

NATIONAL SPORTS ACADEMY “VASSIL LEVSKI”

DEPARTMENT OF WRESTLING AND JUDO

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SPECIALIZED PRE-COMPETITION TRAINING FOR ADOLESCENT SAMBO PLAYERS

ABSTRACT

of a dissertation for the award of the educational and scientific degree
“Doctor” in the professional field 7.6. Sport, doctoral program “Theory and
Methodology of Sport Science”

Supervisor:

Assoc. Todor Marinov, PhD

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The dissertation contains 164 standard pages of text. It is illustrated with 28 tables and 32 figures. The bibliography references 126 sources, three of which are Internet sources. Three appendices are included with the dissertation.

The dissertation was discussed and directed for public defense before a scientific jury at an extended meeting of the Department of Wrestling and Judo at the National Sports Academy "Vassil Levski," held on 27.04.2022.

The public defense of the dissertation thesis for the award of the educational and scientific degree "Doctor" will take place on 29.06.2022 at 13:00 in Lecture Hall A3 of the National Sports Academy "Vassil Levski," Studentski Grad, Sofia.

INTRODUCTION

Sambo is a martial art, combat sport, and self-defense system that combines some of the best and most effective martial arts techniques. In practice, two styles of sambo are known: sport sambo and combat sambo.

As in all sports, in sambo the achievement of high sporting results implies going through a complex and lengthy sport-pedagogical process of preparation. A distinctive feature of preparation appears to be the periodic repetition of relatively complete periods of time, with the advancement through them being linked to the achievement of sport shape. In sambo, the periodization of sport training includes three periods related to the attainment, maintenance and relative stabilization of sport shape: the preparatory, competitive and transitional period.

Considering the objective of our work, we focus on the nature of the preparatory period, during which the aim is to provide conditions for developing sport shape. The majority of methodological manuals related to training in sambo and similar sports – like wrestling and judo, prioritise considerations of the basic theoretical propositions for the application of training means and methods for physical preparation and technical improvement. Little attention is paid to the work done in one of the most crucial periods, facilitating the transition to competitions - that of the pre-competition preparation. This is a part of the preparatory period, and it is characterized by its specificity, owing to the nature and principles of sport training in the particular sport or sporting discipline.

Taking into account the knowledge and experience accumulated over the years and having observed training in sport sambo, we developed a methodology for specialized pre-competition training for adolescent sambo players.

The developed specialized pre-competition training is original and is being experimented in practice; its application is fully governed by the principle of adequacy of training impact in accordance with the specificity of the basic technical skills (the special - competitive exercises) in sambo.

PROBLEM STATEMENT

I. 1. Characteristics of sambo and its place in the group of one-on-one combat sports.

Sambo (translated as self-defense without weapons) is a martial art, combat sport and self-defense system developed in the Soviet Union by Anatoly Kharlampiev, Vasily Oschepkov and Viktor Spiridonov - martial arts masters who managed to combine the best techniques from the national wrestling styles of different USSR republics, as well as techniques from jiu-jitsu, judo, aikido, kendo, and punches from English boxing

The development of sambo in Bulgaria was first advanced by Kamen Lozanov (Stoilov, 2005). The first specialist, who in 1954 graduated from a sambo coaching school in Leningrad under the guidance of the assumed creator of the martial art - A. Kharalampiev. Significant contributions were also made by Neyko Delin, Tsen Tsenov, Todor Penchev and Gotse Popov. The first steps in the new sport were characterized by a lack of specialized knowledge and the necessary facilities for the practice of sambo. Nevertheless, with the help of accessible Russian literature and enthusiasm for practicing the typical sambo holds - throws, switches, holds, undercuts, etc., more and more people were attracted to the sport (Bozhichkov, Stoilov, 2005).

Nowadays, Bulgarian sambo athletes are among the most titled athletes internationally. Their achievements, especially in the last decade, make sambo one of the most preferred martial sports among adolescents.

I. 2. Basic principles in the motor development of adolescent sambo players

Considering the topic of our dissertation and the peculiarities of the training process in sambo, we consider only some of the changes in the motor development of adolescents in the years from 6-7 to 14-15 years. This makes it necessary to consider the changes during the pre-pubescent period and during the first phase of sexual maturation in puberty.

In the motor development of adolescents, the sum influence of three general factors stands out (Ilyin, 1980).

- ✓ Genetically determined development of motor activity and its morphological basis - motor apparatus.

- ✓ The general influence of the environment on the formation of the arsenal of everyday movements.

✓ The intensive, organized impact of different training means and methods in the process of sport improvement.

I. 3. Factors determining the effectiveness of the sambo player's actions in conditions of training and competition

The effectiveness of the training of sambo players is directly dependent on the influence of different groups of factors, which in their totality influence each other.

In direct relation to contemporary dimensions of sambo training, M. Yancheva (2016) separates the factors that influence the sport performance of sambo players into the following three groups:

✓ **The first group**, which includes the following individual factors: giftedness (the athlete's natural attributes) and the degree of preparedness for the sporting achievement.

✓ **The second group** brings together factors that are related to the scientific and technical support of the training system, the training methodology, the system of competitions, the medical and biological and information support.

✓ **The third group** refers to socio-economic factors such as: the general social living conditions of the population and the economic provision of sporting achievement, the popularity of sport and the availability of the necessary human resources in the country.

It is these three groups of factors, pertaining to sporting achievement, that are in close relationship with each other and determine to the greatest extent the effectiveness of the sambo player's actions.

I.3.1. General characteristics of preparation in sport

Preparation in sport is a complex, continuous, systematic and purpose-driven process by which an athlete undergoes the transition from beginner to elite athlete. This process is a system of specialized knowledge, means, methods and organizational forms providing complex conditions for full training and maximum expression of the athlete's abilities. In its full version, sport training is considered as a unity of goal, tasks, principles, training means, methods and forms of work, which are applied in the individual stages of multi-year sport training to achieve high sport results (L. Volkov, 2002 and T. Marinov, 2020).

The contemporary system of sport training has been formed as a result of the continuous development of theory and practice in sport. It consists of multiple subsystems for competition and competitive activity, a system for sport improvement and a system for recovery, which increase the effectiveness of

training and competitive activity (Suslov, 1999; Platonov, Oleynik, Gunina, 2010; Zhelyazkov, Dasheva, 2017; Suslov, 1995).

Taking into account the nature of our scientific work and the need to create an effective methodology for pre-competitive training in adolescent sambo players, we consider the different types of sport training. Important here are the mental, physical, technical and tactical preparation, which are the basis of sport training and which, in combination with specialized pre-competition training, contribute greatly to the achievement of high results - Fig. 1.

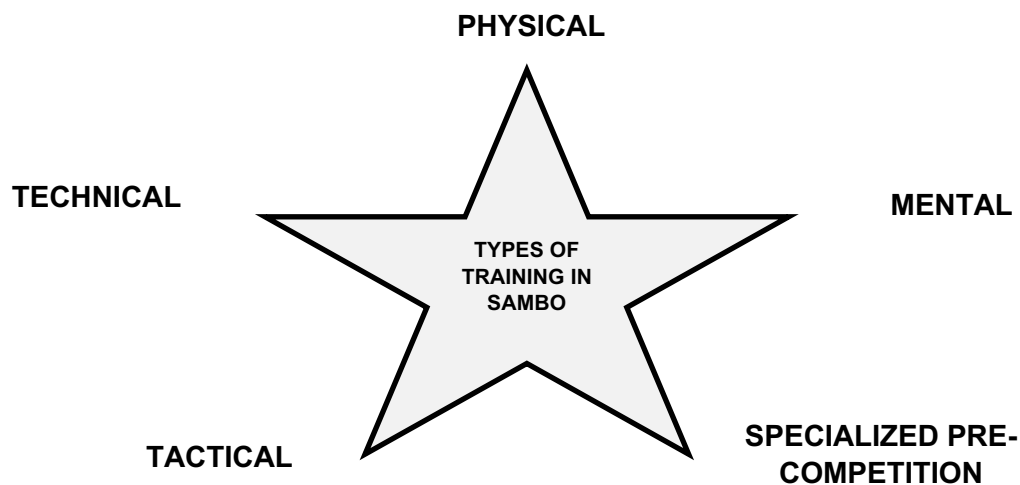


Fig. 1. Types of training in sambo

The individual types of sport training, as part of the overall system of sport training in sambo, provide an opportunity to determine the content, character, and direction of the training process, as well as to distribute the training load in different structural formations, starting from the individual training task to the long-term training program of the sambo player.

Specialized pre-competition preparation is subject to all the principles of sport training, with the guiding principle being the adequacy of the training impact in accordance with the specificity of the basic technical skills (special - competitive exercises). This implies increasing the volume of applied special exercises for the specified period of the overall training process in sambo.

I. 3.2. Specificity of the pre-competition training in sambo

Through pre-competition training in sambo, the transition to competitions takes place. Depending on the level of training attained by the sambo players, training means and methods are applied in the pre-competition preparation to achieve greater dynamics of training loads. Mainly special preparatory and

competition exercises are applied, which aid the necessary adaptation of the sambist to the specific conditions of the competition.

