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**EXPERIMENTAL TEST JUSTIFICATION FOR STUDYING THE LEVEL OF
COORDINATIVE ABILITIES DEVELOPMENT IN RHYTHMIC GYMNASTICS**

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Abstract. *This work presents the experimental forming test for examination use of the development coordination in the rhythmical gymnastics. The testing was conducted using a system of units, in which the included tests were investigating a certain kind of coordination abilities. The subgroup of coordination abilities special-motor abilities included units of tests for studying: motor coordination, speed, explosive power - jumping ability, mobility of joints. There were 4 such units, consisting of 21 tests. The subgroup of coordination abilities - specialized perceptions / "senses" combined test units for determining the "sense" of: time, rhythm, tempo, apparatus, orientation in space, balance, comprising 6 units, including 18 tests. A total of 39 tests were selected and conducted.*

Keywords: *the test, the rhythmical gymnastics, the initial level, sports preparing, the coordinative skills, movement of specialty and the specialized perceptions capacities.*

Research relevance. Modern rhythmic gymnastics is characterized by the intensity of competitive activity and training process, exercises' ever-increasing coordination complexity, the need to form stable and reliable technical skills, and early specialization. In regards to this, we see an increase in the importance of athletes' physical and coordinative development at the initial training stage, in which the foundation for further growth of functional capabilities and technical skills is created [9,11]. All this predetermines the need to study in young gymnasts the structure and level of development of motor and sensorimotor abilities, which are parts of the coordinative abilities unit [5, 9, 10].

Studying various classifications of coordination abilities [1, 4, 5, 8], for rhythmic gymnastics, in our opinion, the classification presented by E.P. Ilyin is the most appropriate [2]. From his point of view, this ability covers the proportionality of movements, the "sense" of tempo and rhythm of the movements executed, the "sense" of balance, vestibular stability, accuracy of ballistic movements. The

above listed characteristics are all present in the competitive compositions of gymnasts.

Based on this, we have identified the following two groups of coordinative abilities for rhythmic gymnastics [3]: *special-motor abilities; specialized perceptions / "senses"*.

In the athletic practice of rhythmic gymnastics, there is a wide variety of control exercises, motor tests, which, with varying degrees of informational content and reliability reflect the state of various physical abilities involved. Tests that study the level of development of coordination abilities for gymnasts in the initial stage of athletic training have not yet been sufficiently studied.

Purpose of the study. The experimental test justification for examining coordination skills development in rhythmic gymnastics.

Research Methodology. Based on the studied literature and on our coaching experience, we chose 45 tests, out of which 39 tests turned out to possess an acceptable degree of reliability $r_{xy} = 0.544-0.760$ with $P < 0.05-0.001$ (Table 1). For this purpose, a correlation relationship was calculated using the Bravais-Pearson method, which determined the reliability of the tests used.

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Special motor abilities. The group of tests to identify the level of development of *motor coordination* in girls practicing rhythmic gymnastics included: tests for determining *motor coordination with the participation of the visual analyzer* and *without the participation of the visual analyzer, accuracy, virtuosity.*

1. *Motor coordination* was determined as a result of performing a coordinative linking element with and without the involvement of the visual analyzer, modified for children 6-7 years old according to L. A. Karpenko [12]:

I.p. – standing, hands on the waist.

1 – feet apart by jumping, right hand on the right shoulder;

2 – feet together by jumping, left hand on the left shoulder;

3 - feet apart by jumping, right hand up;

4 - feet together by jumping, left hand up;

5 - feet apart by jumping, right hand on the right shoulder;

6 - feet together by jumping, left hand on the left shoulder;

7 - feet apart by jumping, right hand on the waist;

8 - feet together by jumping, left hand on the waist.

This exercise was performed 5 times and was estimated on a 10 points scale, each

correctly executed attempt was estimated at 2 points.

2. *Accuracy* - was determined using a test of throwing a tennis ball from a sitting position, legs wide apart, into a hoop lying on the floor at a distance of 5m. Ten attempts performed. We recorded the number of successful hits in the hoop out of 10 attempts. (modified: according to V.I. Leah [6]).

3. *Virtuosity:*

a – it was revealed through tests on apparatus handling: spinning of the hoop - its diametrical rotation, with two hands in a vertical plane in front of herself. We counted the number of spins in 30 seconds, modified: according to L. A. Karpenko [12]

b – performing “*echappe*” - catching the free end of the skipping rope, from the position of the rope lying open on the floor. We counted the number of times the free end of the rope was caught in 30 second.

The development of the level of *rapidity* was assessed using a group of tests for the *speed of action, immediate reaction* and *stability of the vestibular reactions.*

1. *The speed of action* – was determined with the help of claps, performed with straight arms above the head and going down through the side, clap on the hips. We counted the number of claps in 20 seconds.

