TOWARDS THE OLYMPIC GOLD: THE TRAINING PLAN ON THE GYMNASTICS RINGS

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Case study *DOI:10.52165/sgj.14.2.145-157*

Abstract

The objective of this article was to describe the training plan and the strategies developed with an Olympic champion gymnast on the rings in Men's Artistic Gymnastics. In London 2012, our athlete became the first Brazilian to stand on the podium in the history of Gymnastics at Olympic Games, and the first Latin American to win an Olympic gold medal in Gymnastics. At the 2016 Rio Olympic Games, the gymnast again stood on the podium and won the silver medal. However, we have not yet seen studies that would highlight the preparation process of an athlete that culminated in such unprecedented achievements for Gymnastics at the continental level. We present the structure of the periodization of this gymnast for the period cycle that included the Olympic Games. In order to detail the training process, we looked at the training sheets with strength tests, the macrocycle, and the physical and technical preparation distributed among the three stages of the macrocycle. The periodization planned and applied by the coaches led the gymnast to increase the complexity of the technical elements of his routine, which made it possible to increase the final score. The main factors that facilitated the Olympic result were the training periodization in three stages and the competitive tactics in the preparatory evaluations.

Keywords: *artistic gymnastic, resistance training, muscle strength, athletic performance.*

INTRODUCTION

Men's Artistic Gymnastics (MAG) comprises competitions on six apparatus, including the rings. This apparatus requires varied technical elements of swing, strength and hold in approximately equal parts (FIG, 2018). Thus, various forms of muscular strength manifestation (isometric, endurance and power) are required; they are presented in specific ways in MAG routines, with the execution quality of gymnastics technical elements (FIG, 2018).

The motor capacities required in gymnastics are primarily determined by the need to manipulate gymnasts' own body mass (Arkaev & Suchilin, 2004; Smolevskiy & Gaverdovskiy, 1996). The rings event demands predominantly upper limbs strength (FIG, 2018; Smolevskiy & Gaverdovskiy, 1996). Considering that the main motor task is to lift and support one's own body weight, relative strength is very important for the event (Arkaev & Suchilin, 2004; Jemni, Sands, Friemel, Stone, & Cooke, 2006), as well as endurance strength that requires a relatively long duration of muscle tension with minimal decrease in its efficiency. Its manifestation can occur

dynamically or statically (Siff & Verkhoshansky, 2004).

The physical training process must respect a series of biological principles that aim at best results, such as biological individuality, specificity, overload, and reversibility (Bompa, 1999; Issurin, 2010). The periodization is applied to improve the physical training process, which is a comprehensive and detailed way of planning the development of performance for a certain period of time by observing the principles of sports training (Gomes, 2009). The purpose of periodization is to facilitate the best possible performance and, concomitantly, to preserve the integrity of athletes through a coherent distribution of content and appropriate handling of training loads by specific stages, distributed throughout the entire sports career (Lacordia, Miranda, & Dantas, 2006; Weineck, 1999). Periodization is a training subdivision that aims to improve the athletes' performance to peak at competitions, that is, the competition calendar that the coach prepares by planning the cycles and defining the milestones to reach the set objectives (Bompa, 1999; Verkhoshanski, 2001; Weineck, 1999).

One of the challenges in MAG is to plan the training program in such a way that progressive and balanced demands are met to achieve the objectives, but at the same time to maintain the integrity and prolong the gymnast's career (Tricoli & Serrão, 2005). The double periodization, used in the present study, occurs over two periods of competitions in a year, and is indicated for high performance athletes and sports disciplines that run competitions for extensive periods of the year (Bompa, 1999; Weineck, 1999).

The block periodization system is an efficient alternative to the traditional model (Issurin, 2016), as it also seems to be superior to the traditional periodization for athletes who participate in sports disciplines characterized by fast muscular contractions of the upper limbs (Bartolomei, Hoffman, Merni, & Stout, 2014) as occurs in most MAG competitions.

