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OPERATIONAL SYNTHESIS ON THE TRAINING OF “SPECIAL
OLYMPICS” GYMNASTS

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Abstract

Due to the special requirements imposed, the horizontal bar, one of the most spectacular apparatus in men's gymnastics, involves strategic, methodological, operational, special learning and enhanced skills in adapted artistic gymnastics. The conditional relation between technical training and physical training was objectively identified in an exploratory-observational experiment conducted on a group of 5 Down syndrome gymnasts. The research was applied in two stages, from 1 April to 30 June 2017 and from 1 October 2017 to 30 March 2018, at the National University of Physical Education and Sports of Bucharest. The objectives of this paper are to determine the strategic conditions, operational means and concrete values of the minimal and optimal thresholds for assessing each test, all these based on the quantitative and qualitative analysis, more specifically on the applied strategy, the activity carried out and, last but not least, the results obtained in the technical and physical tests and assessments. The research findings have confirmed both experimentally and statistically that the 7 technical tests and 7 specific physical training tests, with their minimal and optimal values, can become an effective guide and also reference points in the training of gymnasts with intellectual disabilities at the horizontal bar – level II.

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1. Introduction

The effects of competitive artistic gymnastics on people with intellectual disabilities are recognized. “Participation in specific sports competitions, like Special Olympics events, facilitates continuous progress in terms of motor control, coordination, balance, spatial orientation etc.” (Popescu, Dina, Stroescu, & Dina, 2013). This exceptional discipline provides gymnasts with a generous, staged, ascendant, long-lasting project, perhaps for all life, where they can learn and evolve physically, mentally and intellectually towards achieving unimaginable performances. These people can accumulate skills and abilities that ensure their social integration, autonomy, and the opportunity to manifest and communicate through movement. (Popescu, 2014a)

The scientific foundation of the staged training of gymnasts with intellectual disabilities is an act of professional responsibility and maturity. Volunteering should be backed up in the near future by a theoretical and operational synthesis based on positive experiences.

1.1. The importance of the study

Reality confirms that, although artistic gymnastics training must be approached uniformly, in adapted artistic gymnastics, the training is not done in the same way for all 6 apparatus (floor, pommel horse, rings, vault, parallel bars, horizontal bar), but progressively (one apparatus after the other), individually and specifically, depending on the athlete’s capabilities, qualities and accumulated motor experience (Popescu, 2014b). Temporally speaking, in the 14 years of study, we have found that, in this category of gymnasts, the training is first done for the floor and vault apparatus, followed by the pommel horse, parallel bars and rings, and in the end, the horizontal bar – levels I, II, III and then IV.

Due to the special requirements imposed, the horizontal bar, one of the most spectacular apparatus in men’s gymnastics, involves strategic, methodological, operational, special learning and enhanced skills in adapted artistic gymnastics (Vieru, 1997). This may be related to the fear of the apparatus, its height, but also to motivation, stress and palm pain, spatial and temporal orientation, courage and will, the special technical objectives of the “hanging school” (in hanging and support).

The lack of specialists, theoretical and practical-methodological materials, as well as specific knowledge, limits the number of athletes performing on this apparatus in national and international competitions. The modest number and quality of executions presented in international or national competitions confirms this.

Continuing our constant and responsible effort to provide valuable reference information on areas of interest – studies on the scientific foundation of training in adapted artistic gymnastics, the training of gymnasts with intellectual disabilities based on their own experiences and performances (Popescu, 2015, p. 3), we will ensure, through this scientific approach, the theoretical, practical and methodological support necessary to guide the training of gymnasts for the horizontal bar apparatus – level II.

2. Problem Statement

Special Olympics coaches, specialists, instructors, volunteers, athletes, gymnasts with disabilities from all over the world consider the horizontal bar, especially level II, a dangerous and hard-to-reach apparatus. Their specific training level, the lack of specialised information, the lack of an advanced

scientific framework for promoting the experiences and models of training gymnasts with intellectual disabilities have led us to conduct this study to identify the objective parameters that can guide and regulate their preparation for this gymnastics apparatus.

