„BABEȘ-BOLYAI” UNIVERSITY CLUJ-NAPOCA
FACULTY OF PHYSICAL EDUCATION AND SPORT
DOCTORAL SCHOOL PHYSICAL EDUCATION AND SPORT

Contributions
on the optimization of mentoring and evaluation techniques for contact sports athletes through innovative training

PhD Thesis Summary

PhD Supervisor:
Prof. univ.dr. Emilia Florina Grosu

PhD student:
Adrian Antonel Moisa - Turcu

Cluj - Napoca
2021

Table of Contents

PART III – PERSONAL RESEARCH CONTRIBUTIONS

Chapter 6. Study I – Study on the biochemical assessment of samples of saliva, in terms of the salivary concentration of cortisol, testosterone, respectively, urinary catecholamine in the boxers

6.1. Introduction

6.2. Aim of the study

6.3. The assumptions of the study

6.4. Subjects, duration of study

6.5. Materials and methods

6.6. Design of the intervention program

6.7. Data collection and analysis

6.8. Interpretation of results

6.9. Discussions

6.10. Conclusions

Chapter 7. Study II - Proposed structures for innovative training, experimental results in assessing and quantifying athletes

7.1. Aim of the study

7.2. The objective of the study

7.3. The study hypothesis

7.4. Subjects, period of deployment

7.5. Design of the intervention program

7.6. Materials and methods used in the study

7.7. Graphic representation of individual results

7.8. Collection, analysis and interpretation of the initial results obtained in the experimental study

7.9. Discussions and conclusions

Chapter 8. Study III - Experiment for the development of force endurance

8.1. Aim of the study

8.2. The objective of the study

8.3. The study hypothesis

8.4. Subjects, duration of study

8.5. Materials and methods used in the study

8.6. Description of the intervention program

8.7. Data collection, analysis and interpretation of the results

8.8. Discussions

Keywords:

Contact sports, mentoring, evaluation, innovative training, boxing

Introduction

Nowadays, the issue of adaptation and education through sport as well as the development of our daily existence through the practice of sport are characterized by scope and diversity, which is why its practice must be done only from complementary perspectives, which requires a careful specialization of skills. At the same time, the universal character of the educational phenomenon and the humanistic message attached to educational thinking and practices must be taken into account. The transition to the name of adaptation and education through sports was due to the widening of the scope of these activities, the diversification of the content, the forms of organization and the growth of the segment of the population involved in its practice.

Boxing or boxing has long been a simple confrontation in which two opponents demonstrate their strength, but has evolved into an authentic art that involves an enviable physical condition, speed in performing specific movements, efficient and spontaneous reflexes and tactical intelligence.

Also known as the art of hitting an opponent and also avoiding his blows, boxing became until 10-15 years ago a favorite sport of many young people. Although boxing offers multiple strengths, especially physically, and has long been included among the most complete and complex sports, in recent years interest in it has declined. Other contact sports such as kickboxing began to enjoy much greater interest. Boxing rings are less and less populated by boxers and more and more often by fighters from other contact sports. Boxing galas are more and more sporadic, being organized only on the occasion of national or international championships and very rarely on other occasions.

Through what is presented in the paper, through the research and conclusions carried out and deduced, we try to motivate children, juniors, male and female youth to orient themselves, in everything they undertake in their movements and sports, and towards boxing.

PART I - ARGUMENTATIVE REFERENCES REGARDING CURRENT TRAININGS

Chapter 1. Argumentative analysis of boxers' training through current training

The design of high-performance scientifically well-trained training, especially in the field of boxing, already has a history of over 80 years. They can be located in time immediately after World War II, mainly in the strongest states that formed the Soviet Union. At that time in the world there was a power significantly unaffected by war, namely the United States of America. Russia and the United States have begun to become the strongest political and economic forces. A cold war of almost 50 years has set in between the two state structures, in the struggle for world power and ideological supremacy (Hopkins, 2007).

The availability of such resources has allowed Russia to conduct a wide variety of studies on sports performance and training methodologies at a time when the United States and other free world nations were still in their infancy in sports science. Some of the Soviet research focused on the applied aspects of training that were eventually incorporated into professional boxing in America from 1985. Boxing continued to be covered globally (Julio Cesar Chavez, Pernell Whitaker and Evander Holyfield were big names in the 1980s) (Murray, 2014).

American boxing had Mike Tyson as its superstar, and MMA (Mixed Martial Arts) didn't really exist (the term was coined in 1993). Boxing was also publicized and loved by fans in the late 1980s and 1990s, although not at the same level as decades earlier.

Time has eroded boxing to the point where it barely catches the attention of fans (when Floyd Mayweather fights, people are paying attention for a few minutes, but that's about it), while MMA is the fastest growing sport in America, although its base of fans is made up predominantly of men, which is a limiting factor. The Ultimate Fighting Championship was founded in 1993, but it really started in the mid-2000s and has a solid fan base.

It is hard to imagine anything other than a continuous decline for boxing and an increase for MMA (Murray, 2014). Boxing could gain some fans if a hard charismatic character enters the scene, but for now his best days are in the past. MMA and UFC will continue their recent rise, but are facing low turnout from older fans and women, which will be difficult to overcome.

Chapter 2. Defining parameters and indicators of current training activities

2.1. Defining physical quantities as information of interest in traditional training

From the analysis and synthesis of the information contained in the studied bibliography, bibliography related to the field of contact sports, several consultations with coaches and their

collaborators, we came to the conclusion that those who are interested in current training, traditional training, can be synthesized in a triangulation scheme as in Figure 2.

It often plays the issue of determining which parameter in those mentioned above to be importance to improve performance in some evidence within a period of preparation. Speed, force or resistance or whose parameter? There are such questions not because the man was able to move on the earth or on the water through his own force an impressive distance of the sea, but because of his ability to go through the same distance in a shorter time. The more of the above mentioned. It is important for improving performance in some samples within a training period. Speed, force or resistance or whose parameter? There are such questions not because the man could move on the earth or on the water through his own force an impressive distance of the sea, but because of his ability to go through the same distance in a shorter time.

In contact sports, these questions are asked due to the fact that any blow involves a longer or shorter energy discharge and must be determined how this phenomenon is more effective in the opponent's actions: high speed and constant force or High force and low speed? Consequently, it was pursued that, first of all, to develop the travel speed of the impactor, as well as the development of an as large force, this being the main purpose of any preparation, overcoming the biological limits of the human body.

Apart from these parameters, in the paper, a fourth parameter is inserted called the sports gesture or gesture frequency. In this way, the parameter-item triangulation diagram in Figure 2 turns into a chart in the parameters of parameters as in Figure 3.

Theoretically, when the speed component is analyzed, obviously in combination with other motor qualities, it is based on the premise that its singular manifestation is only taken into account when the energy-genesis of the respective movement is anaerobic.

Regardless of the sports sports profile, it is necessary that it can execute the competitive effort with high-speed. He needs the speed reserve reported at the match temple. It increases in proportion to the maximum possibilities for an optimal speed in the execution of the contact-specific movements (El Ashker, 2018). Starting from this truth of the current features of these sports, the conception of the role and place of speed in structuring training, as a condition for optimizing sports performance.

Among the information caused by parameters as a speed variants of interest is as follows:

- ► Movement speed and sports reaction time,
- ► The speed or speed at which the athlete scroll the heating phase,
- ► The speed or speed at which the athlete accesses the technique available,
- ► Athletes' speed or response speed to opponent's actions,
- ► Rapidity or time of response of the athlete to changes in actions in the training structure.

2.3. Parameters of complementary items in the traditional training structure

In the structuring of innovative training, it has been found that it is beneficial to take account of certain parameters constituted by the interdependence between those defined above or by their complementary physiological parameters. Thus, it has opted for those listed here (Cunnifices, Ellison, Losemore, & Cardinal, 2017):

►The speed - force in streamlining blows.

►Synchronization between the arm - shoulder - hip in performing lower energy strikes but increased efficiency.

► Effective election of input information and response type in structuring the software implemented in innovative training.

► The uncertainty included in the correlation with the sporting time of the athlete to the sudden change in innovative training conditions.

Chapter 3. Motor coordination or reactivity -CMR

3.1. Motor coordination - adequacy and synchronization of limb movements

Motor coordination is a branch of the preparation of a sportsman who is at least as important as all other types of training.

3.2. Methods of educating coordinating or motor skills

Coordination can be educated and improved by: the varied use of the initial execution positions; Execution with the skill and non-drainage; alternating rapid rhythms with slow ones; Alternating and combining the technical elements, motor skills; space limitation and increasing the speed of execution; combining old skills known to new ones that are in the learning stage;

3.3. General methods for educating coordinating skills

According to Harre (1996), the following series of means and methods for the development of coordinating skills are distinguished:

1. Variation of movement execution by filling partial phases of the motor sequence or rhythm (example: in boxing, the boxer facing the coach at the optimal distance of each other, hits by moving forward and backward)

2. Variation of external conditions (Example: series of blows in the manikin and then immediately in imaginary opponent)

3. Combining automated skills already (Example: Execution of Specific Brows - Repeated Direct, Repeated Overcut, Repeated Hits to Liver)

4. Practice with time control (example: 15 blows in the bag in 30 ", 15 strokes in the coach glove at the same time as repeating the two sets of blows 3 times)

5. Variation of information - amplification of visual, acoustic information, etc. (Example: Changing the types of kicks with your arms, workout, every coach's whistle)

6. Fatigue exercises (not recommended for beginners or in correction) (Example: String training, alternatively right-left and vice versa in kickbox)

7. Imitation exercises for required motor sequences (Example: Bits both with arms and legs in imaginary opponents in kickbox, etc.)

8. Bilateral exercises (Example: Making bumps with arms in static legs - in boxing or repeated blows with the same foot, the other being static).

3.4. Factors conditioning skill as coordinating aptitude

In the literature, the meaning of the coordination term is synonymous with skill, skill, precision, accuracy, fineness, grace, balance, all representing an individual's ability to learn and quickly combine new moves, to perform harmonious movements And efficient in a given time with a small energy consumption (Kendellen & Camire, 2019).

3.5. Articular mobility and muscular elasticity

Mobility expresses man's ability to execute large amplitude movements. Haare (1996) shows that mobility is the ability of man to maximize the anatomical locomotic potential in a particular joint or in the body joints, materialized by performing large amplitude movements.

Mobility is manifested by two ways: active and passive. The first type is the maximum amplitude of its own muscular activity (without help). The second type is achieved with the help of the external force, with its partner with his own body weight (Popovici, Moraru, & Hodorca, 2015).

3.6. Neuromuscular proprioceptive drive techniques (FPN)

These techniques are derived from some techniques similar to the recovery of parallel suffering or neuromuscular paralysis but are sometimes particularly beneficial in innovative workouts for sports in contact sports. Pretentious but efficient - consist of the alternations of the stamp phases with relaxing phases having a duration of 10 seconds each.

3.7. Developing combined and complex motor qualities

Theoretical aspects. As a growing performance is increased, the development of motor qualities is becoming increasingly difficult. Analyzing the intimacy and specificity of sports branches, specialists agree that the combined and complex approach of the training process is a process that engages an increasing number of motorized qualities, but with an increasingly participating share (Morris, Oliver, Pedley, Haff, & Lloyd, 2020).

1. Speed resistance describes the possibility of conducting long efforts over time, in the conditions of rapid muscle contractions.

