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Original article

The Relationship Between Motor Abilities and the Performance of the Osoto Gari in Police Students

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Abstract

The aim of the study was to determine the association between motor abilities and the performance of the Osoto Gari (OSOTOG) from the special physical education (SPE) program, as a narrower part of the Physical Education field. The sample consisted of 84 male first-year students from the Faculty of Security Sciences in Banja Luka. The variable sample consisted of sixteen tests for assessing motor skills, which served as independent variables, and the dependent variable, the Osoto Gari, represented the average grades of performing the throwing technique with a backward standing leg from the SFE program. This technique differs from the classic Osoto Gari by its training methodology and level of application in defense or attack situations. Based on the results of the regression analysis, it can be concluded that motor skills are significant for the effectiveness of the throwing technique with a backward standing leg, with 46.4% of the total variability of the dependent variable OSOTOG being determined by the independent variables assessing motor skills. The statistically significant individual contributions to explaining the criterion variable OSOTOG were made by the following variables: hand tapping, side steps, twisting, side lying, forward bend on a bench, and standing long jump, which suggests that these variables are predictive for performing the throwing technique with a backward standing leg from the SPE program. The obtained results could be used to develop certain motor skills to improve the quality of performing the throwing technique with a backward standing leg.

Keywords: Tactical athletes, Self-defense, Use of force, Throwing technique, Police

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Introduction

Within the scope of security duties, martial arts should be understood as a tool for developing specific knowledge, skills, and habits necessary for the successful execution of everyday tasks, assignments, and obligations, particularly when there is no other way to overcome resistance from individuals who pose a physical threat to the safety of authorized personnel, other people, and protected property. Due to the fact that certain programs include throwing techniques within their algorithms, the study program at the Faculty of Security Sciences in Banja Luka, through the curriculum of the Special Physical Education (SPE) course, teaches, in addition to other techniques, hand, foot, and side throwing techniques from judo, which, from the biomechanical perspective of execution, can be divided into: throwing techniques by clearing, throwing techniques by kicking, throwing techniques by grasping and lifting, and throwing techniques by blocking an extended leg. In SPE, throwing techniques represent complex movement structures primarily aimed at destabilizing and inflicting pain on the "opponent" on the path to gaining full control over them (Arlov, 2001).

Like other throwing techniques, the throwing technique by sweeping out the back supporting leg (Osoto Gari throw) is characterized by the phase of destabilizing the opponent's balance, the phase of establishing contact with the opponent, and the phase of executing the throwing technique (Ćirković, Jovanović, and Kasum, 2010; Santos et al., 2014). Each of these phases is characterized by specific movements (trajectories of individual body segments), with maximum interdependence, which is why all these phases are interconnected into one whole. The efficiency of their execution depends on the precise and rapid performance of all phases. The throw is executed from a basic stance and right guard, when the opponent steps back with the right leg, pulling the performer toward them and destabilizing their balance forward. At the moment of balance disruption, the performer, through a reflexive movement, attempts to restore and maintain stable balance by stepping forward with the left leg to the left side, about 15 to 20 cm from the opponent's right foot, thereby fully transferring their weight to the left leg and stabilizing their balanced position. Continuing the action, the performer simultaneously pulls the opponent's right arm towards the waist with the left hand and pushes the opponent's left shoulder and left side of the body to the left with the right hand, destabilizing the opponent's balance. Further, through a strong external twist of the body at a 45-degree angle (with continuous contact with the opponent), the performer brings the opponent into an unbalanced position, reducing their support surface (forcing them to stand on the outer side of the right foot). Next, through a rotation of the pelvis to the left, the performer swings the right leg forward (behind the opponent's right leg, aligning the head and the toes of the right leg), after which, with a simultaneous forward and downward bend of the body, and a strong backward swing of the same (half-bent) leg, the performer establishes contact at the opponent's right knee joint, kicking their leg backward and upward. After making the contact, the performer, with synchronized and powerful pulling of the left hand toward themselves and pushing the right hand downward, throws the opponent in front of them, directing them so that they fall onto their left side on the ground (Koshida, Ishii, Matsuda & Hashimoto, 2017).