The pre-competition training covers the last stage of the preparation period, which is characterised by getting into sport shape. In it the means and methods applied are highly specialized (Bulkin, 1978). The possible variants of their application are two:

- ✓ With high training load at the expense of high intensity and optimal training volume. Control competitions are allowed.

- ✓ With a reduced training load, based on the optimal ratio of training loads, in terms of volume and intensity.

A characteristic feature of training in sambo is that through pre-competition training it is necessary to attain sport shape up to three or four times in the annual cycle. This necessitates proper planning of training means and methods and of the possibilities for rapid recovery of the energy expended in the preparatory and competitive period.

The periodization of the training process in sambo should be consistent with the following phase structure of sport shape: attainment, retention (relative stabilization) and temporary loss.

We consider the specialized pre-competition training in sambo with the help of a systematic approach; thus, the training itself, which is the object of our research, will be presented in its dynamic state and development - Fig. 2.

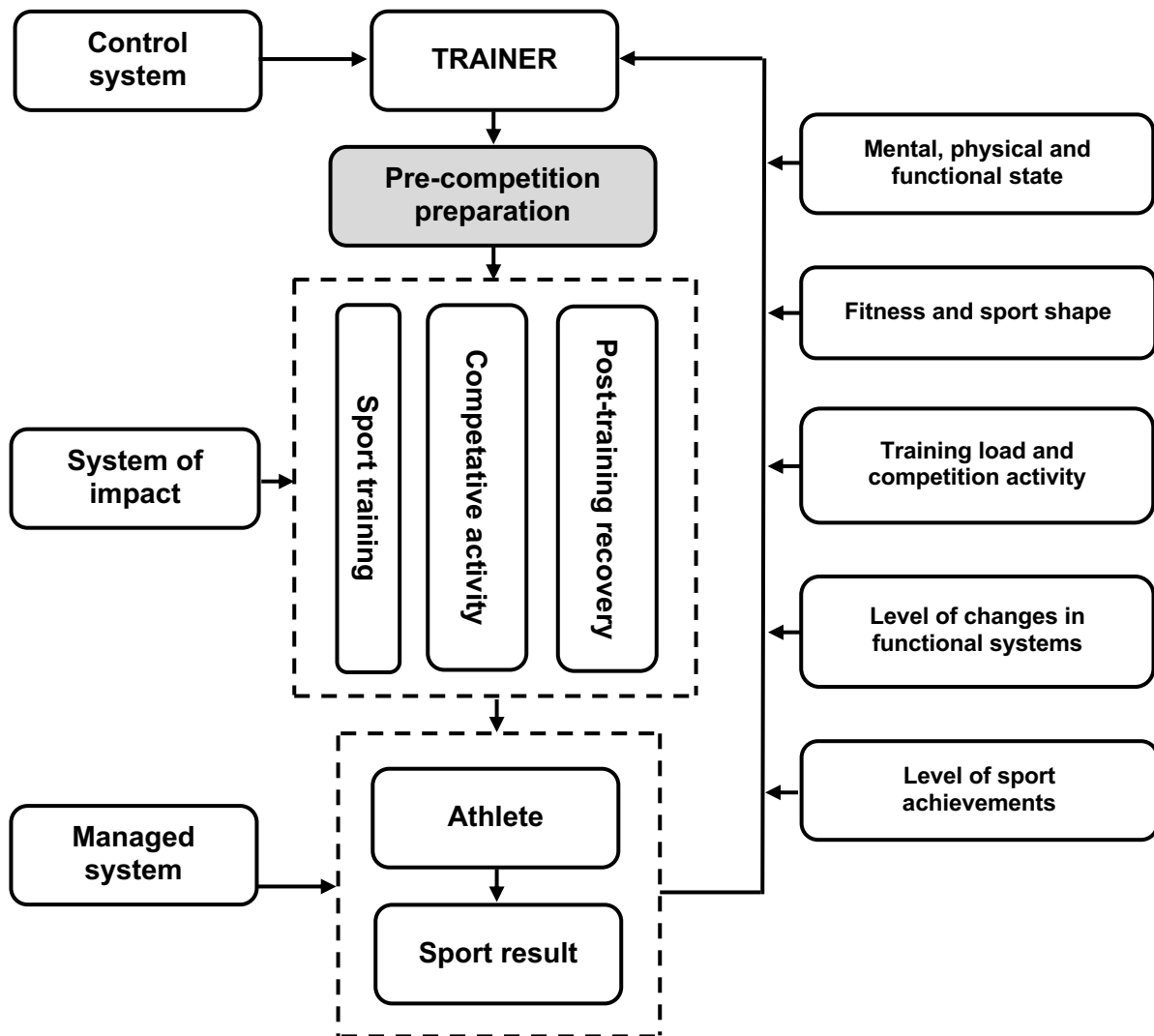


Fig. 2. System of specialized pre-competition training in sambo as an essential component of the sport training system (after O. Kamaev (2017))

The interaction between the different elements of the system of specialized pre-competition training in sambo is based on certain principles and rules. For the successful implementation of pre-competition training and its further improvement it is necessary to observe:

- ✓ *Strong corespondence between the training system and the requirements of the chosen sport.* It is this guideline that plays an important role in planning and conducting highly specialized complex training in sambo;
- ✓ *Maximum orientation to the individual talents and abilities of each specific athlete in the choice of sport specialization;*

✓ *Dynamicity of the training system*, together with its regular improvement, in accordance with new developments in the sport or sport discipline (Platonov, 2005).

Specialized pre-competition training of adolescent sambo players is based on the principles of mental, physical, technical and tactical preparation in sport.

Working hypothesis:

As a result of the pedagogical observations we made, the theoretical grounding of the research problem, and especially based on my years of experience in sambo, we derived the following working hypothesis is:

We hypothesize that through the purposeful application of the specialized pre-competition preparation in training activities with adolescent sambo players, a high level of mental, physical and technical-tactical preparedness will be formed to achieve success in sport sambo competitions.

CHAPTER TWO RESEARCH METHODOLOGY

II.1. Aim and objectives of the study

The aim of the present study was to develop and test the effectiveness of specialized pre-competition training for adolescent sambo players.

In order to achieve the set objective, the following **tasks** need to be accomplished:

1. To study and analyze the scientific and methodological literature on the research problem.
2. To establish and experiment with the implementation of a specialized methodology for pre-competition training in sambo practice.
3. To record and analyze the results obtained from the experiment on the effectiveness of the applied methodology for specialized pre-competition training.
4. To investigate the interconnection between the different aspects of the training of adolescent sambo players.

I. 2. Subject, object and contingent of the study

The subject of the study is the effectiveness of specialized pre-competition training in adolescent sambo players.

The object of the study is the pre-competition (mental, physical, technical and tactical) preparation of adolescent sambo players.

The contingent of the study was a total of 32 sambo athletes aged 15-16 years, divided into two groups: the Experimental Group (EG) - 16 sambo athletes from CSKA Sports Academy and the Control Group (CG) - 16 sambo athletes from sport sambo clubs in Chelopech and Panagyurishte.

II. 3. Research methodology.

To achieve the goal and prove the working hypothesis, a complex methodology was applied, including the following research methods: literature review; observation; discussion; pedagogical experiment; psychological tests; motor tests, expert evaluation; statistical methods.

Specialised pre-competition training included the application of mental, physical and technical training methods.

Mental influence methods are an integral part of every activity of the experimental group for the period of our study. These methods were applied both alone and in combination.

The methodology of physical training of adolescent sambo players is generally characterized by its complex nature. In our case, the specialized pre-competition training also has this character, but what is different from the standard methodology is that we emphasize the development of speed-strength qualities.

The option of applying our specialized pre-competition physical training is in a training mesocycle that covers a period of 4 weeks. During the first week, the volume of exercise represents 40% of the total volume, with priority given to developing sport-specific speed and muscular strength. In the second week, the volume of the training load is about 30% of the total, and the means and methods applied are more specialized and related to the nature of competitive activity in sambo. The sambo athlete's ability to perform powerful (fast and strong) muscular contractions is developed, ensuring the technique of their actions in accordance with those of the opponent and with the magnitude of the external resistances applied. In the third week, the volume of the load is 20% of the total, and the application of the technical skills with competitive conditions is stimulated in the training sessions. In the fourth week, the training load volume is 10% of the total, with one sparring session included in the activities.

The application of specialized pre-competition physical training is in accordance with the sport calendar of sambo athletes.

Specialized technical training is an integral part of every training session. It is held 2 to 3 times a week, according to the sport calendar of sambo competitions.

The duration of technical training in one training session is 50 minutes and includes:

- ✓ 3 parts with a total duration of 30 minutes for work in stance;
- ✓ 2 parts of 5 minutes for ground work;
- ✓ 2 parts of 5 minutes perfecting the throw with a transition to the ground.

What differed in the methodology of the experimental group from that of the control group was that we relied on 1) Refining the details of grip techniques; 2) Achieving wider variability in opponent unbalancing; 3) Refining the details of belt throwing (throwing the opponent from the waist) technique; 4) Refining the details of arm switch technique; and 5) Achieving wider variability in hold and escape.

