

## Flexibility Development Technique Using TRX Loops for Young Swimmers Specializing in Butterfly Stroke

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**Abstract:** The authors note that the development of flexibility is one of the main directions for swimmers specializing in the sport method of butterfly swimming. With the participation of young swimmers, the development of flexibility was tested in six tests. The author conducts an analysis of scientific and methodological literature. Taking into account the results of a study of the initial indicators of flexibility in young swimmers, a methodology for the development of flexibility with the help of TRX loops was developed and tested, which included goals, tasks, principles, methods, organizational and methodological features, expected result. A special set of exercises for the shoulder girdle, spine column, and legs was also developed. The results of flexibility development using TRX loops obtained in the experimental group showed a positive effect on the performance in girls and boys.

### 1. Introduction

Preparing a reserve for young swimmers is one of the strategic tasks. The formation of optimal conditions for training and improving the physical qualities of athletes is a complex process that is the subject of the work of the coaching staff. The importance of flexibility in the training and competitive activities of swimmers is one of the fundamental units. This factor is especially significant for young athletes specializing in the butterfly style [1].

The lack of the necessary level of flexibility leads to errors in technical training, reduction of force of impact on the water surface [4, 6]. Training an athlete requires systematic work on his physical qualities. Flexibility helps to avoid trauma in the process of competitive activity and reduce the level of energy consumption [3, 5]. The greatest effect is observed among athletes aged 9-14 years, with a targeted impact on the process of improving flexibility. The purpose of the study is to evaluate the effectiveness of the technique for developing the flexibility of young swimmers using TRX loops.

### 2. Materials and Methods

The study involved 24 young swimmers (11-12 years old). Each group consisted of 12 people (for six boys and girls in each). A technique for developing swimmer flexibility using TRX loops is introduced into the training process.

Recently, TRX loops are used in the training of athletes at various levels [2, 8]. We used this equipment to develop flexibility in the training of young swimmers specializing in butterfly swimming.

In the process of working with young swimmers, a technique for developing flexibility with the help of TRX loops specializing in butterfly swimming was developed and tested. The basis for the experimental study was the children and youth sports school “Vityaz” in the city of Naberezhnye Chelny.

### 3. Results

Based on the analysis of scientific and methodological literature and experience of trainers, a technique of flexibility development using TRX loops in young swimmers was developed (Table 1) [7, 9, 10].

A set of exercises was compiled for young swimmers, which included exercises for the shoulder girdle, for the spinal column, for the legs. At each lesson, these exercises were modified. For example, the exercise “T-shaped hand swings to the sides” was proposed to be performed in one lesson from the starting position (from a narrow stance). With each week, the number of repetitions and approaches changed in the direction of increase. From the 4th week until the end of the experiment, the number of repetitions did not change.

TABLE 1. A TECHNIQUE FOR DEVELOPING FLEXIBILITY USING TRX LOOPS FOR YOUNG SWIMMERS SPECIALIZING IN BUTTERFLY SWIMMING

Purpose	To increase the efficiency of the training process of flexibility among young swimmers specializing in butterfly swimming.
Tasks	1) to optimize the training process; 2) to build skills when applying TRX loops; 3) to raise flexibility indicators.
Principles	1) gradualness; 2) compliance with training tools and methods.
Methods	1) repeated; 2) variable and interval exercise; 3) verbal; 4) visual.
Organizational and methodological features	Exercises were performed 15 minutes at the end of the main part of the training session.
Expected result	Increasing the level of flexibility development among young swimmers specializing in butterfly swimming.

Before the start of the pedagogical experiment, young swimmers were given an explanation of safety measures and the rules for performing exercises using TRX loops (the location of the hands, feet in the loops, ways to lengthen and shorten the length of the loops to complicate or simplify the exercise). All swimmers had a medical permit to perform exercises using the TRX loop.

