0.42$ Std. Err. est.: 0.53

$F(4.135) = 25.62$ $p < 0.01$

Model	Unstandardised Coefficients		Standardised Coefficients			95% CI (*B*)
	B	Std. Error	Beta	*t*(135)	Sig.	
(Constant)	3.283	.749		4.382	.000	1.801 – 4.765
MAGKUS	-.234	.047	-.351	-4.986	.000	-.327 – (-.141)
MFECUC	.026	.008	.226	3.118	.002	.009 – .042
MFEBML	.002	.000	.234	3.550	.001	.001 – .003
ZGIB	-.044	.017	.187	2.516	.013	.009 – .078

Table 9: Regression analysis of the predictor variables and the fourth criterion variable obnenao ocj

$R = 0.66$ $R^2 = 0.43$ Adj. $R^2 = 0.42$ Std. Err. est.: 0.48

$F(4.135) = 25.73$ $p < 0.01$

Model	Unstandardised Coefficients		Standardised Coefficients			95% CI (*B*)
	B	Std. Error	Beta	*t*(135)	Sig.	
(Constant)	3.436	.687		5.002	.000	2.077 – 4.794
MAGKUS	-.227	.043	-.372	-5.279	.000	-.313 – (-.142)
MFEBML	.002	.000	.284	4.319	.000	.001 – .003
ZGIB	.039	.016	.183	2.458	.015	.008 – .071
MFECUC	.017	.008	.159	2.194	.030	.002 – .031

$R = 0.61$ $R^2 = 0.37$ Adj. $R^2 = 0.35$ Std. Err. est.: 0.45						
$F(3.136) = 26.33$ $p < 0.01$						
	Unstandardised Coefficients		Standardised Coefficients			
Model	*B*	Std. Error	Beta	*t*(136)	Sig.	95% CI (*B*)
(Constant)	4.547	.518		8.776	.000	3.522 – 5.572
MAGKUS	-.216	.039	-.401	-5.470	.000	-.294 – (-.138)
ZGIB	.047	.014	.252	3.467	.001	.020 – .074
MFEBML	.001	.000	.192	2.778	.006	.000 – .002

Table 10: Regression analysis of the predictor variables and the fifth criterion variable obnaoru_ocj

6 DISCUSSION

This research confirms that the measurement tests used are reliable and valid for the analysed population (police officers). The results obtained in previous research are comparable to the results of this evaluation regardless of the differences between the measured populations, namely the level of training, age, gender etc. Even though the above differences necessarily produce different absolute measurement values, the interrelationship of the measurements is nonetheless the same. The difference in the population included in this research is precisely the new contribution made by this paper to overall knowledge in the field.

Generally speaking, there was a statistically significant correlation between the group of predictor variables and the evaluation of all five groups of martial arts techniques (N1, N2, N3, N4 and N5). A significant contribution to explaining the *first criterion variable N1* is made by three variables for assessing motor abilities, explosive leg strength (jumping strength type) (MFESDM), repetitive arm and shoulder girdle strength (MFESKL) and explosive strength of the throwing type (MFEBML), as well as the variable referring to age (DOB) because the younger subjects achieved better results. Roschel et al. (2009) concluded that the achievements of contestants in karate competitions at the international level were significantly influenced by the power and strength of their upper and lower extremities. Strikes and other movement structures in taekwondo are very demanding for most muscle groups, especially the leg and trunk muscles. The activity of the following muscle regions should be emphasised: rectus and oblique abdominal muscles, dorsal and plantar foot flexors, lower leg flexors and extensors, upper leg flexors, upper leg abductors and adductors and lower and upper arm extensors and flexors (Bridge, Santos, Chaabene, Pieter, & Franchini, 2014; Pieter, 1991). Due to the kinesiological structure of strikes, kicks and hand and leg blocks (correct technique with a short-lasting muscle contraction in the technique focus followed by the immediate relaxation of all muscles) and the number of repetitions, the best predictive value was shown by tests that assess the explosive and repetitive strength of the arm and leg muscles.

The second criterion refers to the evaluation of the performance of judo techniques. The best predictive value was shown by variables reflecting agility (MAGKUS), repetitive arm and shoulder girdle strength and repetitive leg strength

(ZGIB, MFECUC) and explosive strength of the throwing type (MFEBML). Sertić, Sterkowicz and Vuleta (2009) state that achievements in judo competitions depend on a factor interpreted as the ability to perform complex motor tasks of the speed-explosive type defined primarily by coordination tests, and that specific movements in the competition were performed fast. Another significant contribution to the assessment in judo competitions was made by the variable arm and shoulder strength and coordination (Banović, 2002). The characteristics of elite judokas as opposed to non-elite ones are their larger upper leg muscle perimeter, power and strength, and especially their stronger upper body muscles (Franchini, Takito, Kiss, & Sterkowicz, 2005).

Arrest techniques (N3) must be performed quickly and without prior indication and signalisation, usually accompanied by distracting the opponent in the initial phase. Power is adjusted according to the strength of the resistance, the severity of the attack and the attacker's persistence to avoid arrest (Kosanović, 1988). Agility (MAGKUS) has the strongest influence on achievements while performing these techniques. It is reflected in each rapid change in the body's centre of gravity in space. Rapid changes of the movement line are enabled by proper leg power (MFECUC), while performing upper body techniques that are of the speed-explosive type (MFEBML) is also allowed by the repetitive arm and shoulder girdle strength (ZGIB).

Defence against an unarmed attacker (N4) is the broadest range of self-defence given the many possible ways of attacking and defending. A timely response to an attack and the quick optimal positioning of the body to defend oneself and to counterattack, by taking control, i.e. a manifestation of agility (MAGKUS), again proved to be the most important ability in predicting the performance of self-defence techniques. Explosive strength of the throwing type (MFEBML) manifests itself in the structure of the vast majority of defence techniques against an unarmed attacker, all withdrawals of attackers for the purpose of unbalancing, a large number of judo throws and all techniques in which the arms are brought close to the body. Accordingly, the variable overhand grip pull-ups on a bar (ZGIB) holds a significant predictive value.

It is more difficult and complex to defend oneself against an attacker who is in possession of a hand tool or arms since such attacks are more dangerous and the consequences may be more serious in the case of an inefficient and poorly timed defence. In this paper, the *fifth criterion variable* (N5), defence against an armed attacker, is forecast by the same predictive variables as the criterion variable (N4).

A total of six variables for assessing motor abilities – side steps (MAGKUS), throwing a 3-kg medicine ball (MFEBML), standing long jump (MFESDM), overhand grip pull-ups on a bar (ZGIB), squats in one minute (MFECUC) and push-ups in one minute (MFESKL) – show statistically significant predictive values when assessing police officers' achievements in the practical part of the martial arts examination.

7 CONCLUSION

It may be concluded from the research results that police officers' martial arts training should pay attention to developing and improving coordination, agility,

as well as explosive and repetitive strength. On the other hand, these motor abilities are normally developed by learning and improving martial arts techniques.

Police officers in the field will act more effectively and with less risk in dangerous situations if they know the legal regulations governing the area of their work, if they are psychologically and physically well prepared, and well trained in self-defence techniques to apply effective arrest procedures. All of these qualifications are conditional on fully professional conduct. When police officers have a professional attitude, one can expect the highest level of safety in the exercise of police tasks, including when coercion is being applied.

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