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## Special Olympics - Artistic Gymnastics Terms of Reference in Training Gymnasts with Down Syndrome on Parallel Bars – Level 1

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### Abstract

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The training of gymnasts with Down syndrome must be scientifically based, at a national and international level, in order to make them benefit from the complex positive effects of competitive artistic gymnastics for a longer period of time and to ensure them motor progress. Teachers, volunteers, specialists and athletes involved in this activity need constant guidance, encouragement and practical terms of reference in the methodical, technical steps that must be followed. This study was carried out in the first and second semester of the university year 2013-2014 and the first semester of the university year 2014-2015 (with a minimum work level - 1 training per week), on a group of 12 adult gymnasts with Down Syndrome, aged between 18-32 years. Methodical, strategic and operational elements for training control, evaluation and adjustment to gymnasts with Down syndrome on the parallel bars routines – level 1 were checked and confirmed. The experiment and statistical analysis confirmed actual values of correlative parameters needed in training by means of 4 tests of general physical preparation, 3 tests of specific training and 9 tests of technical preparation, which measure the quality of execution. The research data represents a valuable reference model by offering scientific training on the parallel bars – level 1 for gymnasts with Down syndrome.

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**Keywords:** Artistic gymnastics - Special Olympics; gymnasts with Down syndrome; parallel bars - level 1; training methods; operational system.

### 1. Introduction

Sport itself is a kind of adventure event. This characteristic puts sport in the position of being an attractive and exciting activity suitable for all (Kasser, 1995). Sport participation as a lifestyle of an individual has noticeable benefits; better health and enhanced quality of life are probably the most obvious ones (Giacobbi et al., 2008).



The persons with Down syndrome have many health problems, which include: thyroid disorders; visual disorders; muscle, bone and joint diseases; ear, nose and throat disorders, heart defects; epilepsy (Bowman-Kruhm, 2002: 18). Systematic practice of artistic gymnastics can avoid or mitigate them.

For individuals with Down syndrome, competitive artistic gymnastics represents a beneficial and efficient way of reaching the norms of social integration.

“Not only in Romania, but also in Europe, training Down’s athletes on gymnastics apparatus raises special problems, especially to coaches, teachers and volunteer instructors who do not have specialization or enough experience. This process tries to support and encourage them, to offer them confidence, safety and scientifically valuable and worthwhile technical references” (Popescu, 2014).

“Gymnasts with intellectual disabilities must be trained for competition only by experienced and certified coaches” (Popescu, 2007).

“Practical experience proves that individuals with Down syndrome can improve their motor skills and abilities... motor control, coordination, balance, spatial orientation, etc.” (Popescu et al., 2013).

In order to benefit from the complex positive effects of competitive artistic gymnastics for a longer period of time and to ensure the athletes integrative motor progress, the training of gymnasts with Down syndrome must be scientifically based for each of the apparatus. In fact, this is the goal of our approach.

One apparatus which requires special attention on our part, due to the requirements connected to initiation on this apparatus, is men’s parallel bars.

## **2. Materials and methods**

Integrated as part of a larger long-term project since 2004, to promote Special Olympics Artistic Gymnastics in Romania, this study was carried out in the UNEFS gym, in Bucharest, during the 1<sup>st</sup> and 2<sup>nd</sup> semesters of the university year 2013/2014, and in the 1<sup>st</sup> semester of the university year 2014/2015, with a group of 12 adult gymnasts, each with Down Syndrome and aged 18-32 years, from the Down Syndrome Association of Bucharest. The purpose of this study was to create a scientific frame of reference for the initiation/fundamental stage of parallel bars training (level 1) with gymnasts suffering from Down syndrome.

The volume of work with the group was minimal – 1 training/week lasting 2½ hours. The duration of this training was 3 university semesters, each 14 weeks long. In total: 48 training sessions, 144 hours of training, 30 hours of technical preparation on the parallel bars.

Based on the reality of our own experience and in an effort to harmonize the components of training, particularly: general physical preparation, specific physical preparation and technical preparation, this study verified and confirmed different methodical, strategic, operational elements of training, evaluation and regulation of Down’s gymnasts in the parallel bars event – level 1.

In this context, and so as to objectify and confirm the relational systems of reference, the progressive and final results of 16 tests were put under statistical, correlative analysis: 4 tests of general physical preparation, 3 tests of specific training and 9 tests of technical preparation measuring the quality of execution.

#### *A. General physical preparation tests*

- GPP1. Hanging leg raises to 90° on wall bars;
- GPP2. Held picked position on wall bars / timed;
- GPP3. Wheelbarrow walks along a 10m course;
- GPP4. Back strength (lying prone with torso on gymnastics horse, reverse leg raises with maximum extension – number of repetitions).

