Plovdiv University "Paisii Hilendarski"

FACULTY OF BIOLOGY

Department of Theory and Methodology of Physical Education and Sport

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Sports-Pedagogical and Psychological Aspects to Optimise WingTsun Training

ABSTRACT

of the Dissertation for the Award of an Educational and Scientific Degree **"Doctor"**

Field of Higher Education 1. Pedagogical sciences
Professional field 1.3. Pedagogy of training in...
Doctoral Program "Theory and Methodology of Physical Education and Sports Training"

Doctoral Advisor:

Prof. Dr. Veselin Zhelyazkov Margaritov, PhD

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The dissertation work was discussed and proposed for thesis defence by the extended Departmental Council of the Department Theory and Methodology of Physical Education and Sports at the Biological Faculty of Plovdiv University "Paisii Hilendarski" on 28.2.2024.

The volume of the dissertation is 167 pages, structured as an introduction, 4 chapters containing text, 32 tables, and 48 figures. Attached to the dissertation work are 26-page applications. The bibliography consists of 151 literary sources in Latin. The list of author's publications includes 3 titles.

The doctoral thesis defence will take place on 28 May 2024 at 11.00 at the University of Plovdiv "Paisii Hilendarski", 24 Tsar Asen Street, meeting room.

The thesis defence materials are at the disposal of those interested in the library at Paisii Hilendarski PU, Plovdiv, 236, floor IV Bulgaria Blvd.

INTRODUCTION

Martial arts play an important role in postmodern societies and are applied in many areas. In the field of sports, they are used for training and competition in the economic system, they can be used as a marketing tool or as part of the company's healthcare management. They have a significant presence in the media and science, which is analysed and studied (especially in sports science) (Kuhn, Lange, Leffler, & Liebl, 2011).

In addition, combat sports/arts are used as a means of conflict resolution and pacification. There are organisations and initiatives that use martial arts as a tool to resolve conflicts between communities and individuals and to promote understanding and positive interaction between participants.

Another aspect is the use of combat sports/arts as a form of therapy. There are studies that show that practicing martial sports/arts can have a positive effect on mental and physical health. This includes improved mood, reduced anxiety and stress, as well as improved physical flexibility and strength.

After all, it is important to note that combat sports/arts can also be cultural heritage and part of a community. This is especially true for traditional martial arts, which are often deeply rooted in the culture and history of the community. By practising and preserving these arts, people strengthen their cultural identity and connection with their community. Several million people are expected to practice martial arts/sports in Germany soon. The German Olympic Committee (GOC) reports that around 600,000 people are active in the Olympic and Neolympic martial sports disciplines in their organisation alone. According to Körner and Istas, there is an increasing professionalisation of established types of combat sports, especially in terms of scientific support for Olympic disciplines and by linking them to specific and general scientific discourses (Körner and Istas, 2018).

A special role here is played by EWTO, the European WingTsun Organisation, which, with over 50000 members, is not only the largest association for the Chinese style of kungfu WingTsun, but is also the only martial arts association in the European space that offers a separate martial arts curriculum in collaboration with a recognised state university. In 2004 at Plovdiv University "Paisii Hilendarski" in Bulgaria the Master's program "Sport Pedagogy with specialisation in WingTsun" at the Department of Physical Education and Sport was established (EWTO, 2003).

Körner and Staller note that schools and clubs are increasingly involved in the educational aspect of martial arts and self-defense systems. The impact of these institutions on education, in particular in terms of planned and unintended effects, has not yet been fully explored. It is important to note that sports pedagogy is mainly focused on school sports and is less concerned with the study of pedagogy and didactics in extracurricular forms such as martial arts schools, sports of excellence, and official organisations such as the army or police (Staller & Körner, 2017). In the case of martial arts specialising in self-defense (as WingTsun is), it must first be clarified to what extent they can be subject to sports-pedagogical observations. At first glance, from the point of view of self-defense, it is about reducing the opponent's countermeasure, injury, or even destruction – if not the enemy, at least his ability to fight.

Accordingly, the purpose of the martial art of WingTsun is to end the struggle by using physical force as a last resort. First of all, it is necessary to clarify how WingTsun can become the subject of sports-pedagogical research if sports pedagogy is "the usual term for this share of sports science in which sport is studied in the context of education" (Grupe & Kurz, 2003).

The next step is to explore to what extent the methods of teaching martial art WingTsun, which consist on the one hand of traditionally accepted unchanged exercises and, on the other hand, modern teaching concepts based primarily on K. Kernspecht's research, already contains sports-psychological concepts. Special attention is paid to the methods of mental training.

The experimental subject of research is the introduction of the psycho-educational concept "Heidelberg Competence Training" in the training of WingTsun to improve the output of the participating students.

SHORT CONTENT OF THE DISSERTATION

Chapter I

The theoretical analysis of the present study is divided into parts, in which we studied, analysed, and summarised literary sources of research by solving a problem.

The main focus of the current thesis is the Heidelberg Competence Training (HCT), necessary for the improvement of the psychophysical and motor-coordination capacities of the studied practitioners of WingTsun.

Heidelberg Competence Training (HCT)

At the Higher School of Pedagogy, Heidelberg Knörzer et al. developed a training concept under the name "Heidelberg Competence Training" (HCT), which aims, by building or strengthening mental control mechanisms, to support people in their pursuit of the goal and satisfaction of needs (in short, in the HCTHCT, this is called "the development of the power of mind") (Wolfgang Knörzer, Amler, & Rupp, 2011).

Knörzer found that the athlete during pre-race training is outside the ideal capacity zone or exits that zone (Wolfgang Knörzer, 2007).

Therefore, the whole set of experiences can be recorded in a trizone model:

- Overmotivation zone;
- Area of ideal capacity;
- Submotivation zone.

The task of mental training is to help the athlete reach this zone of optimal capacity. This makes him sensitive, and he can feel it when he leaves this area. Mental training sets of strategies to return to your zone of optimal capacity.

According to Knörzer, in doing so, account must be taken of the peculiarities of mental processes. Every mental process has a mental-cognitive and intuitive-emotional side. It is the emotional structure that has a decisive influence on the quality of the mental process.

Mental training in sports should always clearly emphasise the development of cognitive processes and their positive influence on emotional processes, especially in an intensely emotional field such as sports. Each process contains the above four steps, which are intermediate targets on the way to achieving the final goal.

The following principles serve as a methodological basis for all HCTHCT processes (Wolfgang Knörzer et al., 2011):

- First principle of the HCT – each HCT process is so oriented that it achieves the four intermediate goals on the way to the ultimate goal – successfully mastering a challenge;
- Second Principle of HCT – Every HCT process is so oriented as to take into account both thought and experience processes.

The purpose of the HCT concept is to develop the personality through systematic mental training, so that athletes can make full use of their capabilities:

- Implementation possibilities must be fully exploited;
- The athlete must remain optimally able to act even under pressure;
- The personality of the athlete must be strengthened;
- Attention should be stimulated and stabilised.

The development of HCT is based on Klaus Grave's theory of consistency (Grawe, 2004) and the concept of "integrative mental training" (Amler, Bernatzky, & Knörzer, 2006). According to Knörzer, the HCT is an opportunity to control non-cognition situations through a four-stage process (Wolfgang Knörzer et al., 2010):

1. To precisely formulate the relevant objectives according to the criteria for purposes and to be able to experience them mentally;
2. To know the ways of accessing concentration and to be able to concentrate;
3. Know your strengths and be able to consciously activate;
4. Formulate strategies for solving possible violations and applying opportunities for mental isolation.

Symbolically, this can be represented as a "HCT tree" (Fig. 1).

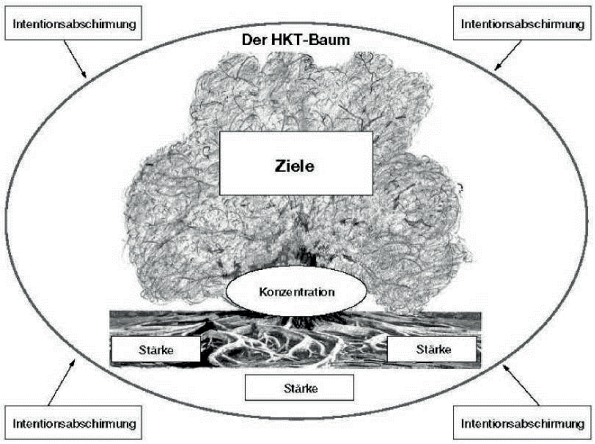


Figure 1.

The goal to be achieved is symbolically placed in the crown of the tree (for example, a certain individual achievement or a winning competition). Strengths are presented as roots that need to be stepped up to achieve the goal. In the stem, which symbolises concentration, strengths are tied to the goal. Finally, a protective shell isolates the entire tree symbolically from outside interference..

Chapter II

HYPOTHESIS, PURPOSE AND OBJECTIVES, SUBJECT, OBJECT, METHODOLOGY AND ORGANISATION OF THE RESEARCH

1. HYPOTHESIS

We assume that the application of the Heidelberg Competence Training (HCT) will improve the psychophysical and motor-coordination abilities of the studied practitioners of WingTsun.

2. PURPOSE AND OBJECTIVES:

The purpose of this study is to explore and improve the sports-pedagogical and psychological aspects of WingTsun training through mental training (Heidelberg Competence Training).

To achieve the goal, the following main tasks are solved:

1. To carry out a theoretical analysis of the actual state of the current didactics in the training of WingTsun.
2. To carry out an analysis of the methods, techniques, and approaches of didactic of teaching.
3. To analyse the age-related peculiarities and characteristics of practitioners of WingTsun.
4. Development and implementation of psychophysical and motor-coordination models of exercises based on Heidelberg competency training to improve the training in WingTsun.
5. To monitor the dynamics of psychophysical and motor-coordination abilities in the parameters studied.
6. To follow and analyse correlational dependencies between certain mental and physical parameters.
7. To determine the effectiveness of the methodology used.

3. SUBJECT AND OBJECT OF THE RESEARCH:

The subjects of the study are the methods, techniques, and approaches of the Heidelberg Competence Training to optimise the legal capacity of practitioners at WingTsun.

The object of the study were 100 trainees aged 22 to 38, divided into 4 groups: 2 experimental and 2 control.

Structure of Experimental Training Units

The application of Heidelberg Competence Training (HCT) in a WingTsun training unit helps to show an improvement in trained skills compared to normal WingTsun training.