2. Strength in force reflects the body's ability to withstand moderate effort over a long distance.

3. Speed force is the ability of neuromuscular system to defeat a high resistance through a maximum shrink speed.

4. Strength force is the body's ability to efforts under long-term muscle contractions.

5. Speed in force mode is the quality of neuromuscular system to perform fast movements in the conditions of overcoming a relatively small resistance. Is also referred to as a detainer.

6. Resistance speed is the quality of the body to efforts with 30-65% of possibilities, under short-term muscle contractions.

With the achievement of sport performance, the further development of motor qualities becomes problematic, even if the combined and complex approach of the training process is assumed.

3.8. Methods for assessing coordination

Currently, because coordination is the most complex of psycho motor skills, it has not yet found a method that can fully assess it. Tests and samples used by coaches or teachers, as remarks M. Epuran, 2005, are not "sufficiently precise, often resorting to analog segments of specific behaviors in some sports."

As regards the coordination test of the Sports Motor Test, the Davis, Wittekind and Beneke authors (2013) considers that it has the following advantages: it can be applied as a working method with a relatively large "real" content and an investment for the equipment and tools Relatively restricted "is appropriate to the research object, because the result of a motor action as a test load will be interpreted starting from the outline of a personality. In an even smart extent, physiological, psychological, medical and biomechanical methods are currently used in training research, for clarifying the sphere of the object. It will be necessary to introduce these methods because it can be researched relatively elementary functions of the coordination process (for example psychophysical functions) that are the basis for coordination quality. "

The interpretation of the results recorded following the support of sporting tests must highlight the degree of skill proven in the motor actions carried out on the test. During testing actions with simple coordination (example - jumping in length) can go from the fact that they can be mastered by all athletes as well and constantly (Moraru & Radu, 2014). As a result, the influence of the skill should be considered as constant and permanent, and the test result can be highlighted from the different degrees of precision of the executions, during the testing of motor actions that require "complex coordination, which can achieve or exceed the difficulty of competitive exercises, during the diagnosis of the specific aspects of skill and coordination. The

level of skill is usually differentiated inter and individually entered, which strongly and differently influences the outcome of the coordination tests. "

Chapter 4. Stress Resistance in Contact Sports

4.1. General Considerations on Stress Resistance

The term stress, or stress, is the adaptation syndrome that the individual realizes as a result of environmental aggression; Assembly comprising tension, tension, constraint, force, request, etc. (Christ, 1952). Starting from this concept, it is mentioned that the term belongs to Selye (1956) that considers stress binds to adaptation syndrome. Hans H. B. Selye defines the stress as a "assembly of reactions of the human body to the external action of causal agents (physics, chemical, biological and mental) consisting of morpho-functional changes, most often endocrine. If the stressor agent has a lasting action we are talking about general adaptation syndrome that involves a stage evolution. "

The first level is that of the alarm reactions (Bejan & Toniţa, 2014) and is characteristic of the childhood period when biological resistance is very low.

The second level is the specific resistance (return), when after the first contact with the Stress Agent the body is adapting, the behavior of the individual being apparently normal, persisting changes specific to the previous stage, especially from the contrast phase. On an ontogenetic chart, this level corresponds to maturity, when the individual has a good resistance, being able to adapt to almost any type of stress in the environment (Schevaun & Bellingier, 2019).

The third level is the exhaustion, on the ontogenetic, the old age, when it decreases almost all the Adaptive Resources of the body (Schevaun & Bellingier, 2019). Adaptation is no longer maintained due to the decrease in vegetative reactions. The negative consequences of the long-term action of these neuro vegetative mechanisms are obvious.

4.2. Mental training techniques, relaxation, meditation and cognitive behavior

Among the most frequencies of mental training, it cannot be considered that there is some better than others. Depending on the situation and the individual, there will be more relevant than others. Imposing a Technique of a Sport is not good, it is better to find it with him that fits best (Kraemer & Nitka, 2021). The methods listed below are not exhaustive, and their presentation is meant only to know their principle.

4.3. Imaging and mental viewing techniques - Stress adjustment

Mental view makes it possible to change time and space (returning to the past, projection in the future, etc.), while mental images can be made from an internal or external perspective

(Parnabas, Parnabas, & Parnabas, 2015). In the internal perspective: the athlete involved in action uses "ego"; He imagines himself in his mind, executing the gesture and feels all the sensations he can offer (visual and kinesthetic) (Parnabas, Parnabas, & Parnabas, 2015).

PART II - PRELIMINARY RESEARCH ON INTERVENTION PROTOCOLS AND EVALUATION INSTRUMENTS USED

Chapter 5. Testing in the pilot study of the evaluation of psychomotor components: Perceptions; Motor coordination and self-regulation

5.1. The purpose of preliminary research

The purpose of this research was to design a working protocol to assess psychomotor components: Perception, motor coordination and self-regulation in young people aged 14-16, athletes, practitioners of contact sports.

5.2. The objectives of preliminary research

1. Achieving and applying an intervention program addressed to sporting sports athletes for testing the perception rate, motor coordination and self-regulation in order to validate the proposed concept and its application methodology.

2. Using the ”Psitest Cabinet” system in order to validate the advantages offered by it in the study.

5.3. The hypothesis of preliminary research

It is assumed that by applying the intervention program for a year, positive changes occur in the values of the three components of psychomotricity: the speed of perception, motor coordination and self-regulation in the experimental contact sports compared to the athletes in the control group.

5.4. Subjects, duration of preliminary research

Participated 30 athletes aged 14-16 years, of which 15 practitioners of the contact sports in the private and state sports clubs in Cluj-Napoca and 15 in the city of Tăşnad, contact sports practitioners: Boxing, Judo, Aikido, Karate, Taekwondo. Subjects participated in at least 3 workouts per week. The percentage of left-handed was 9.37%.

Preliminary research was 12 months and took place between 31 November 2015 - 1 November 2016.

5.5. Equipment and methods used in preliminary research

For computer-assisted examination of persons operating in risk conditions and / or predominantly psychological request and athletes in contact sports are structured specialized test packages, which involves the use of performing computers (Hăvârneanu & Gheorghiu, 2012).

Tests used in "Psitest Cabinet" systems addresses inter alia item packages such as: PVM - visual perception test; ACRM - a manual response test; TR - test for basal reactivity assessment (reaction time); CMR - motor coordination test and reactivity (complex reactions); RO - Test for

the assessment of psychological fatigue resistance; RS - Psychic stress resistance test; RCR - Test for assessing rationality and clarity of reasoning; As - test for assessing focus; MA - Test for assessing attention mobility.

Table 3 are detailed these tests indicating the indicators or information items followed in the evaluation. The modalities of administration are also detailed as well as the duration of the established item evaluation.

Table 4 are parametrically detailed, which, by selecting by criteria related to the specificity of sport or sports discipline, may enter into the structure of innovative training. Parameters are detailed either as objective items either as semi-objective items. The modalities of administration are also detailed as well as the duration of the established item evaluation.

Table 5 presents parameters that will be used in the structure of innovative training, indicators or items in the evaluation.

Table 6 is presented by for parameters used in the structuring of innovative training and especially in the processing of test results with "Psitest Cabinet" systems.

5.6. Data collection and analysis

The results obtained were statistically interpreted using the SPSS version 20. In the table, the results were presented as a medium and standard deviation.

All statistical tests were nonparametric, as the Shapiro-Wilk was statistically significant. Statistical calculations for intra-group, inter-group and correlations were made.

5.7. Interpretation of preliminary research results

Statistically significant intragroup values for the experimental group have been statistically at all 3 variables. In the case of the control group, two out of three variables were statistically significant, and the significant difference at no level was not exceeded at intergroup. Even so, it was a percentage calculated (%) as much as it grew up and highlighted that, although there were no significant differences in intergroup, the increase has become even 3.5 times higher within the experimental group for some variables.

At the beginning of the pilot study, the Mann-Whitney U test did not record statistically significant differences between the experimental group (M = 7.73, SD = 4.86) and the control group (M = 7.73.72, SD = 4.74) on the speed of perception, (U = -0.10, p = 0.92).

The averages of the two groups were not significant in the case of the "motor coordination" variable, the initial results being close to the experimental group (M = 80.40, SD = 5.64) and the control group (M = 81.06, SD = 4.82) , (U = -0.88, p = 0.38).

The same can be said about the "self-regulation" variable, where the differences were not statistically significant at the beginning of the study between the experimental group (M = 89.93,

sd = 10.26) and the control group (M = 88.06, SD = 9.90), the nonparametric test Mann-Whitney u demonstrating this, (u = -0.27, p = 0.79).

At the end of the study no statistically significant differences between the two groups were recorded in any of the three variables, but the experimental group recorded statistically significant improvements in all three variables compared to initial tests, suggesting that the subjects in this group registered a visible progress compared to the control group.

For variable, the perception rate, the control group achieved a statistically significant decrease at the end of the study (M = 6.40, SD = 4.14) compared to initial tests (M = 7.73, SD = 4.74), Wilcoxon nonparametric test demonstrating this, (Z = -2.98, p = 0.003). The experimental group recorded a statistically significant decrease at the end of the study (M = 5.67, SD = 4.08) compared to the results obtained in the initial samples (M = 7.73, SD = 4.86), (z = -2.95, p = 0.003). The differences between the two groups were not statistically significant at the end of the study, (U = -0.68, p = 0.50). However, the experimental group registered an improvement by 26.7% compared to only 17.2% in the control group.

Instead, in the "motor coordination" variable, only the experimental group recorded a statistically significant improvement at the end of the pilot study (M = 84.87, SD = 4.29) compared to initial testing (M = 80.40, SD = 5.64), (z = -3.24, p = 0.001). The control group did not register a statistically significant difference between the initial values (M = 81.07, SD = 4.82) and the final values (M = 82.33, SD = 5.07), (z = -3.19, p = 0.001). Between the two groups, the nonparametric test Mann-Whitney U did not record a statistically significant difference (U = -1.21, p = 0.23). However, the experimental group recorded a 5.6% increase, but the control group recorded an increase by only 1.6%, therefore, as a 3.5 times higher growth in the experimental group, compared to the control group.

The experimental group registered a statistically significant improvement at the end of the study (M = 89.93, SD = 10.26) compared to baseline (M = 86.53, SD = 11.24), (Z = -3.09, p = 0.002) on variable, self-regulating. " The control group recorded a statistically significant improvement at the end of the study (M = 88.07, SD = 9.90) compared to initial testing (M = 86, SD = 11.63), (Z = -3.31, p = 0.001). Between the two groups there was no statistically significant difference at the end of the study, (U = -0.79, p = 0.43); Therefore, the experimental group recorded a 3.9% increase, compared with only 2.4% in the control group.

There are also correlations between the variables presented above; More precisely between the "perception speed" and "motor coordination" there is a negative correlation, and as can be seen in Figure 9, with the decrease of the variable values, the speed of perceptions, the values of the variable, "motor coordination" , correlation that is statistically significant, r = -0.43, df = 28, p <0.05.

Also, a positive correlation was observed between the "motor coordination" variables, and as can be seen in Figure 10, with the increase in a variable values, the values of the other variable, increase, the correlation being statistically significant, $r = 0.65$, $df = 28$, $p < 0.001$.

5.8. Discussions and conclusions

The specific requirements of a contact sport can be reflected in the perceptual-motor performance of practitioners.

The level of coordination skills is of crucial importance in battle sports and martial arts. Its particular and very specific manifestation is the "feeling of the opponent" that exerts a considerable impact on the effectiveness of the fight. Despite the considerable importance of "opponent's sentiment," this problem has been treated so far very marginal. Proof of fact is the existence of a small number of publications such as Blady, et al., (1988) or Star (2003), which attempts to define the notion, describe the structure and conditions of development.

