

Development of speed-strength abilities in 8-10-year-old sambo wrestlers

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ABSTRACT

The aim of this study was to improve the level of speed-strength abilities of young wrestlers using active games. This non-randomized controlled research was conducted at the Olympic Reserve Sports School in Kirov (Russia) during 5 months. The study involved 38 children aged 8–10 years who trained in sambo three times a week. Participants were divided into control and experimental groups. The control group followed the standard training program, while the experimental group performed active games with wrestling elements to develop speed-strength abilities. All participants completed control tests before and after the study to assess speed-strength development. The results showed that speed-strength abilities improved in both groups. Significant and reliable improvement of all studied parameters was achieved in the experimental group. In the pull-up test, the children improved their indicators from 25.7 ± 0.95 to 22.7 ± 0.57 ($p < 0.05$), and in the dummy throw test from 37.5 ± 0.84 to 33.8 ± 0.49 ($p < 0.05$). Long jump increased by 5.35% ($p < 0.05$). Rope climbing speed increased by 18.1% ($p < 0.05$), and wrestling races by 15% ($p < 0.05$). As for the control group, only the long jump indicators improved significantly from 138.5 ± 0.19 to 142 ± 0.53 , the increase was 2.5% ($p < 0.05$). If active games are used for 30 minutes during the preparatory period of the training stage at each sambo training for children between 8-10 years of age, the speed- strength abilities of young wrestlers will improve significantly.

KEYWORDS

Preparatory Period; Young Wrestlers; Training Process; Initial Training; Speed Abilities

1. INTRODUCTION

Sambo wrestling provides great opportunities to reveal and use abilities necessary in life: physical, mental, intellectual and spiritual-moral at the highest level. The intensity of the fight at competitions, in situations close to extreme, requires the athlete to demonstrate the highest level of volitional powers and physical qualities, maximum concentration and mobilization of efforts, revealing the internal reserves of the body (Begimkulov, 2023; Mykaevna et al., 2023).

The importance of speed-strength training for young sambo wrestlers is beyond doubt, as further growth in the level of technical and tactical mastery is based on the high potential of their physical fitness. Wrestlers must demonstrate strength abilities when performing throws in short periods of time (Makhalin et al., 2016; Ustoev, 2021; Toshboyeva, 2022).

Speed is the ability to perform certain movements or solve problems in the shortest possible time. For sambo, speed plays an important role, it is an integral part of the movement in a fight and one of the most important factors in the effective implementation of an action. Sambo wrestlers perform their actions, defensive movements and attacks, counterattacks very quickly. The basis of such movements is complete automation. In sambo, speed is very complex. First of all, it depends on the time and accuracy of the reaction. The reaction is unthinkable without perfect skills and concentrated attention (Sabillah et al., 2022; Komilov, 2024).

Strength is the biological basis of all motor abilities. Without the impact of strength, movement is impossible. Strength training also has a positive effect on improving performance. Properly planned training helps develop all muscle groups and achieve good results. The use of strength by sambo wrestlers helps overcome the opponent's resistance or counteract it through muscular effort when performing motor actions in a standing position and on the ground (Karatrantou et al., 2020; Komilov, 2024). The strength used in wrestling is constantly changing in magnitude, direction and nature. Manifestations of strength in wrestling are observed in combination with other physical qualities and specific skills for a particular sport (Karatrantou et al., 2020; Sabillah et al., 2022).

Speed-strength abilities in sambo are characterized by non-maximum muscle tension and are manifested in the maximum power of efforts when performing balance breaks, throws, and pursuits of an opponent on the ground (Makhalin et al., 2016; Ustoev, 2021; Toshboyeva, 2022).

The development of speed-strength abilities in sambo wrestlers occurs under the influence of 2 factors. The leading factor is the coordination factor, which determines intramuscular coordination. It affects the synchronicity and frequency of the impulse, regulates the number of motor units involved in the work (each of them consists of one motor neuron and a group of motor fibers innervated by it), and also determines intermuscular coordination. The other factor is actually muscular (muscle length, number of muscle fibers, ratio of fast and slow fibers - muscle composition) (Makhalin et al., 2016; Ustoev, 2021; Toshboyeva, 2022).