Given the goals set by the coaches and the challenge to achieve results, which periodization model should be followed? In the current context, the question is very relevant for many coaches. In the literature, studies were found for Women's Artistic Gymnastics (Lacordia et al., 2006) in Brazil or for MAG in other countries (Chu, 1994; James, 1987), which means that there are limited materials that can be used for our scientific basis.

There are some international models offered, including suggestions from the *Fédération Internationale de Gymnastique* (Fink & Hofmann, 2015). However, high performance coaching is very individualized, therefore, specific to each athlete. Nevertheless, models are valuable as support materials for less experienced coaches as they provide comparisons and diverse reflections, and help coaches update and share their experiences.

Thus, a scientific paper describing and clarifying how the training of an Olympic Champion was thought out, planned, and executed is of great importance, since it would support other coaches and would be a useful guidance for their athletes when designing their training. Therefore, the objective of this work was to describe the training periodization of the gymnast who won the gold medal on the rings event at the London Olympic Games.

METHODS

In the present study, this gymnast is responsible for the greatest achievement in the history of Brazilian AG. It occurred at the London Olympic Games (2012) when he won the ring event and was awarded the unprecedented gold medal. At that time, the gymnast belonged to the senior category, was 22 years old and had had 13 years of sport practice, always in the same institution and with the same coaches. The project gained approval from the State University of Campinas Research Ethics

Committee, CAAE:16529219.8.0000.5404, and followed all the ethical precepts for studies involving human beings.

The weekly training frequency involved ten sessions lasting approximately 25 to 30 hours. Both the systematic preparation and the training plan progression were developed through direct observation (Borresen & Lambert, 2009) of the gymnast's training needs by the head coach, who at the time had accumulated more than 20 years of experience in MAG coaching. The training sessions included preventive exercises with physiotherapist, general and specific warm-ups, technical preparation with elements on the apparatus, combinations of elements or complete routines, and finally, physical preparation with specific exercises on weight-training apparatus, or on competition rings with adaptations.

In order to guide the load values for strength training, dynamic concentric strength tests (Planche Support, Hirondelle, Azarian, Inverted cross, Triceps, Dorsal Leg, Cross, Front Raise, ESG, cross on pulley) of one maximum repetition (1MR) were performed (Kraemer & Ratamess, 2004). After the warm-up, the gymnast performed the movements with the maximum possible load using adjustable dumbbells, without technical faults in execution, with two minutes of rest between them (McArdle, Katch, & Katch, 2008). The tests used to quantify training loads were proposed by the International Gymnastics Federation (FIG, 2018; Fink & Hofmann, 2015) and adjusted by the coaches according to the specifics of the gymnast and the training venue.

For this type of test, in addition to the methodological issues that must be considered, it should be noted that the values obtained vary depending on the subject, the level of strength, the experience, and the number of maximum contractions performed (Häkkinen, Alén, & Komi, 1985; Hartmann, Bob, Wirth, & Schmidtbleicher, 2009).

Furthermore, the tests were based on the specific intended technical elements that would be part of the target routine to be presented at the Olympic Games. The routine presented at the Games, which has theD-score of 6.8 points, contained the following technical elements: roll backward slowly to planche support (2s) (E value 0.5); descent to back lever (2s) (A value, not counted); press to hirondelle (2s) (F value 0.6); uprise backward to support scale (2s) (D value 0.4); double salto forward piked (D value 0.4); uprise backward to support scale straddled (2s) (C value 0.3); roll backward slowly to hirondelle (2s) (F value 0.6), through hanging scale rearways with straight arms pull to cross (2s) (D value 0.4); salto forward direct to cross (2s) (D value 0.4); uprise backward swing to handstand with straight arms (C value 0.3); double salto backward stretched with full twist (D value 0.4); plus 2.5 points for five groups of elements.

Descriptive statistics were used to analyze the data. The load amount in the maximum strength tests and exercise weight/body weight ratios for calculating the relative strength for cycle distribution were calculated in Microsoft Excel software.

RESULTS

Table 1 presents the competitions that the gymnast participated in during each macrocycle, with dates, results and final scores for difficulty and execution. Table 2 shows the results of the 1MR strength test. Even though at the beginning of the macrocycle the relative strength values were already close to one for the basic exercises when performing technical elements as part of the routines, such as the planche support, hirondelle and cross.