Improvement in stance includes:

1. Improving grip - 10 minutes.

To apply a technique and execute it, the first most important thing is to reach the partner and apply a comfortable and correct grip for the athlete. The basic actions for this are:

- moving to the partner and application of the hold by the performer.
- breaking a hold. When the partner has succeeded in applying his grip first, the next step is to break and block the hand that is comfortable for him. Hence, one of the goals of training in sambo players is the execution of techniques on both sides.

The breaking of a hold can be performed with one or two hands, and for greater success rates we emphasized the two-handed rip.

Along with improving the grip, we included the following exercises at the end of each workout to improve strength and endurance:

- Hanging from a pull-up bar.
- Hanging on a pull-up bar with a jacket on it.
- Inverted rowing with a rope attached to a bar
- Twists and wrist curls using a belt and/or sticks (exercise in pairs).

An important rule of thumb is to do the grip strength exercises slowly, and work sets of 5 to 8 in one workout.

2. Improving throwing technique - 15 minutes. When the partner moves forward.

Work is done in a standing position and technique is further improved by throwing over the log (forward) at full amplitude of body movement. We emphasized the belt throw, alternating it with the shoulder throw and front tuck.

3. Perfecting the backward technique - 5 minutes. When the partner moves backwards.

The techniques are: rear footstool, inside leg hitch and outside leg hitch.

Ground improvement includes:

1. Refining of arm switches - 5 minutes.

2. Perfecting holds and escaping them - 5 minutes. Here we applied techniques from wrestling for better performance for both the hold and the dodge.

Perfecting technique from a standing position with transition to ground:

At the beginning of the experiment, stance-partner transition was observed to stop in most of the sambo players. That is why we relied on this method. The sambists are tasked with performing the techniques with more resistance and finishing on the ground.

An important part of the technical training where the techniques are improved on and the overall readiness of the sambo athletes is checked, is when

the throwing techniques are performed under varying conditions and time deficits. For this purpose, the sambo players of the experimental group performed a throwing exercise with different partners (4 to 6) for a control time (60s and/or 90s). The condition was: each subsequent partner throw was performed after a sudden verbal signal from the coach (e.g. "Belt throw to the left" ... "Shoulder throw to the right" ... "belt throw again to the same partner", etc.). At the end of this exercise, the mental impact methods of Idea-motor Modelling Training, Breathing Regulation for Recovery and Visualisation were applied.

II. 4. Organisation of the study

The study was conducted in three consecutive phases lasting from January 2020 to January 2022.

CHAPTER THREE

ANALYSIS OF THE SURVEY RESULTS

III.1. Analysis of the impact of specialized pre-competition training on the mental readiness of sambo athletes

The mental readiness of sambo players determines their ability to develop their motor potential adequately to the demands of the sport competition.

At the beginning of the study, we found no significant differences in the individual mental readiness indicators of the two groups.

Perception and attention are important for the effectiveness of sambo techniques. Through them the sambo player orients himself in a given situation and reacts adequately to the challenges from the opponent - Fig. 1.

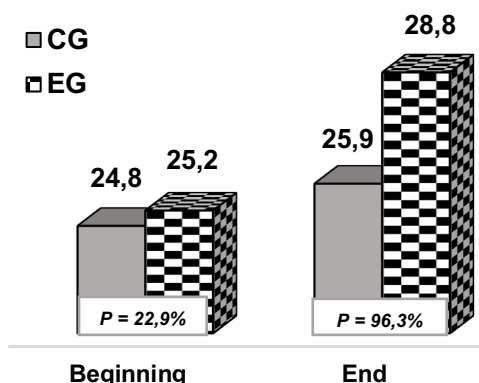


Fig. 1. Changes in visual perception and attention of the subjects from both groups (n)

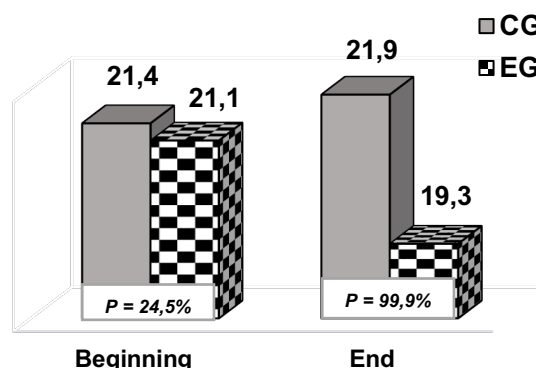


Fig. 2. Changes in the perception of the passage of time in the subjects of the two groups (s). Control time - 20 s.

At the end of the study, significant changes occurred in the sambo players of the experimental group (EG) as a result of the applied influence methods. Their initial score of 25.2 numbers ($S = 4.76$) increased to 28.8 numbers on average ($S = 4.04$). The observed difference of $d = 3.6$ numbers is further guaranteed by $P = 97.1\%$.

No significant changes occurred in the control group (CG). Comparing the incremental performance of the two groups at the end of the experiment shows that the performance of the EG was significantly better than that of the CG. The difference of an average of 2.9 numbers in excess for EG is evidenced by a probability guarantee ratio of $P = 96.3\%$.

We measured the perception of time passage immediately after the application of an intense training load and before the sambists of both groups recovered. In this way, we wanted to determine to what extent the different factors of the sport spars that induce excitation would influence the rate of time passage. In the beginning, both groups demonstrated higher values for time passage. On average, these were 1.4 s (21.4 s for the control group) and 1.1 s (21.1 s for the experimental group) higher than the actual value of 20 s - Fig. 2.

As a result of the application of the influence methods, and especially the method of modeling training, a beneficial effect on the rhythmic and dynamic change of the nervous processes of excitation and retention in the cerebral cortex is achieved. In this way, the perception of the passage of time in the EG is regulated. The changes are significant. Sambists are now able to regulate their excitation and retention processes more accurately under stress. The difference between the two groups at the end of the study was on average 2.6 s more than that of the EG, 19.3 s ($S = 1.01$). The calculated t-criterion value was $P = 99.9\%$.

A strong influence on the perceptions of the sambo players are their emotions, which are highly variable in the conditions of the sport spar. Therefore, it was important for us to identify their self-regulation abilities (emotional, behavioral and cognitive) as an important condition for success in competition - Figs. 3 and 4.

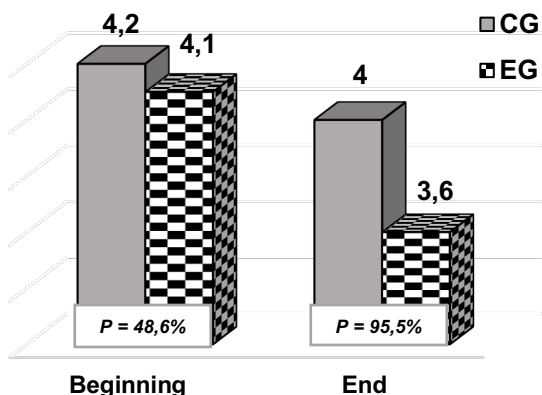


Fig. 3. Variability in emotional regulation in the two groups (score)

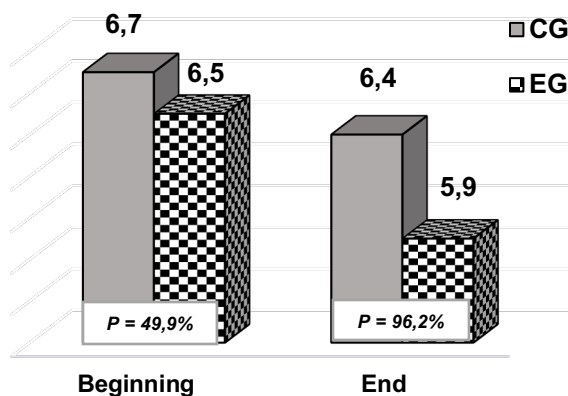


Fig. 4. Variability in behavioural regulation in the two groups (score)

Through the application of the "breathing regulation" method combined with "verbal suggestion" applied at the end of each session of the EG, a significant difference to that of the CG was achieved ($P = 96.6\%$). The final mean score of 3.6 points for EG is 0.4 points better than that for CG, 4.0 points.

Behavioral regulation data are plotted in Fig. 4. To the greatest extent, a sambist's behavior is influenced by his emotions. Thus, by regulating emotions, a beneficial effect on behavior is achieved. Manifestations of rage, nervousness and restlessness are significantly reduced. Therefore, the parallel application of the methods "breathing regulation" and "verbal suggestion" has an effect again. Thus, the initial EG score of 6.5 points ($S = 0.76$) improved significantly by an average of 0.6 points to a final value of 5.9 points ($S = 0.70$). The CG, which was not impacted by the aforementioned methods, did not show a significant increase in their behavioral regulation score. When comparing the final scores of the two groups, a significant difference was found at the expense of the EG. Their mean score of 5.9 points was 0.5 points lower than that of CG, at 6.4 points ($P = 96.2\%$).

At the beginning, there were no significant differences between the two groups in terms of cognitive regulation. They have the best possible performance indicators that can be obtained. The subjects have a plan of action, think through their actions and pursue the goals they have set. With the information thus captured, it is difficult for psychological impact to result in significantly better outcomes at the expense of one of the groups studied. Therefore, at the conclusion of the study, the results found were not associated with the presence of a significant difference.