The reason why this technique is appropriately applied in the SPE program is that the initial phase of the throw involves pushing the opponent backward. A direct and rapid entry into this throw allows the performer to transfer their body weight onto the opponent, causing them to lose balance because they lack visual contact with the direction in which they are moving. As a result, it becomes more difficult for the opponent to regain stable balance and organize their defense. In performing the technique, force from the entire body must be applied to the opponent, not just from the arms (because the body relies on the lower extremities). Therefore, the lower extremities should be used in synchronization with the upper extremities and the abdominal part of the body (Liu et al., 2021). These movements can be performed in all directions, and their execution requires quick application to prevent the opponent from returning to a balanced position. Throughout all phases of the throwing technique, motor skills such as strength, speed, coordination, flexibility, balance, and precision are involved, which significantly determine the success of the throw's execution (Nurkić, 2005; Segedi et al., 2014; Paspalj & Gužvica, 2017). Additionally, numerous previous studies have shown that the effectiveness

of mastering the content of the SPE course is significantly influenced by the motor skills of the students (Milošević, 1985; Božić, Milošević & Zulić, 1990).

Considering that the processes of orientation and the effectiveness of training are closely linked to motor skills (Sertić, 1997; Sertić & Vuleta, 1997; Banović, 2001; Drid, 2006; Toskić, Lilić & Toskić, 2014; Orr et al., 2019; 2020), the subject of this research was to determine the relationship between the effectiveness of performing the Osoto Gari from the SPE program and the basic motor skills. The aim of the research was to determine the magnitude and direction of the connection between motor skills and the throwing technique with a backward standing leg from the SPE program, i.e., to identify the motor skills that are significant for executing the throwing technique with a backward standing leg, and to determine whether the success of executing this throwing technique can be predicted based on certain motor skills. The basic hypothesis was that there would be a statistically significant connection between motor skills and the efficiency of executing the throwing technique with a backward standing leg, which would make it possible to predict its training and the selection of methods to improve its execution.

Methods

Participants

The sample of participants consisted of 84 male first-year students from the Faculty of Security Sciences, University of Banja Luka, with an average age of 19 ± 0.6 years. All participants were clinically healthy. The basic anthropometric indicators of the tested sample were as follows: height (Ht) = 181.85 ± 6.13 cm, body mass (BM) = 78.43 ± 9.83 kg, and BMI = 23.71 ± 2.43 kg/m^2. Before participating in the study, the participants were familiarized with the procedures and tests used in the study. Only students who voluntarily agreed and signed an informed consent form were tested as part of this study. The study was conducted in compliance with the Declaration of Helsinki for research involving humans and animals, with approval from the ethics committee.

Measurements and Procedures

The predictor variables in the system consisted of variables used to assess the students' motor skills, while the criterion variable was the assessment of the throwing technique with a backward standing leg, which evaluates the technical execution of judo techniques from the SPE program. All tests were conducted in a single indoor session in the same order, following a standardized dynamic warm-up. Passive recovery of three minutes was given between all trials. Unless otherwise indicated, the best of three trials was retained for analysis. The predictor variables were covered by 16 tests to asses Upper and Lower Limb Movement Frequency, Mobility While on the ground and Lateral agility, Balance, Flexibility, Power and Speed, and Muscular strength (Metikoša et al., 1989).

Upper and Lower Limb Movement Frequency

Upper limb movement frequency was assessed using the Hand Tapping Test (HTT). Participants were seated at a table with a wooden board (100 × 25 × 2 cm) placed in front of them. Two circular plates (20 cm diameter) were fixed on the board, 61 cm apart. With the left palm on the board center and the right hand on the left plate, participants tapped the plates alternately with the right hand for 15 seconds, moving as fast as possible. The total number of correctly alternated taps within the 15-second period was recorded.