1. Conducting a workshop on HCT before the regular WingTsun training. A workshop on HCT is held in which the students of WingTsun learn to set goals, stimulate concentration, activate strength, as well as protection of their intentions. This workshop helps students strengthen their mental skills, which are crucial for effective WingTsun education.
2. Setting a goal and pursuing it: Students are urged to set individual goals for training WingTsun, such as improving a certain technique or increasing conditioning. The progress of students applying the principles of HCT is compared with the progress of students who are taught without these principles.
3. Promoting concentration and activating strengths: Students who have completed HCT training use their concentration and strengths during WingTsun training to improve their performance in peer exercises, applied training, and conditioning and strength training. This is compared to the results of students who do not apply the principles of HCT.
4. Protecting intentions and solving problems: Students who apply the principles of HCT develop plans for condition and effect "If, then" and use them successfully in situations of self-defense. Their ability to adapt to various threats and find effective solutions is compared to the ability of students who do not apply the principles of HCT.
5. Evaluation and feedback: After a certain period of time (e.g., several weeks or months), the progress of students applying the HCT principles is assessed compared to students who do not. Both the students' self-assessment and the feedback of the teacher and training partners are used.

4. RESEARCH METHODOLOGY

The following **research methodology shall** be used to achieve the objective and prove the hypothesis**:**

Table1. *Methodological Toolbox*

No.	Measurement method	Units of measurement
1.	Test correction sample (attention)	points
2.	Test Perception of Time	seconds
3.	Dynamic tremor test (psychomotor coordination)	number
4.	SAN Test	points
5.	SMR Test	points
6.	Jump&reach test (explosive force and jump height)	points
7.	Standing long jump(explosive force and length of jump)	centimeters
8.	20 m sprint (speed)	seconds
9.	Throwing a medical ball with both hands over the head (explosive force)	centimeters
10.	Sit-ups for 30 seconds (strength and endurance of the torso muscle)	number
11.	Push-ups for 30 seconds (strength of upper limbs)	number
12.	Speed of visual reaction (response speed)	number
13.	Depth of body bend (flexibility)	centimeters
	Variation analysis	
	Correlation analysis	
	Graphic and tabular analysis	

Methods for obtaining retrospective information

Pedagogical observation

Pedagogical experimentation –Mental Training on Heidelberg Competence Training Model of Competence Training

The Heidelberg Competence Training Model (HCT) in WingTsun Training

Heidelberg Competence Training (HCT) has been developed as a psycho-educational technique to give people the skills they need to deal effectively with complex situations. It was originally used in areas of conventional education such as schools and universities, but its application is now expanding to cover various areas such as health promotion and a number of sports. The variability of HCT in many types of contexts is due to its result-oriented concept. This unique feature of the HCT allows you to adapt the training to a diverse number of participants, schedules, and specific target groups. The time frame for the HCT process can vary between the typical WingTsun training of two hours (45 minutes each) and a few days during a WingTsun instructor course. For the practical application in groups suitable, there were at least four sessions of 1 hour – 1 hour and 30 minutes.

Methods of Psychophysical Effects

Methods of Exploring Mental Capacity

Methods of Measurement of Physical Capacity

Mathematical-statistical processing of results

The analysis of the experimental data obtained will be carried out using statistical methods. They were processed, analysed and summarised below in Chapter III.

Variation analysis

The mathematically-statistical data processing was carried out with the Microsoft Excel 2019 program and the SPSS22 statistical package. The statistical methods used are:

arithmetic mean:

$$\overline{x} = \frac{\sum x}{n}$$

standard deviation:

$$S = \frac{\sum (x_l - \overline{x})^2}{n - l}$$

coefficient of variation (V%)

$$V = \frac{S}{\overline{x}}.100$$

— the confidence limit of the mean for a normally distributed sample of 95 % (a = 0.05),

$$\mu = \overline{x} \pm \frac{ts}{\sqrt{n}}$$

— absolute $d = \overline{x}_2 - \overline{x}_1$ growth and relative growth

$$d\% = \frac{\overline{x}_2 - \overline{x}_1}{\overline{x}_1}.100$$

Verification of hypotheses

For this purpose, the Student criterion for dependent samples was applied at the confidence level P = 0.95 (95 %)

$$t_{emp} = \frac{\left|\overline{d}\right|}{\sqrt{\frac{\sum d^2 - n\left(\overline{d}\right)^2}{n^2 - n}}}$$

Correlation analysis

Calculate the Pearson coefficient (r) using the formula:

$$r = \frac{P}{S_x . S_y}, \text{ where}$$

$$P = \frac{\sum XY}{n-1} - \frac{\sum X \sum Y}{n(n-1)}$$

5. ORGANISATION OF THE STUDY

This study is divided into three main stages:

The preparatory phase ran from autumn 2019 to autumn 2022. During this first phase, work focused on the following preparatory and organisational aspects:

1. Identifying, the research topic, purpose, and issues to be addressed.
2. Concept of the study plan, as well as the definition of the methodological approach.
3. Selection of relevant test methods.
4. Conducting interviews with coaches, teachers, and students, which were taken into account in the study.
5. Identification of test groups consisting of experimental and control groups.
6. Selection of participants in the study.

The main phase of the study took place from autumn 2022 to spring 2023 and covered the following main points:

1. Conduct tests to determine the baseline level of study participants.
2. Application and implementation of the experimental approach.
3. Control the measurements of selected variables to make any necessary adjustments to the EG.
4. Conduct the final exit tests.

The final phase ran from spring 2023 to autumn 2023 and included:

1. Statistical processing and analysis of the collected data.
2. Drawing conclusions on the basis of the data received.
3. Final revision and adaptation of the model to the model of Heidelber competence training in the training of WingTsun in its final form.

Conduct of the study

This study explores the impact of mental training based on H Heidelberg Competence Training Model (HCT) on WingTsun training. The aim of the study is to evaluate the benefits of mental training in improving exercise in WingTsun. The study was conducted as a double-blind/ two-leaf randomised controlled experiment with repeated measurements.

Study design:

1. Selection and sample. A total of 100 participants aged 22 to 49 (84 % men, 16 % women) from different WingTsun schools were selected. The participants had an average level of training on WingTsun.
2. Randomisation. Participants were randomly divided into four groups, each with 25 participants per group: two experimental groups (EGs) and two control groups (CGs). The distribution was done by secret inclusion in a random group to ensure the internal validity of the study.
3. Intervention. The experimental groups trained WingTsun's exercises using the mental training model of Heidelberg competency training. Control groups practiced the same exercises without mental training. The training programmes were supervised by qualified WingTsun coaches and sports educators to ensure adequate application of training methods. The training intervention lasted a total of three months.

Data acquisition. At the start of the study (instant x) and three months later, participants were evaluated with a total of 13 tests in the categories of mental and physical performance.

Chapter III
RESULTS AND ANALYSIS OF THE RESULTS OBTAINED

RESULTS AND ANALYSIS OF THE TESTS FOR THE EXAMINATION OF MENTAL CAPACITY

Dynamic tremor test (psychomotor coordination)

Table 2 and 3 present the results of the first and second studies of the control and experimental groups on key statistical indicators related to the distribution of values in both groups.

Table 2. *Related sampling test for dynamic tremor measurement (number of errors) for EG and CG in the I and II tests.*

Study	First study			Second study			Reliability (%)
Groups	$\bar{x}$	s	V(%)	$\bar{x}$	s	V(%)	
EG	15,28	1,06	6,95	13,16	1,28	9,73	**99%**
KG	19,00	0,87	4,56	17,42	0,90	5,18	**99%**

Table 3. *Related sampling test for dynamic tremor measurement (average time) for EG and CG in the I and II tests.*

Study	First study			Second study			Reliability (%)
Groups	$\bar{x}$	s	V (%)	$\bar{x}$	s	V (%)	
EG	81,28	25,51	31,39	76,48	23,30	30,46	99%
KG	84,64	28,22	33,34	79,84	26,17	32,77	99%

These results show that the application of the HCT method has a positive effect on the performance of individuals in the dynamic tremor test group.

On table Changes between the first and second studies in the control and experimental groups were shown by absolute, relative and percentage values.

Table 4. *Mean, absolute and relative (in %) increase in measurement of dynamic tremor test (number of errors) for EG and CG in the I and II tests*

Studied group	$\bar{x}$	d	d(%)
EG	13,16	-2,12	-13,87%
CG	17,42	-1,58	-8,32%

Table 5. *Mean, absolute and relative (in %) growth in the measurement of dynamic Tremor (mean time) for EG and CG in the I and II tests*

Studied group	$\bar{x}$	d	d(%)
EG	76,48	-4,80	-5,91%
CG	79,84	-4,80	-5,67%

By analysing the results in Tables 4 and 5, which reflect the changes between the first and second measurement for the two groups in the dynamic Tremor test study, we can draw the following conclusions.

The conclusion of this analysis is that the experimental group showed a significant increase in all three change measures (absolute, relative, and percentage) after the application of the HCT method in the results of the dynamic Tremor test (number of errors). The control group showed smaller changes in the same measures. dynamic tremor test results (required time) do not show significant statistically significant differences.

These results are visualised in Figures 2, Figures 3 and 4, where the changes in absolute and relative values of both groups are presented, as well as the mean values of the first and second measurements.

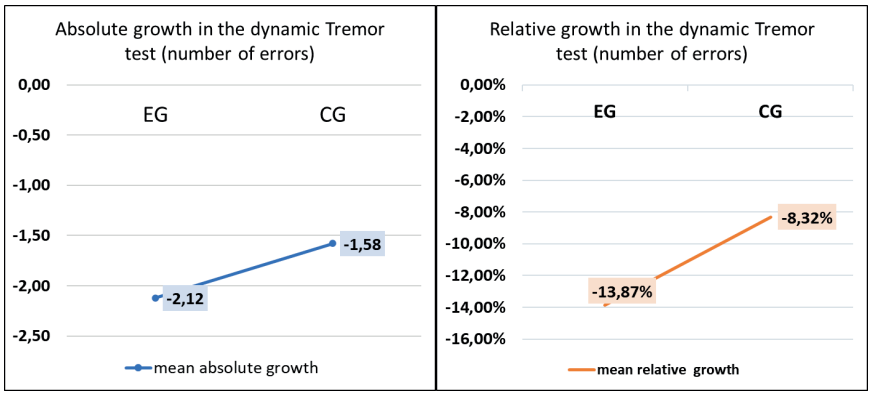


Figure 2. *Mean, absolute and relative growth in the dynamic Tremor test (number of errors) for EG and CG in the I and II tests.*