The exercises were performed in compliance with the following methodological recommendations:

1. Perform exercises in the following sequence: exercises for the shoulder girdle, for the spinal column, for the legs.
2. Observe the rest interval between approaches in the first week for 50 sec.; reducing each week for 10 sec.; on the fourth week, and in the following, the rest interval between approaches should be 20 sec.
3. To facilitate the implementation of exercises during training, the load angle was 60° on the first three weeks and 45° on the following.
4. When performing the exercises, the number of repetitions and approaches varied depending on the week of the experiment.

On the basis of the obtained data (Tables 2, 3), significant differences between the indicators of the observed participants were not revealed before the experiment ( $p > 0.05$ ), that is, the groups were identical for the pedagogical experiment.

All data obtained during the pedagogical experiment were processed using Student's t-test. At the end of the experiment, in the experimental group, the results were considered reliable ( $p < 0.05$ ), and in the control group in the test parameters before and after the experiment, no significant differences were found ( $p > 0.05$ ).

TABLE 2. INDICATORS OF FLEXIBILITY IN BOYS OF THE EXPERIMENTAL AND CONTROL GROUPS BEFORE AND AFTER THE EXPERIMENT

Statistical indicators	"Bridge," cm		"Inclination forward from a standing position," cm		"Squat with hands extended forward," point		"Twisting straight hands forward and backward," cm.		"Flexion in the ankle joint," degree		"Extension in the ankle joint," degree	
	before	after	before	after	before	after	before	after	before	after	before	after
Experimental group												
$X_{avg} \pm S_x$	60.5 ± 0.7	55.8 ± 1.1	-0.1 ± 0.5	0.6 ± 0.5	0.3 ± 0.2	1.0 ± 0	55.2 ± 1.2	50.3 ± 1.1	155.0 ± 3.6	165.8± 4.0	119.2 ± 3.9	105.0 ± 4.3
$t_{est}$	3.406		1.659		3.162		2.921		2.011		2.429	
Control group												
$X_{avg} \pm S_x$	60.2 ± 0.7	58.0 ± 2.0	0.1 ± 0.5	0.5 ± 0.6	0.5 ± 0.2	0.8 ± 0.2	54.8 ± 1.1	50.5 ± 1.3	150.0 ± 3.6	156.7± 4.6	114.2 ± 3.5	106.7 ± 4.4
$t_{est}$	1.007		1.225		1.195		2.718		1.136		1.330	

TABLE 3. INDICATORS OF FLEXIBILITY IN GIRLS OF THE EXPERIMENTAL AND CONTROL GROUP BEFORE AND AFTER THE EXPERIMENT

Statistical indicators	"Bridge," cm.		"Inclination forward from a standing position," cm.		"Squat with hands extended forward," point.		"Twisting straight hands forward and backward," cm.		"Flexion in the ankle joint," degree		"Extension in the ankle joint," degree	
	before	after	before	after	before	after	before	after	before	after	before	after
Experimental group												
$X_{avg} \pm S_x$	57.7 ± 1.1	53.0 ± 1.2	0.3 ± 0.4	2.1 ± 0.5	0.3 ± 0.2	1.0 ± 0	58.7 ± 1.5	54.3 ± 1.7	154.2 ± 3.0	166.7 ± 3.8	120.0 ± 2.8	108.3 ± 3.3
$t_{est}$	2.767		2.693		3.162		2.872		2.780		2.946	
Control group												
$X_{avg} \pm S_x$	56.8 ± 1.3	52.7 ± 1.2	0.5 ± 0.4	2.0 ± 0.5	55.8 ± 1.2	51.5 ± 1.2	0.3 ± 0.2	0.8 ± 0.2	156.7 ± 3.3	164.2 ± 4.0	119.2 ± 3.0	110.8 ± 3.5
$t_{est}$	2.327		2.236		2.797		2.861		1.449		1.802	

Figure 1 shows the increase in flexibility indicators in boys from the experimental and control groups over the period of the experiment.