Lower limb movement frequency was evaluated using the Foot Tapping Test (FTT). Participants sat upright with the dominant foot placed on the left side of a 30 × 60 × 2 cm foot-tapping board featuring a 15 cm central divider. At the start signal, they moved the foot laterally over the divider and tapped both sides of the board alternately as quickly as possible for 15 seconds. The total number of valid taps was counted.

Mobility While on the Ground and Lateral Agility

Mobility While on the Ground was assessed using the Agility L Test (ALT). This test was performed on a 5 × 8 m matted area with four gym mats arranged in an L shape. From a prone start, participants rolled laterally along

the long arm of the "L," crawled backward to a judo jacket held between the knees, executed a forward roll, turned 90°, and performed a backward roll while retaining the jacket. The fastest time of four trials was recorded using a stopwatch.

The Lateral Agility Test (LAT) required participants to perform six complete side-step sequences between two lines taped 4 m apart. From a straddle stance behind the starting line, they moved laterally using a step-together technique (without crossing the legs) to the opposite line and back. Time was recorded to the nearest 0.1 s using a stopwatch, and the best of six trials was retained.

Balance

Balance was evaluated using the Single Leg Balance Test (SLB). Barefoot participants stood on one leg on a balance bench, placing the support foot across the bench's narrow rail while the non-support foot remained above the ground. Arms were held loosely by the sides. The trial ended if balance was lost or if 180 seconds was reached. The longest duration from six trials was recorded with 0.1 s precision.

Flexibility

Three tests evaluated flexibility. In the Shoulder Flexibility Test (SFT), participants grasped a 165 cm × 2.5 cm stick with the left hand fixed on a 15 cm grip mark and the right hand sliding outward while raising the bar overhead. The minimal distance between hands (in cm) achieved over three trials was recorded.

The Side-Lying Leg Abduction Test (SLLA) assessed hip abduction range. Participants lay on their left side on a horizontal board marked from 0–90°, abducted the right leg maximally while keeping the knee extended, and the peak angle at the ankle joint was noted from three trials.

The Forward Bend on Bench Test (FBB) involved standing barefoot on a 40 cm high bench with feet together. Participants slowly bent forward from the hips and reached downward along a calibrated ruler fixed to the front edge of the bench. The furthest reach point, measured in cm beyond the toes, was taken from three attempts.

Power

Power was assessed using three field-based tests. In the Standing Long Jump Test (SLJ), participants jumped forward as far as possible from a two-footed stance on a springboard onto mats, with distance measured from the take-off line to the nearest body contact. The longest of three jumps was used.

In the Medicine Ball Throw Test (MBT), participants lay supine on a mat with arms extended overhead holding a 1 kg medicine ball. They threw the ball backward over the head using a chest pass action. Distance to the first contact point was measured in decimeters; the best of three throws was recorded.

The Handball Throw Test (HBT) required subjects to sit in a straddle position and throw a standard handball forward using an overarm technique. The furthest of three throws was noted.

Speed

Speed was evaluated using the 20 m Sprint Test (20MST). Participants sprinted maximally from a standing start on a 30 m indoor track, with photocells placed at 0 and 20 m lines to record sprint time to the nearest 0.01 s. The fastest of three trials was retained.

Muscular Strength and Endurance

Muscular endurance was assessed through three strength-endurance tests. In the Bench Press Test (BPT), participants performed as many consecutive repetitions as possible with a 30 kg barbell, maintaining proper form and full range of motion. The total number of valid repetitions was recorded.

In the Sit-Up Test (SUT), participants lay supine with knees bent and feet anchored. Holding a 20 kg barbell against the chest, they performed continuous sit-ups, bringing the trunk to an upright vertical position. The

test was terminated upon voluntary exhaustion or loss of form, and the number of correctly executed repetitions was noted.

The Half Squat Test (HST) involved participants performing as many half squats as possible with a 60 kg barbell on the shoulders. Squat depth was controlled using 10 cm high wooden blocks placed on a bench. The number of complete, correctly executed repetitions was recorded.