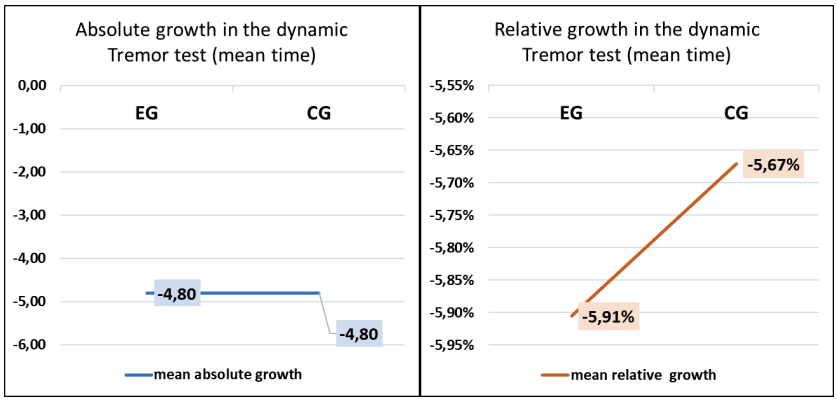


Figure 3. *Mean, absolute and relative growth in the dynamic Tremor test (mean time) for EG and CG in the I and II tests.*

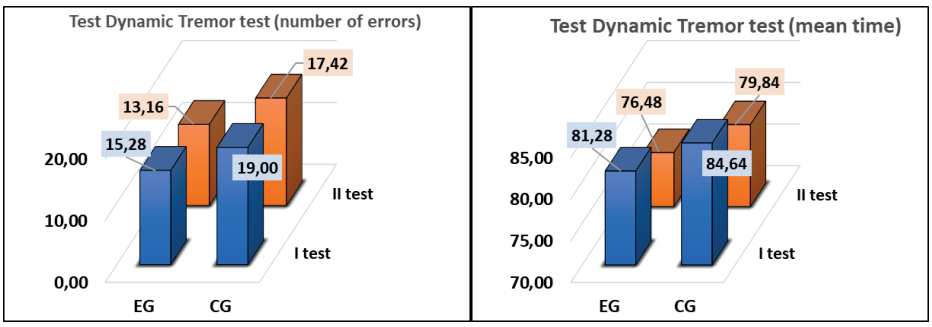


Figure 4. *Changes in the presentation of a dynamic tremor test for EG and CG in the I and II tests.*

Overall, the results show that the intervention used in the EG is effective and leads to a reduction in the number of errors and faster processing time. CG also showed improvements, but they are not as pronounced as in the EG. This means that the specific intervention in the EG had a positive impact on the test results.

Situational Mental Readiness Test (SMR) (Mental readiness)

Situational mental readiness is the current state of cognitive, emotional, and motivational factors that affect a person in a particular situation and determine their ability to respond to challenges and act effectively. In sports like WingTsun, situational mental readiness is crucial to being successful in both training and competitions.

On table 6 the results of the first and second studies of the control and experimental groups are presented on main statistical indicators related to the distribution of values in both groups.

Table 6. *Situational Mental Readiness (SMR) test for EG and CG in the first and second tests*

Study	First study			Second study			Reliability (%)
Groups	$\bar{x}$	s	V (%)	$\bar{x}$	s	V (%)	
EG Awareness	47,06	1,73	3,68	48,72	4,23	8,67	99%
KG Awareness	46,04	1,86	4,03	46,96	2,32	4,94	97%
EG Emotion	40,44	1,54	3,81	43,72	3,61	8,26	99%
CG Emotion	40,88	1,86	4,54	42,28	1,90	4,50	<95%
EG Will	41,39	1,61	3,90	46,89	5,35	11,40	99%
CG Will	39,84	1,77	4,45	44,20	3,03	6,85	<95%
EG Total	128,89	2,76	2,14	139,33	10,90	7,82	99%
CG Total	126,76	2,28	1,80	133,44	5,49	4,11	<95%

Reliability of results: For the experimental group (EG), plausibility was achieved at 99 % and for the control group (CG), plausibility was below 95 %.

These results show that the application of the HCT method has a positive effect on the situational mental readiness of the individuals in the experimental group.

On table 7 The changes between the first and second studies in the control and experimental groups were shown by absolute, relative and percentage values.

Table 7. *Mean, absolute and relative (in %) growth in the measurement of Situational Mental Readiness(CG) test for EG and CG in the I and II tests*

Study group	$\bar{\chi}$	d	d(%)
EG Awareness	48,72	1,67	3,54%
CG Awareness	46,96	0,92	2,00%
EG Emotion	43,72	3,28	8,10%
CG Emotion	42,28	1,40	3,42%
EG Will	46,89	5,50	13,29%
CG Will	44,20	4,36	10,94%
EG Total	139,33	10,44	8,10%
CG Total	133,44	6,68	5,27%

Analysing the tab. 7, which reflects the changes between the first and the second measurements for the two groups in the study on the effectiveness of the HCT method, we can make the following observations.

The conclusion of this analysis is that the experimental group showed a significant increase in all three change measures (absolute, relative and percentage) across all SMR test indicators, including the total value, after the application of the HCT method. Compared to this, the control group showed smaller changes in the same measures.

These results are visualised in Figures 5, 6, 7, 8 and 9, where changes in the absolute and relative values of both groups are presented, as well as the mean values of the first and second measurements.

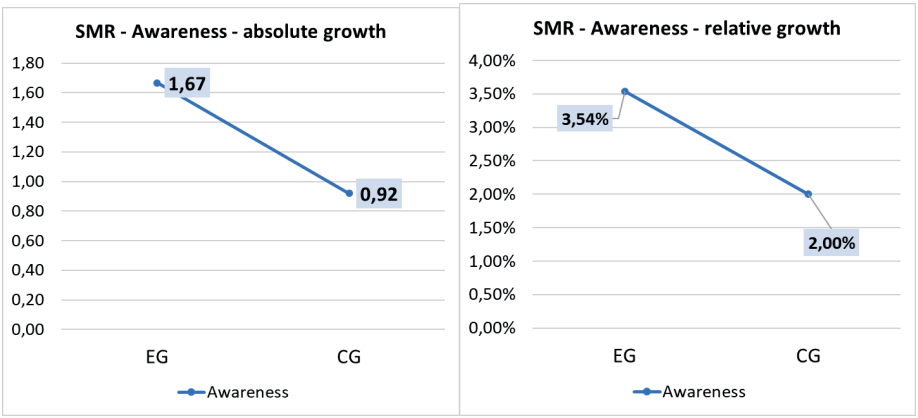


Figure 5. *Mean absolute and relative growth in **SMR test** – EG and CG self-confidence in the I and II tests.*

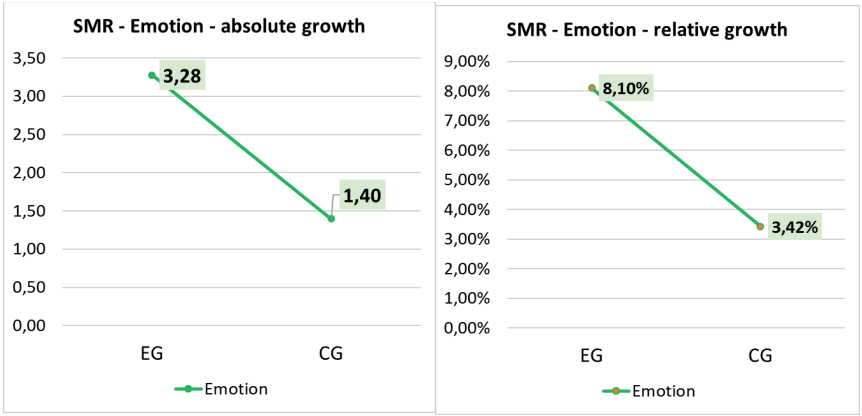


Figure 6. *Mean Absolute and Relative growt **SMR Test – Emotion** for EG and CG in Study I and II.*

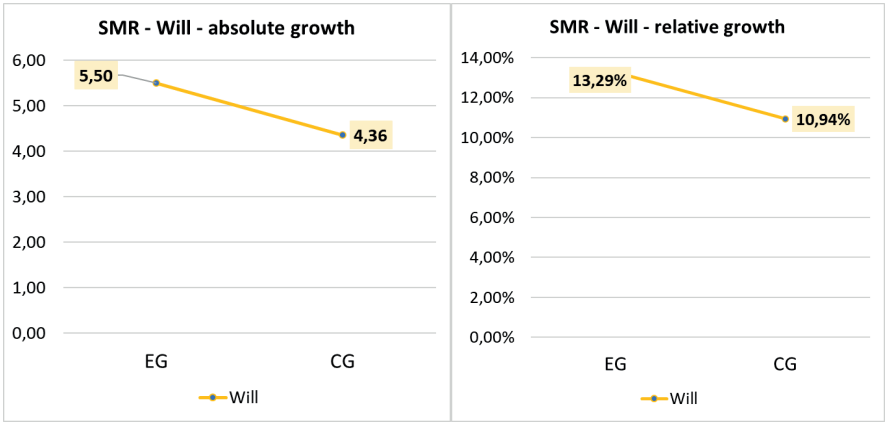


Figure 7. *Mean absolute and relative growth in the **SMR Test – Will** - EG and CG in the I and II tests.*

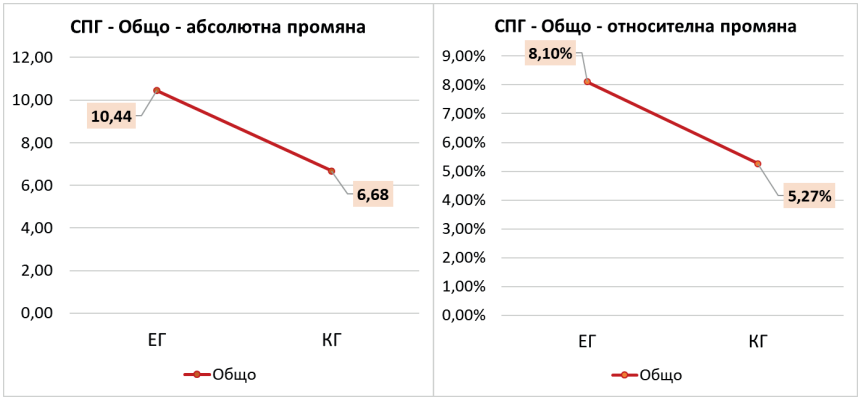


Figure 8. *Mean absolute and relative growth **SMR Test – Total** for EG and CG in I-vo and II-nd study.*