#### *B. Specific physical preparation tests*

- SPP.1. Front support position on parallel bars; number of forward and backward swings touching specific markers;
- SPP.2. Walking in front support from one end of the parallel bars to the other;
- SPP.3. Held picked position (lever) – time held.

#### *C. Technical preparation tests*

- TP.1. Forward walking – 6 steps (with penalization of execution errors);
- TP.2. Forward swing to seated straddle support;
- TP.3. Arm swing up and forward from behind, moving into front support position;
- TP.4. Backward cast off of the legs in preparation for the swing;
- TP.5. Forward swing to seated straddle back support;
- TP.6. Legs together to picked position held;
- TP.7. Kick-out, backward swing, forward swing;
- TP.8. Backward swing and tucked dismount over the bar laterally landing on the feet;
- TP.9. Parallel bars exercise (Artistic Gymnastics, 2014; Gymnastics (Artistic) Coaching Guide, n.d.).

### **3. Results**

The results obtained in the three sets of tests gave objective values to the components of training, as well as dimensions to the conditional relationships between them. By analysing the results in Table 1, we can identify reference values which confirm an adequate level of physical preparation necessary to perform the technical elements of the Level 1 Parallel Bars routine. The scores recorded for static abdominal strength (GPP1 average - 18.55, max - 25.56 sec.) and dynamic abdominal strength (GPP1 average - 21.25) correspond to the execution requirements for the picked lever, leg raises and swings. The fact that all of the athletes succeeded in completing the 10m wheelbarrow course (GPP3) confirmed the existence of a potential base for the development of the specific support position on the parallel bars. Furthermore, the results obtained in the test GPP4 (average - 18.08, max - 30 torso raises) ensures superior control of the back muscles that will sustain the learning of swings in the dynamic or compensatory positions of the torso.

**Table 1.** Results in general physical preparation

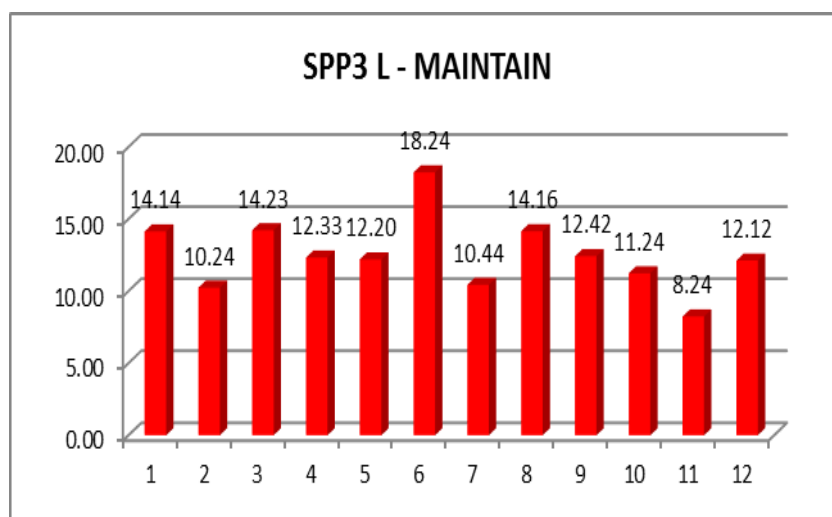
No.	Initials	GPP1	GPP2	GPP3	GPP4
1	A.N.M.	22	15.24	YES	15
2	A.A.	17	12.43	YES	12
3	B.V.	20	22.23	YES	20
4	C.C.	27	14.33	YES	12
5	C.N.	27	15.20	YES	14
6	C.B.	22	14.05	YES	14
7	D.F.	21	25.56	YES	25
8	J.S.	20	24.16	YES	30
9	M.P.	20	20.42	YES	18
10	P.I.	28	25.24	YES	20
11	S.I.	19	17.56	YES	22
12	S.V.G.	12	16.25	YES	15
Average		21.25	18.55583		18.08333
Max		28	25.56		30
Median		20.5	16.905		16.5

The average values, as well as the maximum values reached in all of the tests, attest to the potential of the gymnasts with Down syndrome in their efforts towards normality and performance, while also drawing attention upon the importance of individual preparation and positive examples.