The trunk endurance test (TEN) is used to assess static trunk strength. The test requires a Swedish box (with two frames removed), a bar, a mat, two stands, a stopwatch, a 15 kg weight, and a measuring tape. It is conducted in a 3 x 2 meter space. The participant sits on the edge of the Swedish box with legs extended while an assistant secures the feet. The participant holds the 15 kg weight with an overhand grip, placing it on the chest, then lowers backward into a fully extended, unsupported horizontal position. A bar is mounted between two stands, 50 cm away from the box, parallel to it, with the bottom edge aligned with the padded surface of the box. The participant's task is to maintain this position using trunk muscle engagement for as long as possible. The outcome is recorded in seconds from the moment the participant reaches the horizontal position with the weight on the chest until the position is no longer maintained. Two trials are performed, and the better result is used for evaluation.

Osoto Gari

The technical level of knowledge in judo among students was assessed based on the execution of the Osoto Gari from the SPE program. The overall education of the throwing technique with a backward standing leg, including learning the parts of the technique, linking them into a whole, and stabilizing the technique, lasted for three weeks and was conducted over six teaching sessions during regular classes with first-year students from the Faculty of Security Sciences, in the second semester, at the martial arts hall of the Faculty of Physical Education and Sport, University of Banja Luka. The efficiency of executing the throwing technique with a backward standing leg was assessed through the average grade on a scale from 5.00 to 10.00, given by five evaluators (experts teaching SFE). Special attention during the assessment was given to specific phases of technique execution, which include destabilizing the opponent's balance, establishing contact with the opponent, achieving the correct position for the throw, and executing the throw itself.

Statistical analyses

The basic measures of central tendency and measures of dispersion of the results were defined using: arithmetic mean (Mean) and standard deviation (Std. Deviation), the minimum achieved result (Min.) and the maximum achieved result (Max.). In order to test the correctness of the data distribution, the Kolmogorov-Smirnov test was used, while regression analysis was applied to determine the relationship between predictor variables and the criterion variable at a significance level of $p = 0.05$. The statistical data processing was carried out on a Pentium 4 PC using the SPSS Statistics 17.0 application software (Hair, J., Anderson, R., Tatham, R., & Black, W., 1998).

Results

Table 1 presents the descriptive parameters of the results for the variables used to assess motor skills and OSOTOG. According to the presented results, it was established that for most of the variables, the results are well grouped. The results of the Kolmogorov-Smirnov test indicated a deviation from normal distribution for the variables: ALT, LAT, SLB, SLLA, and SU.

Table 1. Descriptive indicators of the variables for assessing motor skills and Osoto Gari from the special physical education program.

Variable	N	Mean	Std. Deviation	Min.	Max.	KS p
HTT	84	40.49	6.35	27	59	0.05
LTT	84	32.45	3.90	26	57	0.05
ALT	84	12.87	3.70	9.19	42.25	0.00
LAT	84	9.24	1.40	7.66	17.21	0.02
SLB	84	3.71	2.96	1.09	19.48	0.00
SFT	84	75.18	19.27	30	120	0.09
SLLA	84	72.29	11.33	50	100	0.04
FBB	84	50.73	9.38	28	105	0.14
SLJ	84	248.73	15.16	213	290	0.84
20mST	84	3.31	0.14	2.90	3.75	0.72
MBT	84	130.0	18.19	9.0	18.0	0.22
HBT	84	190.0	32.71	11.5	26.5	0.67
BPR	84	34.98	11.95	16	66	0.17
SU	84	26.77	9.71	12	75	0.03
HSQ	84	23.49	9.06	10	50	0.08
TEN	84	23.46	10.86	10	68	0.06
OSOTOG	84	6.45	1.176	5.0	10.0	0.00

Note: KSp – p-value of the Kolmogorov-Smirnov test; HTT, hand tapping test; FTT, foot tapping test; ALT, Agility L test; LAT, lateral agility test; SLB, single leg balance test; SFT, shoulder flexibility test; SLLA, side-lying leg abduction test; FBB, forward bend on bench test; SLJ, standing long jump test; MBT, medicine ball throw test; HBT, handball throw test; 20mST, 20 m sprint test; BPR, bench press test; SU, sit-up test; HSQ, half squat test; TEN, trunk endurance test.; OSOTOG, Osoto Gari.