The tasks of speed-strength training of sambo wrestlers are as follows:

1. To form the basis for the adaptation of the body of sportsmen to speed-strength loads (increase joint mobility, strengthen ligaments).
2. To ensure harmonious development of all muscle groups of the locomotor system in those involved.
3. To improve the ability to demonstrate muscle strength in various modes of operation (static and dynamic).

At the preliminary training stage, for first-year girls and boys who studying in the initial training groups, the foundation of high-quality speed-strength preparedness is laid. To do this, it is necessary, first of all, to increase the mobility of the joints: shoulder, elbow, hip, knee, ankle, and to strengthen the muscles and ligaments of the musculoskeletal system (Sabralieva et al., 2023).

Primary school age covers the period of life between 6-7 and 10-11 years of age. The coach must be well aware of the anatomical, physiological and psychological characteristics. Insufficient knowledge of the characteristics of the child's body can lead to errors in the methodology of physical education and, as a result, to overloading children, damaging their health. The physical development of primary school children differs sharply from the development of children of middle and especially senior school age. According to some development indicators, there is no big difference between boys and girls of primary school age; up to 10-11 years of age, the body proportions of boys and girls are almost the same. At this age, the structure of tissues continues to form, their growth continues. The rate of growth in length slows down compared to the previous period of preschool age, but body weight increases. Height increases annually by 4-5 cm, and weight by 2-2.5 kg. The chest circumference increases noticeably, the annual increase in the vital capacity of the lungs is, on average, 160 ml for boys and girls of this age. Blood pressure in children is usually lower than in adults. By the age of 7-8 it is 99/64 mm Hg, by the age of 9-11 – 105/70 mm Hg. During extreme

muscular work, heart rate in children increases significantly, usually exceeding 200 beats per minute. The muscular system in children of this age is capable of intensive development, which is expressed in an increase in muscle volume and muscle strength. (Safarova et al., 2021; Chernogorov et al., 2022).

Active and sports games are of great importance for the comprehensive physical development of children; the games require demonstration of strength, agility, speed of movements and response to various circumstances and situations in the game (Sivasubramanian et al., 2022). It is known that in the process of game activity all mental functions and qualities of the child develop: acuity of sensations and perception, attention, operational memory, imagination, thinking, social feelings, volitional qualities (Rybalko et al., 2021; Ashiraliyevich et al., 2022).

The game method involves the development of physical qualities primarily in game activities, where game situations force one to change the modes of tension of various muscle groups and combat the increasing fatigue of the body. It was proven that this method of developing physical qualities is quite effective in childhood (Veldman, et al., 2020; Azimkhujaevich & Madaminovich, 2022; Ravshanovich et al., 2024).

Thus, sambo wrestling has become more dynamic and intense in recent years, which has led to increased demands on the systems of vegetative maintenance of the motor activity of a young athlete. However, the opinions of specialists on the development of speed-strength training in sambo are often incorrect and contradictory, especially on the primary school age. The process of increasing the speed-strength abilities of boys at the age of 8-10 who practice sambo has not been sufficiently studied. At the same time, the effectiveness of using outdoor games to develop physical qualities when working with children of primary school age has been proven (Dao, 2021; Muratova, 2022).

The novelty of the study lies in the development of a set of active games aimed at increasing the level of speed-strength abilities of 8-10-year-old sambo wrestlers, based on the use of special active games with elements of sambo wrestling. The practical significance lies in the development of practical recommendations aimed at increasing the speed-strength abilities of those who practice wrestling and for use by sambo coaches.

So, the aim of this study is the development of the speed-strength abilities of young wrestlers using active games. Based on the aim of the study, the following tasks were formulated:

1. To analyze scientific and methodological literary sources on the research problem.

2. To develop a set of outdoor games to improve the speed-strength abilities of 8-10-year-old sambo wrestlers.

3. To experimentally test a set of outdoor games to develop the speed-strength abilities of 8-10-year-old sambo wrestlers.

4. To develop practical recommendations for improving the speed-strength abilities of 8-10-year-old sambo wrestlers.

2. METHODS

2.1. Participants

The pedagogical experiment was conducted with boys at the age of 8-10 who are engaged in sambo wrestling at the Olympic reserve sports school in the city of Kirov. The study lasted 5 months (September - December 2024). All children practiced sambo wrestling 3 times a week (Monday, Wednesday and Friday) for 90 minutes each training session. A total of 38 children took part in the study. All procedures met the ethical standards of the Declaration of Helsinki.