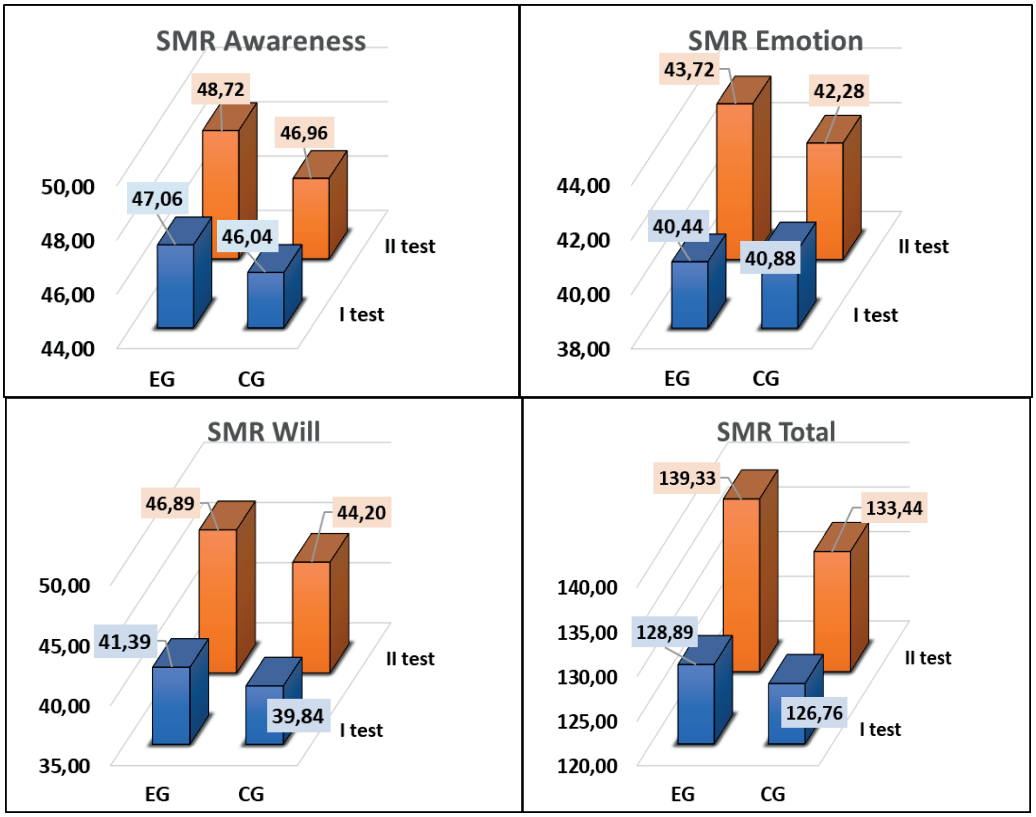


Figure 9. *Changes in the performance of the **SMR** Test for EG and CG in the I and II tests*

The results show that HCT education has a positive impact on the situational mental readiness of students in WingTsun. In particular, improvements in awareness and will readiness suggest that through HCT training, students are better able to use their cognitive and self-affirmation abilities in stressful situations.

The results highlight the importance of HCT training in sports pedagogical practice in order to improve the situational psychological readiness of students in WingTsun and to prepare for various situations of escalation and de-escalation. It is recommended to conduct future studies to investigate the long-term effects of HCT training and assess possible adaptations or broadening of the training approach.

Conclusions from the results and analysis of the tests for the examination of mental capacity

The results of the study clearly show that the application of HCT in the WingTsun learning process contributes to a significant improvement in the mental performance of students in the experimental group. This is reflected in positive results on a number of tests evaluating various aspects of mental health and cognitive function.

General conclusions:

1. Test correction sample (attention): Improved results in this test help to increase the ability to focus and maintain attention. The Heidelberg method helps to strengthen concentration and attention, which is reflected in improved results.
2. Time Perception Test: The improved indicators in this test show an improved intensity of attention, which is improved by the Heidelberg method, and in particular a better sense and perception of time. This is the result of better time management and greater awareness from a time perspective.
3. Dynamic tremor test (psychomotor coordination): The lower number of errors and the reduced average time in this test indicate an improvement in psychomotor coordination. Perhaps the Heidelberg Method, combined with WingTsun's methodology, focuses on body and mind training, leading to better coordination.
4. SAN test (self-feeling, activity, mood): The positive results in this test reflect higher self-esteem, increased activity and improved mood in students. The improved results in this test reflect positive impacts on the physical and emotional well-being of students, which is one of the key aspects of the Heidelberg Method.
5. CG Test (awareness, emotion, will): The improved results in this test indicate increased awareness, emotional management, and willpower following the Heidelberg Method, which, according to the results of the study, contributes to the development of these aspects of personality.

RESULTS AND ANALYSIS OF PHYSICAL PERFORMER TESTS

Tests to assess explosive force, rapidity and velocity

Jump&Reach test (explosive force and jump height)

The aim of the study was to determine the impact of mental training, in particular the HCT method, on explosive force, rapidity and velocity in WingTsun training.

On table 8 the results of the first and second studies of the control and experimental groups are represented on the main statistical indicators related to the distribution of values in both groups.

Table 8. *Related sampling tests for EG and CG measurements in the I and II tests*

Study	First Study			Second Study			Reliability (%)
Groups	$\bar{x}_i$	s	V (%)	$\bar{x}_f$	s	V (%)	
EG	43,68	5,29	12,11	47,68	5,29	11,09	99%
CG	41,68	5,29	12,69	43,68	5,29	12,11	<96%

The results presented in Table 14 allow the following important conclusions to be drawn:

These results show that the application of the HCT method has a positive effect on the explosive force and the height of the jump of the individuals in the experimental group.

On table The changes between the first and second studies in the control and experimental groups were shown by absolute, relative, and percentage values.

Table 9. *Mean, absolute, and relative (in %) increase in measurement in the "Jump&Reach" test for EG and CG in the I and II tests*

Studied Group	$\bar{x}$	d	d(%)
EG	47,68	4,00	9,16%
CG	43,68	2,00	4,80%

By analysing Table 9, which reflects the changes between the first and second measurement for the two groups in the study on the effectiveness of the HCT method, we can make the following observations:

The conclusion of this analysis is that the experimental group showed a significant increase in all three change measures (absolute, relative, and percentage) after the application of the HCT method. The control group showed smaller changes in the same measures.

These results are visualised in Figures 10 and 11, where the changes in absolute and relative values of both groups are presented, as well as the mean values of the first and second measurements.

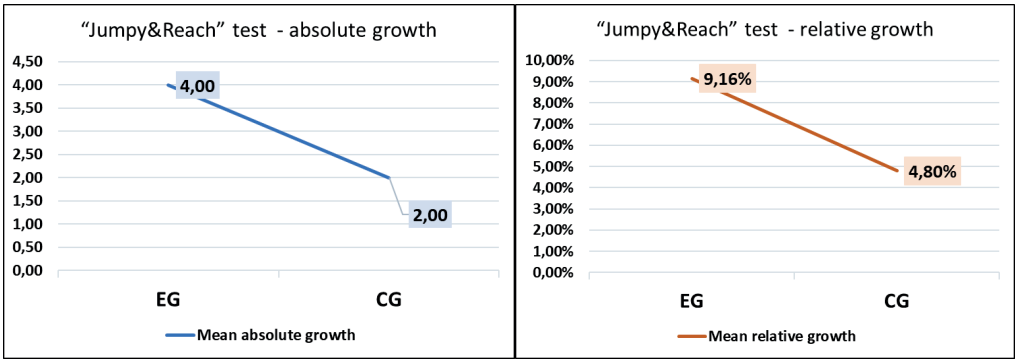


Figure 10. *Mean absolute and relative growth in the results of the "Jumpy&Reach" test for EG and CG in the I and II tests.*

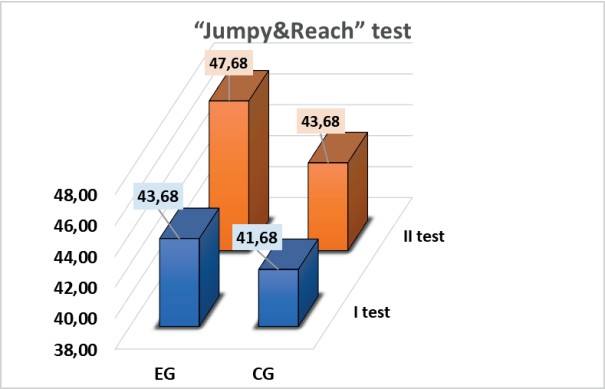


Figure 11. *Changes in the performance of the Jump&Reach test for EG and CGCG in the I and II tests.*

Overall, the results suggest that HCT can be an effective method to increase explosive force and jump height as part of WingTsun training. In order to further verify the validity of these results, it would be useful to conduct the study with a larger sample and over a longer period of time.

Throwing a medical ball with two hands over the head (explosive force)

The results of this study provide valuable insight into the potential effectiveness of HCT in improving athletic performance and provide a solid basis for future research in this field.

On table 10 the results of the first and second studies of the control and experimental groups are presented on main statistical indicators related to the distribution of values in both groups.

Table 10. *Related Sampling Test for Explosive Force Measurement for EG and CG in the first and second tests*

Study	First study			Second study			Reliability (P%)
Groups	$\bar{x}$	s	V (%)	$\bar{x}$	s	V (%)	
EG	10,33	0,17	1,66	10,82	0,22	2,04	99%
CG	9,82	0,13	1,32	10,16	0,11	1,06	<95%

The results presented in Table 10 allow the following important conclusions to be drawn:

These results show that the application of HCT has a positive effect on the physical performance of the subjects in the experimental group, and in particular on their results when throwing a two-handed medical ball over the head (explosive force).

Table 11 shows the changes between the first and second studies in the control and experimental groups by absolute, relative and percentage values.

Table 11. *Mean, absolute, and relative (in %) growth in measurement of explosive force for EG and CG in the I and II tests*

Studied group	$\bar{x}$	d	d(%)
EG	10,82	0,49	4,73%
CG	10,16	0,34	3,48%

By analysing Table 11, which reflects the changes between the first and second measurement for the two groups in the study on the effectiveness of the HCT method, we can make the following observations:

These results are visualised in Figures 12 and 13, where the changes in absolute and relative values of both groups are presented, as well as the mean values of the first and second measurements.

