



Influence of special coordination exercises on the level of policemen's self-defence skills

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Abstract

Introduction: The main aim of the study was to find out the impact of special coordination training on the level of technical skills in the field of self-defence on a policeman during basic vocational training. **Method:** The studies used the classical experiment method and the parallel group technique. The study was carried out using the classic experiment with a pre-test (1st measurement) and post-test (2nd measurement), and included the following groups: research (experimental teaching shaping coordination skills) and control (traditional teaching). **Results:** In both the experimental and traditional training groups, there was an improvement in the rating of defence against each of the three attacks. Simple effects analyses were performed, which showed that the increase in self-defence skills was higher in the experimental training group than in the traditional training group. **Conclusions:** Experimental training, which takes into account the development of coordination skills in its training, contributes to a better improvement of the ability to repel an attack than traditional training. A higher level of skills in the field of repelling an attack on a policeman allows for the conclusion that without the need to increase the number of hours of program training, it is possible to more effectively prepare policemen to act effectively, adequately and safely during an intervention.

Keywords: self-defence, coordination skills, police, training

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INTRODUCTION

The intervention activities of policemen concern a sensitive area on the border of fundamental rights and freedoms of every citizen, on the one hand, and on the other hand, the personal safety of the police themselves. This requires professional training and preparation for the service of newly recruited officers. The importance of this area of educational activity is so important that it can often refer to the most protected values - human life and health. Appropriate psychophysical predispositions seem to be of special importance here. Society expects above-average somatic-motor and personality predispositions from candidates for work in uniformed services. Candidates for the police undergo a multi-stage process of selection for the service, which includes, among others, physical fitness tests and psychological tests. After passing the qualification procedure, people are referred to the police school in order to undergo several months of basic vocational training. During the basic training, they learn the necessary rules and theoretical knowledge, as well as undergo practical training in tactics and intervention techniques (developing motor skills and mastering special motor skills), giving first aid or shooting training.

Some authors note that motor conditioning and coordination abilities are closely related to each other. By developing one, the other is also shaped indirectly. However, this tendency is more often of a one-way nature, i.e. the development of coordination skills significantly increases the level of fitness. On the other hand, the accentuated development of some conditioning abilities may impair increasing the level of coordination abilities. Coordination skills are more genetically determined. Their level is used to recognize not only the motor and psychological properties of the individual and the efficiency of the central nervous system [1,2].

Coordination (informational) motor skills are currently viewed as integrated psychomotor properties predominantly determined by the functions of the central nervous system. In the complex of potential properties of the organism determining the level of a person's motor fitness, the coordination of motor skills plays a special role. They are a necessary condition for every form of motor activity and, to a decisive extent, they determine the effectiveness of an individual's motor actions and behaviour. It is also not without significance that a high level of motor coordination development correlates with high intellectual efficiency. Sets of tests are used to assess specific coordination abilities [3].

In the research and literature of various authors, a different number of basic coordination abilities can be discerned, ranging from 5 to 11. An approach that distinguishes seven specific coordination motor abilities is common. A considerable consensus of views has already been achieved (despite many different concepts) as to the need for differentiated characteristics, diagnosis, and stimulation of the coordination area of motor skills. In this procedure should be taken into account, *inter alia*, human capabilities in the field of sensory feeling, spatial and temporal orientation, control of the organization and order of movements, quick response to various signals, maintaining balance, merging motor acts, and motor adaptation [3].

Studies of various sports disciplines prove that for the master level of mastery of sports technique, a high level of motor coordination skills is necessary, which in this situation are of fundamental importance [4]. Movement skill must be associated with goal-directed movement. Pointless movements cannot be called motor skills. Various definitions of skills can be found in this literature. Motor skill is a goal-oriented and task-specific movement (movements) that must be learned [5]. Other common definitions of motor skills are: "an activity or a task with a specific goal or intention", "movements whose performance depends on exercise and experience, as opposed to genetic movements" [6]. Motor learning is the learning of motor skills. The ability to repel attacks directed at a policeman is characterized by a sudden course, often in a new situation and changing conditions. Therefore, it is important to carry out training in different circumstances, which increases the possibility of effective use of skills in a new situation.