Aggressive behavior was one of the essential issues in sport psychology, while the aggressive boxers behavior received limited attention. Although some publications reported that self-efficacy is related to aggressive behavior, the mechanism through which self-efficacy affects aggressive behavior remains unclear.

Since differences were not significant intergroup in the pilot study, this allows for the continuation of research with an experimental study on a slightly larger sample and for a longer period to be able to remove some relevant conclusions in this respect.

PART III – PERSONAL RESEARCH CONTRIBUTIONS

Chapter 6. Study I on the biochemical assessment of samples of saliva, in terms of the salivary concentration of cortisol, testosterone, respectively, urinary catecholamine in the boxers

6.1. Introduction

In individual or team sport, stress is biochemically characterized by the stimulation of the functional axis of the hypothalamus - pituitary glands, where the target gland is often represented by the adrenal glands (Toma, Farcas, Pârvu, Silaghi-Dumitrescu , & Roman, 2017). The role of the adrenal glands in behavioral adjustment to competitive stress is indirect. Hormones, especially glucocorticoids, catecholamine and sex hormones act on specific receptors in prefrontal cortex, hippocampus, tonsillion or hypothalamus, thus modifying the adaptive behavior in competition (Argus, Gill, Keogh, Hopkins, & Beven, 2009). At the same time, the problem of overlapping biochemical, physiological changes with those associated with competitive stress, which is naturally interconnected (Toma, et al., 2019).

6.2. Aim of the study

The main purpose was the outline of the biochemical and physiological status of athletes subject to organized training and establishing the role of training in the modulation of reactivity to competitive stress.

6.3. The assumptions of the study

Be supposed to:

Following some series of training, there will be changes in the biochemical and physiological profile of athletes.

The structure of the training can influence the reactivity of the athlete at the competitive tracing.

6.4. Subjects, duration of study

The study group was composed of juniors, male, aged 14-16 years, without chronic conditions and based on consent signed by them in order to voluntarily participate in the study. The study group was composed of 50 students from which: 25 pupils of contact sports practitioners in the sports clubs in Tăşnad and Carei Satu-Mare and 25 student clubs in Cluj-Napoca. The contact sports were: Box, Judo, Aikido, Karate, Taekwondo, Box.

The duration of the experiment was 12 months, between December 2016 - November 2017. The frequency of training in training was 3 times a week.

6.5. Materials and methods

The intensive, extensive and recovery trainings carried out by the subjects participating in the study are described in Figures 10 and 11.

6.6. Design of the intervention program

The design is an experimental one with pre- and post-intervention measurements. The intervention program was exercises to improve focusing attention as well as the speed of perception, which were presented in Chapter 6 in Tables 8-11, p. 86-88.

6.7. Data collection and analysis

The harvesting of the evidence was conducted in close connection with the training course in the group. The study was expanded for 24 months (2 years), the harvesting of samples taking place in the initial phase, before the training starts, and in the final phase, after the passage of subjects through all stages of the training provided in the experimental scheme. The harvested samples were saliva and urine, in medium volumes of 1 ml. The harvesting of the samples was carried out under the most rigorous and hygiene conditions in special, sterile containers. Samples were then frozen until biochemical analyzes were performed.

Numerical data obtained from the determinations carried out were processed with the t Student test associated with Welch's correction. The statistical significance was established at a P value associated <0.05 (probability> 95%). The comparison was made between the average of the initial values and the average of the final values for all biochemical dosage markers. Data are expressed as mean ± sd (standard deviation). Statistical data processing was performed using the GraphPad Prism Software 5.

6.7.1. Analysis of salivary concentration of cortisol and testosterone

Cortisol and salivary testosterone were determined by ELISA (Enzyme-Linked Immunosorbent Assay), based on the antigen-antibody reaction, in 96-well plate, pretreated with human anti-cortisol and human anti-testosterone antibodies. Salt samples were processed according to specific methods, diluted 5 times with saline phosphate buffer (TFS) 0.1m pH = 7.4 and then subjected to the determination protocol characteristic of each hormone, as described in a previous work (Toma, et al ., 2019).

6.7.2. Analysis of urinary catecholamine

Urinary samples were diluted 5 times and subjected to spectrophotometric determination at 530 nm of the concentration of total urine catecholamine, prevalence of adrenaline and dopamine. Method of determination (Madrakian, Afkhami, Khalafi, & Mohammadnejad, 2006) is based on the oxidation of catecholamine with potassium periodate followed by coupling the 4-aminobenzoic acid reaction product. Following this reaction, appears a blue color whose spectrophotometric intensity is directly proportional to the concentration of catecholamine in the sample.

6.8. Interpretation of results

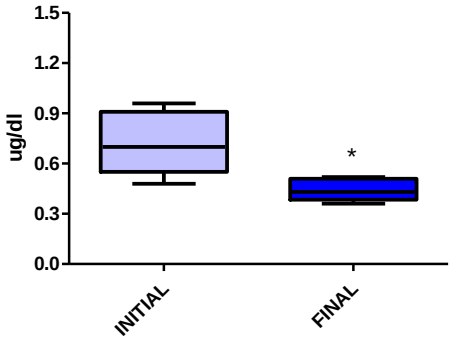


Figure 3. Concentration of salivary cortisol at junior boys in the initial stage of the final test.

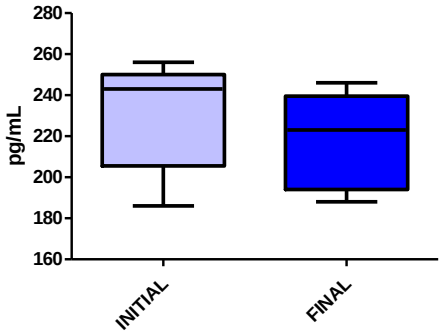


Figure 4. Concentration of salivary testosterone at juniors boys in the initial stage of the test.

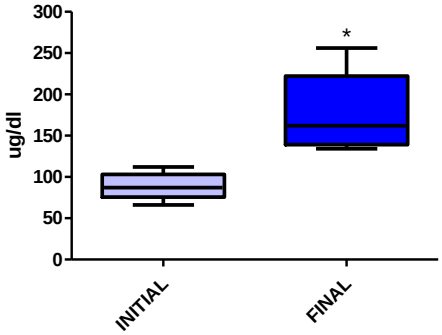


Figure 5. Concentration of urinary catecholamine for junior boys in the initial stage of the test.

The results of the biochemical analyses of the Saliva or the urine from junior boys have demonstrated an independent variation of cortisol, testosterone and catecholamine. The salivary level of Cortisol decreased significantly ($p < 0.05$) in the final harvesting phase (0.44 ± 0.02 µg/ml), after 12 months of training, compared to the level determined in the incoming phase of activity (initial phase) of 0.72 ± 0.08 µg/ml.

Testosterone did not show statistically significant variations but only a decrease in the final harvesting phase after the subjects pass through the 24-month training.

Urinary catecholamine increased significantly ($p < 0.05$) in relation to the initial harvesting stage when the concentration of 88.8 ± 7 μg/dl was determined in the final step, their urinary concentration being 176.8 ± 21.8 μg/dl. The correlation analysis highlighted in relation to the variation in Salivary Cortisol a negative correlation coefficient (-0.708) for salivary testosterone a positive correlation coefficient (0.161) and for urinary catecholamine, a negative correlation coefficient (-0.467). P associated with the correlation analysis did not have values less than 0.05.

6.9. Discussions

The biochemical testing of the subjects in the study wanted to highlight the role of training in modulating the ability to adapt to physical effort and the factors of competitive stress. Through the biochemical parameters dosed by immunochemical methods, respectively, the saliva, the urine, from boys in the 14-16 age group at the beginning of the study, the neuroendocrine reactivity was demonstrated and the pathway by which the specific training contributes to the biochemical reaction of coping. (adaptation to stress). As Radzi, et al., (2018), there is a direct proportionality between cortisol variation and sport performance.

The data of this study showed the decrease in Cortisol after 12 months of constant training. The decrease in this specific stress hormone indicates both the modulating effect of training and the development of internalization and general integration capacity by the individual, stressors.

Previously published data published by Toma, et al., (2019) demonstrated the dynamics of salivary testosterone in the alpine skiing of performance, testosterone showing variations with the age and preparation of subjects, and less with the expectations of its own performance or its competitors.

However, in this study testosterone only presented a tendency to decrease in junior boys, demonstrating that in this type of sport, testosterone is not directly involved in modulating adaptive behavior to competitive stress, as it turned out to be Cortisol. The data also supported what Joksimovic, et al., (2018) and Mihaela (2018), in the tests performed on athletes, in terms of testosterone dynamics. Studies have shown that this hormone varies particularly in sports involving long-term running, muscle effort with isotonic contraction and adult age groups. Testosterone reactivity in children was therefore low.

Increasing the concentration of urinary catecholamine in boys The junior level demonstrates both a way of adapting to mono-aminergical predominantly competitive stress (mediated by dopamine, noradrenaline, adrenaline) catecholamine and an increased metabolism reactivity in sports activity. The coping in the studied age group, 14-16 years, is predominantly based on fast, force reactions, involving the engagement of the entire metabolism at a high metabolic consumption rate, and is based less on the cognitive analysis of situations and the

attempt of cognitive internalization of stressors, as McMorris (2017), McMorris, et al., (2016) and Vakhitov, et al., (2016).

6.10. Conclusions

Constant training, after an application scheme, in the 14-16 age group, in boys, led to an increased stress adaptability capacity by decreasing the salivary cortisol, but the dynamics of urinary catecholamine, increasing as the expectations, both face by one's own person and others have grown. The dynamics of the determined parameters suggest that constant training in boys in the 14-16 age group, prevents the occurrence of distress and maintains capacitive stress under performance sports.

The hypothesis has been confirmed that after performing training, changes can be seen in the biochemical and physiological profile of athletes. It has also been a hypothesis that the structure of training can influence the reactivity of the athlete in competitive stress.

Chapter 7. Study II - Proposed structures for innovative training, experimental results in assessing and quantifying athletes

7.1. Aim of the study

The aim of testing is the assessment of psycho motor components in young people aged 14-16 years, athletes practitioners of contact sports: perception speed, motor coordination and self-regulation.

7.2. The objective of the study

The experiment method is pursued by quantifying the speed of perception and focusing attention to young people aged 14-16 years, athletes practitioners of contact sports.

7.3. The study hypothesis

The use of specialized equipment will increase the ability of visual perception and focus.

7.4. Subjects, period of deployment

Experimental research was carried out with the participation of 64 subjects, guys, of which 32 subjects in the experimental group and 32 subjects in the control group, clubs where contact sports are practiced in Cluj-Napoca – the Experimental group, respectively Tăşnad and Carei – the Control group.

The percentage of left-handed subjects was 9.37%, and the average age was 14 to 16 years.

All subjects had a normal or corrected view of normal.

The duration of the experimental research was 12 months in the 30 Nov period. 2017 - 1 Nov. 2018.

7.5. Design of the intervention program

The design is an experimental one with pre- and post-intervention measurements. The intervention program consisted in conducting concentration power development exercises.

7.6. Materials and methods used in the study

Details of hardware and software applications used in this study are presented in Chapter 6, Tables 8-11, p. 86-88.

The method used is experimental type and involves asking subjects to adjust the speed of a point that moves on an ellipse on a monitor screen. There were a number of 64 athletes in this experiment in the Tăşnad schools, Satu-Mare County, of those who participated in the "Psitest Cabinet" tests. The subjects were presented on the computer monitor the instructions of the operations they had to execute.