Directly related to the self-regulation abilities of sambo players is their self-confidence, activity and mood. These three characteristics together determine the overall mental performance and inform about the possibilities of carrying out effective actions in sport competition.

From the very beginning, we note the relatively high self-esteem values demonstrated by the two groups. This is normal given their success rates in sport.

As a result of the implemented psychological impact in EG, we found a significant increase in their self-esteem. Nevertheless, this was insufficient to show a significant difference to the self-esteem of the CG subjects at the end of the experiment.

Activity, as a basic quality of general mental performance, reflects the characteristics of movement, the speed and rate of progress of functions. It is an important volitional factor in the structure of the sambo player's mental readiness and is important for the practical execution of actions during training and in competition - Fig. 5.

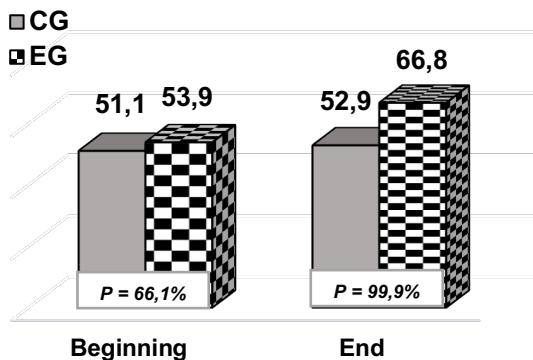


Fig. 5. Changes in activity in the two groups (score)

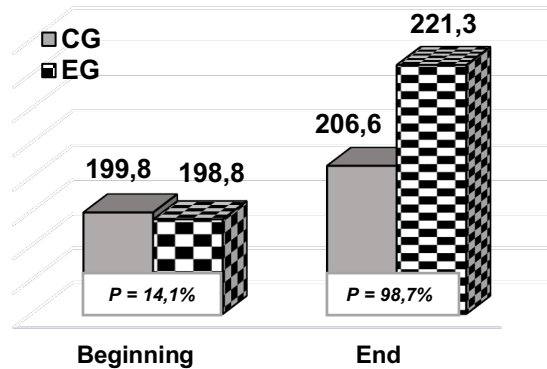


Fig. 6. Changes in general mental performance in the two groups (score)

As a result of the applied specialized methodology for pre-competition training and especially thanks to the increased attention and great desire to perform the tasks, a significant increase in the activity of the sambo players from the EG was found. They improved their initial results in such a way that a significant difference could be found when comparing the activity of the two groups at the end of the study - Fig. 16. The final value for the EG's activity score was 66.8 and that was on average 13.9 points higher than the CG's score of 52.9 ($P = 99.9\%$).

The indicator that directly reflects the emotional experiences of sambo players is mood. In it, as in self-esteem, we find high values after the first testing. The EG shows a significant increase in mood, but nevertheless, when comparing the final results of the two groups, we find an insignificant difference in the moods of the samba players.

Logically, as a result of the increase in self-esteem, activity and mood, an increase in general mental performance is expected - Fig. 6.

The increment in CG, recorded by this study, was not significant ($P = 77.5\%$).

The beneficial impact of the specialized training and the methods of influence applied in it contribute to a significant increase in the overall mental performance of the sambo players from the EG. This was mostly on account of the large increment in activity, as a consequence of which their score increased from 198.8 points by an average of 22.5 points to 221.3 points ($P = 99.9\%$).

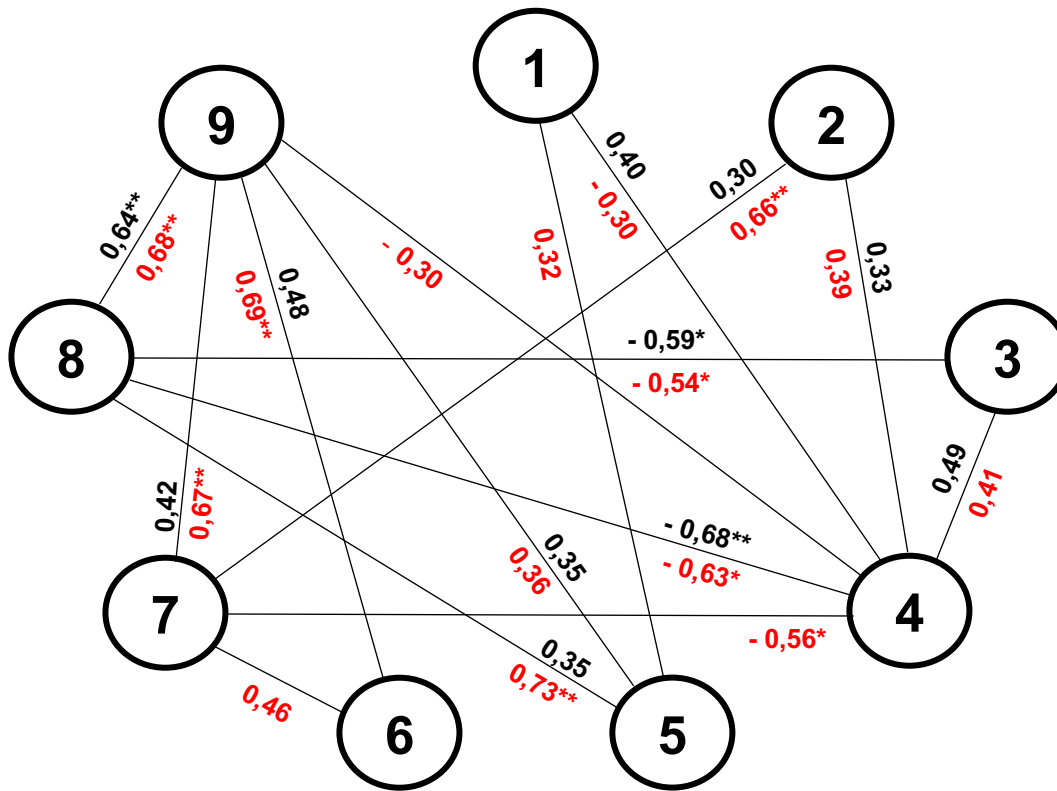
The significant increase in self-esteem, mood and especially activity of the experimental group contributed to their significantly better overall mental performance compared to that of the control group ($P = 98.7\%$).

Given the positive changes that occurred on the level of visual perception and attention, perception of time, self-regulation and indicators of general mental performance, it is assumed that this will lead to the improvement of the structure of mental readiness of the subjects of the experimental group.

After the specialized pre-competition training and the methods of influence applied in it, the following changes in the structure of the mental readiness of the sambo players in the EG occurred. We present the results of both studies in the correlation model - Fig. 7.

At the beginning of the study, many weak correlations were found between the indicators studied.

As a result of the specialised training, the changes in moderate correlations are the most numerous. The correlation between perceived time passage and behavioral regulation increased (from $r = 0.33$ to $r = 0.39$). New moderate correlations, which were initially weak, emerged: between behavioural regulation and general mental performance (from $r = -0.20$ to $r = -0.30$); between self-esteem and activity (from $r = 0.21$ to $r = 0.46$). Here, the strength of determinacy increased from 4.4% to 21.2%. The change between cognitive regulation with visual perception and attention is interesting. At the beginning, the strength of the relationship, although weak ($r = -0.20$), showed a negative interaction between the two indicators. At the end of the experiment, thanks to our influence methods, the strength of the relationship increased to $r = 0.32$, which now indicates a favorable interaction between the studied indicators. Even more telling is the situation between behavioral regulation with visual perception and attention. At the beginning, the relationship between these indicators was unfavorable - $r = 0.40$. At the end of the experiment, it changed and became negative - $r = -0.30$ (the better score for behavioural regulation is the lower score).



Legend:

1 - Visual perception and attention; 2 - Time perception; 3 - Emotional regulation; 4 - Behavioural regulation; 5 - Cognitive regulation; 6 - Self-esteem; 7 - Activity; 8 - Mood; 9 - General mental performance.

Dependency Strength:

Up to 0.3 - weak dependence - these relationships are not reflected;
 0.3 to 0.5 - moderate dependence;
 0.5 to 0.7 - significant dependence;
 0.7 to 0.9 - strong dependence.

Values at the beginning - $r = 0.00$; Values at the end - $r = 0.00$.

* - significance level $\alpha = 0.05$; ** - significance level $\alpha = 0.01$.

Fig. 7. Correlation model of the mental readiness of sambo players from the experimental group

Several correlations increased from moderate at the beginning to significant at the end (between time perception and activity; between activity and general mental performance; between self-esteem and general mental performance) and from moderate at the beginning to strong at the end (between cognitive regulation and mood). It is worth noting here that activity, which marks the largest significant increase as a result of our methodology, also marks the largest changes in the strength of its impact on individual indicators in the structure of mental readiness

of sambo players. At the end of the study, the determinacy of activity with self-esteem increased to 21.2% from 4.4% at the beginning; of activity with behavioral regulation to 31.4% ($r = 0.56$ with a significance level $\alpha = 0.05$) from 1.2% ($r = 0.11$) at the beginning; of activity with perceptual passage of time to 43.6% ($r = 0.66$ with significance level $\alpha = 0.01$) from 9% ($r = 0.30$) at baseline; between activity with general mental performance to 44.9% ($r = 0.67$ with significance level $\alpha = 0.01$) from 23.0% ($r = 0.48$) at baseline.

