

## OPTIMIZATION OF THE TRAINING PROCESS WITH SKILLED ATHLETES ACROBATIC ROCK AND ROLL IN THE ANNUAL PREPARATION OF MACROCYCLES BASED ON MODEL CHARACTERISTICS

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**Annotation.** *Purpose:* to develop and prove experimentally the content of the special physical and technical training athletes. *Material:* the study involved 36 athletes (18 pairs). *Results:* to determine anthropometric indices athletes to perform matchmaking sports couple. Had the most significant biomechanical parameters of the exercise equipment. Developed a biomechanical model of the target technology implementation competitive exercise. Assessment methodology presented special physical and technical training. The technique of selection of partners based on a pair of sports: anthropometric and growth indicators weighty partner and partner. *Conclusions:* it was determined that the determining factor in successful sports couple acrobatic rock-roll the same rate of development of physical effort in joint actions. Characterized by quickness growth efforts, which develops on the joint angle straightening bio kinematic chain.

**Keywords:** acrobatic, rock and roll, special, physical, training, technical, biomechanical.

### Introduction

Training of qualified sportsmen in acrobatic rock-n-roll is a complex, multi-level and many years' process. Searching of optimal correlation between complexity of acrobatics and quality of dance is one of the most difficult tasks of sportsmen's training. Recent years, in Ukraine there have appeared a trend of sportsmen's quantity reduction in acrobatic rock-n-roll. It is connected with the fact that achievement of high sportsmanship has become more difficult and durable. Constantly increasing contest on international arena puts forward still more new tasks for sportsmen's training. Mastering of international class programs in short period of time and at high level as well as demonstration of stability and reliability of their fulfillment on competitions shall be of the first priority. Traditional means and methods and technologies, available in arsenal of domestic coaches can not cope with such tasks of qualified sportsmen's training [7].

The problems of many years' sport training are rather widely reflected in domestic and foreign literature [10, 11, 13-16]. But, if at initial stage of acrobatic rock-n-roll training problems of sportsmen's training have been paid sufficient attention to [1, 2, 8, 9, 12], the, unfortunately, problems of qualified sportsmen's training are not regarded properly. We have not found any scientific works, devoted to training, organization and control of acrobatic rock-n-roll qualified sportsmen in literature, which was in our access.

The above said witnesses that at present stage of acrobatic rock-n-roll's progress improvement of training process and working out of methodic of evaluation of different sides of qualified sportsmen's fitness is rather demanded. In this connection there has appeared a demand in optimization of acrobatic rock-n-roll qualified sportsmen's training in year macro-cycle.

The works has been fulfilled in compliance with combined plan of scientific-research work in sphere of physical culture and sports for 2011-2015, by topic 2.15 "Control of static-dynamic stability of sportsman's body and system of bodies in kinds of sports with complex coordination of movements" (state registration No. 0111U001726).

### Purpose, tasks of the work, material and methods

*The purpose of the research* is to work out and experimentally verify content of special physical and technical training of acrobatic rock-n-roll qualified sportsmen in year macro cycle, considering model characteristics.

*The tasks of the research* were to determine content of special physical and technical fitness and anthropometric indicators of qualified sportsmen for correct selection of pairs in acrobatic rock-n-roll.

*The methods of the research:* theoretical analysis and generalization of scientific and methodic literature, analysis of video materials, pedagogic observation, pedagogic experiment, questioning, testing, method of expert evaluations, morphological-functional examination, bio-mechanical methods of movements' analysis, methods of mathematical statistics.

In the research 36 sportsmen took part (18 pairs), qualification IMS, MS, CMS, 1<sup>st</sup> degree. In our previous research 14 sportsmen participated (7 pairs of qualification: IMS, MS, CMS). 20 sportsmen participated in pedagogic experiment (10 pairs of qualification CMS, 1<sup>st</sup> degree).

### Results of the research

Analysis of literature sources showed that training of qualified acrobatic rock-n-roll sportsmen is paid insufficient attention to and this results in demand in researches, oriented on improvement of special and technical training, working out of model characteristics of kinds of training. Absence of model characteristics and scientifically grounded methodic of qualified acrobatic rock-n-roll sportsmen's training requires researches in this direction.

For building of model characteristics of special physical training (SPT) we used exercises, which, in general, facilitate demonstration of special physical abilities and interactions of these exercises in pair (see table 1). Besides, we developed evaluation scales, which can be used for receiving of total mark of sport pair, which determine level of

special physical fitness of qualified acrobatic rock-n-roll sportsmen.