The curriculum in the field of tactics and intervention techniques, as well as the nature of the police actions undertaken, mainly focuses on dealing with a changing and unpredictable environment. When teaching policemen utilitarian skills, it should be remembered that these should be open movement habits, i.e. movements performed in various ways, as a movement response to changing situations. The area of acquiring motor skills by police officers seems to be still insufficiently explored. The characterized energetic, hybrid and coordination abilities constitute the basis of individual, all-

round motor efficiency. In the training of officers of uniformed services, shaping them is the goal of general fitness training (shaping comprehensive motor skills). Utilitarian skills, taught by policemen during basic vocational training, in their motor characteristics are similar to the techniques used in sports and martial arts. Self-defence skills, now observed in Western culture, come mainly from the Far East martial arts. Experts point to the need for specialized training, as the effectiveness of self-defence requires quite a lot of versatility in training and the selection of really effective techniques as well as appropriate teaching methods and psychological knowledge. Self-defence and its importance are not always perceived in the same way by various experts [7-8].

The methodology of training Polish policemen in the field of tactics and intervention techniques is based on the methodology of physical education, taken from combat sports and martial arts, and selected self-defence systems. Training in sports and martial arts covers many years of preparation, taking into account both the gradual mastery of the technique and fitness preparation. Unlike athletes, police officers are not subjected to many years of training, but only several months of basic training [9].

The study of natural defence reactions was carried out in a group of soldiers and city guards. A test was used that consisted of the usual attacks: throat grab, clasp on clothing with both hands in front, straight forward kick, and round kick to the thigh. The attacks were performed with constant force and speed that prevented the occurrence of an injury [10]. The applied method of Sterkowicz and Gula allowed for the analysis of the behavior of the attacked person. However, the organisation of such research has eliminated the element of surprise that can be decisive in a real emergency. Moreover, the attack techniques used in the test do not fully reflect the ways in which the perpetrators of the assault on policemen acted. Policemen are most often attacked by punching in the face, tearing clothes, attacking with a blunt or sharp tool [11]. Technical development, conducive to better equipping policemen with modern equipment, appropriate legal regulations, training and professional development have a significant impact on the level of personal safety of the intervening officers. However, despite these factors, nearly 88% of respondents consider their work to be dangerous. Among the many reasons for this, the policemen mention aggression, both verbal and physical, directed against the intervening officer in the service. Almost 86% of the respondents encountered verbal aggression in the form of vulgar terms, shouting combined with threats, and attempts to depreciate the profession during the performance of official activities. On the other hand, almost 58% of the respondents experienced various forms of physical aggression. The most common were: jerking clothes (47%), swinging an arm or a leg indicating an attempt to hit or kick a policeman (41%), a direct hit with a hand or a leg (23%), an attack with a firearm, bladed weapon or other objects that could lead to severe bodily injuries and even death (12%). Also, 55% of the surveyed policemen experienced verbal and physical aggression outside the service [12]. The physical education of policemen has primarily a utilitarian value. The whole process is about improving the body as well as teaching movement.

The results of the research on motor fitness and the analysis of tasks performed by policemen clearly indicate that they are an occupational group exposed to physical aggression above average. This, in turn, is closely related to the psychological aspect resulting from the reaction to an unexpected threat, a physical attack. The types of threats faced by police officers in the service do not have extensive documentation in the literature, and knowledge on this subject is necessary to prepare a training program necessary to raise the level of policemen's ability to repel an attack. With a limited number of hours during training, you should use the appropriate methodical method to achieve the desired training effect. This was the intention of the original project discussed in this article, which documented the research during which specialized coordination exercises were used. After being accepted into the service, police officers are referred for basic vocational training to one of the police training units. In terms of program content, the article takes into account the legal status that was in force at the time of the research. Basic vocational training is carried out in a stationary system. The training period covers 124 training days, i.e. 968 teaching hours. The training program has been divided into 10 Modular Units. Modular Unit No. 10 Tactics and Intervention Techniques consists of 5 School Units and includes 132 lesson hours: developing physical fitness (16 hours), using physical force as a means of direct coercion: using punches and kicks, techniques of bringing to the ground floor, leverage, choking, techniques of defence against various types of attacks (48 hours), technical