7.6.1. Methods of development of concentration of athletes

To learn and masters the methods of developing the power of concentration of athletes in contact sports is preceded in advance to ensure a specific environment, a ambient that involves primarily well-dimensioned, well-laid, well-lit space. Sportswear is mandatory to be the one corresponding to the sport. The furniture in the training room is also necessary to be specific to sport. The athlete is required to be in a complete relaxation state. In order to be beneficial to the methods of development of the fulfillment, the athlete must be learned, including the correct air inspiration techniques, maintain it, or its expiration.

7.6.2. Intervention Program - Methods for maintaining mental holidays

The difficulties in concentrating in contact sports are often due to the inadequate environment: an open-space full of noises, the training room in the vicinity of large and persistent noise sources or in the vicinity of terrestrial or air transport lines etc. If the athlete uses noise cancelling headphones can no longer collaborate with the coach. The athlete anyway distributes his attention to what the coach says with the attitude he is obliged to take in front of his opponent.

Anchoring technique.

Positive view.

Maintaining attention.

Routine.

Anchoring at present.

7.6.3. The intervention program applied to the experimental group

24 pupils practicing contact sports in Cluj-Napoca, participated in a "visual perception" and "focus" skills experiment for one year Nov.2017 - Nov. 2018. When clarifications were requested by the interviewees, added that what they had to do was "explained on the screen" and that the experience was not "too long". The percentage of left-handed subjects was 13%, and the

average age was 15 ± 4 years. Of these 24 pupils, 12 students participated in visual training and the other 12 students did not participate in these training.

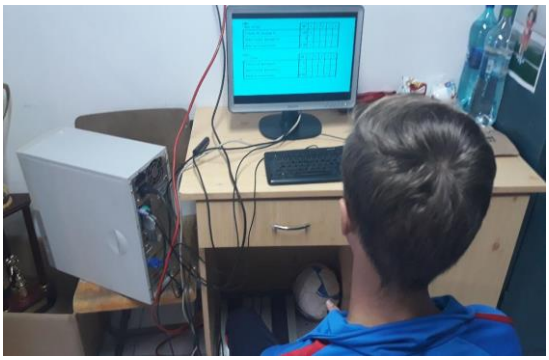


Figure 17. Stimulus used in experiments

The choice of stimulus is guided by three constraints:

1) The movement must be biological;

2) the movement must take place in a plan in the geometric sense of the term;

3) must be periodically to allocate the time to adjust the speed.

Points 1 and 2, respectively, prevent perceived stimulus formation to be subject to strong distortions and avoid difficulties inherent in the screen reproduction of a trajectory in a 3D space. At least two types of simple movements are responsible for these constraints.

Preparing the stimulus. The ELIPSA is defined by Equations X = A COS θ and Y = B SIN θ, where θ represents θ varies linearly from -P to π (400 values). Constants A and B correspond to the semi axis of the ellipse (A = 6.38 cm, b = 2.71 cm). The semi-axis ratio B / A is 0.425. The corresponding eccentricity E / E (XE, YE) is 0.9. The calculated X and Y coordinates were then rotated at 45 ° (Figure 20, a). The approximate perimeter of the ellipse presented is 29.73 cm. The kinematics (Figure 20, b) of this ellipse is an ideal case of biological movement (Viviani & Schneider, 1991).

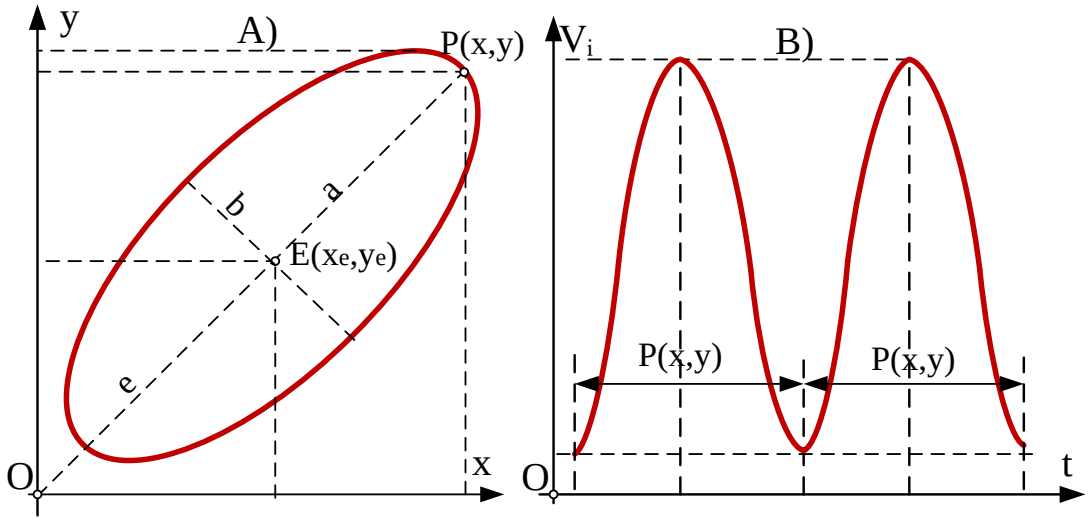


Figure 18. a) Form and, b) the incentive tangential velocity profile,

After (Viviani & Stuckchi, 1992)

The task was to adjust the average movement rate represented by the point. The instruction, presented on the screen, said: "When the experimenter starts the experiment, you will see a point that describes an ellipse at a given speed. With the right arrow of the keyboard you can slow this point and the arrow on the left you can, on the contrary, accelerate this point. With these two arrows, you will need to adjust the point speed. Keep the speed as you prefer. When you are satisfied, press the Enter key. "

After a short pause, the point reappeared: there were 8 samples in total. Subjects were also notified: "If you press the keys continuously, you will decrease or increase the speed." The movement was repeated without interruption until the subjects validated the final PF period corresponding to their preferred speed. After a variable lasting break (from 1 to 2.5 sec, random pull), the point appeared again on the screen with a new PI period and the subject had to resume the adjustment procedure.

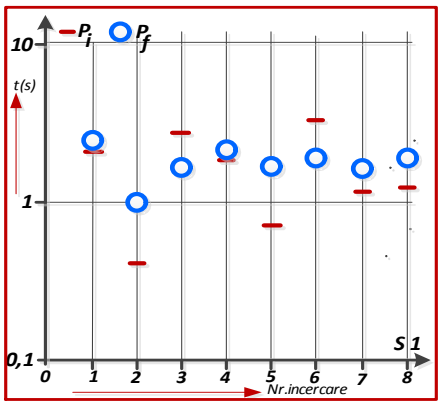
At the end of the 8 tests, sex, age and laterality (hand frequently used to write) the subject were recorded in a file with individual results. Also, the subjects were adhered to the questions: 1) What could be the movement and 2) if he had a certain point on the screen in which his eyes followed.

7.7. Graphic representation of individual results

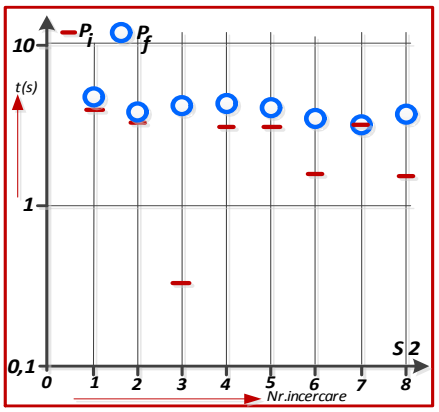
Data include, for each subject, 8 pairs of PI and PF values representing the initial and final periods of the stimulus, respectively. The analysis of these data is done in several stages. Prior to the actual analysis, in which the preferred average periods of subjects are estimated, as well as the measured inter and intra-individual variation, a short paragraph is dedicated to describing different perceptions associated with the modulation of the period and three other sections. are dedicated to a preliminary data analysis.

The main result clearly refers to the final periods chosen by the subjects, but we will see in advance that the detailed analysis of the relationship between PI and PF also offers interesting results. Figure 19 shows PI and PF, in seconds, of the 24 subjects. In addition to differences in the trend and central variability that will be detailed later, the observation in Figure 19 reveals two phenomena that we will call the "catch" and "attraction" respectively.

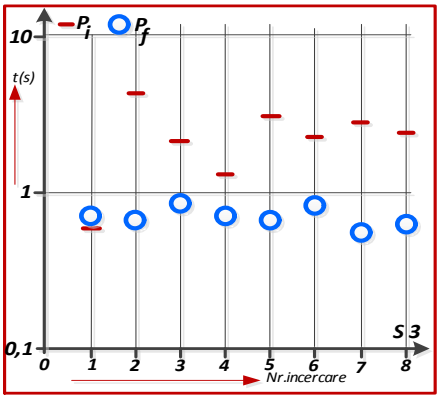
Capture corresponds to the case in which the participant does not modulate the initial period of the stimulus. Thus, the values of PI and PF may be confused (Figure 19), subjects 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, 12).


Pi
Pf
10
t(s)
1
0,1
S 1
0 1 2 3 4 5 6 7 8
Nr.incercare

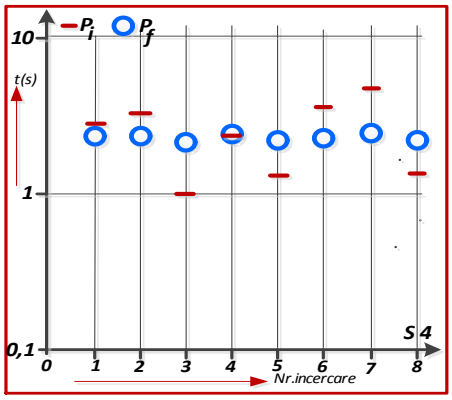
a)


Pi
Pf
10
t(s)
1
0,1
S 2
0 1 2 3 4 5 6 7 8
Nr.incercare

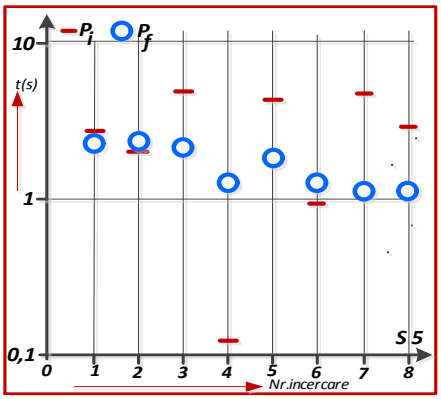
b)


Pi
Pf
10
t(s)
1
0,1
S 3
0 1 2 3 4 5 6 7 8
Nr.incercare

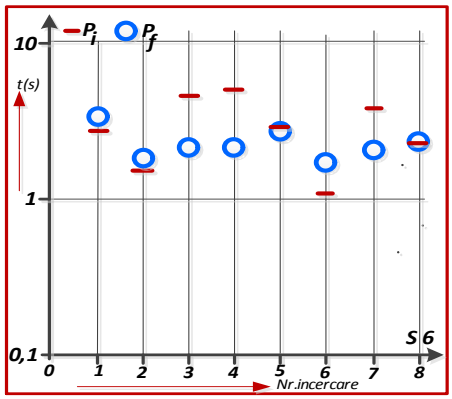
c)