The strength of the relationship between cognitive regulation and mood increases from moderate to strong. In this case, the determinacy between the two indicators also increased the most, from 12.3% ($r = 0.35$) at baseline to 53.3% ($r = 0.73$ with a significance level of $\alpha = 0.01$).

Significant strong correlations of mood with emotion regulation, behavioral regulation, and general mental performance persisted.

In a minority of cases, the strength of the correlations was maintained or minimally reduced at the end of the study compared to the beginning.

Behavioral regulation was the most informative indicator in the structure of the sambo players' mental readiness at the end of the experiment, with a total of 6 moderate and significant correlations, in comparison with other indicators.

We can summarize that as a result of the applied methodology of specialized pre-competition training, the strength of interrelationships and, respectively, the determinism between the main indicators in the structure of mental readiness of sambo athletes is increased. This is a prerequisite for ensuring more adequate and more effective technical-tactical actions during competition.

III. 2. Analysis of the impact of specialized pre-competition training on the physical readiness of sambo athletes

Physical readiness is an essential component of overall training and a key factor in the effectiveness of technical actions in sambo. In this regard, emphasis is placed on the purposeful development of speed-strength qualities, flexibility and sambo-specific strength endurance.

At the beginning of the study, we found no significant differences in the performance of the subjects in the two groups ($P < 95\%$).

Speed is of great importance for the effectiveness of the sambo player's actions. It is expressed in the ability to quickly change the position of the body and in the ability to carry out single and multiple changes in the direction of movement at high speed of execution of technical skills - Fig. 8.

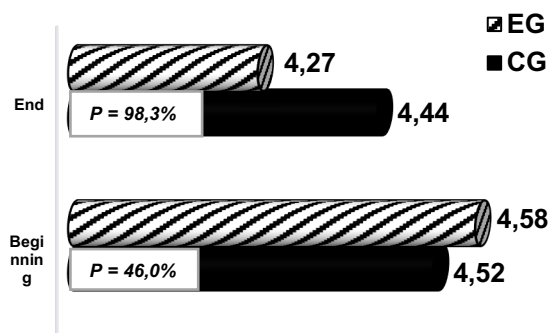


Fig. 8. Changes in the speed of the subjects of the two groups (s)

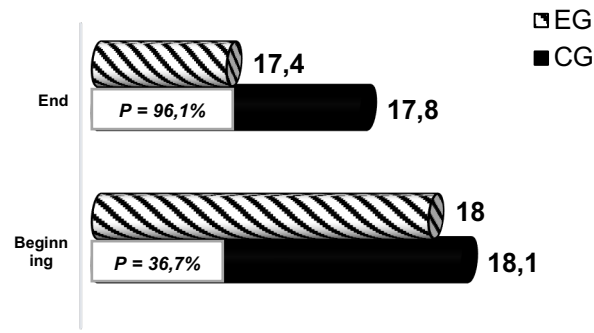


Fig. 9. Changes in running speed and displacement mobility in the horizontal plane (s)

Our work was entirely dedicated to developing reaction speed alongside developing explosive lower limb strength. At the end of the experiment we report a significant increment in the subjects' performance. The control time for the 30 m run was improved by 0.31 s ($P = 99.9\%$). At the same time, CG did not achieve significant changes.

The final achievement of the EG of 4.27 s ($S = 0.21$) was on average 0.17 s better than that of the CG, 4.44 s ($S = 0.14$). The difference was significant ($P = 98.3\%$).

To test the ability to perform the fast movements, which also depend on the explosive power of the lower limbs, we applied the 10x5 m Run test - Fig. 9. Through the test, we found that purposeful speed and strength work contributed to the significant changes in the sambo players' abilities to quickly change the body position in space. The initial result of 18.0 s ($S = 0.62$) was improved by an average of 0.6 s to 17.4 s ($S = 0.49$). This difference was supported by $P = 99.9\%$. Significant changes were also observed in CG between the two tests ($P = 97.8\%$).

Comparing the achievements of the two groups at the end shows that, thanks to the specialized training, the EG sambo players have significantly developed their speed abilities. Their final achievement was 0.4 s better than the CG's time ($P = 96.1\%$), confirming the effectiveness of our methodology.

The basis of the ability to perform fast movements with the lower limbs in sambo is explosive power. The incremental development of this quality in CG is not significant - Fig. 10.

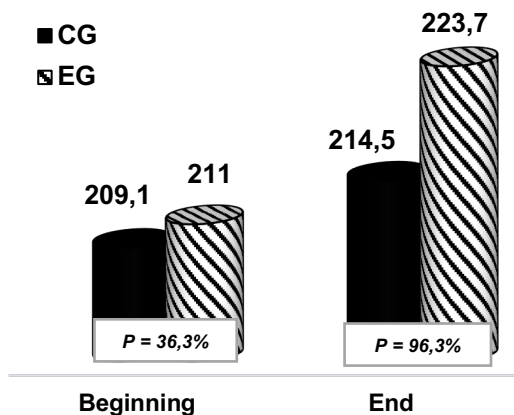


Fig. 10. Changes in lower limb explosive force (cm)

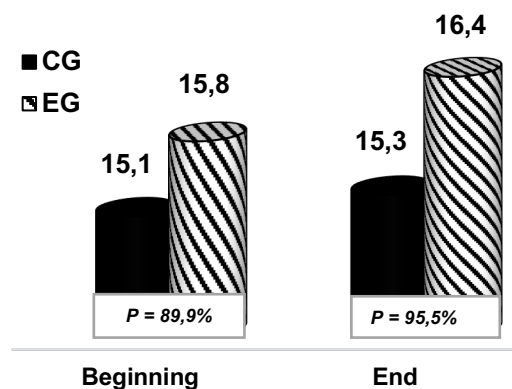


Fig. 11. Changes in lower limb strength endurance (n)

With EG, things are different. In the beginning, they overcame an average of 211.0 cm ($S = 12.72$). After the application of the specialised strength training tools and methods, at the end of the experiment the performance increased to 223.7 cm ($S = 12.35$). The difference of 12.7 cm between the two testings was significant ($P = 99.7\%$). The increment in lower limb explosive power development in EG is sufficient to prove the effectiveness of our methodology. The difference between the performance of the two groups at the end of the experiment with an average of 9.2 cm better results is guaranteed with a probability guarantee coefficient of $P = 96.3\%$.

Properly planned and carried out training means and methods of strength training have a beneficial effect on the strength endurance of the lower limbs of the sambo players - Fig. 11.

The final achievement of 16.4 repetitions on average ($S = 1.75$) of EG was 0.9 repetitions more than that of CG's 15.3 repetitions on average ($S = 1.25$). The difference found was significant at $P = 95.5\%$.

Important for the sport shape of the sambo player is the state of strength endurance of the abdominal musculature. That is why it was also an important part of our pre-competition training.

The strength training methodology we applied, together with the performance of sambo techniques that require the active participation of the muscles of the lower limbs, trunk and upper limbs, resulted in the significant improvement of the mean performance of the EG subjects ($P = 99.7\%$). The mean number of repetitions at baseline was 27.2 ($S = 1.17$). At the end of the study it had increased by an average of 1.4 repetitions to 28.6 ($S = 1.20$) in 30 s. This

increment was sufficient to note a significant difference between the two groups at the end of the experiment - Fig. 12.

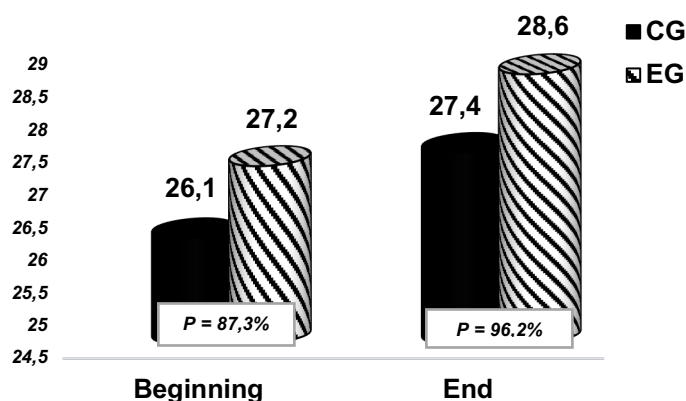


Fig. 12. Changes in strength endurance of abdominal muscles (n)

The final achievement of the EG was 28.6 repetitions ($S = 1.20$). CG's final achievement was 27.4 repetitions ($S = 1.96$). The achieved difference of 1.2 repetitions in favour of EG was significant - $P = 96.2\%$.

For the effectiveness of techniques in sambo, the grip strength is of great importance. It is used for successful opponent unbalancing, initial movement in different types of throws and ground techniques.

In the experimental period, the CG sambists did not significantly improve their grip strength performance.