Inclusion criteria:

1. Children aged 8-10 who practice sambo wrestling.
2. Children who have medical clearance to practice sambo wrestling.
3. Children whose parents have given permission to participate in the training.

Exclusion criteria:

1. Children who missed most of the planned classes.
2. Children who went to the sports section or were injured.

2.2. Experimental Design, Intervention, and Assessment Procedures

The experiment was conducted based on the comparison of two similar parallel groups - experimental and control. In order to obtain objective and reliable results, some conditions of identity were presented to both groups:

1) the groups must have complete equality of initial data (the same number of children, level of training, age and gender);

b) have equal working conditions (the same shift for training, use of the same equipment in each group).

Thus, after conducting preliminary activities, 2 groups were formed:

1. Control group (CG) – 19 children who trained according to the generally accepted program for sambo wrestlers for sports schools.

2. Experimental group (EG) – 19 children who used a special set of active games during each lesson for 30 minutes, aimed at increasing the speed-strength abilities of sambo wrestlers at the age of 8-10. During the lessons, classic active games with elements of wrestling were used (Polevoy et al., 2023; Polevoy et al., 2024).

2.2.1. Experimental Intervention: Active Games with Wrestling Elements

- “Fisherman”. The game is played in pairs. The sambo hall is divided into 2 parts. Players take positions on different sides of the middle line. The players' task is to pull the opponent's hands to their side. The player who steps over the opponent's line loses.
- “Rooster Fights”. Participants are divided into two teams, the hall is divided into 2 parts, each team must run to the opponent's side, while using elements of wrestling, participants must hold back the opponent with strength and speed so that he does not have time to step over to his side. If the participants cross their line, then the opponent is released and the team remaining on the opponent's part of the hall loses.
- “Crocodiles”. A zone for the game is determined, beyond which the participants are not allowed to step. A volunteer is chosen who will catch the opponents. The game leader kneels (on the ground), and in this position catches up with his opponents, who run standing. The task is to catch up and overcome the opponent so that he falls on his knees on the ground, and then they together catch the rest, and so on, until the last player.
- “Sailors”. Children are divided into two equal teams, stand in front of the ropes. Each player must quickly climb the rope, get off it and pass the baton to the next. The team that completes the task faster wins.
- “Sunshine”. Participants are divided into two equal teams; one of them lies on the carpet faces down and holds each other with a grip. The other team, which is in a standing position, must "break" the grips of the opponents. They play for time.
- “Horseman”. In the wrestling hall, a corner is chosen, where one participant stands on one leg and takes the belt in his hand. The other participants also have belts, but run away from the driver at a normal run. The game leader must touch the leg of any participant with the belt, as soon as he touches, the participant must run to the selected corner at high speed

so that as few participants as possible touch him with the belt on the leg. Now this participant is the game leader.

The simplest actions of wrestling, tackles and movements in combination with achieving the necessary goal set by the conditions of the game gradually enter the arsenal of technical and tactical means of those involved. Thus, the fight for an object (ball, rope) obliges one to concentrate one's efforts on a certain tackle in a timely manner. The use of games with elements of wrestling (such as rugby) contributes to the fact that those involved periodically enter into single combat, without thinking about the final result.

2.2.2. Control Testing of Motor Abilities

Before and after the study, control testing of the sambo wrestlers' motor abilities was conducted. These are well-known tests of general physical fitness of athletes and specific tests of sambo wrestling, known all over the world (Vorozheikin et al., 2022):

1) Pull-up (figure 1).