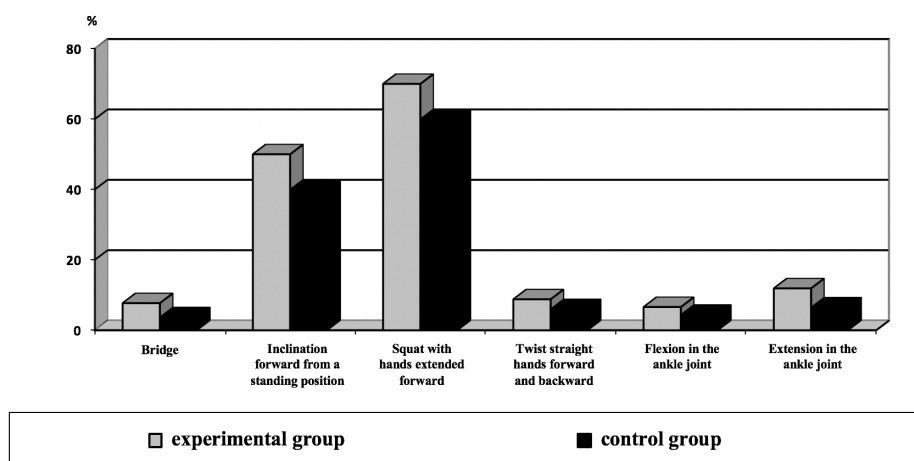


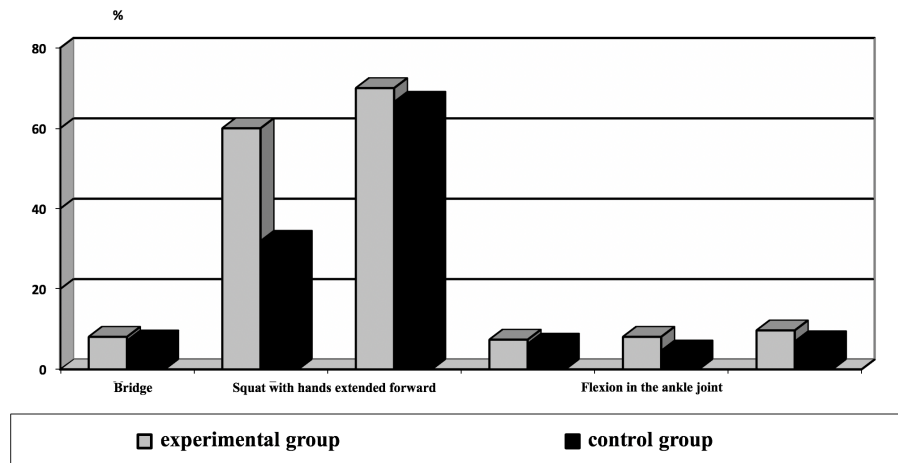
Fig. 1. Increasing flexibility indicators in boys from the experimental and control groups during the period of the experiment.

According to Figure 1, an increase is observed in all boys participating in the tests "Inclination forward from a standing position" and "Squat with hands extended forward." The smallest increase in flexibility was

observed in boys from the experimental group in the parameters of the Flexion in the ankle joint test, and in boys from the control group, the smallest increase in indicators was found in the Bridge test.

Figure 2 shows the increase in flexibility over the period of the experiment in girls from the experimental and control groups.

According to Figure 2, the maximum increase in flexibility results for girls of both groups was tracked in the tests “Inclination forward from a standing position” and “Squat with hands extended forward.” Smaller changes were observed in girls from the experimental group in the indicators of the “Twist straight hands forward and backward” test, and in girls from the control group.



**Fig. 2.** The increase in flexibility indicators in girls of the experimental and control groups during the period of the experiment.

#### 4. Conclusion

The study shows an improvement in the results of testing flexibility in swimmers from both experimental and control groups. However, the growth difference in indicators is higher among swimmers from the experimental group, both in the group of boys and in the group of girls.

Therefore, this methodology had a positive effect on the performance of boys and girls in the experimental group. It can be recommended for further use.

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