Table 1

*Model characteristics of SPT of "M" class category's sportsmen of acrobatic rock-n-roll sportsmen.*

<b>Test</b>	<b>Parameter</b>	<b>Model characteristic</b>
<b>For he-partner</b>		
Backbone strength	Strength, kg	<b>232–258</b>
Main moving	Quantity of repetitions for 20 sec, times	<b>12,1–13,1</b>
Squatting with she-partner	Maximal quantity of repetitions, times	<b>61,2–73,5</b>
<b>For she-partner</b>		
Main moving	Quantity of repetitions for 20 sec, times	<b>12,4–13,4</b>
2 forward rolls, 1 backward roll "tour"	Quantity of repetitions for 30 sec, times	<b>5,7–6,5</b>
Jumping on pedestal	Quantity of repetitions for 20 sec, times	<b>17,0–19,2</b>
<b>For pair</b>		
Back death spiral with «фус»	Maximal quantity of repetitions, times	<b>5,7–7,0</b>
Lower, upper replacement, «fus»	Maximal quantity of repetitions, times	<b>8,7–11,3</b>
Обертання («сугел», «sun», «dulane»)	Maximal quantity of repetitions, times	<b>13,4–17,3</b>

Execution of technically difficult acrobatic elements and acrobatic combinations requires high coordination and optimal difference in partners' height-weight indicators.

Our researches showed that optimal difference of height-weight partners' indicators shall be: for body mass –  $22.6 \pm 1.9$  kg, for body length –  $16.7 \pm 7.1$  cm, for height-weight index –  $97.7 \pm 5.5$  g.cm<sup>-1</sup>.

On the base of worked out model characteristics of anthropometric indicators we selected sport pair of "M" class category. Anthropometric parameters of this sport pair coincide with previously worked out models.

The offered by us methodic of selecting of qualified sportsmen and sportswomen in sport pairs is based on the following:

- Anthropometric and height-weight indicators of partners;
- Level of special physical fitness of partners separately and in pair;
- Technical fitness of partners (fulfillment of dancing and acrobatic elements with complex coordination with high quality).

Analysis of training and competition processes of "M" category's sportsmen permitted to reveal that the basis of technical actions of competition composition of "Acrobatic" program is exercise front death spiral from "fus" [5].

Bio-mechanical analysis of this exercise permitted to determine the most important bio-mechanical parameters of this exercise's technique: phases of this exercise; trajectory of general mass center (GMC) of she-partner; maximal height of she-partner's GMC (*H*); velocity (*V*) of she-partner's GMC; acceleration (*a*) of she-partner's GMC; total applied force (*F*). Besides, we determined algorithm of calculation of force of separately he-partner ( $F_{n-p}$ ) and she-partner ( $F_{n-ka}$ ), applied for fulfillment of competition exercise front death spiral from "fus".

At next stage of the research we used developed by us methodic of exercise "front death spiral from "fus" . In its base we put improvement of technique of moving she-partner with minimal deviation from vertical plane as per axis of coordinates and the least passing of she-partner's GMC by horizontal axis [4].

It should be noted that indicators of she-partner's GMC height with fulfillment of competition exercise "front death spiral from "fus" for three stages of our research and bio-mechanical analysis differ significantly. Increment of height indicators was 0.45m, that, in its turn, proves correctness of application of our methodic and developed complex of preparatory exercises for improvement of competition exercise's technique. With overcoming of maximal height by she-partner velocity of her GMC increases. With the help of our methodic and complex of preparatory exercises we achieved increasing of velocity of she-partner's GMC by  $0.41$  m·sec<sup>-1</sup>.

As a result of the conducted researches we determined targeted bio-mechanical model of technique of competition exercise "front death spiral from "fus", of category "M" class in acrobatic rock-n-roll (see table 2).

Table 2

**Targeted bio-mechanical model of competition exercise “front death spiral from “fus”, category “M” class in acrobatic rock-n-roll**

Level of simulation:	Parameters	Model characteristics
Geometric	Height of she-partner's GMC, m	3,4
	Angle of she-partner's GMC take off (deviation from vertical plane), degrees	7
	Horizontal travel of she-partner's GMC, m	0.94
	Horizontal travel of she-partner's GMC in unsupported motion, m	0.54
	Angle of knee joint of he-partner's optimal posture, degrees	8.2
	Height of support (“lock” of he-partner's hands) of optimal he-partner's posture, m	0.48
Time	Time of fulfillment of competition exercise “front death spiral from “fus”, sec.	1.97
	Time of she-partner's GMC movement up to upper pint of take off, sec.	1.03
	Time of unsupported movement of she-partner's GMC, sec.	0.66
	Time of partners' interaction before entering in unsupported movement of she-partner's GMC, sec.	0.69
	Time of partners' interaction at the moment of she-partner's contact with he-partner and moving her on parquet, sec.	0.62
Kinematic	Initial velocity of she-partner's GMC, m.s <sup>-1</sup>	1.61
	Vertical velocity of she-partner's GMC in moment of entering in unsupported movement m.s <sup>-1</sup>	4.07
	Mean vertical velocity of she-partner's GMC up to moment of entering in unsupported movement, m.s <sup>-1</sup>	3.55
	Initial horizontal velocity of she-partner's GMC, m.s <sup>-1</sup>	0.2
	Horizontal velocity of she-partner's GMC up to moment of entering in unsupported movement, m.s <sup>-1</sup>	0.5
	Mean horizontal velocity of she-partner's GMC up to moment of entering in unsupported movement, m.s <sup>-1</sup>	0.44
	Initial acceleration of she-partner's GMC, m.s <sup>-2</sup>	10.91
	Initial acceleration of she-partner's GMC at moment of entering in unsupported movement, m/s <sup>-2</sup>	-6.7
Dynamic	Initial total force, applied by both partners to she-partner's GMC, kg.	88.75
	Initial total force, applied by he-partner to she-partner's GMC, kg.	74.41
	Initial total force, applied by she-partner to own GMC, kg.	14.82
	Initial total force, applied by she-partner to own GMC at moment	0.0