According to the principles of programmed training and algorithmic training, preparation for this apparatus must be grounded and regulated by the determined harmonious relationship between the training components (Stroescu, 2014, p. 165).

In this area, but especially in the relation between specific physical training and technical training, a set of instruments and references, methodological and operational data can be identified, helping to guide or monitor step by step the training of level II gymnasts at the horizontal bar.

The horizontal bar exercise, level II, has 9 elements and movement parts. Their learning and improvement will be a priori supported by specific physical training and then by dedicated algorithmic programs for achieving the full exercise. The quality of execution of the elements and the full exercise represents the main objective of the evaluation and validation of all hard work.

3. Research Questions

This study tries to find concrete solutions for the development of an experimentally objective general reference, a methodological and operational line for the training of gymnasts with disabilities at the horizontal bar, level II, which must meet the requirements of security, safety and performance.

The project aims to answer the following questions:

- a. What is the optimal algorithmic-type objective program for learning and improving the content structures of the full exercise at the horizontal bar, level II?
- b. What are the correlative means and values of the specific physical training and technical training that can become objective reference elements in acquiring and perfecting the horizontal bar exercise, level II?

4. Purpose of the Study

4.1. Hypothesis

Based on the experimental analysis of a technical training report, operational benchmarks, optimal physical and technical evidence and standard tests can be determined to guide and monitor the training of “Special Olympics” gymnasts, level II, for the horizontal bar.

4.2. Training guide

Following the step-by-step algorithmic program developed by us for the “support” training (Popescu, 2007), the learning and improvement of the elements, the parts and the whole exercise, experimentally applied to a group of 5 Down syndrome gymnasts from the Down Syndrome Association in Bucharest, the concrete reference, methodological and operational, physical and technical, quantitative and qualitative elements that can support and ensure the training and monitoring of level II gymnasts at the horizontal bar will be identified and statistically confirmed.

5. Research Methods

The research methods used in this scientific approach are: experiment, observation, study of literature, analysis of video recordings, methods of analysis and interpretation of results, such as the statistical method to calculate the objective correlation between specific physical training and technical training, graphical method.

5.1. Experiment method

With the purpose of verifying the hypothesis, we have developed:

- a. Algorithmic model programs for learning and improving the contents of the horizontal bar exercise – level II;
- b. An operational training plan with 2 workouts per week, 3 hours and 30 minutes horizontal bar/training;
- c. A system of physical and technical assessment tests that could offer determining and correlative reference and monitoring elements for the staged training at the horizontal bar – level II. It encompasses:

A. Tests to assess the level of technical training (TT)

- TT.1. Hang on the horizontal bar with a top handgrip, tipping back to front support with the body bent and legs stretched
- TT.2. Hip circle backward from support to support
- TT.3. Clear underswing; backward and forward swing
- TT.4. Backward swing with release of the grip and hang on the bar
- TT.5. Forward swing with 180° to 45° turn in mixed grip; forward swing with mixed grip and backward swing with hop – change of the grip to regular grip
- TT.6. Forward swing, backward swing, releasing the horizontal bar and dismount with landing on both legs
- TT.7. Whole exercise

B. Tests to assess the level of specific physical training (SPT)

- SPT.1. Hang with arms bent at 90° and hold
 - SPT.2. Pull-ups (number of repetitions)
 - SPT.3. Hang on the bar, lifting the legs at 90° (number of repetitions)
 - SPT.4. Front support between two gym steps, with hand support under the forehead and on the tiptoes – holding position
 - SPT.5. Lying on the back between two gym steps, with hand support under the head and on the heels – holding position
 - SPT.6. From front support on the bar, backward cast at horizontal level/floating support (number of repetitions)
 - SPT.7. Front lying with hands on the head – extension of the body (number of repetitions)
- d. We organized a pedagogical experiment divided into two stages, during the periods: 1 April – 30 June 2017 and 1 October 2017 – 30 March 2018, due to the structure of the academic years and the summer holidays. The experimental group consisted of 5 Down syndrome gymnasts from the Down Syndrome

Association in Bucharest. The 5 gymnasts were selected in accordance with the requirements of the start-up training, based on the results obtained in the horizontal bar contest – level I.