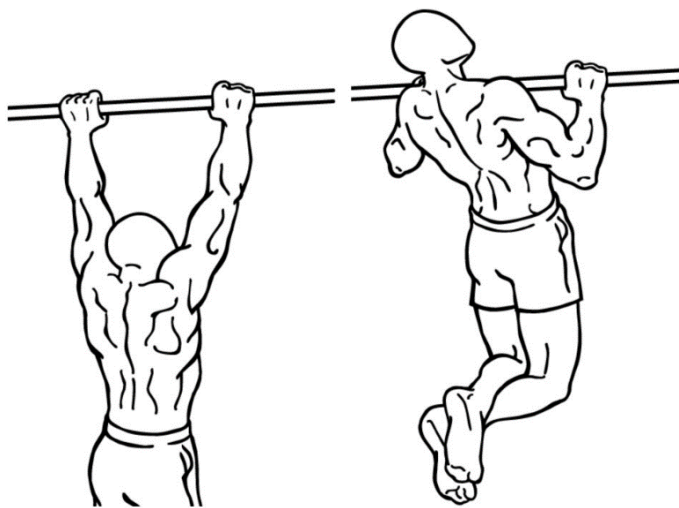


Figure 1. Pull-up

The participant assumes a hanging position, grabs the bar with an overhand grip at shoulder width and performs 5 pull-ups on the bar for time. A pull-up is counted when the chin is above the bar, each subsequent pull-up is performed from a position of fully straightened arms. Pull-ups are performed without swinging legs, from a static position. The participant is given one attempt. The result is measured in seconds that the participant spent performing 5 pull-ups.

2) Dummy throw (figure 2).



Figure 2. Dummy throw

The participant performs 10 throws of a wrestling dummy with a bend in the back on the mat. One attempt is made, and the result is measured in seconds.

3) Long jump (figure 3).

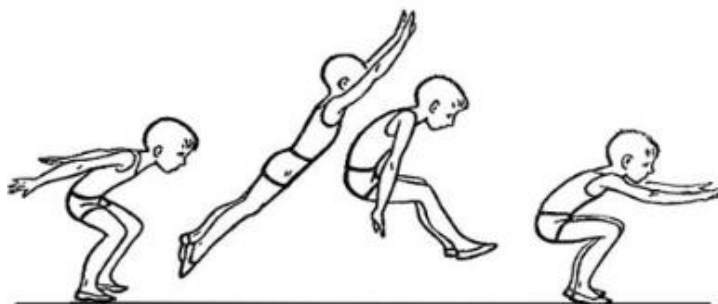


Figure 3. Standing long-jump

Standing long jump pushing off with both legs. The athlete stands at the starting line in the preparatory position, legs are parallel, and with a push-off with both legs and a swing of the arms makes a jump. Landing is done simultaneously on both legs. The result is recorded in centimeters out of 2 attempts.

4) Rope climbing (figure 4).

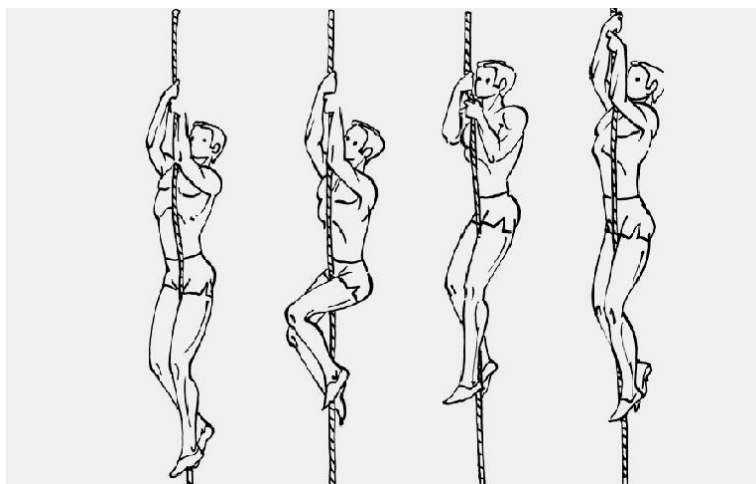


Figure 4. Rope climbing

The athlete must bend his legs forward and grab the rope with his feet. Then he straightens his legs (pushing off) and bends his arms. Alternately moving his arms and legs he reaches the top (the rope is 5 meters long). One attempt is made, and the result is measured in seconds.

5) Wrestling races (figure 5).