skills for the implementation of police interventions: the use of grips and transport levers, techniques of overpowering people and putting on handcuffs, using technical means of direct coercion (20 hours), using a truncheon as a measure direct coercion (20 hours), intervention tactics (28 hours) [9].

Many experimental studies have shown a close relationship between the level of coordination skills and the learning outcomes of motor skills [13-15]. This is expressed primarily in the reduction of the time needed to learn motor skills, their better mastery and more effective use in various changing conditions and situations. Thus, the results of the research confirm the views indicating that the process of teaching motor skills should not be carried out in isolation from the process of motor improvement, especially coordination [16,17]. However, the relationship between motor coordination skills and the degree of mastering the ability to repel attacks on a policeman has not been studied so far. This issue is important because these issues directly concern the health and life of policemen who intervene. The necessity to carry out research on coordination was also noticed by Bukowiecka in her doctoral dissertation on the system of diagnosing the physical fitness of police officers [18].

A number of research attempts were undertaken on the possibility of effective action in real self-defence situations, taking into account the psychological aspect. Scenario training was used as a tool in self-defence research and training. An important factor in this type of training is the presence of mental stress and a dynamic situation. The respondents admitted that they felt fear and the physiological symptoms of stress described in the literature were noted: trembling with fear, sweat, palpitations [19-21]. In the research of Dutch policemen, attention was drawn to the need to modify both the principles of selection for service and training programs. The subjects of the study claimed that the taught techniques of self-defence are moderately useful in interventions [22].

The problem of coordinating motor skills in martial arts is still being addressed by domestic and foreign researchers. The results of many studies indicate the existence of a relationship between the technical level and coordination skills [23-25]. The experiment carried out on a group of students of the Military University of Technology showed that a higher level of special physical fitness (identified with the effectiveness of actions during simulated interventions, the so-called "defensive double-fight") of cadets who have completed the original program allows, within a short period, without the need to increase training hours, to prepare the soldiers at a good level to carry out the most difficult activities during the "operations other than war" - that is, interventions requiring, above all, the use of force against the enemy in a relatively gentle manner [26].

The classic experiment, which was a project examining the impact of special coordination training on increasing the ability to repel attacks on a policeman, was carried out in natural conditions, taking into account the authentic course of the teaching process. The surveyed policemen participated in training in a barracked system at the Police Training Center. The training period was 124 training days - 968 teaching hours (6 months and one week). In their free time, the students had the opportunity to use the CSP sports facilities: a track, an obstacle course, a team game hall, a mat room, a swimming pool, and a gym.

In this work, the authors looked for an answer to the question whether coordination exercises had a significant impact on the effectiveness of teaching self-defence skills during basic vocational training. Only men were included in the research, as they constitute the vast majority of Polish police officers. The main hypothesis was adopted that coordination exercises significantly increase the effectiveness of teaching policemen's self-defence skills during basic vocational training. The main objective of the research was to enrich knowledge about the physical education of Polish policemen and to examine the impact of coordination exercises and the level of coordination of motor skills in general on the level of skills in the field of repelling attacks on a police officer. The basis of this project were two basic vocational training programs for police officers - traditional and experimental (original). The following main research questions were formulated: what is the effectiveness of teaching self-defence skills of policemen participating in training conducted with the experimental method (shaping coordination motor skills) compared to policemen participating in traditional training?