The scores of the experimental group gymnasts at the horizontal bar are shown in Table 01.

Table 01. Scores of the experimental group gymnasts at the horizontal bar – level I

Item no.	Initials	Grade
1	P.I.	9.35
2	A.M.	9.20
3	S.I.	9.30
4	J.S.	9.10
5	D.F.	9.20
Arithmetic mean		9.23

5.2. Observation method

The observation method was capitalised throughout the experiment, focusing specifically on the quantitative and qualitative aspects of each execution, on individual feedback or group feedback.

5.3. Video analysis method

The method of video analysis was used in learning, correction, representation formation, establishing the bio-mechanical parts of the structures.

5.4. Methods of processing and interpreting the results

The methods of processing and interpreting the data used in the study were the statistical method and the graphical method:

Statistical method: using the Excel formulas (correlation coefficient, arithmetic mean, maximum and minimum limits), linear or complex correlation values of the training components were determined, as well as other optimal reference data highlighting the importance of evidence-supported learning.

Graphical method: used to facilitate representation and reinforce through images the significance of the obtained results.

6. Findings

6.1. Workout parameters in the experiment (Table 02)

Table 02. Workout values of gymnasts in the experiment group

Training parameters	Stage I	Stage II	Total
No. of weeks	13	12	25
No. of workouts/week	2	2	2
No. of workouts/period	26	24	50
No. of training hours/day	3	3	3
No. of training hours/week	6	6	6
No. of training hours/period	78	72	150
No. of training hours/horizontal bar	13	12	25

Referring to the technical results obtained at the end of the experiment, such as the scores and arithmetic mean of the full exercise, we can state that the minimum number of weekly workouts recommended for superior and lasting results should be 3. The higher the number of weekly workouts, the better the performance will be.

The grades obtained by the 5 research subjects for the full exercise are shown in Figure 01.

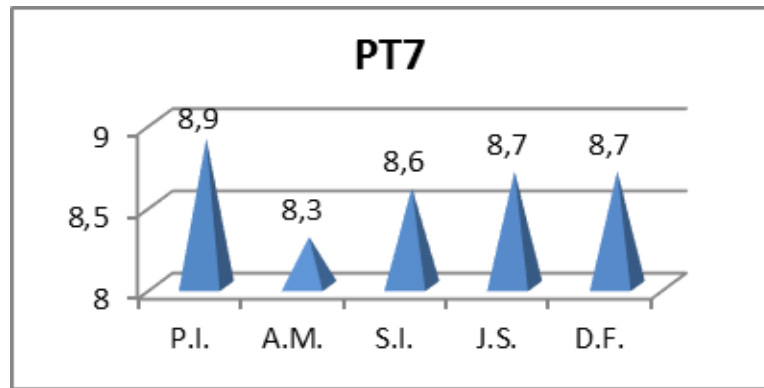


Figure 01. Grades obtained for the full exercise

6.2. Analysis of results – Specific physical training

The minimum, maximum and arithmetic mean calculated for each test are the reference values in direct support of learning the content structures of the horizontal bar exercise, level II.

For example, the 32-second hold of the hanging with bent arms at 90°, the 20-feet lifting at 90° and the 6 pull-ups become the optimal reference rules for the “support” preparation to perform the backward hip circle from hanging on the horizontal bar.

Arithmetic mean values obtained in SPT.4 and SPT.5 tests become standards that support the body’s isometric control during the swings and rotation while performing the exercise.