Based on the results of the regression analysis, it can be concluded that motor skills significantly ($R = 0.681$, $R^2 = 0.464$, $p < 0.001$) affect the efficiency of the OSOTOG, with 46.4% of the total variability of the dependent variable being determined by the system of independent variables for assessing motor skills. From Table 2, it could be observed that the variables: HTTP, MALT, SFT, SLLA, FBB, and SLJ, individually made a statistically significant contribution in explaining the criterion variable, as confirmed by their Beta coefficients, which indicate that these variables contribute the most to explaining the dependent variable, after accounting for the variance explained by other independent variables in the model. Table 2 provides information on the individual impact of the variables used to assess motor skills on the efficiency of performing the OSOTOG from the SPE.

Table 2. Regression coefficients of motor skills and the Osoto Gari Osoto Gari from the special physical education program.

Model	Unstandardized coefficients		Standardized coefficients	t	Significance
	B	Standard error	Beta		
HTT	-0.05	0.01	-0.27	-2.74	0.00
LTT	0.05	0.03	0.16	1.63	0.10
ALT	-0.02	0.03	-0.06	-0.51	0.60
LAT	-0.21	0.10	-0.25	-2.07	0.04
SLB	-0.00	0.04	-0.00	-0.01	0.98
SFT	-0.03	0.00	-0.54	-4.80	0.00
SLLA	-0.02	0.01	-0.22	-2.00	0.04
FBB	-0.02	0.01	-0.23	-2.10	0.03
SLJ	0.01	0.00	0.21	2.04	0.04
20mST	1.13	0.78	0.13	1.45	0.14
MBT	0.09	0.06	0.15	1.44	0.15
HBT	-0.03	0.04	-0.09	-0.86	0.38
BPR	0.02	0.01	0.19	1.80	0.07
SU	0.01	0.01	0.13	1.07	0.28
HSQ	-0.00	0.01	-0.06	-0.57	0.56
TEN	0.00	0.01	0.06	0.54	0.59

Note: HTT, hand tapping test; FTT, foot tapping test; ALT, Agility L test; LAT, lateral agility test; SLB, single leg balance test; SFT, shoulder flexibility test; SLLA, side-lying leg abduction test; FBB, forward bend on bench test; SLJ, standing long jump test; MBT, medicine ball throw test; HBT, handball throw test; 20mST, 20 m sprint test; BPR, bench press test; SU, sit-up test; HSQ, half squat test; TEN, trunk endurance test.; OSOTOG, Osoto Gari

Discussion

The primary problem of this research is to analyze the structure of the importance of motor skills for performing the throwing technique with the rear foot. Based on the set problem, the goal of the research was to identify the motor skills that are significant for performing the throwing technique with the rear foot, or to determine whether the success of performing the throwing technique with the rear foot can be predicted based on certain motor skills. The results of the regression analysis showed that the applied set of predictor variables is highly correlated (0.68) with the criterion variable, with the system of predictor variables explaining a total of 46.4% of the variance in the throwing technique with the rear foot. The predictor variables with the highest partial correlations with the criterion variable are: HTT, SFT, LAT, FBB, SLLA, and SLJ. Based on the obtained information, it can be asserted that in order to efficiently perform the throwing technique with the rear foot, one needs to have a good frequency of arm movements, flexibility in the shoulder girdle, torso, and hip joint, explosive strength of the lower extremities, and agility. The throwing technique with the rear foot is performed in accordance with biomechanical principles, with maximum speed and optimal force levels, during which the relationships between the body segments change. The execution of the technique is based on the biomechanical principle involving two forces, where one vector represents the force created by the

