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Experimental Methodology of Psychomotor Training of Young Gymnasts (8-10 Years Old) Through Fitness

Olga CRAIJDAN

"Dunarea de Jos" University of Galati, Romania
Institute of Physical Education and Sport, Moldova State University
olgacraijdan1976@gmail.com

Abstract

This article explores the experimental methodology for psychomotor training in young gymnasts (aged 8-10) through fitness, providing a detailed analysis of the implementation of fitness-based methods within their training system. The aim of the research is to optimize the instructional training process for girls aged 8-10 in rhythmic gymnastics through fitness methods. The following research methods were applied in this paper: analysis and generalization of data from the specialized literature; analysis of training documentation in rhythmic gymnastics for gymnasts aged 8-10, including the annual training plan, weekly schedules, teaching projects, and the FIG Code of Points (2022-2024; 2025-2028); pedagogical observation; the testing method; pedagogical experiment; statistical and mathematical methods for data processing and interpretation. Following a literature review, it was determined that psychomotor training is based on such abilities as motor coordination, sense of rhythm, sense of tempo, sense of balance, joint mobility and muscle elasticity, and strength under a resistance regime. These abilities are best developed in 8-10-year-old gymnasts through fitness. Additionally, the study presents evidence supporting the effectiveness of this methodology. The results of the research highlight the effectiveness of the experimental methodology in relation to all tested parameters, such as muscular endurance of the abdominal, back, and arm muscles, joint mobility, motor coordination, as well as the sense of rhythm, tempo, and balance. These results show statistically significant validity at a significance level of $P < 0.01–0.001$, with Student's t-test values ranging from $t = 3.44$ to 5.83.

Key words: psychomotor training, rhythmic gymnastics, young gymnasts, 8-10 years old, fitness.

Introduction

Relevance of the research and importance of the topic. Rhythmic gymnastics is a sport that requires a high level of coordination, grace, elegance, and artistry, demanding well-developed psychomotor preparation from young gymnasts. In order to successfully complete the competitive program, which includes four or six events, gymnasts must also possess specific endurance. Additionally, at the age of 8-10, gymnasts have not yet fully developed the muscular corset and the joints of the legs and arms. However, at this stage, they are

already required to perform various throws and catches with the hoop, ball, clubs, or ribbon. These apparatuses weigh between 350-450 grams, and young gymnasts often lack the necessary strength in their hands to handle them flawlessly during training or competitions. Rhythmic gymnastics, according to author Ludmila Carpenko (2003), is a sport in which gymnasts perform movements with handheld apparatus in the form of figures, meaning they create "drawings" with a ribbon, rope, clubs, ball, or hoop in all competitive routines. Additionally, compositions must include acrobatic elements that are part of "Risks" - dynamic elements with rotations around the vertical or horizontal axis, according to the FIG Code of Points (2025-2028). These elements require gymnasts to have muscular strength, flexibility, motor coordination, and speed; all of these capacities are part of psychomotor capacities.

For some gymnasts, these movements present difficulties, as they struggle to maintain endurance throughout the routine, experiencing muscle pain in the arms, legs, and joint discomfort. Coaches work on the physical preparation of their athletes, but not always at the desired level, and each gymnast requires an individual and specialised approach to psychomotor training.

Therefore, we aim to develop an experimental methodology for the psychomotor training of young gymnasts aged 8-10 by integrating fitness methods into the training process. Fitness offers a variety of techniques and programs that can be adapted for young athletes of different ages and training levels. We have attempted to incorporate fitness elements into the preparation of young gymnasts.

For example, using Pilates programs, we strengthen the muscular corset of the back and abdomen. Through yoga, we develop muscle flexibility and joint mobility. Light-weight fitness exercise enhances the strength of the arms and legs. By practising exercises on unstable platforms, we improve balance. Additionally, performing exercises with resistance bands or balance trainers helps refine the technique of executing balances, ultimately enhancing both the gymnasts' physical conditioning and technical preparation.

Research hypothesis. It is assumed that the development and implementation of an experimental psychomotor training methodology for young gymnasts aged 8-10, incorporating fitness techniques into the instructional training process, will contribute to: improving psychomotor abilities; which, in turn, will enhance general and specialized physical preparation; and refining the instructional training process for gymnasts aged 8-10.

Research objective. This research aims to improve the instructional training process for girls aged 8-10 in rhythmic gymnastics using fitness techniques.

To achieve this ***objective***, the following research tasks have been set:

1. Studying methodological and scientific literature related to the training system for young gymnasts aged 8-10 using fitness techniques.
2. Determining the psychomotor preparedness level of gymnasts aged 8-10.
3. Identifying the components, means, and methods of psychomotor training for gymnasts aged 8-10 in order to develop an experimental methodology.
4. Developing and experimentally validating a psychomotor training methodology for young gymnasts (aged 8-10) using fitness techniques.