**Table 2.** Results in specific physical preparation

No.	Initials	SPP1	SPP2	SPP3
<b>1</b>	<b>A.N.M.</b>	10	<b>YES</b>	14.14
<b>2</b>	<b>A.A.</b>	2	<b>YES</b>	10.24
<b>3</b>	<b>B.V.</b>	12	<b>YES</b>	14.23
<b>4</b>	<b>C.C.</b>	4	<b>YES</b>	12.33
<b>5</b>	<b>C.N.</b>	4	<b>YES</b>	12.20
<b>6</b>	<b>C.B.</b>	4	<b>YES</b>	18.24
<b>7</b>	<b>D.F.</b>	10	<b>YES</b>	10.44
<b>8</b>	<b>J.S.</b>	10	<b>YES</b>	14.16
<b>9</b>	<b>M.P.</b>	8	<b>YES</b>	12.42
<b>10</b>	<b>P.I.</b>	10	<b>YES</b>	11.24
<b>11</b>	<b>S.I.</b>	6	<b>YES</b>	8.24
<b>12</b>	<b>S.V.G.</b>	4	<b>YES</b>	12.12
<b>Average</b>		<b>7</b>		<b>12.5</b>
<b>Max</b>		<b>12</b>		<b>18.24</b>
<b>Median</b>		<b>7</b>		<b>12.265</b>

The results obtained in the specific physical preparation tests confirm the ascending accumulations which are necessary for the rapid and efficient learning of the elements contained with the Level 1 Parallel Bars routine. The results of test SPP2 show that all of the gymnasts with Down's managed to travel from one end of the apparatus to the other. The picked lever test, with the scores recorded, eliminates any problems when executing this element in the routine. As can be seen in Graph 1, all members of the experiment group can hold a picked lever for 2 seconds.



**Graph 1.** Abdomen L-test values

The progress achieved while learning the elements and routine at the stages analysed is obvious. It becomes apparent when comparing the initial and final results in Tables 3 and 4 analysing the execution of the elements and the competition routine. We can also note a significant decrease in the deductions taken away for each element and for the routine.

**Table 3.** Results in technical preparation – Initial testing

NO.	INITIALS	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	PEN.
1	A.N.M.	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.5	7.1	2.9
2	A.A.	1	0.3	0.3	0.3	1	0.3	0.3	1	5.6	4.4
3	B.V.	0.5	0.3	0.3	0.1	0.1	0.1	0.3	0.3	8	2
4	C.C.	0.5	0.2	0.3	0.1	0.1	0.3	0.1	0.3	8.1	1.9
5	C.N.	0.6	0.3	0.3	0.3	0.3	0.3	0.3	1	6.6	3.4
6	C.B.	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.5	7.5	2.5
7	D.F.	0.3	0.3	0.3	0.3	0.1	0.3	0.1	0.3	8	2
8	J.S.	0.5	0.1	0.3	0.1	0.1	0.3	0.3	0.3	8	2
9	M.P.	0.3	0.1	0.3	0.3	0.1	0.1	0.3	0.3	8.2	1.8
10	P.I.	0.4	0.1	0.3	0.1	0.1	0.3	0.1	0.3	8.3	1.7
11	S.I.	0.6	0.1	0.1	0.1	0.1	0.3	0.3	0.3	8.1	1.9
12	S.V.G.	0.5	0.1	0.3	0.3	0.3	0.3	0.3	0.5	7.4	2.6
Average		0.5083	0.2083	0.2833	0.2166	0.2416	0.2666	0.2416	0.4666	7.575	2.425
Max		1	0.3	0.3	0.3	1	0.3	0.3	1	8.3	4.4
Median		0.5	0.25	0.3	0.3	0.1	0.3	0.3	0.3	8	2

**Table 4.** Results in technical preparation – Final testing

NO.	INITIALS	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	PEN.
1	A.N.M.	0.3	0.1	0.3	0.3	0.1	0.1	0.3	0.3	<b>8.3</b>	1.7
2	A.A.	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	<b>7.4</b>	2.6
3	B.V.	0.2	0	0.3	0.1	0.1	0.1	0	0.1	<b>9.1</b>	0.9
4	C.C.	0.5	0.2	0.3	0.1	0.1	0.3	0.1	0.3	<b>8.1</b>	1.9
5	C.N.	0.3	0.3	0.3	0.3	0.3	0.1	0.3	0.5	<b>7.6</b>	2.4
6	C.B.	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.5	<b>7.5</b>	2.5
7	D.F.	0.1	0	0.3	0	0	0	0.1	0.1	<b>9.3</b>	0.7
8	J.S.	0.1	0	0.3	0	0	0	0.2	0.1	<b>9.2</b>	0.8
9	M.P.	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	<b>8.9</b>	1.1
10	P.I.	0.1	0	0.3	0.1	0.1	0	0.1	0.1	<b>9.2</b>	0.8
11	S.I.	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	<b>9</b>	1
12	S.V.G.	0.2	0.1	0.3	0	0	0.1	0.2	0.5	<b>8.6</b>	1.4
Average		<b>0.225</b>	<b>0.125</b>	<b>0.283</b>	<b>0.15</b>	<b>0.125</b>	<b>0.125</b>	<b>0.175</b>	<b>0.2666</b>	<b>8.5166</b>	<b>1.4833</b>
Max		<b>0.5</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.5</b>	<b>9.3</b>	<b>2.6</b>
Median		<b>0.2</b>	<b>0.1</b>	<b>0.3</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>	<b>8.75</b>	<b>1.25</b>

The values recorded for the arithmetic mean, median, maximum values and coefficient values ( $p < 0.005$  with a few examples presented in Tables 5, 6, 7) statistically confirm the significant progress recorded in learning the elements and full routine on the parallel bars.