2. *Instant reaction* – was estimated with the help of a stick with a 1 meter long measuring tape on it. The examiner holds the stick vertically by the top end at the distance of an outstretched arm in front, at chest level. The gymnast holds an open palm near the lower end of the stick. After 1-2 seconds, the examiner releases the stick, and the subject must catch it as quickly as possible (close the hand). The result is determined from three attempts: by calculating the average distance (cm) from the lower edge of the stick to the gymnast's grip point from the little finger – the test of V.F. Lomeiko, K. Mekota [6].

a – knocking the ball on the floor, followed by a 360° turn and catching the ball. We counted the number of catching the ball in 30 seconds;

b – throwing the gymnastic ball, followed by a 360° turn on two feet under the thrown ball, after a ball bounced on the floor, the ball was caught. We counted the number of caught balls in 30 seconds;

c – catching a ball thrown by a partner (a distraction factor) after making a 360° turn. We counted the number of caught balls in 30 seconds.

The level of development of *explosive power - jumping ability* was determined using the tests of V.M. Abalakov [6].

1. The gymnast is wearing a belt with a measuring tape, which, falling down, passes through a brace attached to the floor. The height of the jump (cm) is determined by the stretching of the measuring tape at the time of the jump, of the “straightening” after the push on both feet from a half-squat position.

2. In the same way, the height from jumping on the right leg is determined (cm).

3. The same, left leg (cm).

The unit of tests for determining the level of development of *joint mobility* tests: *spine, shoulder and hip mobility*.

Spine mobility:

1. Leaning forward from a 33-cm-high gymnastic bench. We measured the distance from the tip of the third finger to the floor (cm) by using V. M. Abalakov’s test [6].

2. Performing a “bridge” on straight legs. The distance from the heels to the wrists (cm) according to V. I. Leah [6] was measured.

Shoulder mobility was estimated according to V. I. Leah tests [6]:

1. Bending the right arm behind the head with the elbow up and the left arm behind the back with the elbow down. We measured the distance between wrists (cm).

2. The same, but the left arm on the top and the right one at the bottom. The measurements are the same.

3. Transferring a gymnastic stick with centimeter markings over the head and back. The difference in the distances between the hands of the initial and final hold of the stick with straight arms (cm) is taken into account.

Hip mobility was determined according to V. I. Leah [6]:

1. Performing the splits on the right leg from a gymnastic bench 33 cm high. The distance from the groin area to the floor was measured (cm).

2. The same on the left leg.

3. Performing side splits.

Specialized perception. “Sense” of time.

1. Evaluation of the sense of time was achieved using a regular stopwatch. The experimenter gave a countdown of 10 seconds, indicating the beginning of the time interval with a pencil stroke, after which the gymnast had to perform jumps on a rope for the specified time interval. The end of the specified time was determined after stopping the test. The examiner recorded the time, as determined by the gymnast (sec), done according to the modified test by V.L. Marishchuk et al. for girls 6-7 years of age practicing rhythmic gymnastics [7].

„Sense” of rhythm

2. The gymnasts were shown 5 rhythmic connective elements using hand claps. The subjects had to repeat correctly the rhythmic pattern. Each correctly performed rhythmic pattern was evaluated with 2 points.

„Sense” of tempo

3. The gymnast was offered to listen to 5 musical segments, different in tempo. For the fast paced, the subject had to perform a run around the hall, for an average tempo - a tumble, for a slower pace - to perform the

splits. For each correctly defined musical segment the gymnast was awarded 2 points.

„Sense” of apparatus

4. It was estimated by the gymnast executing a series of 5 frontal throws of the ball with two hands, with closed eyes. For each correctly performed attempt gymnast received 2 points.

„Sense” of spatial orientation

5. It was tested by performing a sequence of elements in a given corridor, 50 cm wide. The gymnast had to perform 3 tumbles, 3 turns and a passage forward on a limited support (bench). All tasks were rated at 10 points; for each exit from the corridor and descent from the bench, 2 points were taken out.

„Sense” of balance was determined by applying two units of tests:

The unit for static balance and the unit for dynamic balance.

Static balance

6. The balancing was performed on the entire foot sole. Standing on one leg, the other is bent at the knee at 90°, hands behind the back. We recorded the time of maintaining the balance (a modified Romberg - V.L. Marishchuk et al. test, [7]).

7. Standing on one leg, the other is bent at the knee at 90°, arms forward, no visual control. We recorded the time of maintaining the balance (a modified Romberg – V.L. Marishchuk et al. test [7]).

8. Standing on tiptoes, arms up. We recorded the time of maintaining the balance (modified test of Biryuk – V.L. Marishchuk et al., [7]).

9. Advanced version of Biryuk’s test, the balance was performed without visual control. We recorded the time of maintaining the balance.

10. Standing on one leg, on the toes, the other leg is bent at the knee at 90°, arms to the

sides. We recorded the time of maintaining the balance. (a modified and complicated Romberg – V.L. Marishchuk et al. test, [7]).

11. Performing the previous test without visual control. We recorded the time of maintaining the balance.

Dynamic balance included tests for turns, jumps and flips.

Turns

12. Turns without shifting the center of gravity. Standing on the right leg, the left one is bent at the knee at 90°, arms bent behind the back. A turn at a 90° angle to the left is performed – a *tour lent* on the entire foot sole (modified according to L.A. Karpenko [12]). We counted the number of correctly executed turns until the moment of getting out of balance.