Level of simulation:	Parameters	Model characteristics
	of entering in unsupported movement, kg.	
	Total impulse of partners' force applied for entering of she-partner's GMC in unsupported movement, kg.m.s <sup>-1</sup>	24.75
	Impulse of he-partner's force applied for entering of she-partner's GMC in unsupported movement, kg.m.s <sup>-1</sup>	16.3
	Impulse of she-partner's force applied for entering of own GMC in unsupported movement, kg.m.s <sup>-1</sup>	8.45

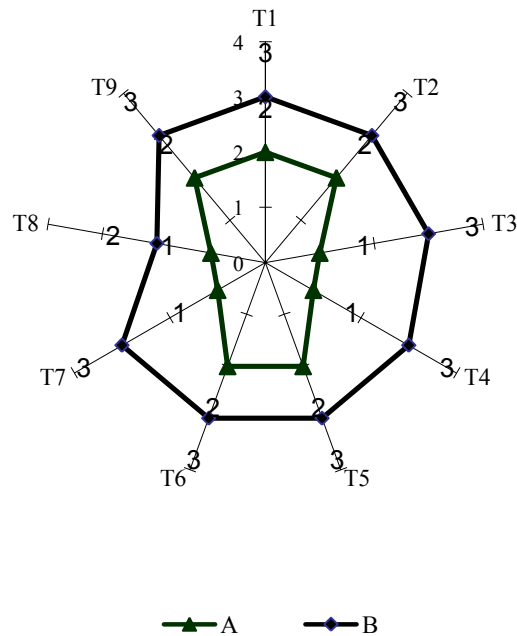
Thus, as per results of the fulfilled bio-mechanical analysis we specified peculiarities of partners' actions, oriented on improvement of this exercise's technique.

The obtained data permitted to work out program and complexes of exercises for perfection of special and physical fitness of acrobatic rock-n-roll sportsmen.

The conducted analysis of training process of "M" class category's sport pairs in period of year macro-cycle showed:

- application of the offered methodic determines change of strategy and directions of improvement of special and technical fitness of sport pairs;
- new methodic permits to introduce corrections, which facilitate improvement of pair's results at competitions.

Research of dynamic of sport pair's special physical fitness permitted to observe significant changes of strength and speed-power indicators of sportsmen as well as increment of their indicators in their interaction in pair (see fig. 1).



*Fig. 1. Dynamic of SPT indicators of acrobatic rock-n-roll qualified sportsmen in year macro-cycle of training: T1-T3 –test exercises for he-partner; T4-T6 – test exercises for she-partner; T7-T9 – test exercises for pair; A – before application of our methodic; B – after application of our methodic; T1- strength of backbone (points); T2- main movement for 20 sec (points); T3-squatting with she-partner (points); T4- main movement for 20 sec. (points); T5- 2 forward roll and 1 backward roll, "tour" for 30 sec. (points); T6- jumping on pedestal for 20 sec. (points); T7- back death spiral from "fus" (points); T8- low, upper replacement, "fus" (points); T9- rotation (cugel) (points).*

Pedagogic experiment proved effectiveness of new methodic of fulfillment of exercise "front death spiral from

“fus”, considering selection of sport pairs of qualified sportsmen of acrobatic rock-n-roll (n=20). With method of occasional choice pairs were divided in two homogeneous groups (experimental and control). Every group consisted of 5 pairs (10 persons).

It has been determined that experimental methodic facilitates acceleration of sportsmanship growth of acrobatic rock-n-roll qualified sportsmen. We found more expressive improvement of sport results of experimental group's sportsmen, comparing with control; group ( $p < 0.05$ ).

#### Conclusions:

1. We have developed methodic of selection of sport pair on the base of anthropometric partners' parameters as well as height-weight indicators, of their special and physical fitness.

2. We have determined that decisive factor of successful sport pair is equal rate of development of physical force in mutual actions that is characterized by increment of force owing to angle of bending in joints of bio-kinematic links. We also specified targeted bio-mechanical model of “front death spiral from “fus” technique for “M” class category and marked optimal parameters of its' fulfillment in acrobatic rock-n-roll.

3. Application of developed methodic permits to optimize training process of acrobatic rock-n-roll qualified sportsmen, to increase effectiveness of their performances for shorter period of time.

*Further research* implies working out of training programs in this kind of sports and increasing of sport results at all stages of training of qualified sportsmen in acrobatic rock-n-roll.

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