Pi
Pf
10
t(s)
1
0,1
S 4
0 1 2 3 4 5 6 7 8
Nr.incercare

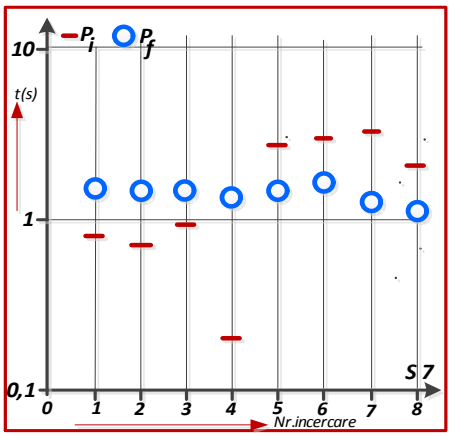
d)


Pi
Pf
10
t(s)
1
0,1
S 5
0 1 2 3 4 5 6 7 8
Nr.incercare

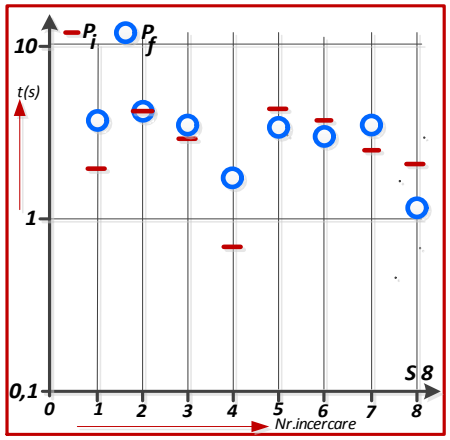
e)


Pi
Pf
10
t(s)
1
0,1
S 6
0 1 2 3 4 5 6 7 8
Nr.incercare

f)


Pi
Pf
10
t(s)
1
0,1
S 7
0 1 2 3 4 5 6 7 8
Nr.incercare

g)


Pi
Pf
10
t(s)
1
0,1
S 8
0 1 2 3 4 5 6 7 8
Nr.incercare

h)

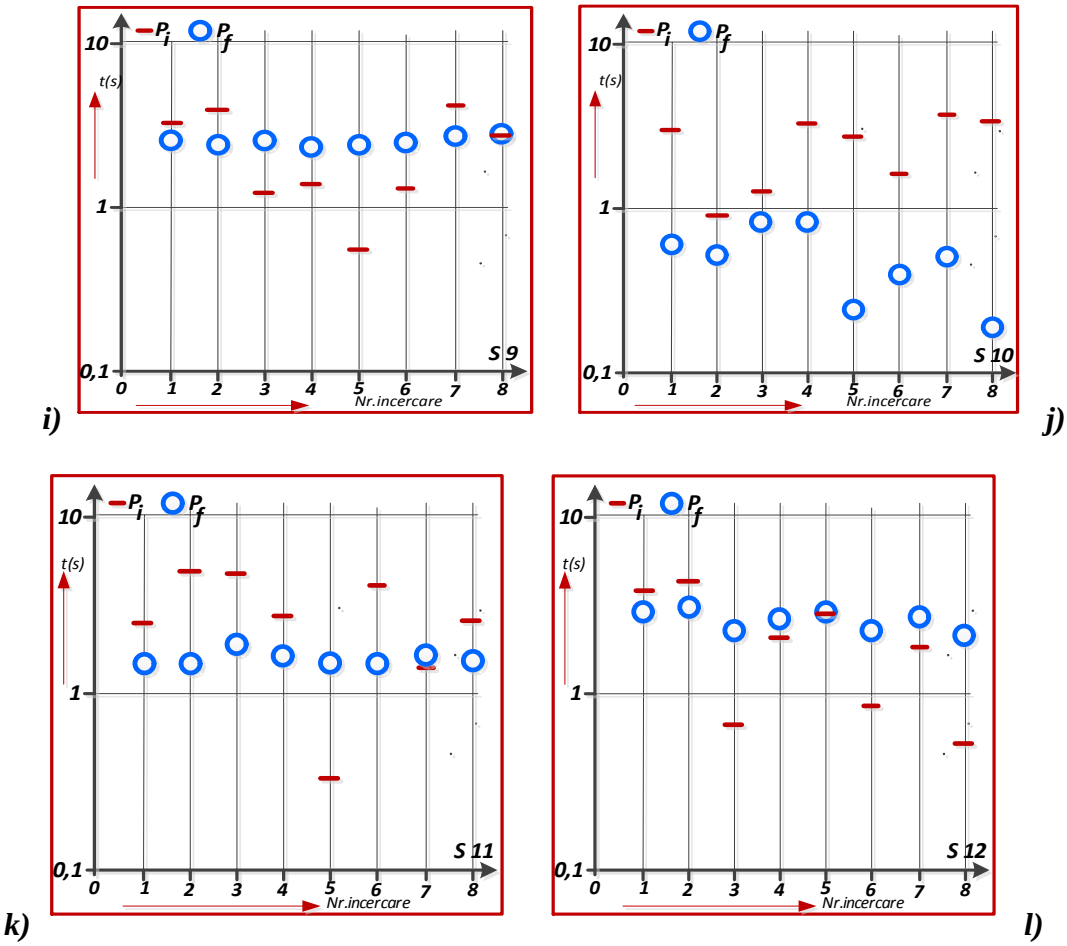


Figure 19. Representation of individual results

To ensure this, the total distribution of observations was analyzed and atypical data was filtered. Then the capture and attraction phenomena were analyzed.

7.8. Collection, analysis and interpretation of the initial results obtained in the experimental study

At the beginning of the study, the Mann-Whitney U Test did not record statistically significant differences between the experimental group (M = 6.72, SD = 4.2) and the control group (M = 6.72, SD = 4.0) on the speed of perception, (u = -0.20, p = 0.84).

For the "coordination" variable, the initial results were close to the experimental group (M = 81.63, SD = 5.13) and the control group (M = 81.59, SD = 3.9), the T test for independent variables showing that the differences were not Statistically significant, (T32.32 = -0.03, df = 62, p = 0.98, as a difference of 0.03, 95% CI [-2.31, 2.25]) (see Tables 18 and 19).

The same can be said about the "self-regulatory" variable, where the differences were not statistically significant at the beginning of the study between the experimental group (M = 87, SD = 9.33) and the control group (M = 87.16, SD = 9.81) , Nonparametric Mann-Whitney U Test demonstrating this, (u = -0.01, p = 0.99).

In the "motor coordination" variable "The experimental group recorded a statistically significant improvement in final testing (M = 84.41, SD = 5.1) compared to initial testing (M = 81.63, SD = 5.13), T test for dependent variables demonstrating this, (T32 = -9.37, df = 31, p <0.001). Instead, the control group did not register a statistically significant improvement, (T32 = -1.56, df = 31, p = 0.13). Between the two groups, the T test for independent variables did not register a statistically significant difference (T32.32 = 1.04, df = 62, p = 0.26), between the two being an average difference of 1.41 in favor of the experimental group, 95% CI [-1.06, 3.89]).

For the "Perception Speed" variable, the experimental group has achieved a statistically significant improvement at the end of the study (M = 3.88, SD = 1.9) compared to initial tests (M = 6.72, SD = 4.2), Wilcoxon nonparametric test demonstrating this, (Z = -4.48, p <0.001). And the control group recorded a statistically significant improvement at the end of the study (M = 5.44, SD = 3.30) compared to the results obtained in the initial samples (M = 6.72, SD = 4.0), (z = -4.55, p <0.001), The differences between the two groups being statistically significant at the end of the study, (U = -1.90, p = 0.06).

At the last variable, ie "self-regulating", the experimental group recorded a statistically significant improvement at the end of the study (M = 93.34, SD = 5.5) compared to baseline (M = 87, SD = 9.33), (Z = -4.94, p <0.001). The control group recorded a statistically significant improvement at the end of the study (M = 88.50, SD = 9.3) compared to initial testing (M = 87.16, SD = 9.8), (Z = -3.19, p = 0.001), and between the two Groups There was a statistically significant difference at the end of the study, being a more obvious improvement in the experimental group (U = -2.04, p = .04) (Figure 19).

Between variables "Perceptions" and "motor coordination" there is a negative correlation, suggesting that with the decrease in a variable values, the values of the other variable increase, which is not statistically significant, r = -0.19, df = 62, p = 0.14. And between the "perception speed" and "self-regulation" there is a negative correlation, but insignificant statistically, r = -0.05, df = 62, p = 0.67.

Instead, a positive correlation has been observed between the "motor coordination" variables, which suggests that with the increase of a variable values, the values of the other variable also increase, r = 0.53, df = 62, p <0.001.

7.9. Discussions and conclusions

The experiment was intended to test the existence of a perceptive preference for speed when moving a point along an elliptical trajectory. The preferred average speed was associated with the average value of the final period chosen for a revolution of the ellipse PF. Firstly, the individual responses and distribution of gross data in the population were described. Two phenomena (capture and attraction) were then defined to describe PF variations associated with

the initial PI value of stimulus implementation. These preliminary analyzes were used to filter the gross data and to better closer the central trend and the variability of the preferred average speed. Finally, the effects related to the subject and the subject's laterality was tested by analyzing the variance of the calculated clues.

The average preference, calculated on a population of 24 participants, corresponds to a period of 2.2 sec (σ = 0.97 sec). The average point speed is 13.5 cm / sec. The PF value is significantly higher than the average movement time measured when comparable ellipses (1.2 sec) (Viviani & Schneider, 1991) are executed. However, it was seen that this estimate is a questionable reference due to the small number of subjects in the quoted experiment. More simply, take the first and third quarter limits (1.52 sec and 2.82 sec). This period of 1.3 sec contains 50% of the average preferences. It is noted that these periods are compatible with the engine system execution capacities. Subjects do not prefer minimum implementation periods (2.2% option <0.3 sec) and periods greater than 6,075 sec are only chosen in 2.5% of cases.

Finally, predictions based on data in the production of rhythmic and extrapolated sequences, assuming a segmentation of the fourth cycle of the elliptical movement, which are most compatible with our results. It was observed in the introduction that the preferred average tempo would be between 100 and 120 bpm (0.5-0.6 sec per cycle) and that an area between 81 and 162 bpm (0.37-0.74 sec) would It could contain up to 70% of the observed preferred tempo. Assuming the idea of segmentation of the quarterly ellipse, the observed PF average should be between 2 and 24 seconds, and 70% of the preferred periods should be included in an area between 1.48 and 2.96 sec. Our results indicate that the PF average is 2.2 ESA and that 50% of PF observed is between 1.52 sec and 2.82 sec. More specifically, 55% of observations fall within the expected limits.

As regards point observation, subjects indicate that they sometimes followed the point of their eyes, especially at the beginning or to check their choice, but they also set a part of the ellipse at other times (generally the higher or lower stimulus). Observing subjects also make it possible to assert that criminal prosecution phases are alternate with the fixing steps during the adjustment procedure.

Chapter 8. Study III. Experiment for the development of strength to force

8.1. Aim of the study

The aim of the study is to verify which of the two sports training approaches is more efficient in the development of force endurance: classic sports training or innovative sports training.

8.2. The objective of the study

It is intended to clearly establish the benefits of innovative sports training on athletes, from the point of view of the development of force endurance, compared to the beneficiaries of classical sports training.

8.3. The study hypothesis

Be supposed to:

The development of force endurance is more intense in the athletes who follow innovative sports training.

8.4. Subjects, duration of study

12 junior athletes, boys, Satu Mare were selected for the study. They were grouped as follows: 6 athletes were the experimental group and took part in different boxing competitions, and the other 6 constituted the control group and followed innovative workouts being beginners in boxing.