13. Standing on the left leg, the right one is bent at the knee at 90°, the arms are bent behind the back. The turn was carried out 90° to the right – *tour lent* on the entire foot. We counted the number of correctly executed turns until the moment of getting out of balance.

14. Turns with changing the center of gravity. Standing on the right leg, the left one stretched back straight, arms to the side. The turn was carried out 90° to the right – *tour lent* on the entire foot sole. We counted the number of correctly executed turns until the moment of getting out of balance.

15. Standing on the left leg, the right one stretched back straight, arms to the side. The turn was carried out 90° to the left - *tour lent* on the entire foot sole. We counted the number of correctly executed turns until the moment of getting out of balance.

Cartwheels

16. Performing a series of 5 side cartwheels in a chalked corridor 150 cm wide. We recorded the number of correctly executed

cartwheels in the given corridor. For exiting the corridor the attempt was considered failed

Jumps

17. Pushing on one leg and landing on the same one. Jumping “open-closed”: jump on the left leg, right one bent at 90° at the knee, head tilted forward under the forward extended arms, followed by jumping on the right leg, left one extended back, arms straight to the sides. Performing a series of 5 jumps in a 150 cm wide chalked corridor. We counted properly executed jumps. For exiting the corridor, the attempt was not counted.

18. Pushing on one leg, turning of 360° and landing on the swing leg. Jump with the change of bent legs with a rotation of 360°, hands up. Serial performance of 5 jumps in a 150 cm wide chalked corridor. Properly executed jumps were counted. For the exit from the corridor the attempt was not counted.

Digital designations of the studied parameters of coordination abilities [3]: Test unit of *special-motor abilities*:

1. Motor coordination - coordination connective element with the participation of the visual analyzer (points);
2. Motor coordination - coordination connective element without the participation of the visual analyzer (points);
3. Accuracy - shots on target (no. of times);
4. Virtuosity with hoop (no. of times);
5. Virtuosity with the rope (no. of times);
6. Speed of action - claps in 20 seconds (no. of times);
7. Immediate reaction – catching the stick (cm);
8. Stability of vestibular reactions - ball-beating (no. of times);
9. Stability of vestibular reactions - ball-throwing (no. of times);
10. Stability of vestibular reactions - the ball-distracting factor (no. of times);

11. Explosive power/jumping abilities – jumping on the right leg (cm);
12. Explosive power/jumping abilities – jumping on the left leg (cm);
13. Explosive power/jumping abilities – jumping on both feet (cm)
14. Spine mobility - forward (cm);
15. Spine mobility – backward (cm);
16. Hip mobility – front splits on right leg (cm);
17. Hip mobility – front splits on left leg (cm);
18. Hip mobility – side splits (cm);
19. Shoulder mobility - the right arm is bent behind the back with the elbow up, the left elbow down: grip the wrists behind the head (cm);
20. Shoulder mobility - left arm bent behind the back with the elbow up, right elbow down: grip the wrists behind the head (cm);
21. Shoulder mobility of both arms – transfer the gymnastic stick overhead (cm);
- Unit of *specialized perceptions/ “senses”*:
22. Sense of time – jumps on the skipping rope, repeating 10 seconds time intervals (sec);
23. Sense of rhythm – reproducing the rhythmic pattern (points);
24. Sense of tempo – listening to musical pieces of various pace and performance, and demonstrating the corresponding movements (points);
25. Sense of apparatus – throwing with the following catching of the ball (points);
26. Sense of spatial orientation (points);
27. Static sense of balance, balancing on one leg, with the participation of the visual analyzer (sec);
28. Static sense of balance, on one foot without participation of the visual analyzer - Romberg's test (sec);

29. Balance on tiptoes with the participation of the visual analyzer – Biryuk's test (sec);

30. Balance on tiptoes without the participation of the visual analyzer – Biryuk's test (sec);

31. Balance on one leg, on the toes, with the participation of the visual analyzer (sec);

32. Balance on one leg, on the toes, without the participation of the visual analyzer (sec);

33. Dynamic sense of balance, turns on the right leg – without transferring the center of gravity (no. of times);

34. Dynamic sense of balance, turns on the left leg – with transferring the center of gravity (no. of times);

35. Dynamic sense of balance, turns – with transferring the center of gravity on the right leg (no. of times);

36. Dynamic sense of balance, turns – with transferring the center of gravity on the right leg (no. of times);

37. Side cartwheels (no. of times)

38. Jumps – pushing with one leg and landing on the same one: no. of correct executions;

39. Jumps – pushing with one leg, 360° turn around, and landing on the swing leg: no. of correct executions;

All the listed tests (by numbers) and their cross-correlation indicators are presented in Table 1. As follows from the table, not all 45 tests turned out to be with an acceptable degree of reliability, where $r_{xy} = 0.544-0.760$, with $P < 0.05-0.001$. The identified cross-correlation coefficients with reliable traits turned out to be 39 tests.

Conclusion. The results of the study allowed us to determine the battery of tests that permit us to reliably determine the level of development of girls' coordination abilities at the initial stage of athletic training in rhythmic gymnastics.

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