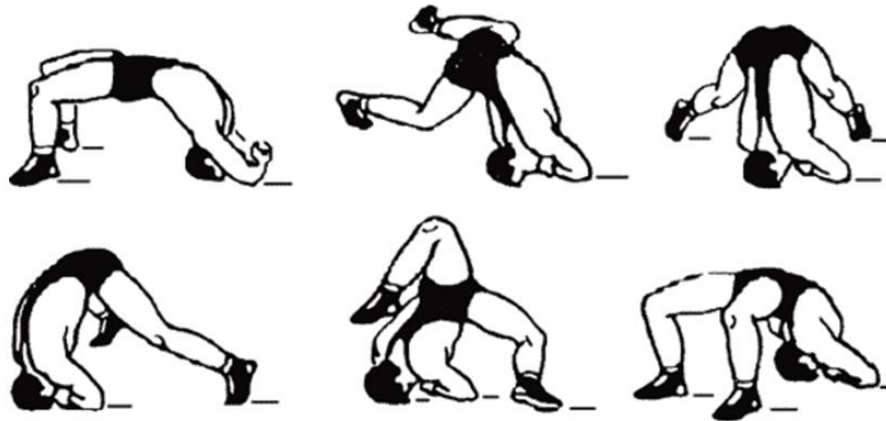


Figure 5. Wrestling races

The exercise Wrestling races is performed on a wrestling mat. The athlete gets into the wrestling triangle position and moves around his head with side steps (runs in) and goes into the wrestling bridge position, continues moving (runs in) and returns to the wrestling triangle position. He controls the load on his neck by pushing his hands into the mat. 5 movements in one direction, then in the other. The exercise is performed for time (sec). Only one attempt was allowed.

2.3. Statistical Analyses

Statistical processing of the collected data was performed using IBM SPSS Statistics. Descriptive statistics were calculated to objectively evaluate the experimental results, including the arithmetic mean (M) and standard deviation (SD) for each indicator at the beginning and end of the study. To assess the significance of differences between the obtained results, Student's t-test was applied. Statistical significance was set at $p < 0.05$, corresponding to a 5% significance level. In addition, the percentage increase in each indicator from pre-test to post-test was calculated for both the control and experimental groups to evaluate changes in motor abilities following the intervention.

3. RESULTS

Before the start of the pedagogical experiment, control testing was conducted for all children at the age of 8-10 who practice sambo in the sports school. Based on the results of the initial indicators, 2 groups were formed in such a way that at the beginning of the study there were no reliable differences between them in the studied indicators (Table 1).

Table 1. Comparison of the indicators of both groups before the start of the study

Tests	Groups	M±SD	t	p value
Pull-up (sec)	EG	25.7±0.95	0.16	>0.05
	CG	25.5±0.73		
Dummy throw (sec)	EG	37.5±0.84	2.17	>0.05
	CG	35.0±0.59		
Long jump (cm)	EG	136.5±0.12	1.5	>0.05
	CG	138.5±0.19		
Rope climbing (sec)	EG	21.1±0.42	0.14	>0.05
	CG	20.9±0.53		
Wrestling races (sec)	EG	23.7±0.85	0.1	>0.05
	CG	23.6±1.72		

Table 1 shows that no significant differences were found for any of the indicators studied at the beginning of the pedagogical experiment ($P>0.05$), which indicates the homogeneity of the groups.

After the end of the pedagogical experiment, the differences in the indicators from the beginning of the study and after its completion in both groups were calculated and tested for reliability. The results of the experimental group are presented in Table 2.

Table 2. Changes in indicators in the experimental group during the study period

Tests	Groups	M±SD	t	p value
Pull-up (sec)	Before	25.7±0.95	2.27	<0.05
	After	22.7±0.57		
Dummy throw (sec)	Before	37.5±0.84	3.8	<0.05
	After	33.8±0.49		
Long jump (cm)	Before	136.5±0.12	7.3	<0.05
	After	144±0.71		
Rope climbing (sec)	Before	21.1±0.42	2.48	<0.05
	After	17.6±1.05		
Wrestling races (sec)	Before	23.7±0.85	3.3	<0.05
	After	20.4±0.53		

Table 2 shows that during the study period the speed-strength abilities of children in the experimental group increased significantly and reliably. This may indicate the effectiveness of using active games in classes with children at the age of 8-10 who practice sambo. The indicators for the control group from the beginning to the end of the study are presented in Table 3.