Research methodology. The research is based on the following methodological approaches:

Theoretical analysis and generalisation of data from specialised methodological and scientific literature. Analysis of training documentation in rhythmic gymnastics for gymnasts aged 8-10, including the annual training plan, weekly schedules, teaching projects, and the FIG Code of Points (2022-2024; 2025-2028). Pedagogical observation. Testing. Pedagogical experiment. Statistical and mathematical methods for data processing and interpretation.

Scientific novelty and originality. The scientific novelty and originality lie in the development and experimental implementation of a psychomotor training methodology for young gymnasts (aged 8-10) through fitness techniques within the instructional training process in rhythmic gymnastics. This, in turn, will contribute to enhancing the specialised physical preparation level of gymnasts.

Organisation of the research. The research was conducted within the sports complex of the State University of Physical Education and Sport, in the rhythmic gymnastics and aerobics hall.

The experimental group consisted of 10 girls (gymnasts) aged 8-10. Participants were selected based on the criterion of homogeneity, sharing not only age but also similar physical preparation and body parameters.

Main objectives of the methodology: Developing gymnasts' psychomotor abilities (strength, endurance strength, endurance, flexibility, speed, motor coordination, and balance) through fitness techniques. Strengthening the muscular corset through bodyweight exercises from the Pilates system. Strengthening the joints of the legs and arms. Relaxing the muscles through fitness techniques (Yoga).

The experiment lasted for six months, with training sessions held four times per week.

Each rhythmic gymnastics training session, incorporating fitness techniques into the training system of young gymnasts, had a duration of 120 minutes. The structure of the training lessons is fragmentary. In each lesson, sandbags weighing 250-500 grams were used for the legs and arms, elastic bands with equal spacings, wide elastic bands of different colors with varying degrees of stretch, and balance trainers. From fitness programs, fitness aerobics, Pilates, stretching, Yoga, and rope skipping were implemented.

In the preparatory phase of the rhythmic gymnastics training, fitness-aerobics complexes were included as a warm-up for the gymnasts, aiming to develop psychomotor abilities such as rhythm perception, tempo control, movement coordination, and endurance. Additionally, during this part of the session, balance training was conducted using balance trainers to enhance the sense of equilibrium, essential for the precise execution of balance elements and pirouettes.

First segment. During the week, in the preparatory part of rhythmic gymnastics training sessions, fitness-aerobic elements with a dance character (Moldovan folk or Latin) were implemented twice a week, on Mondays and Fridays, lasting 30 minutes. Fitness-aerobic routines were performed to modern rhythmic music, with 16 repetitions of each

aerobic step on both the right and left foot, using various methods such as linear, free style, additive, or block method.

Fitness aerobic complexes help gymnasts develop movement coordination, a sense of rhythm, and overall endurance. These psychomotor abilities are essential for performing exercises and competitive routines in rhythmic gymnastics.

Basic fitness aerobic movements are as follows:

- Basic aerobic steps: v-step, step-touch, open step, knee up, kick, grapevine, lunge.
- Aerobic jumps: jumping jack, pony, pendulum, skip.

On two other days of the week, choreographic exercises were performed beside the support bar.

The second segment involves floor exercises with small weights on the legs (500g), focusing on strengthening the core muscles through Pilates-based movements (e.g., circles with the legs, "boat", "swan", "bridge" from the back position, "lumbar" and others), as well as various swings in lying and kneeling positions.

The third segment involves leg swings forward, backwards, and sideways with an elastic band and weights on the legs next to the choreographic support bar.

The fourth segment includes pirouettes and balances with weights, as performed in the competitive program.

The fifth segment involves gymnastic jumps: on both legs, in choreographic positions: first, second, and combinations between them; in the second and fifth positions, and combinations between them.

The main part of the training was structured according to the primary objectives set for rhythmic gymnastics lessons for girls aged 8-10. In the basic part of the training, the main skills are executed in front of the class. These could either be the learning of new exercises or the refinement and consolidation of previously learned movement techniques, or the improvement of competition compositions necessary for upcoming participation.

In the conclusion part, Pilates exercises are performed to strengthen the core muscles, abdominal and back muscles, combined with stretching exercises and relaxation of all muscle groups involved in physical effort. On another day of the week, in the concluding part, a Rope-Skipping fitness program can be applied to develop special endurance and movement coordination for 3-5 minutes. This program is very similar to the rope jumps in rhythmic gymnastics, but the exercises in this program are performed synchronously in a group. After completing the Rope-Skipping exercises, breathing recovery exercises are practised.

The concluding part of the rhythmic gymnastics training included stretching exercises, yoga asanas (standing, seated, and lying postures), as well as breathing exercises [3]. This phase focused on improving the flexibility of the spine, hip joints, and shoulder girdle while also enhancing muscle and joint elasticity.

The research included parameters presented through tests to verify the level of psychomotor abilities in 8-10-year-old gymnasts, presented in Table 1.