**Table 5.** T-Test – PT1

PT1		
	Variable 1	Variable 2
Mean	0.225	0.508333333
Variance	0.014772727	0.03719697
Observations	12	12
Pearson Correlation	0.378118399	
Hypothesized Mean Difference	0	
Df	11	
t Stat	-5.30403086	
P(T<=t) one-tail	0.000125427	
t Critical one-tail	1.795884819	
P(T<=t) two-tail	<b>0.000250855</b>	
t Critical two-tail	2.20098516	

**Table 6.** T-Test – PT8

PT8		
	Variable 1	Variable 2
Mean	0.266666667	0.466666667
Variance	0.035151515	0.06969697
Observations	12	12
Pearson Correlation	0.783640832	
Hypothesized Mean Difference	0	
Df	11	


t Stat	-4.195235393
P(T<=t) one-tail	0.000748782
t Critical one-tail	1.795884819
P(T<=t) two-tail	<b>0.001497564</b>
t Critical two-tail	2.20098516

**Table 7.** T-Test – PT9

<b>INTEGRAL ROUTINE</b>		
	<i>Variable 1</i>	<i>Variable 2</i>
Mean	8.516666667	7.575
Variance	0.510606061	0.6475
Observations	12	12
Pearson Correlation	0.775502956	
Hypothesized Mean Difference	0	
Df	11	
t Stat	6.321383251	
P(T<=t) one-tail	2.833E-05	
t Critical one-tail	1.795884819	
P(T<=t) two-tail	5.66599E-05	
t Critical two-tail	2.20098516	

The determinative relationships which must function harmoniously between the training components, especially those of general physical preparation – specific physical preparation and specific physical preparation – technical preparation, are confirmed through the values of linear or complex correlations statistically identified. Examples of complex correlation can be identified in the following relationships:

**Table 8.** Examples of complex correlation

	GPP3	SPP2	PT1	
	GPP2	SPP3	PT6	
GPP1	GPP4	SPP1	SPP2	PT8

#### 4. Discussions and conclusions

The strategy used to train Down syndrome gymnasts for Level 1 Parallel Bars must contain the following priority objectives, in chronological order:

- A. develop the specific support position;
- B. learn the ‘support’ positions – straddle sit, tucked lever, picked lever;
- C. correctly learn the supported swing;
- D. correctly learn the elements which comprise the full routine, beginning with the dismount;
- E. learn the full competition routine.

The evaluation tests and their results become elements of reference in the initiation and basis of training gymnasts with Down syndrome on the parallel bars. Analysis of the results obtained in the 3 different sets of tests correlatively interpreted confirms:

- the efficiency of the technical strategies and the means applied;
- the importance of individualizing the training program and the parameters of effort connected to volume, intensity and duration for each member of the group, within each exercise performed;
- the importance of exceptional positive performances achieved by some of the gymnasts, strongly acting as a stimulator or motivator, which is key to the progress of the other teammates who regard the performance as a goal to be attained and beaten;
- the value of a system which monitors, increases awareness, evaluates and verifies;
- the importance of video applications to the teaching – learning – evaluation/self-evaluation process;
- the operational value of algorithm-type programs in the learning of elements, combinations, segments and whole routines in which each structure becomes a means of assessment;
- the importance of respecting the volume-quality ratio for each objective in the learning process.

The volume of training undertaken, with 1 training/week, each lasting 2½ hours, is, in our opinion, minimal. Doubling or tripling the number of training hours would provide the optimal time for the continuous progression of initiation and basic training of Down's gymnasts on all of the gymnastics apparatus. Three training sessions per week would ensure objective support of the determinative ratios of accumulation.

In the process of training the gymnasts in the experiment group, the following were remarked:

- techniques of repetition-evaluation through games and contests;
- techniques applied to correct, guide and motivate;
- the diversity and volume of general and specific means, on the floor and other apparatus, to develop the support position;
- the rules regarding discipline, repetition and execution;
- the enthusiastic, challenging, motivational style of the coach.

By respecting all of these guidelines, gymnasts with Down syndrome can successfully begin training on the parallel bars. This approach has the role of increasing the level of scientific knowledge in this domain, which is of European and world interest. It offers a valuable system of reference for coaches, instructors and volunteers involved in the training of Down syndrome gymnasts. To many individuals with Syndrome Down, it offers hope and a chance to benefit from the complex, positive effects of Artistic Gymnastics – Special Olympics.

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