Table 3. Changes in indicators in the control group over the study period

Tests	Groups	M±SD	t	p value
Pull-up (sec)	Before	25.5±0.73	0.95	>0.05
	After	24.8±0.15		
Dummy throw (sec)	Before	35.0±0.59	0.67	>0.05
	After	34.6±0.07		
Long jump (cm)	Before	138.5±0.19	1.25	<0.05
	After	142±0.53		
Rope climbing (sec)	Before	20.9±0.53	0.14	>0.05
	After	20.7±1.30		
Wrestling races (sec)	Before	23.6±1.72	0.98	>0.05
	After	25.3±0.10		

Table 3 makes it clear that the children's performance in the control group improved, but not significantly. The exception is the long jump, which showed a reliable improvement. This may indicate the low efficiency of the standard program for developing the speed-strength training of sambo wrestlers. After the end of the pedagogical experiment, the comparison of the average performance of both groups was carried out (Table 4).

Table 4. Comparison of the indicators of both groups after the study

Tests	Groups	M±SD	t	p value
Pull-up (sec)	EG	22.7±0.57	3.62	<0.05
	CG	24.8±0.15		
Dummy throw (sec)	EG	33.8±0.49	3.18	<0.05
	CG	34.6±0.07		
Long jump (cm)	EG	144±0.71	2.47	<0.05
	CG	142±0.53		
Rope climbing (sec)	EG	17.6±1.05	2.53	<0.05
	CG	20.7±1.30		
Wrestling races (sec)	EG	20.4±0.53	5.07	<0.05
	CG	25.3±0.10		

Table 4 proves that in all tests of speed-strength abilities, children from the experimental group significantly and reliably left their peers from the control group behinds, which may indicate the effectiveness of using active games in sambo classes.

Figure 6 illustrates the increase in indicators in each group from the beginning to the end of the study in percentage.

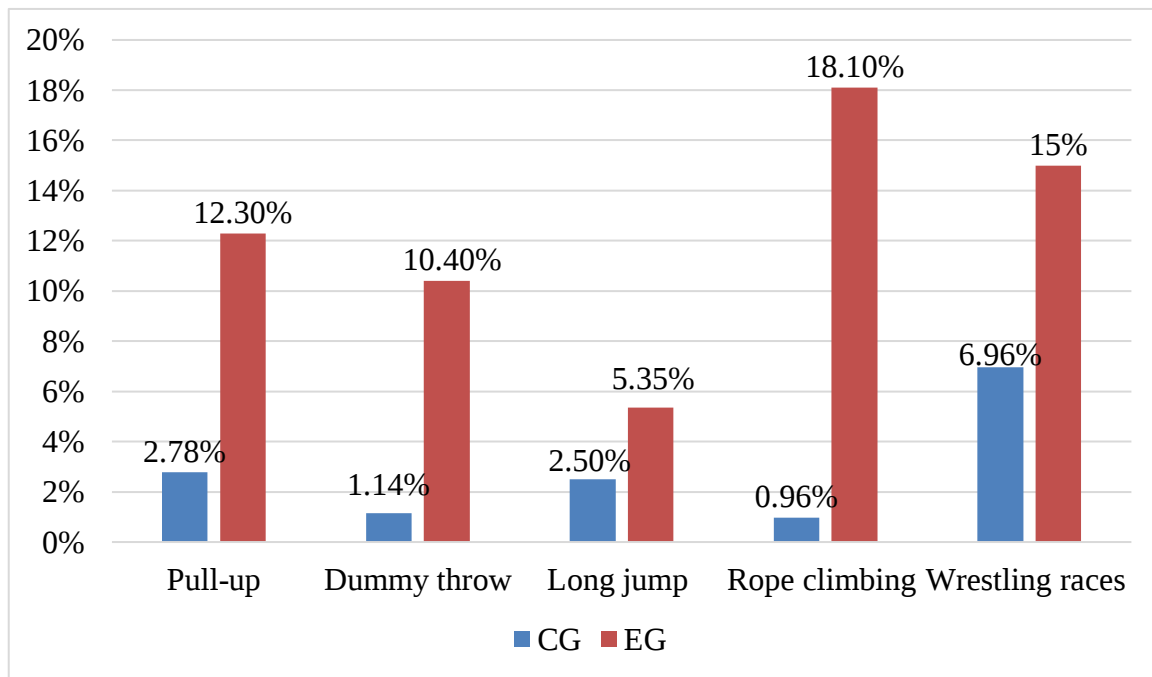


Figure 6. Increase in indicators in both groups during the study period

Figure 6 clearly demonstrates an important increase in the indicators of children at the age of 8-10 in the experimental group compared to the control group. Thus, it can be stated that the use of active games in the training process of sambo wrestlers at the age of 8-10 will significantly improve their speed-strength training