The psychomotor ability parameters are: endurance strength of the abdominal muscles, back, and arms, tested through the number of repetitions; joint mobility was tested through shoulder mobility, spinal mobility, and hip-joint mobility, the parameters were tested in cm.

Additionally, the sense of rhythm, tempo were tested in points, balance was tested in sec, and motor coordination was tested in seconds, according to Craijdan O.M. (2011), [6].

The research determined a positive dynamic in the level of psychomotor abilities of gymnasts aged 8-10 who participated in training sessions following the experimental methodology for psychomotor preparation of young gymnasts aged 8-10 through fitness methods, presented in Table 1.

Table 1. Dynamics of average indices of psychomotor capacities of gymnasts aged 8-10

Tested parameters			Nr/o	Statistical characteristics			
				Initial testing	Final testing	*t*	*P*
				$\overline{X} \pm m$	$\overline{X} \pm m$		
Strength in resistance mode (rep. no.)	Abdominal muscles		1	28,2 ± 1,43	32,1 ± 0,82	3,51	<0,01
	Back muscles		2	30,8 ± 1,13	35,2 ± 0,92	4,27	<0,001
	Arm muscles		3	10,2 ± 0,82	12,5 ± 0,62	3,59	<0,01
Mobility of the joints (cm)	Shoulders - Rotating the stick		4	27,3 ± 1,64	22,9 ± 1,13	3,46	<0,01
	Lumbar region - "Bridge"		5	25,0 ± 1,74	20,1 ± 0,82	3,57	<0,01
	Coxo-femoral mo	With the right	6	8,6 ± 0,61	5,9 ± 0,41	5,62	<0,001
		With the left	7	10,6 ± 0,92	6,4 ± 0,72	5,75	<0,001
		Front	8	11,3 ± 1,23	5,7 ± 0,92	5,83	<0,001

	bility					
Sense	Rhythm (points)	9	5,1 ± 1,13	8,7 ± 0,99	3,49	<0,01
	Tempo (points)	10	6,9 ± 0,82	9,1 ± 0,62	3,44	<0,01
Motor coordination (points)		11	6,1 ±0,92	9,6 ± 0,72	4,79	<0,001
Sense of balance Roumberg test (sec)		12	6,5 ± 1,23	11,2 ± 0,92	4,89	<0,001

Note: n=10, P<0,05, t=2,228; P<0,01, t=3,269;P<0,001, t=4,587

The research implemented the most optimal means (strength exercises with your own body weight - such as push-ups, squats, back or leg raises, back extensions from lying positions, with sandbags, with elastic bands of different colors, with elastic bands with partitions performed for all muscle groups, swings, aerobic fitness exercises, stretching elements, Pilates or Yoga. Due to the daily practice of exercises from the experimental methodology of psychomotor training of 8-10-year-old gymnasts through fitness means, the positive dynamics of the results on all testing parameters was highlighted.

The results of the research demonstrate the effectiveness of the experimental methodology across all tested parameters, such as endurance strength of the abdominal muscles, back, arms, joint mobility, motor coordination, and the sense of rhythm, tempo, and balance, which show statistical validity at the significance level of $P < 0.01$-0.001, where the *Student's t-test* varies from $t = 3.44$ to 5.83.

In conclusion, we summarise that:

1. During the literature review, it was determined that psychomotor training is based on abilities such as motor coordination, sense of rhythm, sense of tempo, sense of balance, joint mobility, muscle elasticity, and endurance strength. These abilities can be developed in gymnasts of various ages and at different stages of sports training through fitness methods.

2. The research determined the composition of the tools that made up the experimental methodology. The following fitness programs were implemented:

- Fitness-aerobics and dance-based fitness-aerobics;
- Rope-skipping - jumping rope;
- Pilates exercises;
- Stretching and Yoga.

The fitness inventory included:

- Sandbags weighing 250-500 grams for the feet and hands;

- Elastic bands with equal resistance;
- Wide elastic bands in different colors with varying levels of stretch;
- Platforms for balance training – "balancers".

Applied methods: the method of multiple repetitions, the linear method for demonstrating fitness-aerobic exercises, the addition or block method, the game method, and the competitive method.

3. Experimental methodology for psychomotor training of young gymnasts (8-10 years old) through fitness tools was developed and experimentally justified. Its results demonstrate effectiveness across all tested parameters of abilities at different levels of significance.

Based on the research conducted and the results obtained, the following ***recommendations*** are made:

1. The training regimen for rhythmic gymnastics, according to the experimental methodology for the psychomotor training of 8-10-year-old gymnasts using fitness tools, should take place 4 times a week, with a duration of 120 minutes.
2. The structure of the training sessions should be fragmented, with a clear focus on task execution.
3. Fitness-aerobics elements with a dance character (Mold folk or Latino) should be implemented twice a week, on Mondays and Fridays, with a duration of 30 minutes. Fitness-aerobics complexes should be performed to modern rhythmic music, with each aerobic step repeated 16 times on both the right and left, using various methods such as linear or freestyle, addition, or block method.

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