The duration of the study was 12 months from 1 December 2018 to 30 November 2019.

8.5. Materials and methods used in the study

Materials: The implementation of the experiment required the use of the following materials:

● Timers to quantify all tests;

● Medical equipment for weighing boxers (control and experimental groups);

● Reconfigurable scale for measuring the standing height;

● Tools for the production of sound and bright signals;

● Equipment for contacts specific to contact sports (mainly bags of

Box of different shapes and sizes);

● Reconfigurable banquets of different sizes (mainly with height adjustments)

● boxing gloves, respectively, specific to the other variants of contact sports;

● Gloves for training equipment.

Research typologies: To resolve evaluation tests, some structural types of research methods, predominantly applicative-experimental were used.

Applied-experimental methods: The performance assessment of the experimental group was made through a test package (general and specific); The evaluation was done twice during a macrocycle to compare them with the control group at different stages and periods of preparation.

Test Protocol: Configure the bench width for each sportsman depending on the size of his bust (mainly the distance over the shoulders), and then the handling loads are fixed as the correct criteria according to the right criteria according to the sports capabilities and skills, Position on the bar These tasks will be symmetrically fixed at a distance equal to the one over the shoulders,

the vertical movements begin from the phase of the arms stretched and continues to bring them to the second position when the bar reaches the sports chest. These positions are repeated continuously over a period of time established by the coach and sports in an initial phase.

The above test is also known as the "pump" test precisely due to a particular character of the movement: move-to-vine movement typical of the piston of a pump with a cylinder and allows the assessment of the endurance of the higher limbs.

Test Protocol: From the largest number of complete go-up movements performed within 1 min. The assessment of the endurance of the upper limbs will be achieved. After the time of 1 min. Complete movements are counted, returns after a 1 min break. And a set of movements is done.

Interpretation of the results. If the number of complete movements is:

• Over 50, the rating is excellent,

• between 30 and 40, the rating is fine,

• Between 20 and 30, the rating is medium,

• Less than 20, the rating is weak.

Methods for the development of motor qualities specific to contact sports

Developing the impact force endurance.

The endurance is manifested in many ways and depends on the following criteria:

• Energy processes: aerobic and anaerobic pathways;

• Effort: duration and intensity;

• Type of muscle contraction: static or dynamic;

• Physical qualities: Resistance or speed;

• Discipline practiced: General or specific resistance

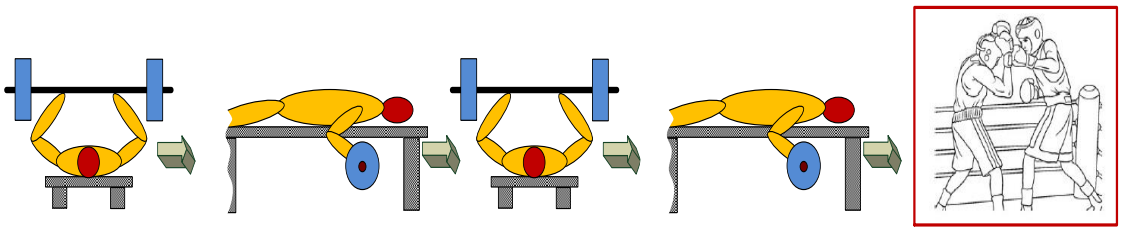
A concept that used is to alternate very high cardiovascular sessions and high intensity with different exercises in the boxing room. Sessions are adaptable to subjects to be repeated for all fifteen subjects. A drive bench is used together with weights of different values. The athlete will opt for the extension of the exercise package structure: how many picks or tracts need to achieve, what is the position of the athlete on the bench and with what kinematic parameters these manipulation is achieved. The positive effects of this type of training are found at the level of energy parameters, nervous factors that need explosives in gestures.

Experimental Protocol. To perform these tests under good conditions they have been performed outside the training sessions programmed so that they do not influence the purpose of the test. For the same purpose, it is being used to check the health of athletes in the test (cold, influenza, injury, etc.) and ensure a specific heating before each test.

These tests have allowed the initial workloads to determine during the muscle building session or circuit training at the beginning. Repeating these tests in the sports season has allowed the progress of athletes in the experimental group in comparison with athletes in the control group.

8.6. Description of the intervention program

Example: 60 repetitions of weight manipulation. These are divided into 6 groups of 10 manipulations.

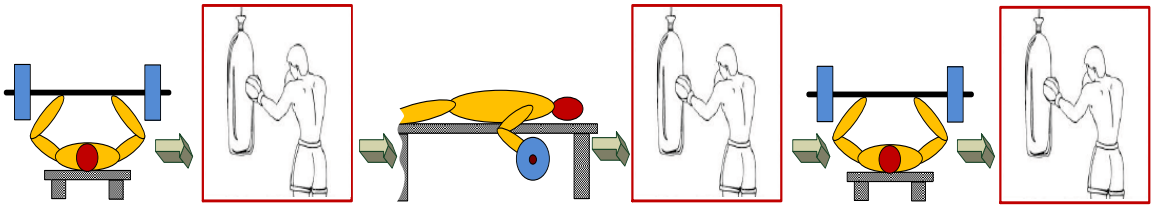


a) *b)* *a)* *b)* *c)*

Figure 23. Exercises for the development of force resistance

a) Lifting weights from lying on the back, b) lifting weights by traction from staring facial, facing the training bench. c) Boxing round with sparing-partner (repeat the 2 exercises, alternating them)

When the athlete begins his exercises, the first 2 groups in 10 do not raise any problem, labor is easy. Experienced athletes know this and opt to perform in a higher tempo the first 40 manipulations so the state of fatigue appears only in the final part of the handling package.



a) *b)* *c)* *b)* *a)* *b)*

Figure 24. Examples of alternation to work on "strength to force"

a) Lifting of weights lying on the back, b) blows to the boxing bag, c) lifting weights by traction staring facial, facing the training bench.

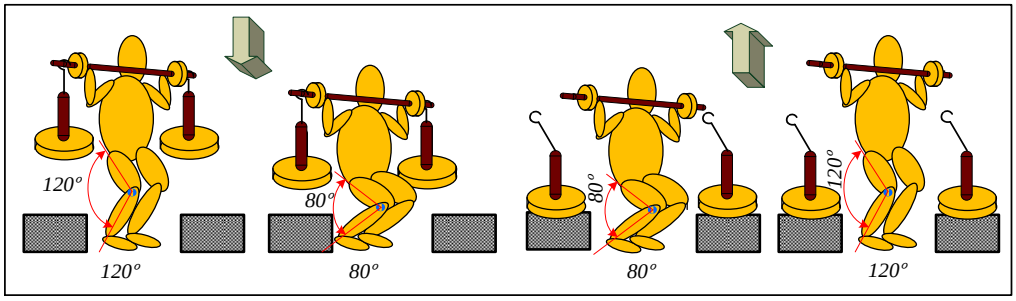


Figure 25. Examples of alternation exercises to work on strength

1. From sitting with the bar hung on the shoulder in position with the knees bent, at an angle of 120 *,

2. Correct bending of knees to reach an angle of 80 *

3. Downloading weights

4. Return to the initial position

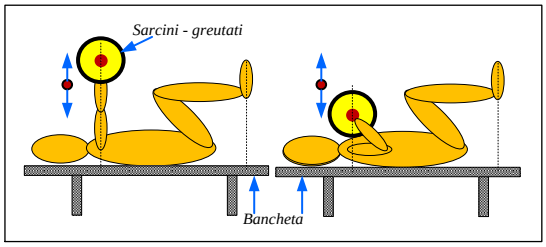


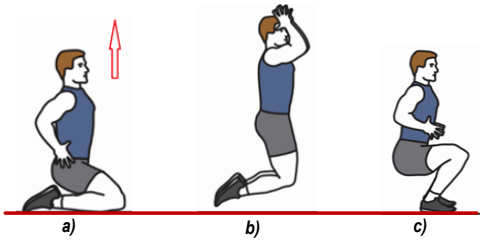
Figure 26. Scheme of elements in the General Assessment Test

1. From lying dorsally with knees bent and with vertical weight bar with stretched arms

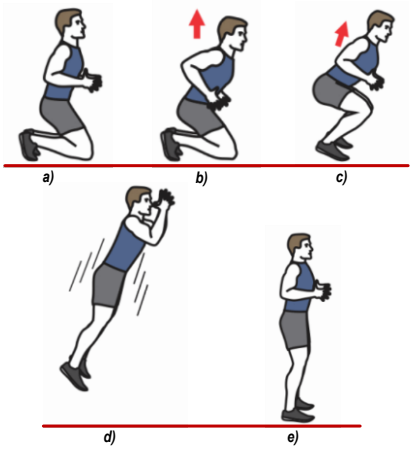
2. Bending the arms to the breast with the bumper bar kept to the chest.

There is a model of exercise structures for the development of lower limbs through the plyometric method:

1. From the sitting on the knees jumping in the squat



2. From position on knee vertical jump and comeback in standing



3. From position on knee vertical jump with landing on a gym lid

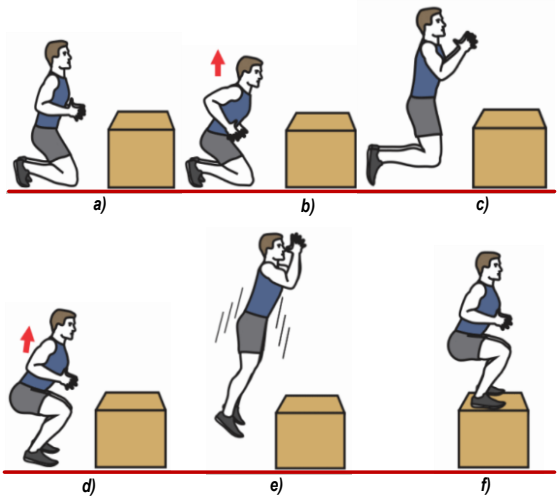


Figure 15. Exercises for the development of lower limbs

8.7. Data collection, analysis and interpretation of the results

The first test that will be subject to the analysis and interpretation of the results was a generally known physical test, the "seat-press".

In Tables 16 and 17 are mentioned the mean values and variations in the "seat-press" test performance in the two groups of athletes.

Comparison of the average values of the "seat-press" test in the two groups leads to the conclusion that both groups recorded very important differences in $p < 0.001$ between (T1-T2).

The analysis of Boxers' progress during the "seat-press" test leads to the conclusion that the variations in the performance of the test demonstrate in experimental group Progressions of 14.88% (a difference of 8.5 repetitions) between (T1-T2). While in the control group we noticed increases of 7.79% (a gap) of 4.13 repetitions between (T1-T2).

The second category of tests analyzed is the "pumps" or "going and return" type. Table 18 are recorded the average test values in the two sets of tests.

In comparing the mean values of the "pump" or "going and return" test between the two groups in the second session compared to the first, we find a very significant difference in $\alpha < 0.001$ between experimental and control group during the second session (T2) at the first session (T1).

Comparison of the mean values of the "pump" or "going and return" test in the two groups: were recorded differences between average values very significant at $p < 0.001$ between (T1-T2).

The analysis of boxers progress during the "pumps" or "going and return" testing: the performance variations of the pump test are demonstrated in experimental group increases of 14.09% (a difference of 8.12 repetitions) between (T1-T2). While in G.crt, increases of 6.62% (a difference of 3.37%) are observed.

In Table 19 performance variations are recorded in the "pump" or "going and return" test by boxers in the two groups.

In Table 20 the mean values of the "fixed bar traction" test are mentioned.