MATERIAL AND METHODS

Subject

Due to the organizational possibilities, the research was conducted at the Police Training Center in Legionowo (CSP). A total of 1,539 people participated in basic vocational training at CSP during the research. From among the planned trainings, a course marked with the symbol SZP-5/16 was selected at random, from which people were then selected for the study. From among 503 policemen, 96 participants were again randomly selected and then randomly assigned to one of the two research teams. Ultimately, there were 48 people in each group (experimental and control).

The study included $N = 96$ men aged 20–30 undergoing six-month basic vocational training in the police in a semi-annual form. The mean in age in the entire sample was $M = 25.29 (\pm 2.77)$, and in the division in the research group, respectively $M = 25.21 (\pm 2.90)$ among people who underwent the experimental type of training and, $M = 25.38 (\pm 2.66)$ in a team with a traditional type of training. The policemen were also tested in terms of BMI and physical activity. The mean BMI in the entire sample was $M = 25.43 (\pm 2.76)$, and in the division of the research group, respectively, $M = 25.40 (\pm 2.76)$ in the experimental condition and $M = 25.46 (\pm 2.78)$ in the traditional training condition. Among the respondents, 29.76% of people declared that they did not practice sport, and 62.4% of people did sport. In the case of sports and martial arts, fewer people reported training, 24%, and almost three times more people, 68.16% said that they had not dealt with combat sports and martial arts at all.

Additionally, the subjects were questioned about the physical aggression experienced in their life. Of all the respondents, the vast majority, 66.24%, did not have to deal with it, 13.44% of people declared that they had experienced physical aggression once in their life, 6.72% - twice, 4.8% - three times, and only one person has experienced physical aggression 5 times in a lifetime. It was decided to study only men due to the fact that they constitute the majority in the police (approx. 85%) and also because due to sexual dimorphism they differ from women in the level of motor skills. The groups distinguished in this way will be as homogeneous as possible (which facilitates the formulation of conclusions, but narrows the scope of research to a smaller population), and at the same time well reflects the age structure of newly recruited officers.

Protocol

The method of the classic experiment was used in the research. In the applied model of testing the hypotheses about the dependencies between the dependent variable and the independent, main variable, attention was paid to manipulating the independent variable, controlling other variables, side effects and confounders, considered by the researcher to be important for the dependent variable, measuring the variability of the dependent variable caused by the researcher's intention the impact of the independent variable on it [27]. In this study, the parallel group technique was used. The study was carried out using the classic experiment with a pre-test (1st measurement) and post-test (2nd measurement), and included the following groups: research (experimental teaching shaping coordination skills) and control (traditional teaching).

The dependent variable was self-defence ability, and the index was the rating of competent judges. The type of training - levels: experimental training vs traditional training, is an independent variable. Self-defence skills were tested with the help of three independent, competent judges with appropriate qualifications and experience in assessing the skills of police officers. Competent judges documented the assessment on the VAS scale.

In terms of the ability to repel attacks, attention was paid to creating a situation similar to the actual surprise attack. In the pretest, the men were informed that they would be attacked in the second part of the building. On the way to the indicated place, they were unexpectedly attacked by the instructor in a controlled manner. After interrupting the fight that lasted several seconds, they received information that the test was over and that they could rest in the adjacent room. When they entered it, the attack was repeated (without any prior announcement) and again lasted a few dozen seconds. This was the second part of the study. In the third part, the subject of the experiment, after entering the next room, was ordered to help the attacked policeman. The policeman's defence process at the time of the attacks was recorded on the monitoring cameras of the training facilities of the Police

Training Centre (vision and sound). Experienced instructors were the perpetrators, and the entire trial was directly supervised by the conciliator.

Three parts of the study on the ability to repel attacks on a police officer were prepared on the basis of scenarios developed on the basis of actual incidents from the police service. First scenario: pushing with both hands to the chest, then grasping the clothes in front with one hand and striking towards the head with the other hand with the palm open (for the safety of the subjects). Second scenario: attack with a training knife (dummy) - multiple stabs in the abdomen and chest. Third scenario: attack on another policeman according to the scenario from first scenario.