As a result of the applied methodology for specialized strength training, the subjects of the EG showed an increase in the grip strength of their right hand. However, their results were not enough to make a significant difference, compared to the final performance of the CG - Fig. 13.

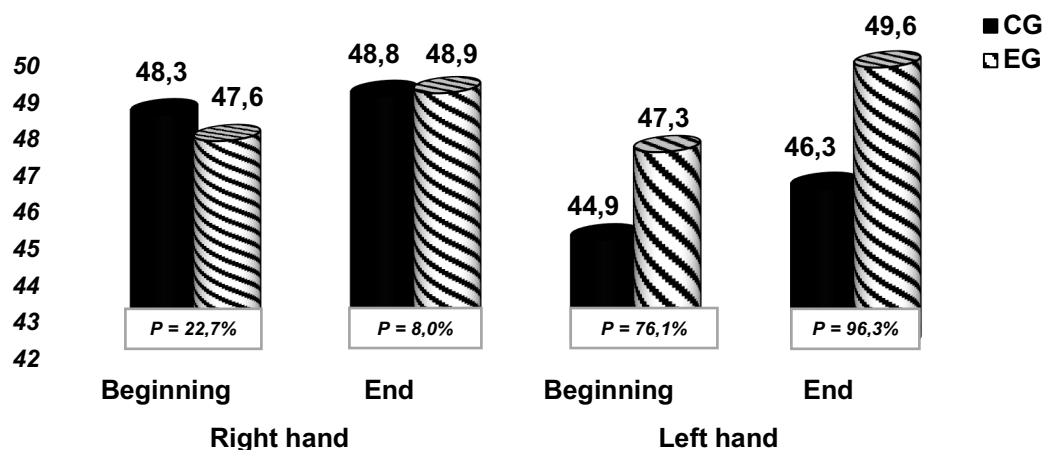


Fig. 13. Changes in grip strength of right and left hand (kg)

This is unlike the changes for left hand grip strength in EG. Their baseline score averaged 47.3 kg ($S = 6.97$). Due to special strength training aimed at improving grip strength, significant gains were achieved. Hence, at the end of the study the average grip strength of the left arm was already 49,6 kg ($S = 5,32$) and the difference was $d = 2,3$ kg, with $P = 98,4\%$. The means of developing the grip, which were characterised by the incorporation of both static and dynamic muscular efforts, contributed to the significantly improved strength of the EG. Their final performance was on average 3.3 kg better than that of CG ($P = 96.3\%$).

The effective implementation of the techniques in attack and defense depend largely on the manifestation of the dynamic flexibility of the sambo players.

In contrast to the CG, the experimental group achieved significant increments in the development of this quality. Sambists improved their dynamic flexibility and had significantly better scores at the end of the study compared to the CG.

Specialized pre-competition training included a complex set of partner throwing performances with differently timed techniques and following verbal instructions. This had a very beneficial effect on the physical readiness of the EG. They significantly improved their initial performance in the 'Shuttle to Targets' test, which comprehensively assessed lower limb kinesthetic abilities, complex motor reaction speed, and attention parameters (from 9.3 s at the beginning to 9.0 s at the end) - Fig. 14. The increment is sufficient to be able to detect a significant difference in the performance of the two groups at the end of the experiment (Fig. 27).

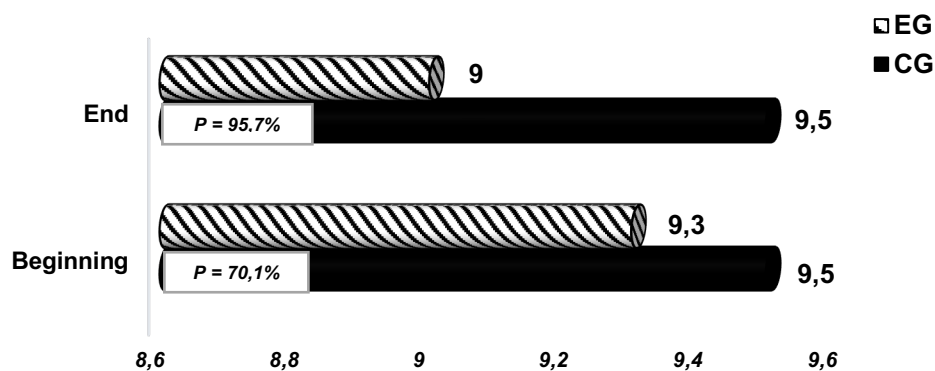


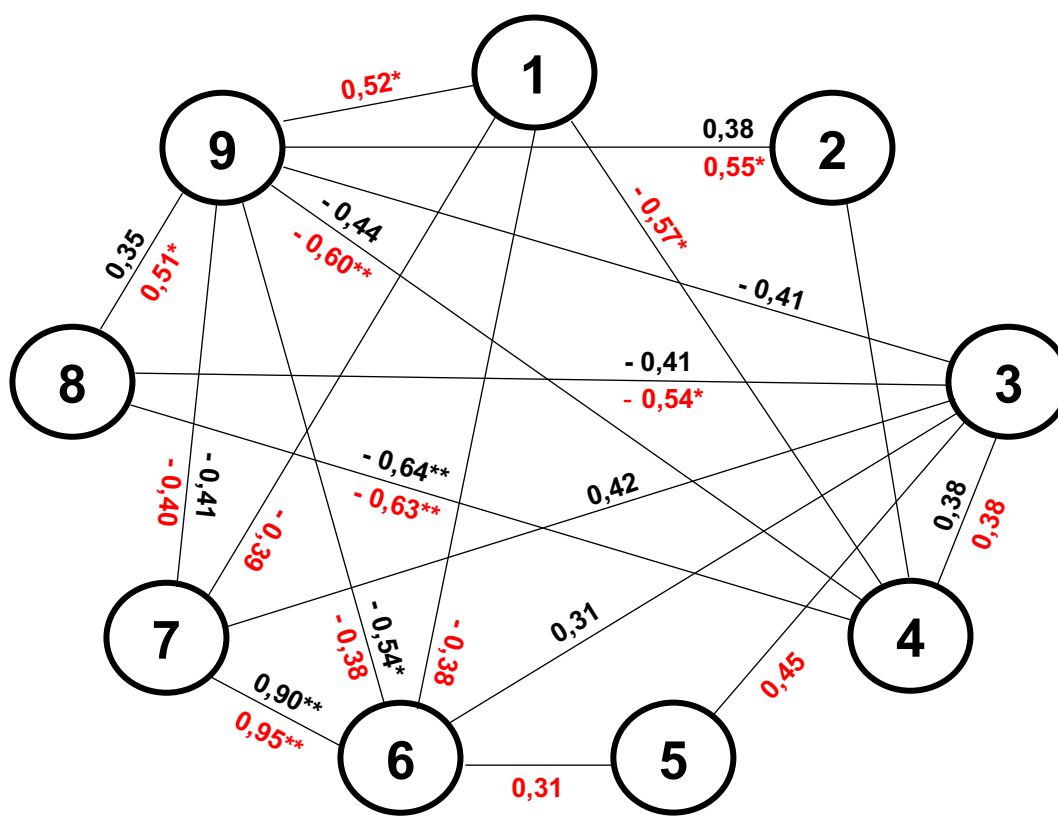
Fig. 14. Changes in lower limb kinesthetic abilities, complex motor reaction speed and attention parameters (s)

The final achievement of the EG was 9.0 s ($S = 0.79$). It is an average time difference of 0.5 s better than that of CG's 9.5 s ($S = 0.50$). The difference is reliable, proved by $P = 95.7\%$, and it is a guarantee of the effectiveness of our methodology for specialized pre-competition physical training.

In summary, we should point out that the methodology we experimented has a beneficial effect on the motor qualities of the adolescent sambo athletes studied by EG. Therefore, besides the quantitative changes found, the qualitative changes in the structure of their physical readiness are of interest to us. In Fig. 15 we present a correlation model of physical readiness (beginning and end).

After the first testing, we found multiple weak linear correlations. Most striking were the weak correlations in the manifestation of speed and velocity of locomotion in the horizontal plane with other motor qualities.

The lower limb explosiveness indicator was the most informative, having the highest number of moderate correlations at the top. A very strong correlation between right and left hand grip strength was revealed, $r = 0.90$, with a significance level of $\alpha = 0.01$. In the end, as a result of the conducted specialized training and the emergent significant changes in the development of motor abilities of sambists, an increase in correlations in the structure of their physical readiness was reached.



Legend:

1 – ‘30 m Run’; **2** – ‘10x5 m Shuttle’; **3** – ‘Long Jump’; **4** – ‘Squatting and Standing’; **5** – ‘Sit-ups’; **6** – ‘Dynamo-Metrics’ - right hand; **7** – ‘Dynamo-Metrics’ - left hand; **8** – ‘Bending-Standing-Touching’; **9** – ‘Shuttle to Goals.’

Dependency Strength:

Up to 0.3 - weak dependence - these relationships are not reflected;
0.3 to 0.5 - moderate dependence;
0.5 to 0.7 - significant dependence;
0.7 to 0.9 - strong dependence;
Above 0.9 - very strong dependence.