In Table 21 performance variations are recorded in the "fixed bar traction" test by the boxers in the two groups.

Analysis of Boxers Progress During the testing of "fixed bar traction": variations in the bars test demonstrates that G.Exp progression of 35.56% (a difference of 7.87 repetitions) between (T1-T2). While in G.Ctr, 9.11% increases (a difference of 2,13 repetitions) between (T1-T2) are observed.

The "Ruffier / Dickson" test.

In Table 22, the mean values of the "Ruffier / Dickson" test are mentioned.

Analysis of boxers progress during the Ruffier Dickson test: Ruffier Dickson test variations show that (G.exp) decreases by -45.65% (a difference of -3.2) between (T1-T2). Also, in (G.ctr, decreases of -18.16% (i.e. a difference of -1.26) between (T1-T2) were observed.

Comparison of average test values "punches to boxing bag 3 x 3 minutes" in the two groups

G.Exp and G.Ctr: Both G.exp and G.Ctr recorded very significant differences in $p < 0.001$ between the two tests (T1) and (T2). Analysis of Boxer Progress During Testing "punches to boxing bag 3 x 3 minutes": Performance Variations " punches to boxing bag 3 x 3 minutes" demonstrates that G.Exp Progressions of 4.43% (a difference of 23.12 blows) between (T1-T2). While in G.Ctr, increases of 2.45% (a difference of 12.25 blows) between (T1-T2) are observed.

8.8. Discussions

Training cycles of highly concentrated specialized tasks have been invented "training blocks" by experts and practitioners; Accordingly, alternative versions were called "Scheduled Block Preparation Systems (BP)" by their presenters. Finally, two BP training models have been proposed: a focused model of unidirectional training (AU) and a BP multi-target approach to prepare athletes. The first innovative version postulated the management of very focused training for improving a peak fitness component, while the second version proposed the development of many skills in sequential blocked block mesocycles containing a minimal number of compatible training. Both versions differ through their methodological fund, duration and content of training blocks, possibilities to provide multi-peak performance and applicability to various sports.

In recent decades, many studies have evaluated the effects of both BP training versions in different sports. Examining training effects produced by the model have in contact sports and team sports found significant gains in different fitness estimates, but not in sport-specific performance. Similarly, the use of a program has elite swimmers has not led to a substantial improvement in their peak performance. Unlike these, studies on Multi-Targets BP training programs have revealed their distinct superiority compared to traditional training in resistance sport, strength / power training (28 studies). It is suggested that the training strategy matches

athletic disciplines that require a fitness component such as explosive force. Unlike this limitation, the BP multi-target system has led to a beneficial increase in specific training in sports and disciplines in which peak performance requires the application of many targeted athletic abilities.

8.9. Conclusions

Following all these analyzes, it turned out that the development of force endurance is more intense in athletes following innovative sports training. Thus, the assumption that the development of force is more intense in the athletes who follow innovative sports training.

8.10. Proposals, suggestions, recommendations

Recommendations for strength development are oriented towards:

• Organizing training must take into account the age of the level acquired and the weight category to be beneficial for all boxers; the use of resistance development methods;

• Each session or exercise aimed at specific physical development must be followed by a set of positive spending exercises;

• organizing the testing of tests in a systematic manner; individualization of task intensity;

• Physical training of senior boxers must take into account the characteristics of training tasks in order to avoid excessive tasks that can lead to serious consequences.

• Respecting the content of training sessions (heating, repetitions, series, recovery) is a guarantee of success.

Chapter 9. Conclusions

The doctoral thesis entitled "*Contributions on the optimization of training and evaluation techniques of athletes in contact sports through innovative training*" is structured in two directions of research, one theoretical and one practical, investigative-experimental.

Thus, the first part of the thesis entitled "Argumentative landmarks on current high-performance training" and developed in the first five chapters, is an objective and comprehensive study of the literature from the perspective of the latest research and innovation on the training of contact sports. More precisely, the component elements of the boxers' training programs were investigated and analyzed based on the defining parameters and indicators of the training activities. Of these, special attention was paid to motor coordination or reactivity, resistance to stress, speed and clarity of reasoning.

Next, the thesis presents the personal contributions of the author, grouped in the second part - “Preliminary research on the work protocols and evaluation tools used”, respectively the third part - “The research itself”.

Following the research, an intervention program was designed and applied to test the speed of perception, motor coordination and self-regulation and subsequently validated the proposed concept and its application methodology.

The ”PSITEST Cabinet” system was used to validate the advantages offered by it in the study.

It was found that constant training, according to an application scheme, in boys in the age group 14-16 years, led to an increase in the ability to adapt to stress marked by a decrease in salivary cortisol but not influencing the dynamics of urinary catecholamine, which increase as expectations, both of oneself and of others, have increased. The dynamics of the determined parameters suggest that the proposed training, in boys in the age group 14-16 years, prevents the appearance of distress and maintains the eustress (capacitive stress) in the conditions of performance sports. Moreover, following a series of trainings, the individual biochemical and physiological profile of the athletes can be established. In addition, the structure of the training can influence the athlete's reactivity to the competitive program.

The hypotheses were confirmed:

- Following a series of trainings, changes can be identified in terms of the biochemical and physiological profile of athletes.

- The training structure can influence the athlete's reactivity to competitive shooting.

- The use of specialized equipment increases the ability of visual perception and concentration.

- The development of endurance of strength is more intense in athletes who follow innovative sports training.

The advantages of strengthening the power of concentration are materialized on several levels, as follows: thought control, strengthening self-confidence.

The development of the endurance of the strength of the athletes practicing contact sports through innovative exercises, better outlines the general framework necessary for them to reach a higher level of performance in a short time.

Selective References

Aghabayk, K., Parishad, N., & Shiwakoti, N. (2021). Investigation on the impact of walkways slope and pedestrians physical characteristics on pedestrians normal walking and jogging speeds. Safety Science.

Anderson, D. I., Lohse, K. R., Costa Videira Lopes, T., & Williams, M. A. (2021). Individual differences in motor skill learning: Past, present and future. Human Movement Science,

Baker, J., Wattie, N., & Schorer, J. (2019). A proposed conceptualization of talent in sport: The first step in a long and winding road. Psychology of Sport and Science, 43, 27-33.

Barley, O. R., Chapman, D. W., Guppy, S. N., & Abbiss, C. R. (2019). Considerations When Assessing Endurance in Combat Sport Athletes. Frontiers of Physiology.

Beranek, V., Votapek, P., & Stastny, P. (2020). Sports Biomechanics. Force and velocity of impact during upper limb strikes in combat sports: a systematic review and meta-analysis .

Bianco, V., Di Russo, F., Perri, R. L., & Berchicci, M. (2017). Different proactive and reactive action control in fencers' and boxers' brain. Neuroscience, 260-268.

Bishop, C., Chavda, S., & Turner , A. (2018). Exercise Technique: The Push Press. Strength and Conditioning Journal, 40(3), 104-108.

Caycedo, N. (2019). La sofrologia es una scientia. Reverte-Aguilar, 28.

Chen, X., Zhang, G., Yin, Z., Li, Y., Cao, G., Gutierez-Garcia, C., & Guo, L. (2019). The Relationship Between Self-Efficacy and Aggressive Behavior in Boxers: The Mediating Role of Self-Control. Frontiers of Psychology.

Cunniffe, B., Ellison, M., Loosemore, M., & Cardinale, M. (2017). Warm-up Practices in Elite Boxing Athletes: Impact on Power Output. Journal of Strength and Conditioning Research, 95-105.

Davis, P., Connorton, A. J., Driver, S., Anderson, S., & Waldock, R. (2018). The Activity Profile of Elite Male Amateur Boxing After the 2013 Rule Changes. Journal of Strength and Conditioning Research, 3441-3446.

Dinu, D., & Louis, J. (2020). Biomechanical Analysis of the Cross, Hook, and Uppercut in Junior vs. Elite Boxers: Implications for Training and Talent Identification. Front. Sports Act. Living.

Dumitru, A. (2020). Stări de conștiință modificată; căi de acces la stările de conștiință modificată. Preluat de pe Academia Edu: https://www.academia.edu/10219748/Stari_de_constiinta_modificata

D'Urso, W. (2020, April 20). https://www.sbnation.com/2020/4/30/21243235/boxing-physiques-muscle-vs-fat-evander-holyfield-james-toney. Retrieved from sbnation.com.

EL Ashker, S. (2018). The impact of a boxing training program on physical fitness and technical performance effectiveness. Journal of Physical Education and Sport.

Fiorese, B. A., Beckman, E. M., Connick, M. J., Hunter, A. B., & Tweedy, S. M. (2020). Biomechanics of starting, sprinting and submaximal running in athletes with brain impairment: A systematic review. Journal of Science and Medicine in Sport, 23(12), 1118-1127.

Friedman, H. H. (2017). Cognitive Biases that Interfere with Critical Thinking and Scientific Reasoning: A Course Module. SRRN Electronic Journal.

Gencay, O., Gencay, S., & Gencay, E. (2020). A comparison of static and dynamic balance performance in adolescent male wrestlers and judoists. Science & Sports, 35(3), 57-63.

Glattfelder, J. B. (2019). The Consciousness of Reality. Springer Open.

Guevorts, B. (2019). Les compétences de l'intelligence émotionnelle. Development personel.

Guidetti, L., Musulin, A., & Baldari, C. (2002). Physiological factors in middleweight boxing performance. J Sports Med Phys Fit, 42(3), 309-314.

Gunther, M., Rockenfeller, R., Weihmann, T., Haeufle, D., Gotz, T., & Schmitt, S. (2021). Rules of nature's Formula Run: Muscle mechanics during late stance is the key to explaining maximum running speed. Journal of Theoretical Biology, 523.

Hukkanen, E., & Hakkinen, K. (2017). Effects of Sparring Load on Reaction Speed and Punch Force During the Precompetition and Competition Periods in Boxing. Journal of Strength and Conditioning Research, 1563-1568.

Jarvis, L. M., Peterson, M. J., & Caves, K. M. (2021). Development, Validity, and Reliability of a Novel Walking Speed Measurement Device: the GaitBox. Gait & Posture, 84, 52-57.

Joksimovic, M., Nemeth, Z., Skrypchenko, I., Trivun, M., & Pantovic, M. (2018). Gender Differences in Development of Explosive Power and Rapidity in Schoolchildren Aged 14-15 Years Old. The Journal of International Anatolia Sport Science, 3(2), 294-304.

Kamandulis, S., Bruzas, V., & Mockus, P. (2018). Sport-specific repeated sprint training improves punching ability and upper-body aerobic power in experienced amateur boxers. J Strength Cond Res, 1214-1221.

Keaney, L. C., Kilding, A. E., Merien, F., & Dulson, D. K. (2018). The impact of sport related stressors on immunity and illness risk in team-sport athletes. Journal of Science and Medicine in Sport, 21(12), 1192-1199.

Kelly, J. K. (2020). Movement in Boxing. Retrieved from First Aid 4 Sport: https://firstaid4sport.co.uk/movement-in-boxing/

Kendellen, K., & Camire, M. (2019). Applying in life the skills learned in sport: A grounded theory. Psychology of Sport and Exercise, 40, 23-32.

Kolesovs, A., Salkovs, D., & Blinovs, A. (2020). Developing and Measuring Attention inBoxers: Mixed Coaches' Expertise and Reaction Time Measures. Society.Integration.Education. Proceedings of the International Scientific Conference., VII, pp. 84-94.

