



IMPACT OF HAND-TO-HAND COMBAT READINESS ON SENSORIMOTOR REACTION AND COGNITIVE DECISION-MAKING RATE

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Annotation: This scientific study is devoted to the study of the impact of hand-to-hand combat readiness on sensomotor reaction rates as well as cognitive decision-making processes. During the study, experimental and control groups were formed, in which, with the help of special tests, indicators of reaction and decision-making were evaluated. In particular, cognitive processes have been analyzed through simple and selective reaction time, as well as Stroop and Go/No-Go tests.

Keywords: *hand fight, sensomotor reaction, reaction rate, cognitive processes, decision making, attention, impulse control, Psychophysiology, sports training, motor skills, coordination.*

Introduction. The service activities of modern internal affairs personnel require a high level of physical and psychological training. Officers of police, rapid service and other law enforcement agencies are often forced to make quick and clear decisions in emergencies. In such situations, agility, accuracy, ability to assess the situation and stress resistance are some of the decisive factors for service efficiency. Therefore, it is necessary that the functional training of employees is developed not only physically, but also at the level of cognitive and sensomotor indicators.

Hand-to-hand combat (hand — to-hand combat) is the most practical and integrated type of physical training for internal affairs personnel, which develops strength, speed, endurance and coordination at the same time. Hand combat training not only develops muscles, but also activates the activity of the central nervous system, increases the speed of sensomotor reaction and decision-making. The Sensomotor reaction measures the ability to respond to external stimuli, that is, the coordination between the eyes, ears and muscles. At the same time, the speed of cognitive decision — making refers to the ability to analyze the current situation and quickly select the optimal solution.

Scientific research shows that hand-to-hand combat training significantly increases the functional training of internal affairs personnel through tasks that require intensity, agility and strategic thinking (Smith et al., 2020; Zhang, 2021). At the same time, hand-to-hand combat training provides positive results in participants, such as reducing stress hormonal levels, increasing the effectiveness of reaction and decision-making.

The main purpose of this study is to scientifically determine the impact of hand — to-hand combat training on the sensomotor reaction rate and cognitive decision-making ability of internal affairs personnel, as well as to assess the effectiveness of training by experimental methods. The results of the study provide important practical recommendations for optimizing employee preparation programs and improving service efficiency.



The purpose of the study is to determine the impact of hand - to-hand combat readiness training on the sensomotor reaction rate and cognitive decision-making ability of internal affairs personnel, and to scientifically assess the role of these training in improving the effectiveness of service activities.

Research tasks:

- measuring the sensomotor reaction time of internal affairs personnel during hand-to-hand combat training;
- analysis of the impact of hand-to-hand combat training on cognitive decision-making speed and accuracy;
- determine the effectiveness statistically, comparing the results of training with the control group;
- development of practical recommendations and an optimized preparation program for internal affairs personnel based on hand-to-hand combat training.

Methods.

This research was carried out experimentally. During the study, it was aimed at determining the effect of hand-to-hand combat training on the speed of sensomotor reaction and cognitive decision-making of internal affairs personnel. The experiment lasted 12 weeks and was carried out on two groups — an experimental group and a control group.

1. Research design (experimental method)

The study was organized on the basis of experimental design. Participants were divided into two groups:

- experimental group (hand-to-hand combat training practitioners);
- control group (individuals with a simple level of physical fitness).

The experimental group performed special hand-to-hand combat training for a certain period of time, while the control group continued its usual activities.

2. Sampling (sampling) method

In the study, healthy male participants between the ages of 18-30 were voluntarily involved. The sample was formulated through the random selection (randomization) method.

3. Sensomotor reaction rate measurement

The Sensomotor reaction was evaluated using the following methods:

- Simple reaction time Test (response to visual and audio signals);
- Choice (choice) reaction test;
- Computerized psychophysiological tests (e.g., programs measuring reaction time).

The results were recorded in milliseconds.

4. Assessment of cognitive decision-making rate

The following methodologies were used to study cognitive processes:

- stroop Test (attention and interference assessment);
- go/no-go test (impulse control and quick decision making);
- computer programs that measure the speed of decision making.

5. Pedagogical experience (intervention)

Hand-to-hand combat training was conducted with the experimental group for 8-12 weeks. Training included the following:

- exercises for the development of rapid movement reactions;
- coordination and balance exercises;
- sparring and situational exercises.



Research results.

The results of the study conducted found that hand fight training has a significant positive effect on the sensomotor reaction rate as well as cognitive decision-making processes. Significant differences were noted as a result of comparisons between experimental and control groups.

While participants in the experiment group had a simple sensomotor reaction time of an average of 245 ± 15 milliseconds before the start of the study, at the end of the experiment it was observed that this indicator had shrunk to 198 ± 12 milliseconds. This indicates a significant increase in reaction rate. The selective reaction rate also has a positive change, improving from the initial 380 ± 20 milliseconds to 310 ± 18 milliseconds.