In the post-test, the first part of the study was similar, but when the participant went to the neighboring room, the attack was not repeated (it was assumed that the subjects would remember the first test, so they could expect another attack). Accordingly, the actual assault took place after they had left the rest room. The other elements remained unchanged. Competent judges rated the participant's self-defence ability for the second time on the VAS scale. The survey was organised in such a way that, after its completion, the participants left the building without contacting the waiting persons. In addition, the respondents were asked to keep the course of activities in which they participated in a secret, so that subsequent participants did not know the procedure.

The surveyed policemen participated in training in a barracked system at the Police Training Centre. The training time included 968 teaching hours (6 months and one week). The physical training was included in the modular unit No. 10 Tactics and Intervention Techniques and consisted of 132 teaching hours. Besides, during their free time, the listeners had the opportunity to use the CSP sports facilities: a track, an obstacle course, a team game hall, a mat room, a swimming pool, and a gym.

During the training, classes were planned mainly in two-hour blocks (2 x 45 minutes), there was no break between lessons, and the whole was shortened by 10 minutes. intended for cleaning and hygiene activities (a single training session lasts 80 minutes). Each lesson was divided into organisational activities (10 minutes), a warm-up with general development exercises (20 minutes), the main part (40 minutes), and the final part (10 minutes). Classes were held in sports facilities and the field.

However, in the planned training using the experimental method, a 20-minute general warm-up was planned to be replaced with exercises shaping coordination motor abilities (mainly shaping balance, reaction time, combining movements). Individual exercises were mainly replaced with exercises with a co-practitioner, and the exercises used in their structure were similar to activities related to situations related to repelling an attack on a policeman, and also adapted to the topic implemented in the main part of the activity. The method adopted in the experimental training largely corresponds to the method of teaching skills in sports and martial arts, i.e. special exercises and playful forms of fighting with a partner.

Ethics

At the stage of preparing the research project, the consent of the Ethics Committee at the Central Clinical Hospital of the Ministry of Internal Affairs and Administration in Warsaw was obtained. Subsequently, informed oral or written consent was obtained from all participants to participate in the study.

Statistics

In the work below, the differences between the two ($N_1 = N_2 = 48$) training groups were mainly analysed. Both groups were equal and relatively numerous ($N > 30$). Due to the fulfillment of the above two conditions, relying on the central limit theorem, it was possible to use the parametric ANOVA test to verify the hypotheses about intergroup differences, without the need to check the fulfillment of the assumption about the normal distribution of the analysed variables. The ANOVA analysis in an intragroup scheme was used to verify the hypotheses assuming changes over time within the same observations (subjects). The η^2 index was used to measure the strength of the ANOVA effect. When the occurrence of the relationship between the categorical variables was verified, the Pearson chi-square test was used, for which the strength of the effect was measured with the Cramer's V index. Due to the fact that many variables did not have a normal distribution, the non-parametric Spearman's rank correlation test was used to measure the correlation between them. The pattern of

multiple regression analysis with the method of introducing progressive selection was used to check which of the analysed variables are effective predictors of the prognosis of effective learning of defence ability. SPSS Statistics 24 (IBM, USA) was used for the analyses.

RESULTS

A series of analyses with the chi-square test showed that the frequency distributions of: experiences of physical aggression, place of residence of the respondents, playing sports, practicing sports or martial arts, were similar in both groups and did not differ significantly from each other. In the next part of the analyses, before the hypothesis was tested, a variable containing information about the assessment of defence skills by each subject was calculated. For this purpose, first, the marks given by each of the three competent judges who scored three types of attacks were averaged. Then the judges' marks for each attack were averaged separately, separately before and after the training. Thus, six assessments of the ability to repel an attack were obtained for each of the subjects: two assessments (before and after training) for each of the three attacks.