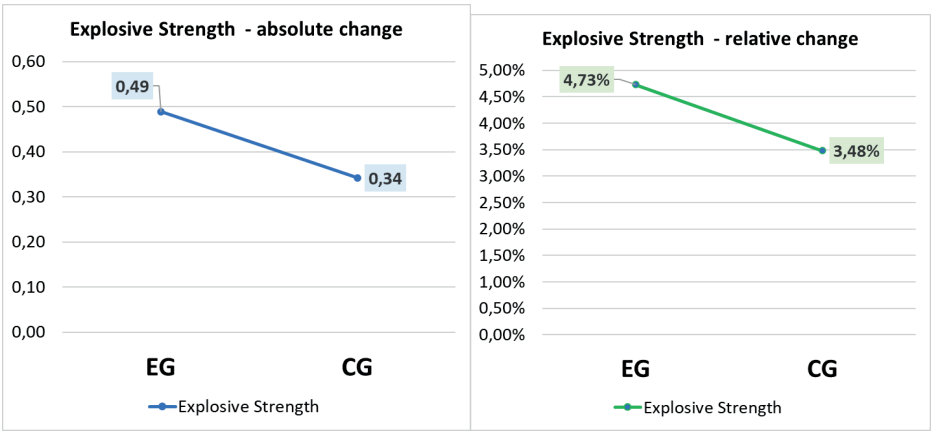


Figure 12. *Mean absolute and relative growth of EG and CG Explosive Strength in 1st and IInd tests.*

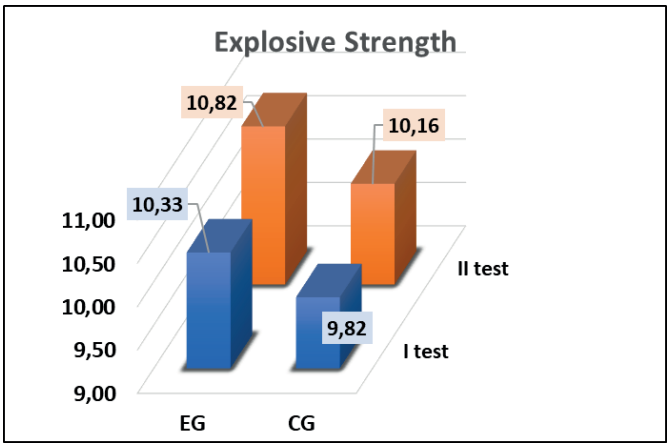


Figure 13. *Changes in the presentation of EG and CG Explosive Strength in the I and II tests.*

After analysing the data collected, the following conclusions can be drawn:

1. In both test series, the experimental group (EG), which conducted a HCT exercise, achieved on average better results than the control group (CG). In the first test series, the average EG was 10.33 meters, while that of the CG was 9.82 meters. In the second test series, the EG improved to 10.82 meters, while the CG reached 10.16 meters. This suggests that HCT training can contribute to improving explosive force.
2. It should be noted that both groups improved their results in the second test series, suggesting that both HCT training and traditional training can lead to progress. However, the improvement in the EG, which conducted a HCT exercise, was higher (increase of 0.49 m compared to an increase of 0.34 meters in CG), which again showed the potential benefits of the HCT training.
3. It is important to note that the performance of individual participants in the groups varies, indicating individual differences in skills, form and response to training. Some participants achieved results well above average, while others were below average. This is a common phenomenon in sports tests and training research and emphasises the need to create individualised training programs tailored to the specific needs and abilities of each individual.

In summary, it can be said that this study provides initial evidence that HCT training can contribute to improving explosive force measured by throwing a medical ball over your head with both hands. However, further research is needed to confirm these results and explore how best to integrate HCT training into the overall training program.

Tests to assess the strength endurance of the muscles of the torso, upper and lower extremities

Push-ups for 30 seconds(strength of upper limbs)

This experiment was conducted to assess the strength of the upper limbs of two groups of students by measuring the number of push-ups performed in 30 seconds.

In general, the experiment was designed to assess the impact of HCT on the strength resistance of the upper limbs and to allow a comparison between a group performing HCT and a control group training without HCT.

On table 12 are presented the results of the first and second study of the control and experimental groups on the main statistical indicators related to the distribution of values in both groups.

Table 12. *Related sample test for the measurement of the upper limb strength for EG and CG in the I and II tests*

Study	First study			Second Study			Reliability (%)
Groups	$\bar{x}$	s	(%)	$\bar{x}$	s	V (%)	
EG	19,96	0,79	3,96	22,48	0,59	2,61	99%
CG	19,48	0,51	2,62	21,44	0,51	2,36	<95%

The results presented in Table 12 allow the following important conclusions to be drawn:

These results show that the application of the HCT method has a positive effect on the physical performance of the subjects in the experimental group and, in particular, on their results from the strength resistance of the upper limbs.

On the table the changes between the first and second studies in the control and experimental groups were shown by absolute, relative, and percentage values.

Table 13. *Mean, absolute, and relative (in %) growth in the measurement of upper limb strength for EG and CG in the I and II tests*

Studied Group	$\bar{x}$	d	d(%)
EG	22,48	2,52	12,63%
CG	21,44	1,96	10,06%

By analysing Table 13, which reflects the changes between the first and the second measurement for the two groups in the study on the effectiveness of the HCT method, we can make the following observations:

The conclusion of this analysis is that the experimental group showed a significant increase in all three change measures (absolute, relative and percentage) after the application of the HCT method. The control group showed smaller changes in the same measures.

These results are visualised in Figures 14 and 15, where changes in the absolute and relative values of both groups are presented, as well as the mean values of the first and second measurements.

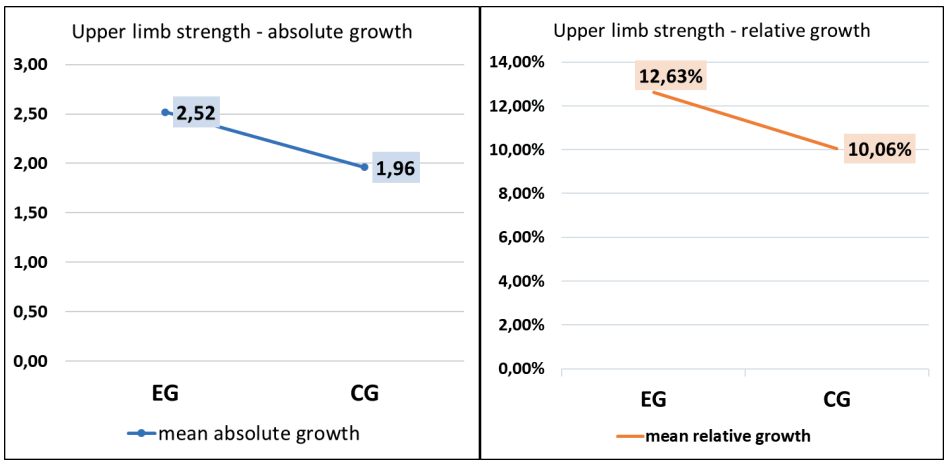


Figure 14. *Mean, absolute, and relative growth in upper limb strength for EG and CG in the I and II tests*

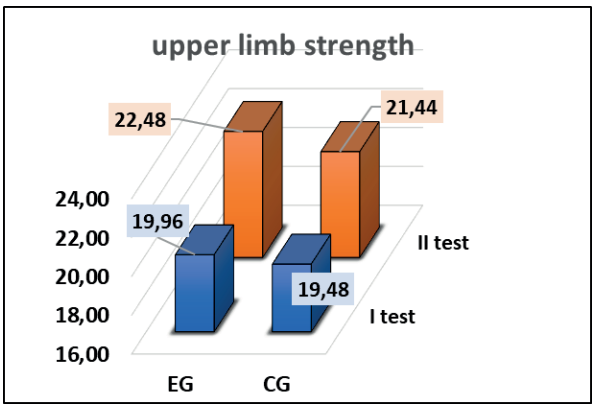


Figure 15. *Changes in the performance of upper limb strength for EG and CG in the I and II tests*

HCT has a positive impact on the improvement of physical capacity, especially with regard to the strength of the upper limbs. Further research could help confirm these findings and possibly explain why some participants benefit more from workouts than others.

Tests to assess the speed of reaction

Speed of the visual reaction

This structure of the study allows to study the effects of HCT on the speed of the visual reaction compared to conventional training. It allows us to consider changes in the speed of reaction over time to assess the long-term impact of HCT.

On table 14 the results of the first and second study of the control and experimental groups are presented on the main statistical indicators related to the distribution of values in both groups.

Table 14. *Related sampling test for the measurement of the speed of the visual reaction for EG and CG in the I and II tests*

Study	First study			Second study			Reliability (%)
Groups	x̄	s	V (%)	x̄	s	V (%)	
EG	8,00	0,71	8,84	9,20	0,76	8,30	99%
CG	6,52	0,51	7,82	6,60	0,50	7,58	<95%

These results show that the application of the HCT method has a positive effect on the physical performance of the subjects in the experimental group and, in particular, on the results of rapidity of the visual reaction.

On table 15 changes between the first and second studies in the control and experimental groups were shown by absolute, relative and percentage values.

Table 15. *Mean, absolute and relative (in %) growth in the measurement of the speed of the visual reaction for EG and CG in the I and II tests*

Sudied Group	ī	d	d(%)
EG	9,20	1,20	15,00%
CG	6,60	0,08	1,23%

By analysing Table 15, which reflects the changes between the first and the second measurement for the two groups in the study on the effectiveness of the HCT method, we can make the following observations:

Experimental group (EG): the arithmetic mean in the results of the second study was 9.20, the absolute change between the first and the second measurement was 1.20. This means that the mean value of the measurement increases after the application of the HCT method. The relative change is 15 %. This indicates that the average measurement in the group increased by a significant percentage after using the HCT method.

Control Group (CG): the arithmetic mean in the results of the second study was 6.60, the absolute change between the first and the second measurement was 0.08. This value is significantly lower than in the experimental group. The relative change in percentage is 1.23 %.

The conclusion of this analysis is that the experimental group showed a significant increase in all three change measures (absolute, relative and percentage) after the application of the HCT method. The control group showed smaller changes in the same measures.

These results are visualised in Figures 16 and 17, where the changes in absolute and relative values of both groups are presented, as well as the mean values of the first and second measurements.

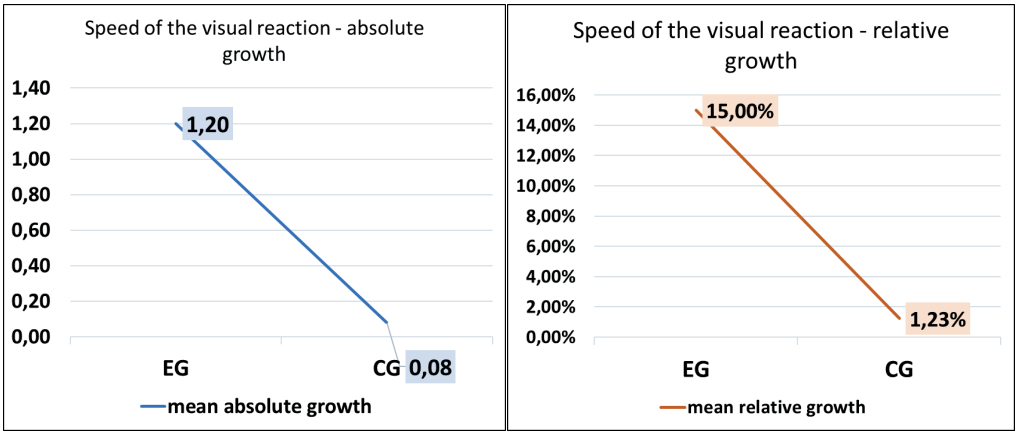


Figure 16. *Mean absolute and relative growth in speed of the visual reaction for EG and CG in the I and II tests.*

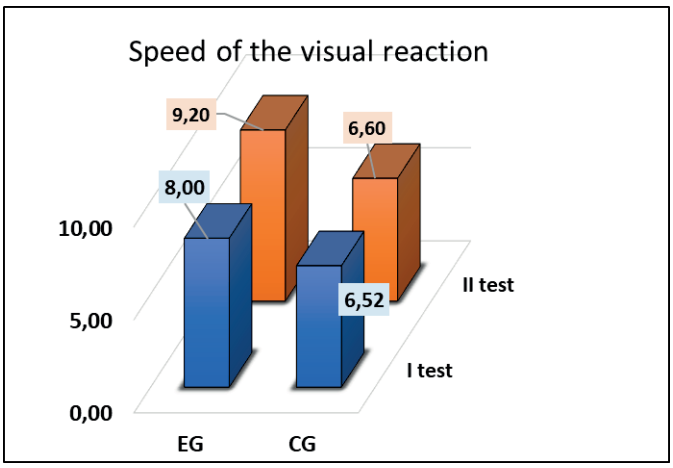


Figure 17. *Changes in the presentation of speed of the visual reaction for EG and CG in the I and II tests.*

Conclusion: The results of the two test series for visual velocity of reaction showed improvement in both groups. Both groups improved their results. This suggests that both methods of training can contribute to improving the visual velocity of the reaction. However, there are individual differences in the data as some participants showed greater improvements than others. This may indicate individual differences in reaction ability and training success.