Following the specific physical training tests, the obtained results were (Table 03):

Table 03. Results obtained in the specific physical training tests

Item no.	Na me	SPT.1 (sec.)	SPT.2 (no.)	SPT.3 (no.)	SPT.4 (sec.)	SPT.5 (sec.)	SPT.6 (no.)	SPT.7 (no.)
1	P.I.	22.87	5	20	33.88	50.35	5	18
2	A.M.	28.2	5	16	40.2	48.4	4	16
3	S.I.	21.3	8	18	47.81	62.35	5	18
4	J.S.	55.47	10	26	50.32	80.2	5	20
5	D.F.	32.62	5	24	60	85.46	5	24
Average		32.092	6.6	20.8	46.442	65.352	4.8	19.2
Min.		21.3	5	16	33.88	48.4	4	16
Max.		55.47	10	26	60	85.46	5	24

6.3. Analysis of results – Technical training (Table 04)

Table 04. Results obtained in the technical training tests

Item no.	Name	TT.1	TT.2	TT.3	TT.4	TT.5	TT.6	TT.7
1	P.I.	9.5	9.7	9.9	10	9.8	10	8.9
2	A.M.	9.5	9.7	9.7	10	9.5	9.9	8.3
3	S.I.	9.7	9.6	9.7	10	9.5	10	8.6
4	J.S.	10	9.5	10	9.9	9.5	10	8.7
5	D.F.	9.5	9.7	9.9	9.7	9.7	9.9	8.7
Average		9.64	9.64	9.84	9.92	9.6	9.96	8.64
Min.		9.5	9.5	9.7	9.7	9.5	9.9	8.3
Max.		10	9.7	10	10	9.8	10	8.9

Each element, part and structure in the exercise composition must be executed close to perfection. The arithmetic mean of TT.1-TT.6 technical tests confirms the execution penalties ranging from 0.1 to 0.4 pts., the training strategy and the quality of the applied algorithmic programs. They certify the importance of the values gained in specific physical training that have directly contributed to accelerating learning and raising its qualitative level.

6.4. Statistical analysis of correlations between training components

Following the calculation of the correlation coefficient between the values of specific physical and technical training tests (Table 05), we have found that some of them, such as those in Table 03, are linear, direct, and others, such as TT.5-SPT.3, SPT.4, SPT.5-TT.2, TT.6, TT.4, are real but complex correlations.

Table 05. Examples of significant correlations between technical training and specific physical training tests

TT	SPT	Correl
TT.1	SPT.1	0.787179
TT.1	SPT.2	0.981401
TT.1	SPT.3	0.561287
TT.7	SPT.6	0.867528
TT.7	SPT.3	0.561287

7. Conclusion

7.1. General conclusions

The lack of modern, scientific, experimental methodological support, as well as the lack of knowledge and specialty training of volunteer coaches and instructors working in “Special Olympics” adapted gymnastics, confirm the importance and necessity of this scientific approach providing an original methodological line, strategic reference elements and valuable guidance in monitoring the training of gymnasts with intellectual disabilities at the horizontal bar.

Following the experiment and the results obtained, we can say that their special training requires an adapted algorithmic method to eliminate all limiting factors related to the apparatus specificity, the structure of swings and support movements while hanging, the biomechanical exigencies of overturns etc.

One should take into account all the methodological milestones of the stereotyped dynamic learning, where the number of training sessions/week, the duration of training/sessions/tests on the apparatus, the number of repetitions/per element, the combination of full exercise, the quality of each repetition are the objective reference elements on which the provision of learning and thorough training at the horizontal bar exercise depends.

7.2. Specific conclusions

The minimum starting level recommended for approaching learning and improving the horizontal bar exercise for level II gymnasts with intellectual disabilities is 9-10, a score confirmed in an official competition for the same test at level I.

As a special objective, it should be remembered that all elements and parts of the exercise must be learned correctly, close to perfection. This objective is a prerequisite for achieving the full exercise at the performance parameters required by the regulations and judging.

Specific physical training should first and foremost support the learning of content structures of the whole exercise at the horizontal bar, level II.

The confirmed linear or complex correlation, the values obtained in specific physical training tests SPT.1-SPT.6 become performances and conditional standards recommended for “Special Olympics” gymnasts, level II, to learn the content elements of the full exercise at the horizontal bar.

The value of the results obtained in technical tests proves the value of the applied algorithm-type program. On the basis of the confirmed program, we can say that gymnasts in the experiment group can improve their scores in the following period if they raise the number of training sessions per week to at least 3. The results of the next national and international competitions will confirm this statement.

Acknowledgments

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