To test the extent to which the judges' scores were consistent and whether the averaging operation was justified, two Spearman rank correlation matrices were performed. The relationships between the average marks of each judge before and after the training were examined. The analysis of the Spearman's rank correlation test showed that there were statistically significant, strong and positive correlations between the assessments of all judges, both before and after the training. The relationships between the judges' ratings were definitely stronger in the case of the ratings given after the training. First, the descriptive statistics for the average assessment of defence skills for all three attacks were reviewed, broken down by type and stage of training. The subjects were assessed on a 100-point scale in which the result 100 was the highest possible defence against attack rating, and a score of 0, the lowest. The results are presented in Table 1.

The analysis with the ANOVA test showed that the training process (without its division into its type) contributed to the improvement of the marks given by competent judges for all three assessed attacks: attack no. 1: $F = 3249.99$, $p < 0.01$, $\eta^2 = 0.97$; attack 2: $F = 3636.23$, $p < 0.001$, $\eta^2 = 0.98$; attack no. 3: $F = 3728.80$, $p < 0.001$, $\eta^2 = 0.98$ (table 2). Clear progress as a result of the training was achieved regardless of the type of attack. The training process itself explained almost the entire variance of judges' ratings. The results of the averaged judges' scores in Table 1 show how strong this effect is. Before starting the training, the subjects were assessed by judges as follows: attack No. 1 $M = 20.65 (\pm 4.37)$; attack No. 2 $M = 19.31 (\pm 3.60)$; attack No. 3 $M = 23.32 (\pm 4.93)$. After going through the training, the subjects were rated much higher: attack No. 1 $M = 74.72 (\pm 12.40)$; attack No. 2 $M = 73.14 (\pm 12.70)$; attack no.3 $M = 78.46 (\pm 12.13)$. Thus, it can be seen that the training significantly contributed to the increase of the respondents' abilities in the context of repelling attacks.

Additionally, the analysis showed significant interaction effects between the training process and its type (experimental vs. traditional) for all three types of attacks (Table 2).

Table 1. Descriptive statistics for the assessment of defence skills, broken down by type and stage of training

Scenario*	Training stage	In all M (\pm SD)	Experimental M (\pm SD)	Traditional M (\pm SD)
First	before	20.65 (\pm 4.37)	21.30 (\pm 4.55)	19.98 (\pm 4.11)
	after	74.72 (\pm 12.40)	83.78 (\pm 5.26)	65.27 (\pm 10.50)
Second	before	19.31 (\pm 3.60)	20.05 (\pm 3.86)	18.54 (\pm 3.17)
	after	73.14 (\pm 12.70)	82.64 (\pm 4.83)	63.23 (\pm 10.59)
Third	before	23.32 (\pm 4.93)	23.28 (\pm 4.90)	23.36 (\pm 5.01)
	after	78.46 (\pm 12.13)	87.63 (\pm 4.39)	68.90 (\pm 10.05)

M – mean; SD – standard deviation; *Scenario of the attack on the police officer; Note: The scale of the assessment of defense skills ranged from 0 to 100 points.

Table 2. ANOVA test results – the main effect of the training process and the interaction effect of the training process and its type for 3 types of attacks.

Scenario*	Effect	F	p	$\Delta\eta^2$
First	Training process	3249.99	<0.001	0.97
	Training process * Type of training	82.70	<0.001	0.47
Second	Training process	3636.23	<0.001	0.98
	Training process * Type of training	101.16	<0.001	0.52
Third	Training process	3728.80	<0.001	0.98
	Training process * Type of training	109.25	<0.001	0.54

F – Anova test statistic; p – significance; $\Delta\eta^2$ - the eta-squared effect size; *Scenario of the attack on the police officer

Table 3. Simple effects test results comparing judges' scores between subjects from different training groups separately before and after training for 3 attacks.