4. DISCUSSION

The athlete and the coach always face the problem of finding new resources for harmonious development and acceleration of the pace of further sports improvement (Sabralieva et al., 2023). Wrestling requires, first of all, the manifestation of speed-strength abilities (Makhalin et al., 2016; Ustoev, 2021; Toshboyeva, 2022)

When choosing exercises that develop strength and speed, it is necessary to remember that wrestling is characterized by maximum tensions, replaced by short pauses of relaxation, explosive tensions, static and dynamic efforts (Makhalin et al., 2016; Ustoev, 2021; Toshboyeva, 2022).

It should be noted that with the help of active games it is possible to diversify training. Organized training sessions with elements of active games cause participants to feel excited and

fascinated, cause additional positive psychological emotions, develop the ability of the participants to perform voluntary, creative actions on the wrestling mat (Azimkhujievich & Madaminovich, 2022; Karimovna et al., 2022; Makhkamovich et al., 2022).

The review of literary sources on the problem showed that targeted development of any abilities in both boys and girls is best carried out during the sensitive period, and for speed-strength abilities this is primary school age (between 6-11 years of age (Van Grunsven et al., 2009; Drouven & Grossmann, 2016)

The analysis of modern literature has shown that the use of outdoor games in various sports has a positive training effect (Dao, 2021; Muratova, 2022). Previous studies have proven the effectiveness of using outdoor games in other sports. It has been proven that during outdoor games, children improve their movements, develop such qualities as speed, strength, endurance, dexterity, flexibility. In the outdoor game, children practice a wide variety of movements: running, jumping, climbing, throwing, catching, dodging, and others (Polevoy et al., 2023; Polevoy et al., 2024).

However, for the first time ever our study has proven the effectiveness of using outdoor games at the preparatory stage of training for 8-10-year-old sambo wrestlers. One of the advantages of a set of special outdoor games is that it consists of several different games, the use of which increases the interest of those involved, it makes classes emotional, monotony disappears, which is very important when working with children of primary school age (Veldman et al., 2020; Luo & Deng, 2022; Ravshanovich et al., 2024). For the first time, a set of outdoor games with elements of sambo wrestling was used in the process of training sessions for young sambo wrestlers at the initial training stage.

In the control group, the results of the study show a positive trend in the growth of speed-strength indicators. However, reliable differences from the beginning to the end of the study were shown by only one test - standing long jump. This indicates a good efficiency of using the standard program for sambo wrestlers to develop key abilities (speed-strength abilities) of sambo wrestlers.

As for the experimental group, from the beginning to the end of the study, the data on all speed-strength tests unexceptionally had a significant and reliable increase. This certainly speaks to the effectiveness of using active games at the preparatory stage in the training process of sambo wrestlers for the development of speed-strength abilities.

Thus, after the completion of the pedagogical experiment, the hypothesis that a set of active games will increase the speed-strength abilities of 8-10-year-old sambo wrestlers is fully proven.

However, despite the fact that the goal of the study is achieved and the tasks are solved, the study could certainly be expanded in the future. For example, it is worth studying the dynamics of other physical qualities or applying the current methodology to another age group of young sambo wrestlers.

4.1. Limitations

The study involved 8-10-year-old children who were healthy and admitted to sambo wrestling training by a doctor. Of course, the study can be expanded and supplemented by studying the effect of outdoor games on other physical qualities and mental processes of children of different ages engaged in sambo wrestling. However, this study and its results scientifically prove the effectiveness of using outdoor games in the training process of 8-10-year-old sambo wrestlers.

5. CONCLUSIONS

The study results showed that if active games are used for 30 minutes during the preparatory period of the training stage at each sambo training for children between 8-10 years of age, the speed-strength abilities of young wrestlers will improve significantly.

It is recommended to conduct training sessions using this set of games three times a week, at the end of the main part of the session for 25-30 minutes. After these games, it is advisable to do stretching exercises for all involved muscle groups. Rest should be 2-3 minutes, up to the pulse of 100-120 beats/min.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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