performer's arms, while the other vector represents the force created by the action of the rear foot's thrust (Sacripanti, 1989; Santos, 2001; 2014; Imamura & Johnson, 2003; Kuleš, 2008; Rexhepi & Hraski, 2011; Koshida et al., 2016; 2017). It is very difficult to isolate a single motor skill and determine its impact on the execution of the throwing technique with the rear foot, because the quality of its performance is influenced not only by one motor skill but by several of them. As is already well-known, the technique is classified as a complex movement structure, as it consists of different but fluid movements and actions combined into a whole. In the first phase of the throw, when disturbing the opponent's balance, in addition to the work of the arms, the greater contribution comes from the explosive strength of the lower extremities (especially if the opponent is standing still or not moving appropriately to suit the performer). It should be emphasized that if the movement is appropriate for the performer, the contribution of explosive strength only multiplies the positive effects of the movement. When establishing contact with the opponent in the second phase of the throw, the first part refers to the initial entry into the throw (while contact with all points of the body has not yet been made), where, during the change of direction, the impact of agility and speed is emphasized. In the second part (which refers to achieving the necessary contact of all body points with the opponent's body), speed still remains the dominant factor for the performer. The final phase of the throw must be performed with full strength in order for the opponent's body to achieve maximum speed and falling amplitude (Kuleš, 2008), with the most significant influence being explosive strength (Sertić and Segedi, 2013).

The results show that the average rating of the effectiveness of executing the throw by pushing the standing leg from behind is 6.45. This relatively low average rating is most likely influenced by certain irregularities noticed by the examiners during the execution of specific phases of the technique, such as improper positioning of the performer in relation to the opponent or incorrect movement of certain body segments during the disturbance of the opponent's balance and establishing contact with the opponent's body (as a prerequisite for the technique's execution), as well as improper movement of certain body segments during the actual execution of the technique. For example, the performer's right hand remains in a holding position without performing any action while pulling the opponent off balance; the initial grip made by the performer with the left hand is at the height of the opponent's right shoulder; there is a significant separation in the sagittal plane between the right side of the performer's chest and the right side of the opponent's chest during the throw; the performer's ankle forms a right angle with the leg during the action; the 'cutting' action is interrupted in its final phase (posterior ascending) because the hip joint does not complete extension but only forms an angle of 25% relative to the vertical; the performer's trunk bending during the leg push is insufficient as it does not exceed 45% of flexion relative to the vertical; during the final phase of the 'cutting' when lifting the leg that executes the push, flexion (bending) occurs at the knee joint. Due to the kinematics and dynamics of the technique of pushing the leg from behind, a disturbance in the body's balance occurs, especially pronounced in the second phase of execution, where rapid compensatory movements are made with the body and head moving forward. At this point, the performer's support area is reduced because they are on one leg, requiring them to shift the entire body weight to the front of the standing foot in order to fully control the opponent's fall to the ground. The role of the standing (left) leg of the performer is to maintain a stable position during the execution of the throw, while the other (right) leg quickly and with full force swings backward in a 'cutting' motion to push the opponent's standing (right) leg. Just before the moment of 'cutting,' i.e., detaching the opponent's leg from the ground, the performer's standing leg tends to extend at the knee joint, which helps raise the opponent's center of gravity, highlighting the flexibility of the trunk, the back part of the thigh muscles, and the hip joint. Since, just before executing the throw, the entire weight of the opponent is on their right (standing) leg, and considering that the final phase of the throw must be executed with full power (to achieve maximum speed and amplitude of the opponent's fall), the speed of the performer's swinging leg during the 'cutting' phase is a very important factor for applying strong force to the opponent's standing leg during the execution of the throw. This highlights the explosive strength of the lower limbs and the flexibility of the trunk and hip joint. These findings are confirmed by the research of Gleeson (1967); (1977); Geesink

(1977); Sarabia (1985); Kolichine (1989); Imamura & Johnson (2003); Suárez & Cortegaza (2003); and Suarez & Baker (2005).