Values at the beginning - $r = 0.00$; Values at the end - $r = 0.00$.

* - significance level $\alpha = 0.05$; ** - significance level $\alpha = 0.01$.

Fig. 15. Correlation model of the physical readiness of the sambo players from the experimental group

A sign of improvement in the speed-strength abilities of the EG subjects was the emergent significant correlation of speed with lower limb strength endurance and with lower limb kinesthetic abilities, complex motor reaction speed, and attention parameters. In the former case, the correlation increased significantly from $r = 0.10$ at baseline to $r = 0.57$ ($\alpha = 0.05$). Thus, the determinacy between lower limb speed and strength endurance is now 32.5%. In the second case, the correlation significantly increased from $r = 0.10$ at baseline to $r = 0.52$ ($\alpha = 0.05$) and, accordingly, the determinacy increased to 27.0%.

The correlation between the ‘Shuttle 10x5m’ and ‘Shuttle to Targets’ test scores also increased. The correlation went from being moderate at $r = 0.38$ baseline to becoming significant in strength at $r = 0.55$ ($\alpha = 0.05$), and the determinacy increased from 14.4% to 30.3%.

At the end of the study, several new moderate correlations were found. These were characteristic of speed with right hand grip strength ($r = -0.38$) and left hand grip strength ($r = -0.39$); of abdominal muscular endurance with lower limb explosive strength ($r = 0.45$) and with right hand grip strength ($r = 0.31$).

The index of assessment of lower limb kinesthetic abilities, speed of complex motor reaction and attention parameters was the most informative at the end of the experiment. At the beginning of the study, one significant, five moderate and two weak correlations in strength were found between it and the other motor qualities of the sambo players. At the end, four significant, two moderate and two weak correlations in strength were found as a result of our application of the specialized methodology for pre-competition physical training. The highest increment is between the ‘Shuttle to Targets’ test indicator with the Speed indicator from the ‘30m Run’ test. At baseline, the correlation was weak - $r = 0.10$. At the

end, it became significant in strength - $r = 0.52$, with a significance level of $\alpha = 0.05$ and a between-indicator determinacy of 27.0%.

The correlation between the 'Shuttle to Targets' and the 'Shuttle 10x5m test' metrics increased from moderate $r = 0.38$ at the beginning, to significant $r = 0.55$ ($\alpha = 0.05$) at the end, and the determinacy of 14.4% reached 30.3%. The situation was similar between the 'Shuttle-to-Targets' test indicator and the 'Leaning-Standing-Touching' test indicator. Here the strength of the relationship increased from moderate at the beginning ($r = 0.35$) to significant in strength at the end - $r = 0.51$, with $\alpha = 0.05$.

The other correlations established at the beginning were only weakly affected. The correlation between right and left hand grip strength increased the most. At the beginning of the study we found a very strong correlation - $r = 0.90$ with a significance level $\alpha = 0.01$. At the end, the correlation was again very strong, but now with $r = 0.95$ ($\alpha = 0.01$), so the determinacy between hand grip strength increases from 81% to 90.3%.

In summary, it can be pointed out that as a result of our specialized pre-competition training, the relationship between speed and strength indicators was strengthened, thus ensuring the performance of fast, strong (powerful) movements in the execution of techniques by sambo players. The increased correlations, as well as the emergence of new moderate and significant strength correlations, is a sign of an improved structure of physical readiness of the adolescent sambists studied by the experimental group.

III. 3. Analysis of the impact of specialized pre-competition training on the technical readiness of sambo athletes

To assess the technical readiness of the sambo athletes, we applied an expert assessment on three indicators of the stance techniques (to perform a grip, to unbalance the opponent, and to belt throw) and three indicators of the ground techniques (to hold a grip, to escape, and to perform an arm switch).

The lowest score the subjects received at the beginning was the one for unbalancing - 8.2 points. The highest score was achieved in the belt throw - 9,1 points.

We have found that in most cases, sambo players approach the unbalancing technique according to the grip performed, which is usually done with their stronger hand - the right. This, in turn, leads to a limitation on the variability of techniques in the stance. Therefore, we initially focused on adopting a stance that allowed the grip to be performed with both the strong and weaker hand. In addition to

opportunities to improve various technical skills, we also provided the necessary knowledge about the biomechanical appropriateness of performing those skills. In this way, significant changes of technical readiness in the stance were achieved - Fig. 16. The variability of the actions was improved and thus the sambists improved their ability to select the best option for the execution of the movements, according to a sudden situation, caused by the opponent.

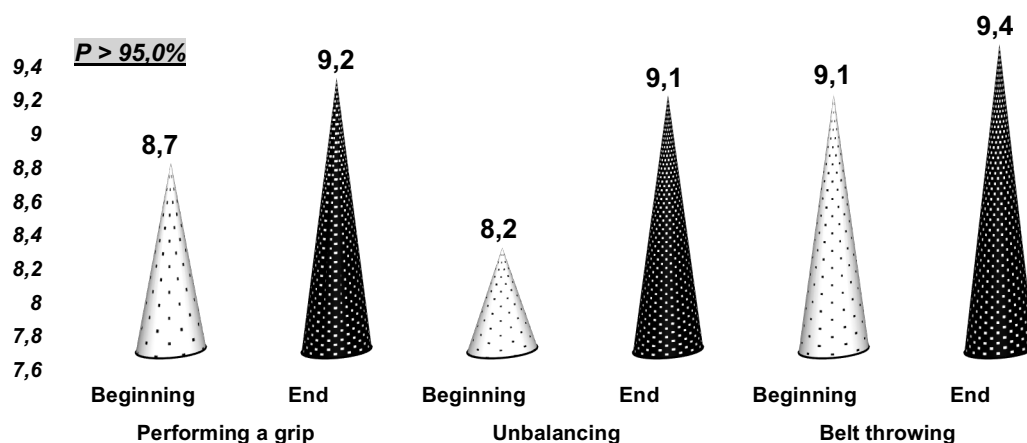


Fig. 16. Changes in technical readiness in stance in the experimental group (score)

Technical grip skills improved by an average of 0.5 points, from an initial score of 8.7 points ($S = 0.71$) to a final score of 9.2 points ($S = 0.54$). Gains in technical grip skills are supported by $P = 96.1\%$. At the end of the experiment, sambists were combining the actions performed while standing more skillfully, moving more flexibly towards the opponent, executing different types of grips, and thus achieving significantly better opportunities for the unbalancing and subsequent throwing of the opponent.

The technical skills for executing a right and left hand grip at the end of the study also improved significantly. Sambists realised the importance of being able to act with greater variation right from the implementation of the grip. Thus, they achieved an increase in their final score of 0.9 points on average, from an initial score of 8.2 points ($S = 0.70$) to a final score of 9.1 points ($S = 0.65$). The calculated probability guarantee ratio is $P = 99.9\%$.

It is only natural, once the techniques of gripping and unbalancing are perfected, to further improve upon technique - in our case, the belt throwing. Although at the beginning of the experiment the subjects achieved a very high average score for the performance of this technical element, at the end their score was significantly higher. This is mainly due to the achieved greater variability of actions and the better unbalancing of the opponent as a consequence. The final

score of 9.4 points ($S = 0.44$) was on average 0.3 points higher compared to that achieved at the beginning of the experiment, which was 9.1 points ($S = 0.49$). And this difference is reliable - $P = 97.8\%$.

The effectiveness of our specialized pre-competition training is also evidenced by comparing the average scores of the two groups at the end of the study.

The lack of detailed refinement of the technical skills of the CG sambo players resulted in scores on all three indicators that were significantly lower than those of the EG - Figure 17.

On the first indicator of grip performance, the final score of the CG is 8.1 points. This is a score that is 1.1 points lower than the 9.2 points ($P = 99.9\%$) achieved by the EG subjects. On the second indicator of unbalancing, the final CG score was 8.1 points ($S = 0.75$). Again, the 1.0-point difference in lower scores from those of the EG subjects, 9.1 points ($S = 0.65$), was found to be significant ($P = 99.9\%$).

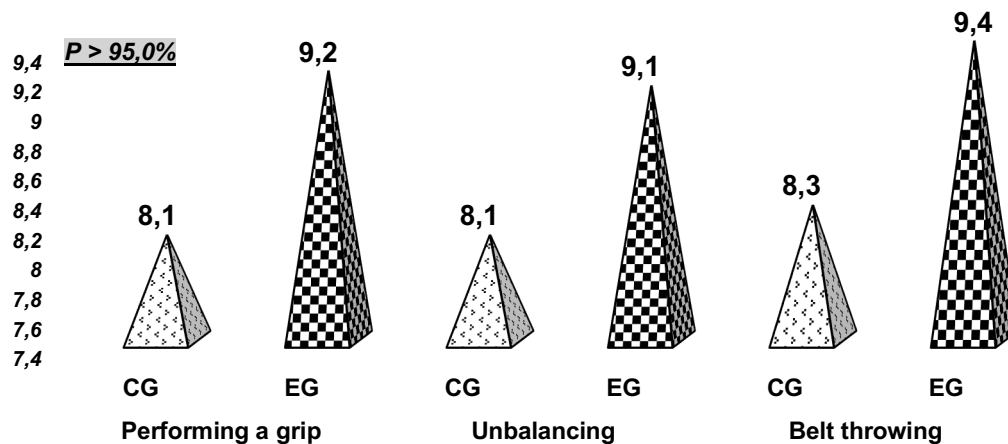


Fig. 17. Mean values of technical readiness in stance for the subjects of the two groups at the end of the experiment (score)

In the third indicator of performing a belt throw, the final score of the CG was 8.3 points ($S = 0.68$). This is a score that is, on average, 1.1 points lower than that achieved by the EG subjects, 9.4 points ($S = 0.44$). The difference is significant with $P = 99.9\%$.