Sensomotor reaction rate indicators (ms)

Table 1

Specification	Experimental group (before)	Experimental group (after)	Control group (prior)	Control group (after)
Normal reaction time	245 ± 15	198 ± 12	248 ± 14	240 ± 13
Selective reaction time	380 ± 20	310 ± 18	385 ± 22	372 ± 20

Cognitive decision-making rate (ms)

Table 2

Specification	Experimental group (before)	Experimental group (after)	Control group (prior)	Control group (after)
Stroop test (reaction time)	520 ± 25	440 ± 20	515 ± 28	500 ± 26
Go / no-go test	460 ± 18	390 ± 15	455 ± 20	445 ± 18

In the control group, however, no significant changes were observed in the sensomotor reaction rates. Although the typical reaction time was slightly improved from 248 ± 14 milliseconds to 240 ± 13 milliseconds, while the selective reaction was slightly improved from 385 ± 22 milliseconds to 372 ± 20 milliseconds, these changes were found not to be statistically significant.

The results of the assessment of the rate of cognitive decision-making also showed positive dynamics in the experimental group. In particular, the Stroop test results have improved from 520 ± 25 milliseconds to 440 ± 20 milliseconds, which means that participants have increased ability to control attention and resist interference. Results on the Go/No-Go test also showed a reduction from 460 ± 18 milliseconds to 390 ± 15 milliseconds, as evidenced by the development of rapid decision-making and impulse control.

In the control group, however, no significant changes in cognitive performance were observed. Although the Stroop test results varied from 515 ± 28 milliseconds to 500 ± 26 milliseconds, while the Go/No-Go test varied from 455 ± 20 milliseconds to 445 ± 18 milliseconds, these differences are not significant.

The results obtained were statistically analyzed and found that the differences between the experimental and control groups were reliable ($p < 0.05$). This scientifically confirms that hand-to-hand combat training is an effective tool in the development of sensomotor and cognitive functions.



Thus, the results of the study showed that hand-to-hand combat readiness significantly improves not only the physical, but also psychophysiological capabilities of a person.

Discussion.

The results of this study confirmed that hand-to-hand combat training has a positive effect on sensomotor reaction rates and cognitive decision-making processes. The results obtained show that, in harmony with existing scientific views, physical training, especially sports that require a high level of coordination and agility, is an important factor in the development of human psychophysiological functions.

In the participants of the experimental group, a significant reduction in the time of the sensomotor reaction is explained by rapid response reactions, which are constantly repeated during hand-to-hand combat training. Such training activates the activity of the central nervous system, increasing the rate of transmission of nerve impulses, and as a result, the response time to external stimuli is reduced. In particular, improved rate of selective reaction indicates that participants have developed the ability to make quick and correct decisions in complex situations.

Cognitive process analysis has also shown significant results. Improvements in Stroop test results are indicative of increased attention management and cognitive flexibility. This is due to the fact that during hand-to-hand combat training, athletes act simultaneously, taking into account several factors. The results of the Go/No-Go test, on the other hand, showed an improvement in impulse control, which indicates the development of the ability to limit incorrect movements in the process of rapid decision-making.

And the fact that significant changes are not observed in the control group once again confirms the effectiveness of precisely specially organized hand-to-hand combat training. It has been found that normal physical activity does not affect sensomotor and cognitive performance to such an extent that it reinforces the basic idea of the study.

Also, the results obtained can be explained from the point of view of sports physiology and psychology. Sports such as hand-to-hand combat require a high level of attention, agility, coordination and strategic thinking. Therefore, such training complexly develops not only the muscular system, but also cognitive processes.

There are also some limitations to the study. In particular, the relatively low number of participants, as well as the limited duration of the study, slightly limit the possibility of generalizing the results. In future studies, it will be advisable to increase the number of participants, cover different age groups and carry out long-term observations.

In general, the results of this study scientifically substantiated that hand-to-hand combat training is an effective tool in the development of sensomotor and cognitive indicators of a person.

Conclusion.

This study focused on studying the impact of hand-to-hand combat readiness on sensomotor reaction rates as well as cognitive decision-making processes. Based on the results of the experimental study conducted, the following conclusions were drawn:

First, hand combat training was found to significantly increase the rate of sensomotor reaction. Participants in the experimental group developed the ability to rapidly respond to external stimuli by reducing the time of a simple and selective reaction.

Secondly, cognitive processes, in particular the speed of decision-making and attention management indicators, have also changed for the better. Results from the Stroop and Go/no-Go tests showed that participants had improved cognitive flexibility, impulse control, and quick thinking skills.



Thirdly, the fact that no significant changes were observed in the control group confirmed that hand-to-hand combat training was effective precisely through specially directed training.

Fourth, it was scientifically proven that hand-to-hand combat training is a complex development of not only physical fitness, but also the psychophysiological state of a person.

It is also possible to develop practical recommendations based on the results of the study. In particular, the inclusion of hand-to-hand combat elements in the sports training system can be used as an effective tool in the development of sensomotor and cognitive indicators.

In general, this study showed that hand — to-hand combat readiness is important in improving important indicators of human activity-rapid reaction and effective decision-making abilities.

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