Overall, the data show that both HCT and standard workouts can contribute to improving visual velocity of reaction. However, further research could be useful in exploring the exact mechanisms by which these training methods improve the velocity of reaction.

Flexibility Assessment Tests

Depth of body bend (flexibility)

The results of the first and second test series were analysed statistically to determine whether there were significant differences in the improvement of flexibility between the experimental group and the control group. It was also checked whether the HCT contributed to a greater improvement in flexibility compared to non-HCT training.

On table 16 are presented the results of the first and second study of the control and experimental groups on main statistical indicators related to the distribution of values in both groups.

Table 16. *Related samplingtest for depth of body bend measurement for EG and CG in the I and II tests*

Study	First study			Second study			Reliability (%)
Groups	$\bar{x}$	s	V (%)	$\bar{x}$	s	V (%)	
EG	4,32	0,16	3,64	6,34	0,15	2,41	99%
CG	4,11	0,10	2,36	5,02	0,10	1,91	<95%

The results presented in the table make it possible to draw the following important conclusions:

These results show that the application of the HCT method has a positive effect on the physical indicators of the subjects in the experimental group and, in particular, on their inclination depth results.

On table 17 the changes between the first and second studies in the control and experimental groups are shown by absolute, relative and percentage values.

Table 17. *Mean, absolute, and relative (in %) depth of body bend growth measurement for EG and CG in the I and II tests*

Studied group	$\bar{x}$	d	d(%)
EG	6,34	2,02	46,90%
CG	5,02	0,91	22,08%

By analysing Table 17, which reflects the changes between the first and the second measurement for the two groups in the study on the effectiveness of the HCT method, we can make the following observations:

These results are presented in Figures 18 and 19, where the changes in absolute, and relative values of the two groups are shown, as well as the mean values of the first and second measurements.

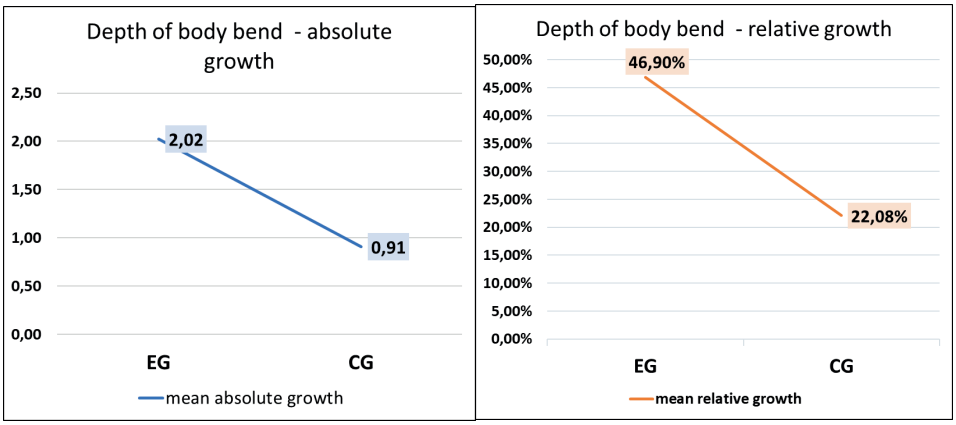


Figure 18. *Mean, absolute, and relative growth in depth of body bend for EG and CG in the I and II tests.*

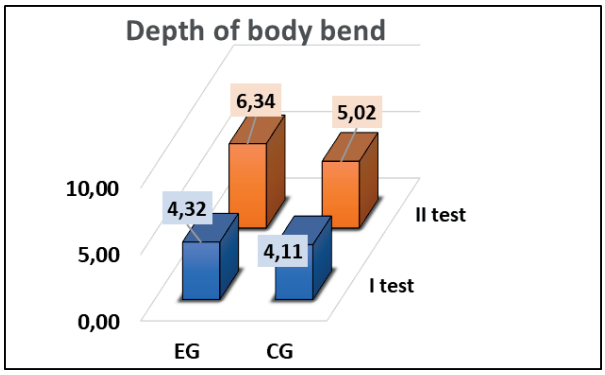


Figure 19. *Changes in the presentation of depth of body bend for EG and CG in the I and II tests.*

However, it is important to note that these data measure only one aspect of participants' capacity. It would be useful to carry out further research to investigate whether the HCT technique also improves other aspects of capacity, such as strength or endurance. In addition, further research could help to understand why the HCT technique has such an impact and how it can be used most effectively.

Overall, however, the evidence suggests that the HCT technique can be a promising tool to improve flexibility.

Conclusions from the results and analysis of physical performance tests

The results of the study highlight the significant improvement in physical performance of WingTsun students who use HCT in training. The experimental group showed much better results in all the physical test areas tested compared to the control group.

Conclusions

1. Jump&Reach test (explosive force and jump height): The improved results in this test are explained by the increase in the explosive strength of the musculature, which is the main goal of the Heidelberg training method.
2. Standing long jump(explosive force and length of jump): Improvements in this test in the experimental group reflect improved explosive force and coordination in the execution of jumps. The Heidelberg Method's training methods that emphasize the velocity and strength of the extremities can explain the increase in explosive force and the length of the jump.
3. 20 m sprint (speed): Increased speed may be due to speed training and muscle strengthening, better coordination, speed and strength in the extremities that develop in the Heidelberg Method.
4. Throwing a medical ball with two hands over the head (explosive force): Improvements in this test highlight the improved explosive force in the upper body and upper limbs, which is a consequence of the training techniques used in the Heidelberg Method.
5. Sit-ups for 30 seconds (strength of the muscles of the torso): Increased strength and endurance in the abdominal muscles is the result of systematic training and the overall role of the HCT model on physical abilities and endurance.
6. Push-ups for 30 seconds (strength of upper limbs): Improved strength resistance of the upper limbs is important for general physical training. The development of strength and endurance in the upper limbs is due to the training specifics in the Heidelberg Method.
7. Speed of visual reaction (speed of reaction): The Heidelberg method's focus on nervous system training explains the increased speed of reaction.
8. Depth of body bend (flexibility): The Heidelberg Method's specific techniques and flexibility exercises aid in the development of flexibility.

Conclusion

Based on the results obtained for physical performance, we can clearly conclude that Heidelberg's training method and methodology are successful in improving the physical training of WingTsun students. This success is associated with a systematic and purposeful workout that promotes all aspects of physical fitness and functionality. The Heidelberg Training Method and Methodology provide a system focused on a complex approach to physical and psychomotor preparation. The strong logical relationship between techniques and improvements in different physical tests emphasises the effectiveness of the method. This approach not only develops specific physical skills, but also improves coordination, velocity and explosive force, which are essential in the physical preparation and performance of various exercises.

Correlation analysis

Correlation analysis reveals relationships and relationships between indicators of physical, mental and psychophysical preparation and serves to determine the influence of the HCT method on these relationships and dependencies. The methodology in correlation analysis looks for links and correlations between the indicators measured by the respective tests in each individual area – physical, mental and psychophysical activity in the experimental group. The correlation analysis was carried out with the IBM SPSS 26 statistical package.

Mental activity

On table 18 correlations between the results of the experimental group in the tests for mental activity are presented.

Table 18. *Correlation analysis of mental activity in EG*

		Concentration Factor (Kc)	Attention span (Ky)	Intensity of attention (V)	Productivity of attention (A)	D. Tremor- erors	D. Tremor- 2 Time	Self confidence	Activity	Mood	SMR - Total
Concentration Factor (Kc)	Pearson Correlation	1	0,840	0,650	0,346	-0,690	-0,710	0,132	0,346	0,223	0,081
	Sig. (2-tailed)		0,000	0,000	0,090	0,000	0,000	0,529	0,090	0,285	0,700
Attention span (Ky)	Pearson Correlation	0,840	1	0,451	0,623	-0,540	-0,615	0,174	0,083	0,230	0,235
	Sig. (2-tailed)	0,000		0,024	0,000	0,008	0,000	0,406	0,699	0,268	0,267
Intensity of attention (V)	Pearson Correlation	0,650	0,451	1	0,433	-0,631	-0,664	0,100	0,521	0,205	0,199
	Sig. (2-tailed)	0,000	0,024		0,026	0,000	0,000	0,633	0,011	0,325	0,329
Productivity of attention (A)	Pearson Correlation	0,346	0,623	0,433	1	-0,591	-0,744	0,230	0,543	0,017	0,019
	Sig. (2-tailed)	0,090	0,000	0,026		0,001	0,000	0,268	0,008	0,934	0,931
D. Tremor- erors	Pearson Correlation	-0,690	-0,540	-0,631	-0,591	1	0,691	-0,541	-0,027	-0,034	-0,056
	Sig. (2-tailed)	0,000	0,008	0,000	0,001		0,000	0,008	0,897	0,872	0,791
D. Tremor- 2 Time	Pearson Correlation	-0,710	0,615	-0,664	-0,744	0,691	1	-0,084	-0,212	-0,124	-0,509
	Sig. (2-tailed)	0,000	0,000	0,000	0,000	0,000		0,689	0,308	0,554	0,016
Self confidence	Pearson Correlation	0,132	0,174	0,100	0,230	-0,541	-0,084	1	0,596	0,601	0,056
	Sig. (2-tailed)	0,529	0,406	0,633	0,268	0,008	0,689		0,001	0,000	0,792
Activity	Pearson Correlation	0,346	0,083	0,521	0,543	-0,027	-0,212	0,596	1	0,100	0,633
	Sig. (2-tailed)	0,090	0,699	0,011	0,008	0,897	0,308	0,001		0,633	0,000
Mood	Pearson Correlation	0,223	0,230	0,205	0,017	-0,034	-0,124	0,601	0,100	1	0,577
	Sig. (2-tailed)	0,285	0,268	0,325	0,934	0,872	0,554	0,000	0,633		0,003
SMR - Total	Pearson Correlation	0,081	0,235	0,199	0,019	-0,056	-0,509	0,056	0,633	0,577	1
	Sig. (2-tailed)	0,700	0,267	0,329	0,931	0,791	0,016	0,792	0,000	0,003	