Scenario*	Training stages	Types of training		F	p	η^2
First	before	experimental	traditional	2.22	0.14	0.02
	after	experimental	traditional	118.26	<0.001	0.56
Second	before	experimental	traditional	4.27	<0.05	0.04
	after	experimental	traditional	132.38	<0.001	0.59
Third	before	experimental	traditional	0.01	0.92	0.00
	after	experimental	traditional	139.13	<0.001	0.60

F – Anova test statistic; p – significance; η^2 – the eta-squared effect size; *Scenario of the attack on the police officer

Table 4. Simple effects test results comparing judges' scores between subjects from different training groups separately before and after training for 3 attacks.

Scenario*	Type of training	Compared stage of training		F	p	η^2
First	experimental	before	after	3714.86	<0.001	0.99
	traditional	before	after	793.32	<0.001	0.95
Second	experimental	before	after	4610.11	<0.001	0.99
	traditional	before	after	793.32	<0.001	0.95
Third	experimental	before	after	4786.58	<0.001	0.99
	traditional	before	after	850.62	<0.001	0.95

F – Anova test statistic; p – significance; η^2 - the eta-squared effect size; *Scenario of the attack on the police officer

To better understand the effects of interactions, simple effects analyses were performed, the results of which are presented in Tables 3 and 4. They showed that the increase in self-defence capacity was higher in the experimental training group than in the traditional training group for all three attacks. Although initially each of the training groups was characterized by similar assessments of the ability to defend against attack (only in the case of the second attack, the judges concluded that the subjects assigned to the experimental group were characterized by a significantly higher level of defence skills, although the difference was small = 1.51, $p < 0.05$), after the training, the subjects from the experimental group were assessed significantly better than the subjects from the traditional group. The differences in the assessment of the ability between the experimental and the traditional group after the training were: attack 1 difference = 18.51; attack 2 difference = 19.41; attack 3 difference = 18.73, in favor of the experimental group.

The results of simple effects analyses also confirmed the implications of the main effect, separately for each of the two course types. In both the experimental and traditional training groups, there was an improvement in the defence rating against each of the three attacks.

DISCUSSION

A scientific problem in the conducted research was to determine whether and how coordination exercises have an impact on the effectiveness of teaching self-defence skills to policemen. The project was carried out using the classical experiment method in the period of basic vocational training. It consisted in comparing the effectiveness of the proprietary basic vocational training program for police officers (including special exercises to shape coordination motor skills) with the effectiveness of the traditional program. The obtained empirical data was analysed and then synthesized, which led to finding an answer to the research question. Both groups (experimental and traditional) improved their skills in this regard, but in the experimental group there was a greater improvement compared to the traditional group. Therefore, it can be concluded that the experimental training, which included the use of special exercises shaping coordination skills, contributed to a greater improvement in self-defence skills than traditional training. The judges noticed this effect in all (three) analysed attack scenarios. The policemen who participated in the traditional training also noted an improvement in self-defence skills, but it was noticeably smaller.

Realism in military training is a deliberate and deliberate process of subordinating this education to the requirements of the psychophysical construction of man in terms of his actions on, perhaps, the future battlefield. High realism in military training should ensure a greater probability of effective action in the future war [28]. The teaching process itself should reflect the conditions in which the tasks will be carried out as faithfully as possible. Another important issue is how to check the training results.

Research on psychomotor competences in the field of self-defence has been undertaken many times. Most often, these specialized skills are assessed using tests that demonstrate specific attack and defence techniques without or with the use of different tools. Often the mode of action of people taking part in the test is specified, and the assessment of correctness of action is carried out by expert judgment [29].