The reason for this level of achievement in executing the technique can be attributed to the relatively small number of training sessions. The participants, within the limited time of three weeks, were unable to perform the optimal number of repetitions, which prevented them from effectively mastering or automating the taught elements of the technique. The available number of classes not only did not provide them with the opportunity to master the external form of the technique, but also hindered them from acquiring the internal form, which involves achieving the optimal dynamics and kinematics defined by the given execution criteria. Furthermore, considering the complexity of the observed technique, such a result is somewhat expected, as it is a complex technique that requires a high level of motor and cognitive abilities. Research results by Marchoka (1988), Bratić (1993), Sertić (1993), Rađo (2001), Nurkić (2005), Sertić, Sterkowicz, & Vuleta (2009), Segedi, Sertić & Leško (2014), Paspalj & Gužvica (2017), Popović et al. (2016; 2018), Popović & Popović (2023), examining the relationship between basic motor abilities and complex motor tasks (judo techniques), support this claim. The results of individual correlations between judo techniques and the system of motor variables showed that for the judo technique Osoto-gari, there is a statistically significant relationship with motor ability variables, most often explained by variables measuring speed, explosive strength, flexibility, coordination, speed, and balance. It has been proven that participants who had these abilities at a higher level mastered the judo technique of Osoto-gari much better and in a shorter period of time.

The study is limited in that it only investigated the impact of motor abilities on the efficiency of performing the Osoto Gari from the SPE. Based on research by Rađo, Kajmović, and Kapo (2001), it has been proven that, in addition to the motor ability of balance, cognitive processing is most strongly associated with the execution of the judo technique Osoto Gari. The fact that the execution of this technique does not solely depend on motor abilities has been demonstrated by Marchocka, Nowacka & Sikorski (1984); Marchocka (1988); Sertić (1993); Francini et al. (2001); Franchini, Takito, & Bertuzzi (2005); Krstulović Žuvela & Katić (2006); Jagiello, Kalina, & Korobrelnikow (2007); Paillard, Montoya & Dupoi (2007); Sterkowicz, Leach & Almansba (2007); and Sertić, Segedi & Žvan (2007), who found a statistically significant relationship between latent anthropometric dimensions and the execution of the judo throwing technique. Furthermore, they found that body volume and mass, as well as longitudinal and transversal body dimensions, contributed to the establishment of a connection between latent anthropometric variables and the quality rating of the execution of the Osoto-gari throwing technique.

Conclusion

The study examined the impact of motor abilities on the efficiency of performing the Osoto Gari from the SPE on a sample of 84 first-year students from the Faculty of Security Studies, University of Banja Luka. Regression analysis revealed a significant relationship between the efficiency of performing the rear leg push throwing technique from the SFE program and the selected set of predictor variables for assessing motor abilities. The variables that made a statistically significant contribution to explaining the criterion variable OSOTOG individually were: Hand Taping, designed to assess hand movement frequency speed, Lateral agility, designed to assess the ability for rapid direction change, Shoulder Mobility, designed to assess shoulder joint mobility, Side Lying Leg Abduction, designed to assess hip joint lateral flexibility, Bench Forward Bend, designed to assess body flexibility, and Standing Long Jump, designed to assess explosive strength in the lower extremities. These findings suggest that the above variables are predictive for performing the Osoto Gari from the SPE program. Based on the results of the regression analysis, it ccould be concluded that the efficient execution of the rear leg push throwing technique depends on motor regulation mechanisms responsible for structuring, controlling, and regulating movement, with the participation of flexibility in the shoulder and hip joints, as well as full-body flexibility and explosive strength of the lower extremities. This confirms the main hypothesis, allowing predictions for training the throwing technique and the selection of appropriate methods

for its improvement. The obtained results are consistent with previous studies that explored the relationship between motor abilities and the efficiency of throwing techniques in judo. The significance of this research also lies in the fact that the results can be used during the selection process for admission to the Faculty of Security Studies, as well as during student orientation in choosing the appropriate technique, considering the predictive significance of manifest and latent dimensions, based on which it is possible to predict success when applying appropriate throwing techniques to solve problem situations that may arise in the performance of official duties and tasks in the field of security.

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