The following statistically significant relationships (correlation relationship with a significance level of less than 0.05) are identified in the matrix presented in Table 18:

Highly positive correlation:

R (concentration coefficient and attention span) = 0.840

Strongly negative correlation:

R (concentration factor and dynamic tremor time) = -0,710

Significant positive correlations

R (dynamic tremor – number of errors and dynamic tremor – time) = 0,691

R (Attention span and Attention Productivity) = 0,623

R (SMR total and activity) = 0,633

R (SMR total and mood) = 0.577

R (attention productivity and activity) = 0.543

R (self-confidence and mood) = 0,601

R (self-confidence and activity) = 0.596

Significant negative correlations

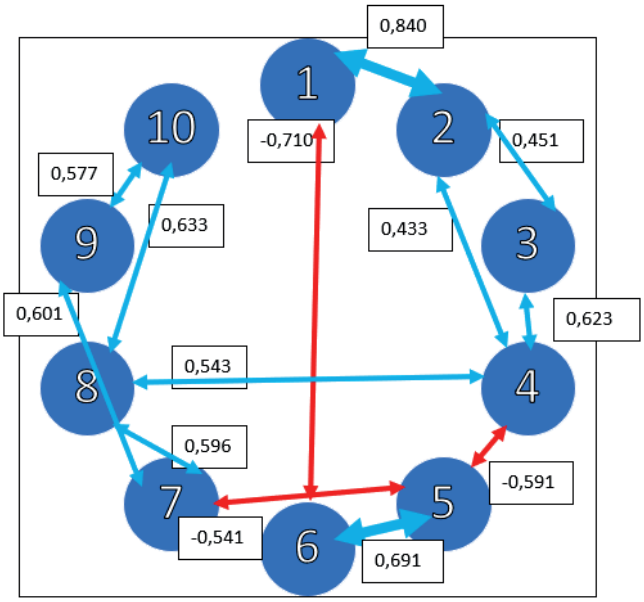
R (self-confidence and dynamic tremor – number of errors) = -0,541

Moderate positive correlations

R (resistance of attention and attention intensity) = 0,451

R (attention productivity and attention intensity) = 0,433

The correlation relationship is shown in Figure 20.



1. Concentration Factor (Kc)	6. D. Tremor- 2 Time
2. Attention span (Ky)	7.Self confidence
3. Intensity of attention (V)	8. Acticity
4. Productivity of attention (A)	9. Mood
5. D. Tremor- erors	10. SMR — total

Figure 20. *Correlation Chart of Mental Tests*

The results of the correlation analysis on the psychological activity of the participants in the experimental group led to the following conclusions:

1. There is a strong positive correlation between concentration ratio and attention span (R = 0,840). This result is explained by the specific aspects of the Heidelberg Method, which improve concentration skills and ability to resist attention. This method focuses on various techniques to improve mental clarity and stability of attention.
2. There is a strong negative correlation between concentration factor and dynamic tremor time (R = -0.710). This result is a consequence of the fact that the lower result of dynamic tremor time (faster reaction) is a logical consequence of increasing the concentration factor. The Heidelberg method, with a focus on velocity of reaction and improvement of coordination, produces precisely such an effect.
3. Significant positive correlations: All positive correlations between different mental indicators emphasise the complex nature of the Heidelberg Method. For instance, improvements in dynamic tremors can have an impact on attention span and productivity, and training techniques in the method can support this combination of factors. Also, improvements in attention span contribute to higher productivity when performing tasks, which is associated with faster execution times and fewer errors. Also, the common SMR, which includes awareness, emotion, and will, is related to mental well-being. The Heidelberg Method visibly assists students to achieve higher values in these areas, resulting in positive correlations.
4. Significant negative correlations: Negative correlations between self-confidence and dynamic tremor can be interpreted as a lower degree of anxiety when reducing the number of errors in dynamic tremors. Or, namely, that high self-confidence makes you more mentally resistant to doubts about possible mistakes. This is a consequence of the Heidelberg Method's effect on stress reduction, improved physical coordination, and increased mental well-being.
5. Moderate positive correlations: Attention span and attention intensity (R = 0.451) indicate that greater attention span promotes attention intensity, especially when performing tasks requiring

caution. Attention productivity and attention intensity (R = 0,433): The Heidelberg Method's greater focus intensity absorption is the cause of increased attention productivity.

Physical activity

On table 19 the correlations between the results of the experimental group in physical activity tests were presented.

Table 19. *Correlation analysis of physical activity in EG*

		Test "Jump&reach"	Standing long jump	20-m sprint	Throwing a medical ball	Sit-ups in 30 sec	Push-up in 30 sec	Depth of the body bend	Speed of the visual reation
Test "Jump&reach"	Pearson Correlation	1	0,470	-0,465	0,523	0,581	0,365	0,161	0,357
	Sig. (2-tailed)		0,018	0,019	0,006	0,000	0,053	0,442	0,080
Standing long jump	Pearson Correlation	0,470	1	-0,601	0,054	0,253	0,155	0,161	0,038
	Sig. (2-tailed)	0,018		0,000	0,799	0,223	0,458	0,441	0,856
20-m sprint	Pearson Correlation	-0,465	-0,601	1	-0,117	-0,199	-0,104	-0,277	0,482
	Sig. (2-tailed)	0,019	0,000		0,579	0,339	0,622	0,180	0,017
Throwing a medical ball	Pearson Correlation	0,523	0,054	-0,117	1	0,712	0,095	0,027	0,084
	Sig. (2-tailed)	0,006	0,799	0,579		0,000	0,651	0,898	0,690
Sit-ups in 30 sec	Pearson Correlation	0,581	0,253	-0,199	0,712	1	0,117	0,270	0,335
	Sig. (2-tailed)	0,000	0,223	0,339	0,000		0,578	0,192	0,101
Push-up in 30 sec	Pearson Correlation	0,365	0,155	-0,104	0,095	0,117	1	0,572	0,224
	Sig. (2-tailed)	0,053	0,458	0,622	0,651	0,578		0,003	0,281
Depth of the body bend	Pearson Correlation	0,161	0,161	-0,277	0,027	0,270	0,572	1	,464*
	Sig. (2-tailed)	0,442	0,441	0,180	0,898	0,192	0,003		0,019
Speed of the visual reation	Pearson Correlation	0,357	0,038	0,482	0,084	0,335	0,224	,464*	1
	Sig. (2-tailed)	0,080	0,856	0,017	0,690	0,101	0,281	0,019	

The following statistically significant links are identified in the matrix presented in the table (correlation relationship with a level of significance of less than 0.05):

Highly positive correlation:

R (throwing a medical ball and push-ups) = 0,712

Significant positive correlations

R (Test Jumps & Reach and push-ups) = 0.587

R (Sit-ups and depth of body bend) = 0,572

R (Test Jump and reach and throw a medical ball) = 0.523

Significant negative correlations

R (Standing long jump and 20 meters sprint) = -0.601

Moderate positive correlations

R (Test Jump & Reach and Standing long jump) = 0,470

R (Speed of visual reaction and 20 m sprint) = 0,482

Moderate negative correlations

R (Test Jump & Reach and 20 m sprint) = 0-465

The correlation relationship is shown in Figure 21.

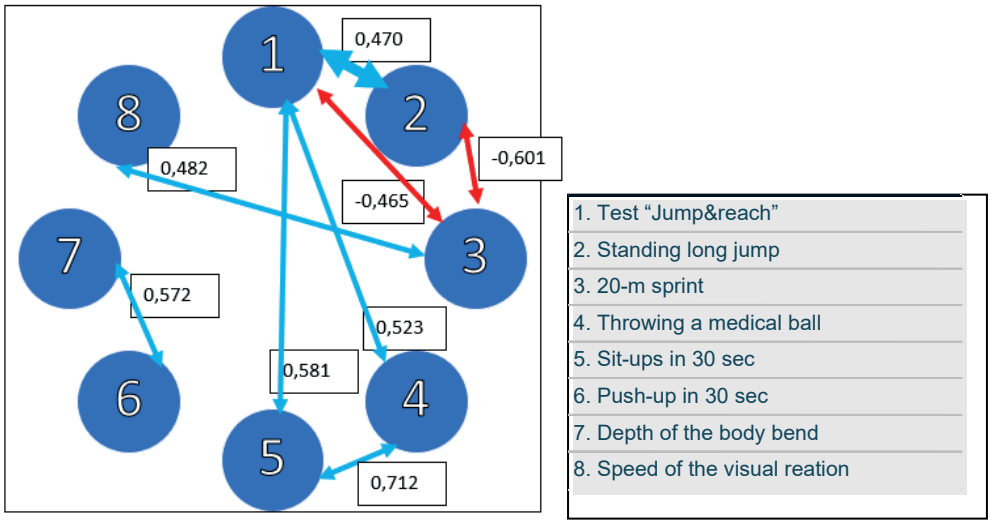


Figure 21. *Correlation diagram of physical tests*

The results of the correlation analysis on the physical activity of the participants in the experimental group led to the following conclusions and conclusions:

1. A Strongly positive correlation (R = 0.712) between throwing a medical ball and push-ups. Improvements in explosive force due to the application of the HCT model required to throw a ball may be related to the greater strength of the upper limbs needed for push-ups.
2. Significant positive correlations: the “Jump &Reach” test involves coordination and strength, which are improved through push-ups. Similar are the interconnections between the crunches and the depth of the slope, as well as between “Jump and reach” and throwing a ball, which are explained by similar physical characteristics. Overall, improvements in these physical indicators due to the HCT method contribute to positive correlations.
3. Significant negative correlations (R = -0.601) between a standing long jump and a 20-meter sprint: the negative correlation reflects the inverse relationship between the strength endurance in the standing long jump and the velocity in the 20-metre sprint. Participants who are stronger and more resilient in the standing long jump have lower speed in the sprint and vice versa.
4. Moderate positive correlations: the “Jump & Reach” test and the standing long jump are related to the explosive force, which is common to both exercises. Also, the speed of the visual reaction affects the result in the 20-meter sprint due to improved efficiency in the combination of speed and reflex.
5. Moderate negative correlations: the speed of the visual reaction and the 20-meter sprint can have a moderate inverse dependence. A faster visual response can be associated with better preparation and speed at the start of the sprint, but there is no deep interconnectedness.