The results of research on attacks on policemen in Poland indicate that the attackers most often hit with their hands (37% of cases), tugged or pushed (36% of cases), and used kicks in various parts of the body - including a lying (after falling over) a policeman (27% of cases)., hit a blunt object, e.g. with a stick (11% of cases) and attacked with a sharp object (24% of cases). In many cases, the attackers used various forms of attack. Moreover, the policemen were strangled, bitten, rushed with the dog, objects were thrown at them (e.g. stones, paving stones, hammers), and attempts were made to run over them with a motor vehicle (passenger car, farm tractor). A large part of the attacks was preceded by verbal aggression and tugging at the uniform [10]. Subsequent research results on attacks on policemen in Poland partially confirmed the previous findings. The most common form of attacks was again a punch with the hand (37.68% of attacks), tearing clothes or body parts (29.33%), kicks (21.65%), attack with sharp tools (3.78%), blunt object (1.8%), head blows (1.96%). In addition, attacks by choking, biting, throwing various objects, attempting to run over a car, and dog chewing have been reported. The analysis showed that the attackers most often attacked the policeman's head while hitting, while the kicks were most often aimed at the lower body. The knife dominated among the tools used for the attack [30].

Training policemen based on scenarios with the use of violence (and not only physical skills), allowed them to master the skills and use their actions to escalate aggression before physical contact and to predict possible attacks. In addition, he learned to respond to attacks with skills based on primal reflexes. The results of this study seem to suggest that reflex-based self-defence training prepares officers better to perform arrest under high pressure than the current form of training in police arrest and self-defence skills [31]. In this research project, a controlled attack was used, based on a scenario training concept similar to the above concept, which was used by the competent judges as an assessment tool. The scenario of the attack on the surveyed policemen was designed based on

the results of own research. This procedure was to realistically reflect the situation of a sudden attack on an officer during official activities.

Bukowiecka claims that the results of test fights are the most accurate measure of a person's suitability to fulfill difficult and even extremely difficult police tasks. One of the tools in the publications is school fights modeled on the sumo rules. The results of the research on soldiers indicate an average significant correlation between the result of the basic self-defence skill test and the result of a defensive double-strike and the second task - the result of test fights modeled on sumo principles [32]. In diagnosing policemen, a test is also carried out to assess the effectiveness of resolving fights in direct combat (fights modeled on the sumo formula). The applied validation procedures for this test allow it to be considered credible, and therefore a valid and reliable research tool, with which it is possible to select the right people for the implementation of intervention activities with a high probability [33]. However, the analysis of the actual course of the assault on policemen leads to the conclusion that the above tool (sumo test fights), despite the presence of an element of a clash between two people, does not reflect genuine intervention actions.

Testing defensive skills in a model self-defence situation is associated with a certain risk of injury, and it is not only physical, but also psychological. Scenario training participants describe various symptoms of psychosomatic stress, such as: increased heart rate, sweating, trembling limbs. A complex psychological reaction usually varies considerably from person to person. Scenario training has its ethical limitations. It carries the risk of possible pain or injury. When dealing with scenario training, it should be remembered that it concerns the balance between the sense of threat and the real danger of both mental [34] and physical trauma [20].

Scenarios for simulating intervention activities are a demanding task that should reflect as realistically as possible the conditions for undertaking an intervention. However, one has to agree that even with a very well-prepared scenario, it is not possible to fully transfer skills from training to the actual situation. The research conducted in martial arts confirms the high probability of this opinion. It showed that competing in training does not adequately simulate the emotional and cognitive demands of fighting during a sports competition. The transfer of skills is the smaller, the less faithfully the training conditions correspond to the conditions of later sports competition. It has been pointed out that the training fight does not simulate the limitations and requirements of the fight during the competition due to the lower level of anxiety and mental arousal [35,36]. Intervention activities should, on the one hand, be carried out efficiently and safely for the policeman, and on the other hand, adequately to the existing situation, taking into account the minimization of the potentially negative effects of the use of physical force.

CONCLUSIONS

Theoretical conclusions

Experimental training, based on the inclusion of coordination exercises in training, significantly increases the effectiveness of teaching skills related to fighting off attacks. The policemen who participated in the traditional training also noted an improvement in their assessment of their ability to repel attacks, but the improvement was noticeably less.

Application conclusions

The higher level of skills in defending an attack on a policeman allows for the conclusion that within the available period, without the need to increase the number of hours of program training, it is possible to effectively prepare policemen for effective, adequate and safe operation during the intervention.

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