This confirms our initial assumption that specialized pre-competition training is effective. This is also valid for the improvement of technical preparedness in ground-work for the sambo players of the experimental group.

After the first study, the high average scores (of 9.0 points) that the subjects achieved for their technical skills in executing the hold and in performing the hand switch were remarkable. Slightly lower was the average score for escaping the opponent's holds, averaging 8.5 points.

In our specialised pre-competition training, when working on the ground, we focused on mastering some elements carried over from wrestling. In this way, we ended up improving mainly the technical skills of holding and dodging.

The mean score for technical holding skills at baseline was 9.0 ($S = 0.58$). At the end of the experiment, it was significantly higher, reaching 9.4 points ($S = 0.43$). The observed difference between the two mean scores of 0.4 points has a probability of guarantee $P = 97.9\%$ - Fig. 18.

The initial mean score for the subjects' technical escaping skills score was 8.5 ($S = 0.53$). As a result of the training, it increased by an average of 0.5 points to a final score of 9.0 points ($S = 0.39$). Again, the difference in mean scores was significant, $P = 99.2\%$.

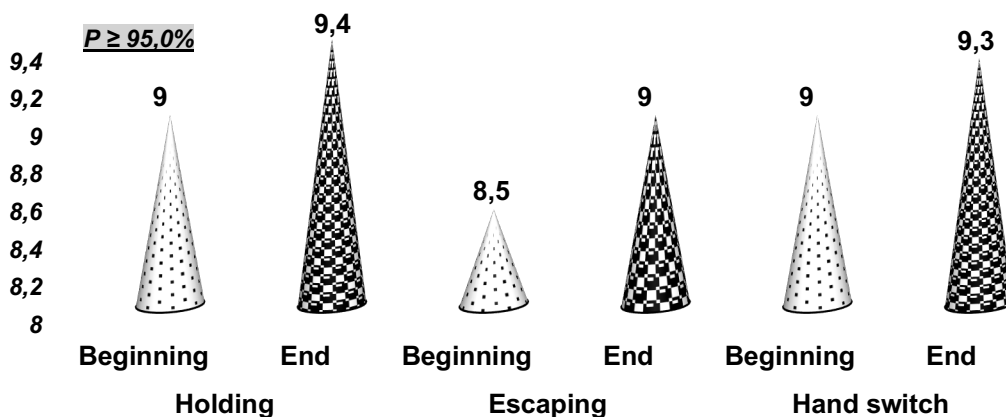


Fig. 18. Changes in technical readiness in the experimental group (score)

At the end of the experiment, the technical skills of the hand switch also improved. The mean score increased from 9.0 ($S = 0.48$) at baseline to 9.3 ($S = 0.41$). Although comparatively small, the achieved difference in this indicator of 0.3 points was also considered reliable ($P = 94.6\%$).

The improvement of the technical holding skills of the EG sambo players, as a result of the specialized pre-competition training, led to recording better scores at the end of the experiment. Their score of 9.4 points ($S = 0.43$) was on average 1.1 points higher than that obtained by the CG subjects' 8.3 points ($S = 0.68$). The difference is significant and is guaranteed by $P = 99.9\%$ - Fig. 19.

In the second indicator of technical preparedness in on-ground escaping, the CG subjects obtained a mean score of 8.5 ($S = 0.66$). The improved skills of the EG contributed to a mean score of 9.0 ($S = 0.39$), this being on average 0.5 points higher than the CG's score and guaranteed by $P = 98.0\%$.

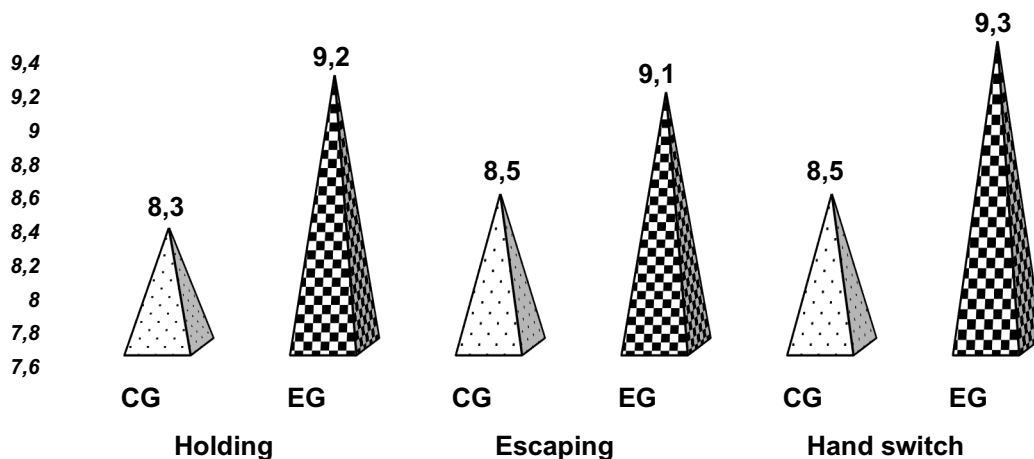


Fig. 19. Mean values for the technical readiness on the ground for the subjects of the two groups at the end of the experiment (score)

The third indicator, strictly specific to the sambist's ground-work, is related to the implementation of the hand switch. Here again the EG had a significantly higher expert score for technical performance. Their mean score was 9.3 points ($S = 0.41$), while that of the CG was 8.5 points ($S = 0.61$). The difference of 0.9 points and has a probability guarantee of $P = 99.9\%$.

In summary, we can point out that as a result of the specialized pre-competition technical training and the specialized mental and physical training, the technical readiness of the experimental group improved. Their actions in stance and on-ground became more effective.

CONCLUSIONS AND RECOMMENDATIONS

FINDINGS

1. In the scientific-methodical literature on the problems of combat sports and martial arts, there is limited information concerning the nature of sport training and especially its specific application during the pre-competition period. Priority in the literature is given only to physical and technical preparation, without considering the unity of mental, physical, technical and tactical preparation, important for achieving sport shape and high sport performance.

2. As a result of the implementation of specialized pre-competition training, visual perception, perception of the passage of time and attention were improved. General mental performance increased. Mental readiness for faster and more accurate reactions was improved.

3. As a consequence of the systematic application of psychological influence methods, the emotional, behavioral and cognitive regulation of the sambo players in the experimental group improved significantly. They developed mental readiness for more accurate management of their actions during competition.

4. The application of specialized physical training improved the speed-strength abilities of sambo players. Grip strength and dynamic flexibility were significantly affected. The sambo athletes' ability to exert maximum effort for a minimum time period and maintain an optimal range of movements, prioritizing the unbalancing and throwing of the opponent was ensured.

5. Implementing specialized pre-competition training led to positive changes in the structure of mental and physical readiness of sambo players. The most informative indicator in the structure of mental readiness was behavioral regulation - with a total of 6 moderate and significant correlations with other indicators. In the structure of physical readiness, the most informative indicators were the assessment of kinesthetic abilities of the lower limbs, the speed of complex motor reaction and attention parameters.

6. Through our methodology the technical skills of the sambo players were improved. A greater variability was developed for the technical actions performed in stance and on the ground.

7. The methodology we experimented with implementing for specialized pre-competition training of adolescent sambo players was effective.

RECOMMENDATIONS

1. We recommend that the methodology for specialized pre-competition training, which we have approbated, be applied in the training of adolescent sambo players.
2. We recommend the continued experimentation with specialized means and methods for mental, physical, technical and tactical training in beginners and advanced sambo players.
3. We suggest the research we conducted and our subsequent findings should go towards enriching the theory and methodology of sport training in sambo.

SCIENTIFIC CONTRIBUTIONS

- ❖ The theory of sport training in sambo was enriched. The concept of unity of mental, physical, technical and tactical preparation on the way to achieving sport fitness was expanded.
- ❖ New methods were created and adapted to study the readiness of sambo athletes.
- ❖ The structure of mental and physical readiness of adolescent sambo players after the implementation of specialized pre-competition training was revealed.
- ❖ A specialized methodology for pre-competition training of adolescent sambo players was created.

PUBLICATIONS RELATED TO THE DISSERTATION

1. Oryashkova, M. (2021). Specialized pre-competition training for adolescents in sambo. // Yearbook of National Sports Academy "Vassil Levski," Sofia.

2. Oryashkova, M. (2021). Influence of specialized pre-competition training on speed-strength qualities of adolescent sambo players. // Yearbook of National Sports Academy "Vassil Levski," Sofia.