The conclusion is that Heidelberg’s model effectively improves the physical performance of the experimental group by strengthening explosive strength, strength and velocity, leading to improved results in the tests used in this study.

Psychophysical activity

On the table the correlations between the results of the experimental group in psychophysical activity tests were presented.

The following statistically significant relationships (correlation relationship with a significance level of less than 0.05) have been identified in the matrix presented:

Significant positive correlations

R (Activity and push-ups) = 0,601

R (Activity and sit-ups) = 0,611

R (Mood and standing long jump) = 0.569

Significant negative correlations

R (Self-confidence and 20 m sprint) = -0.519

Table 20. *Correlation analysis of psychophysical activity*

		Concentration factor	Productivity of the attention (A)	Self-confidence	Activity	Mood	SMR Total	Test „Jump&Reach" "	Standing long jump	20-m sprint	Throwing a medical ball	Push-ups	Sit-ups
Concentration factor	Pearson Correlation	1						0,438	0,170	-0,047	0,044	-0,050	0,095
	Sig. (2-tailed)							0,029	0,418	0,822	0,835	0,811	0,652
Productivity of the attention (A)	Pearson Correlation		1					0,148	0,223	-0,441	0,174	0,356	0,080
	Sig. (2-tailed)							0,481	0,199	0,027	0,405	0,080	0,703
Self-confidence	Pearson Correlation			1				0,122	0,444	-0,519	0,318	0,035	0,043
	Sig. (2-tailed)							0,563	0,026	0,007	0,121	0,869	0,837
Activity	Pearson Correlation				1			0,008	0,043	-0,104	0,181	0,601	0,611
	Sig. (2-tailed)							0,969	0,837	0,622	0,387	0,000	0,000
Mood	Pearson Correlation					1		0,209	0,569	-0,455	0,066	0,047	0,030
	Sig. (2-tailed)							0,315	0,003	0,019	0,753	0,822	0,888
SMR Total	Pearson Correlation						1	0,429	0,140	-0,033	0,415	0,117	0,022
	Sig. (2-tailed)							0,032	0,506	0,876	0,045	0,577	0,915
Test „Jump&Reach" "	Pearson Correlation	0,438	0,148	0,122	0,008	0,209	0,429	1					
	Sig. (2-tailed)	0,029	0,481	0,563	0,969	0,315	0,032						
Standing long jump	Pearson Correlation	0,170	0,223	0,444	0,043	0,569	0,140		1				
	Sig. (2-tailed)	0,418	0,199	0,026	0,837	0,003	0,506						
20-m sprint	Pearson Correlation	-0,047	-0,441	-0,519	-0,104	-0,455	-0,033			1			
	Sig. (2-tailed)	0,822	0,027	0,007	0,622	0,019	0,876						
Throwing a medical ball	Pearson Correlation	0,044	0,174	0,318	0,181	0,066	0,415				1		
	Sig. (2-tailed)	0,835	0,405	0,121	0,387	0,753	0,045						
Push-ups	Pearson Correlation	-0,050	0,356	0,035	0,601	0,047	0,117					1	
	Sig. (2-tailed)	0,811	0,080	0,869	0,000	0,822	0,577						
Sit-ups	Pearson Correlation	0,095	0,080	0,043	0,611	0,030	0,022						1
	Sig. (2-tailed)	0,652	0,703	0,837	0,000	0,888	0,915						

Moderate positive correlations

R (Concentration factor and Jump& Reach test) = 0,438

R (Self-confidence and standing long jump) = 0.444

R (total SMR and Jump & Reach test) = 0,429

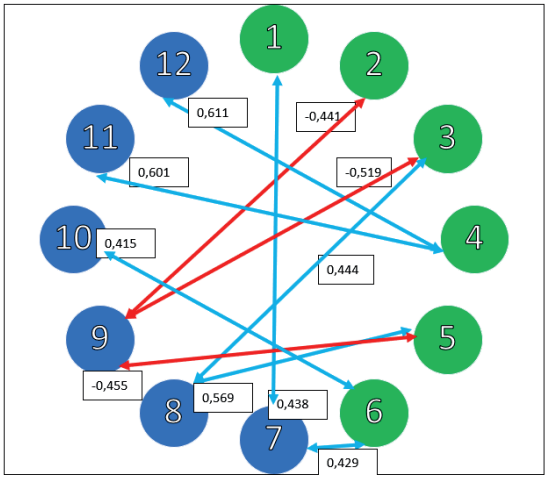
R (total SMR and throwing a medical ball) = 0,415

Moderate negative correlations

R (Productivity of the attention and 20 m sprint) = -0.441

R (Mood and 20 m sprint) = -0.455

The correlation relationship is shown in Figure 22.



1. Concentration factor (Kc)	7. Test „Jump&Reach”
2.Productivity of the attention (A)	8. Standing long jump
3. Self-confidence	9. 20-m sprint
4. Activity	10. Throwing a medical ball
5. Mood	11.Push-ups
6. SMR-total	12. Sit-ups

Figure 22. *Correlation diagram of psychophysical tests*

The results of the correlation analysis on the psychophysical preparation of the participants in the experimental group lead to the following conclusions:

1. Significant positive correlations:

- R (Activity and push-ups) = 0,601: increased activity contributes to increased strength endurance, facilitating the performance of exercises such as push-ups that require force efforts.
- R (Activity and sit-ups) = 0,611: active workouts improve the strength endurance of the abdominal muscles, which leads to better results in the sit-ups.
- R (Modulation and standing long jump) = 0.569: the improved mood increases energy and motivation, which has a positive effect on the ability to perform explosive exercises such as standing long jump.

2. Significant negative correlations:

- R (Self-confidence and 20 m sprint) = -0.519: reduced self-confidence leads to lower energy and motivation, which negatively affects the speed of the 20-meter sprint.

3. Moderate positive correlations:

- R (Concentration factor and Jump&Reach test) = 0,438: improved concentration improves performance in the Jump & Reach test, where good focus is needed.
- R (Self-confidence and standing long jump) = 0,444: better self-confidence contributes to the better explosive force needed to standing long jump.
- R (total SMR and Jump & Reach test) = 0,429: the general self-confidence is interrelated with mental readiness and motivation, which leads to an improvement in the results of the Jump& Reach test.
- R (total SMR and medical ball throw) = 0,415: the general self-confidence affects the physical readiness and strength endurance required to successfully throw a ball.

4. Moderate negative correlations:

- R (Attention productivity and 20-meter sprint) = -0.441: a decrease in attention productivity leads to a decline in focus and reaction, negatively affecting the speed in the 20-metre sprint.
- R (Mood and 20 m sprint) = -0.455: reduced mood leads to lower energy and motivation, negatively affecting the speed in the 20-metre sprint.

These correlations underline the important role of mental readiness and emotional state on physical preparation, providing a logical justification for the influence of the Heidelberg Method. This correlation analysis demonstrates that the Heidelberg Method not only contributes to improvements in mental readiness, but is also associated with significant physical improvements. Thus, the impact of the method is clearly defined as two-way and overall – improvements in one area lead to improvements in another, creating a harmonious link between the mental and physical well-being of athletes.

Chapter IV

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the studies carried out, the methodology applied and the results obtained, the following conclusions and recommendations can be drawn.

Conclusions

1. Theoretically, it was found that there was no unified theory in the methodology of Heidelberg practitioners' competence training in the training of WingTsun.
2. From the results of the physical tests we can clearly conclude that Heidelberg's competency training and its methodology are successful in improving the physical qualities – explosive strength, strength and velocity.
3. The analysis of the results of mental preparation found that significant changes were observed in an increase in concentration factors, resistance, intensity and productivity of attention, indicating that this method can be a valuable tool for improving overall sports performance.
4. There are strong correlations between different mental indicators, which emphasise the complex nature of the Heidelberg method.
5. Our proposed model leads to the improvement of the overall mental and physical readiness of the trainees, providing a logical justification for the influence of the Heidelberg method.

Recommendations

1. We recommend that the model applied by us be adapted to WingTsun training and other age groups with a different level of preparation.
2. The model is to be used as a basis for other martial arts as well as to reveal the potential for improving synergies between mental and physical training methods.
3. Conduct additional studies to examine whether Heidelberg's competency training improves other aspects of capacity.
4. To explore in more detail why the Heidelberg Competence Training model has a positive impact on the legal capacity of the participants in the WingTsun training and how it can be used most effectively.

CONTRIBUTIONS

Based on the theoretical-practical study and the conclusions set out in this thesis, the following important contributions can be identified:

1. In the current dissertation work, Heidelberg's competency training is a working and applicable model in WingTsun trekking.
2. The applied methodology of Heidelberg competence training leads to optimization of the structure of psychophysical readiness in WingTsun training.
3. The applied methodology of Heidelberg's competency training has proven to increase the researched qualities of mental and physical readiness and lead to increased sporting capacity.
4. Concrete evidence of the positive effect of mental training in the context of martial arts contributes convincingly to an understanding of the importance of psychological training methods and emphasises the importance of HCT as an effective method for improving results in WingTsun.
5. The established correlational relationships (strongly positive) between the mental and physical tests are a good basis in the structuring of the WingTsun training and learning process.
6. The positive effect of HCT on legal capacity found in this study is consistent with research in the scientific literature, which highlights mental training as an effective means of enhancing performance in various sports.
7. The study provides a scientific basis for the development of curricula that fully take into account both the physical and mental aspects of WingTchun.
8. In practical terms, the model of Heidelberg competency training was presented, which not only stimulates basic psychological competences, but can also be purposefully adapted to the requirements of WingTsun.

SCIENTIFIC PUBLICATIONS ON THE TOPIC OF DISSERTATION:

1. **Зенфт, М. (2022).** Хайделбергски модел за тренинг на компетенциите (ХТК) по Винг Тчун. В: Докторантски изследвания, брой 6. Пловдив, Университетско издателство „Паисий Хилендарски“, с. 123-131, ISSN 2367-7309.

2. **Senft, M. (2023).** The conception of the wtplus program against the background of historical and current Wing Chun practices. В: Съвременни проблеми на физическото възпитание и спорта № 10, УИ „Паисий Хилендарски“, Пловдив, с. 101-105, ISSN 2367-8216.

3. **Senft, M. (2023).** Conceptual development and implementation strategies in the WT plus model. В: Съвременни проблеми на физическото възпитание и спорта № 10, УИ „Паисий Хилендарски“, Пловдив, с. 106-111, ISSN 2367-8216.