Kotarska, K., Nowak, L., Szark-Eckardt, M., & Nowak, M. (2019). Selected Healthy Behaviors and Quality of Life in People Who Practice Combat Sports and Martial Arts. International Journal of Environmental REsources and Public Health, 16(5).

Kraemer, W. J., & Nitka, M. (2021). The Challenge of Managing Stress Versus Distress. Strength and Conditioning Journal.

Krzysztofik, M., Jarosz, J., Matykiewicz, P., Wilk, M., Bialas, M., Zajac, A., & Golas, A. (2021). A comparison of muscle activity of the dominant and non-dominant side of the body during low versus high loaded bench press exercise performed to muscular failure. Journal of Electromyography and Kinesiology, 56.

Lambert, C., Beck, B., & Weeks, B. (2018). Concurrent validity and reliability of a linear positional transducer and an accelerometer to measure punch characteristics . Journal of Strength and Conditioning Research.

Lenetsky, S., Brughelli, M., Nates, R., Neville, J., Matt, R., & Lormier, A. V. (2020). Defining the Phases of Boxing Punches: A Mixed-Method Approach. Journal of Strength and Conditioning Research, 1040-1051.

Lenetsky, S., Uthoff, A., Coyne, J., & Cronin, J. (2021). A Review of Striking Force in Full-Contact Combat Sport Athletes - Methods of Assessment. Strength and Conditioning Journal.

Loch, F., Ferrauti, A., Meyer, T., Pfeiffer, M., & Kellmann, M. (2019). Resting the mind – A novel topic with scarce insights. Considering potential mental recovery strategies for short rest periods in sports. Performance Enhancement & Health, 6(3-4), 148-155.

Lopez-Laval, I., Sitko, S., Muniz-Pardos, B., Cirer-Sastre, R., & Calleja-Gonzales, J. (2020). Relationship between bench press strength and punch performance in male professional boxers. J. Strength Cond. Res., 308-312.

Loturco, I., Pereira, L., Kobal, R., Fernandes, V., Reis, V., & Romano, F. (2019). Transference effect of short-term optimum power load training on the punching impact of elite boxers. J. Strength Cond. Res.

Mao, T., Pan, W., Zhu, Y., Yang, J., Dong, Q., & Zhou, G. (2018). Self-control mediates the relationship between personality trait and impulsivity. Personal. Individ. Differ., 70-75.

Martins, H. S., Ludtke, D. D., de Oliverira Araujo, J., Cidral-Filho, F. J., Inoue Salgado, A. S., Viseux, F., & Fernandez Martins, D. (2019). Effects of core strengthening on balance in university judo athletes. Journal of Bodywork and Movement Therapies, 23(4), 758-765.

McMorris, T. (2017). The development of the acute exercise-catecholamines-cognition interaction theory. Physical Activity and Educational Achievement: Insights from Exercise Neuroscience, 64.

Mihaela, V. (2018). Observational Study Regarding the Development Level of 11-12 Year-Old Track and Field Selected Children. Gymnasium: Scientific Journal of Education, Sports & Health, 19(1).

Mo, S., Lau, O., Lok, A., Chan, Z., Zhang, J., Shum, G., & Cheung, R. (2020). Bilateral asymmetry of running gait in competitive, recreational and novice runners at different speeds. Human Movement Science.

Moore, B., Dudley, D., & Woodcock, S. (2019). The effects of martial arts participation on mental and psychosocial health outcomes: a randomised controlled trial of a secondary school-based mental health promotion program. BMC Psychology, 7(60).

Morris, S. J., Oliver, J. L., Pedley, J. S., Haff, G. G., & Lloyd, R. S. (2020). Taking A Long-Term Approach to the Development of Weightlifting Ability in Young Athletes. Strength and Conditioning Journal, 42(6), 71-90.

Nagovitsyn, R., Legotkin, A., Panachev, V., Ponomarev, N., Fendel, T., & Osipov, A. (2019). Development of Coordination, as one of the Key Physical Professional Competencies of Graduates of. International Journal of Applied Exercise Physiology.

O'Neill, H. (2019). A review on the involvement of catecholamines in animal behaviour. South African Journal of Animal Science, 49(1), 1-8.

Pan, X., Kaminga, A., Wen, S., & Liu, A. (2018). Catecholamines in post-traumatic stress disorder: a systematic review and meta-analysis. Frontiers in molecular neuroscience, 11, 450.

Parker, J., Miller, A., Panariello, R., Hall, J., & Reeves, D. (2018). The System: Soviet Periodization Adapted for the American Strength Coach. On Target Publications.

Pascoe, M. C., Thompson, D. R., & Ski, C. F. (2020). Meditation and Endocrine Health and Wellbeing. Trends in Endocrinology & Metabolism, 31, 469-477.

Peterson, D. (2018). Periodic Fitness Testing: Not Just for Athletes Anymore. Strength and Conditioning Journal, 40(5), 60-76.

Petrov, L., Alexandrova, A., & Lefterov, E. (2017). A new approach to interpretation of salivary alfa amylase activity changes as a stress indicator. Journal of Applied Sports Sciences, 1, 21-30.

Phor, R. (2019). Boxing: An effective tool for stress management and depression. International Journal of Physiology, Nutrition and Physical Education, 4(1), 597-600.

Rabinovici, G. (2017). Advances and gaps in understanding chronic traumatic encephalopathy: From pugilists to American football players. Jama, 318(4), 338-340.

Radak, Z. (2018). The Physiology of Physical Training. Academic Press.

Radzi, J., Yusuf, S., Amir, N., & Mansor, S. (2018). Relationship of Precompetition Anxiety and Cortisol Response in Individual and Team Sport Athletes. Second International Conference on the Future of ASEAN (IcOFA). 2, pp. 719-727. Singapore: Springer.

Rothlin, P., Horvath, S., Trosch, S., Grose Holtforth, M., & Birrer, D. (2020). Differential and shared effects of psychological skills training and mindfulness training on performance-relevant psychological factors in sport: a randomized controlled trial. BMC Psychology, 8(1), 80. doi:10.1186/s40359-020-00449-7

Rothlin, P., Horvath, S., Trosch, S., Holtforth, M. G., & Birrer, D. (2020). Differential and shared effects of psychological skills training and mindfulness training on performance-relevant psychological factors in sport: a randomized controlled trial. BMC Psychology, 8(80).

Rowen, D. A., Likens, A. D., & Stergiou, N. (2020). Chapter 6 - Revisiting a classic: Muscles, Reflexes, and Locomotion by McMahon. Biomechanics and Gait Analysis, pp. 149-224.

Russo, G., & Ottoboni, G. (2019). The perceptual – Cognitive skills of combat sports athletes: A systematic review. Psychology of Sport and Exercise, 44, 60-78.

Rydzik, L., & Ambrozy, T. (2021). Physical Fitness and the Level of Technical and Tactical Training of Kickboxers. International Journal of Environmental Research and Public Health, 18(6).

Rydzik, L., & Ambrozy, T. (2021). Physical fitness and the level of technical and tactical training of kickboxers . International Journal of Environmental Research and Public Health.

Sasson, R. (2020). The Power of Concentration. Retrieved from Success Consciousness: https://www.successconsciousness.com/blog/concentration-mind-power/the-power-of-concentration/

Sbenghe, T., Berteanu, M., & Săvulescu, S. (2019). Kinetologie.

Schevaun, N. D., & Bellingtier, J. A. (2019). Daily Stressor Forecasts and Anticipatory Coping: Age Differences in Dynamic, Domain-Specific Processes. The Journals of Gerontology: Series B, 74(1), 17-28.

Shoukat, H., Rabail, A., Mirza, M., Toor, H., & Khan, S. (2020). Comparing Two Types of Punches (Jab and Cross) on the Basis of Maximum Impact and Muscle Involvement. 2020 International Conference on Engineering and Emerging Technologies, ICEET 2020.

Slimani, M., Chaabene, H., Davis, P., Franchini, E., Cheour, F., & Chamari, K. (2017). Performance aspects and physiological responses in male amateur boxing competitions: A brief review. Journal of Strength and Conditioning Research, 31(4), 1132-1141.

Spiteri, T., McIntyre, F., Specos, C., & Myszka, S. (2018). Cognitive Training for Agility: The Integration Between Perception and Action. Strength and Conditioning Journal, 40(1), 39-46.

Stanley, E., Thomson, E., Smith, G., & Lamb, K. (2018). An analysis of the three-dimensional kinetics and kinematics of maximal effort punches among amateur boxers. International Journal of Performance Analysis in Sport, 835-854.

Takagi, Y., Seki, K., Ogiso, Y., Kobuchi, T., Kawagishi, T., Ando, Y., & Yamada, N. (2020). Changes in urinary catecholamine, heart rate, blood pressure and double product during ascent of one-day Mt. Fuji hiking in Japanese young males. The Journal of Physical Fitness and Sports Medicine, 9(3), 143-148.

Takeda, K., Iwai, M., Tanabe, S., Koyama, S., Hamauzu, Y., Kumazawa, N., . . . Kanada, Y. (2020). The effects of combined static and dynamic stretching of anti-gravitational muscles on body flexibility and standing balance: A preliminary study of healthy young participants. Journal of Bodywork and Movement Therapies, 24(1), 221-227.

Tjonndal, A. (2020). #Quarantineworkout: The Use of Digital Tools and Online Training Among Boxers and Boxing Coaches During the COVID-19 Pandemic. Front Sports Act Living.

Toma, V., Bucălie, E., Farcaș, A., Ciolpan, P., Roman, I., Mureșan, A., & Grosu, E. (2019). Dynamics of salivary cortisol and testosterone during competition stress in alpine skiing in adults and children. Cognition, Brain, Behavior, 23(1), 29-41.

Toma, V., Farcaș, A., Pârvu, M., Silaghi-Dumitrescu, R., & Roman, I. (2017). CA3 hippocampal field: cellular changes and its relation with blood nitro-oxidative stress reveal a balancing function of CA3 area in rats exposed to repeated restraint stress. Brain Research Bulletin, 130, 10-17.

Tong-lam, R., Rachanavy, P., & Lawsirirat, C. (2017). Kinematic and kinetic analysis of throwing a straight punch: The role of trunk rotation in delivering a powerful straight punch. Journal of Physical Education and Sport.

Volodchenko, O., Podrigalo, L., Iermakov, S., Zychowska, M., & Jagiello, W. (2019). The Usefullness of Performing Biochemical Tests in the Saliva of Kickboxing Athletes in the Dynamic of Training. BioMed Research International.

Warm Ups Prevent Sports Injuries. (2020). Retrieved from SouthEast Orthopedic Specialists: https://se-ortho.com/warm-ups-prevent-sports-injuries/

Wilson, J., Sup, M., Wilson, M., Maillet, M.-A., & Mekary, S. (2020). Chapter 33 - Developing speed qualities in youth athletes. In J. Wilson, M. Sup, M. Wilson, M.-A. Maillet, & S. Mekary, A Comprehensive Guide ot Sports Physiology and Injury Management (pp. 411-419).

Wright, K. E., Furzer, B. J., Licari, M. K., Dimmock, J. A., Jackson, B., & Thornton, A. L. (2020). Exploring associations between neuromuscular performance, hypermobility, and children's motor competence. Journal of Science and Medicine in Sport, 23(11), 1080-1085.

Ziemba, A., Adamczyk, J. G., Barczak, A., Boguszewski, D., Kozacz, A., Dabrowsky, J., . . . Zekanowski, C. (2020). Changes in the Hormonal Profile of Athletes following a Combat Sports Performance. BioMed Research International, 7.