Table 1
Competition calendar and competitive performance.

Competition	Date	Result	Final Score (Dif + Exec)
World Cup – Cottbus / Germany	22 - 25 / Mar	2nd	15.600 (6.5 + 9.100)
International Meeting – SBC / Brazil	13 - 15 / April	1st	15.825 (6.8 + 9.025)
World Cup – Osijek / Croatia	27 - 29 / April	1st	15.875 (6.8 + 9.075)
Challenge cup – Maribor / Slovenia	01 - 03 / June	1st	15.575 (6.8 + 8.775)
World Cup – Ghent / Belgium	09 - 10 / June	1st	15.925 (6.8 + 9.125)
Olympic Games – London / England	27 - 31 / July	1st	15.900 (6.8 + 9.100)

Legend: Dif = Difficulty, Exec= Execution

Table 2
Maximum Dynamic Strength Test 1MR.

		Weight	Relative strength
Gymnast		59.5	-
Exercises	Support planche	58	0.97
	Hirondelle	61	1.03
	Azarian	30	0.50
	Inverted cross	51	0.86
	Triceps	35	0.60
	Dorsal Leg	42	0.71
	Cross	60	1.01
	Frontal Raise	32	0.54
	ESG	45	0.76
	Pulley cross	47	0.79

Legend: ESG= erector spinae group, weight in Kg, relative strength = exercise weight/body weight.

The double periodization model was used in the planning with the first macrocycle of 28 weeks between January and July (date of the Olympic Games), divided into three distinct blocks: A (Basic), B (pre-competitive) and C (competitive), but correlated (Siff & Verkhoshansky, 2004; Verkhoshanski, 2001), with the main characteristic of concentrated and distributed loads throughout the training cycle. The worksheet of the first macrocycle is shown in Table 3; the second macrocycle is not addressed in this study.

The basic stage (Block A) contained the largest training volume of the entire season. Its objective was to destabilize previous performance levels, aiming to increase strength gains, with greater emphasis on the total volume of repetitions to obtain greater adaptation of the neuromuscular complex to be used (Verkhoshanski, 2001). The central objective was the elevation in the motor potential of the athlete, ensured by a high volume of means and special training methods with emphasis on strength.

The pre-competitive stage (Block B) developed the increase in strength and speed capacity (explosive strength), decreased the volume and increased the intensity of training, to intensify the muscle tension index and activate the neuromuscular system (Verkhoshanski, 2001). Thus, the volume was reduced, and specific loads were accentuated, especially the more intense ones, supported by the foundation created by the morphological and functional changes in the system.

Finally, in the competitive stage (Block C) of the macrocycle, the main objective was training with low volume and greater intensity so that training became more specific to the sport. It was characterized by a greater incidence of

competitive loads which aimed to consolidate the athlete's readiness at the highest level and coincided with major competitions.

Table 4 presents the distribution of the physical preparation variables (means, method, sets, repetitions, load and rest) between the training Blocks. Comparing the variables in the Blocks, an adjustment of values and items from a general training organization to a specific organization of the routine on the apparatus can be observed: a decrease of sets and repetitions, a load increase until close to the maximum relative strength, and a rest increase.

Table 5 presents the distribution of the technical preparation between the days of the week in accordance with the training Blocks. Comparing the days in each Block, a few modifications in the combination of movements are notable, adapted to the gymnast's individual needs. However, when considering the distribution during the week, there is a variation in the movements and methods. As for the apparatus, there is the construction of the routine to be presented, with the refinement of movements and combinations of technical elements acquired and new combinations, in line with the gymnast's partial results and scoring needs.

DISCUSSION

The objective of this paper was to describe the training plan of the Olympic champion in the rings event. The objectives and methods of strength training vary according to sports characteristics, the athlete and the competitive calendar (Bompa, 1999). The increase in the number of competitions (Gomes, 2009), the development of the sport and the need for success were determinant factors in the search for new training systems to ensure an increase and prolongation of the sport performance in the athlete at the highest competitive level (Platonov, 2008). Considering the sequence of competitions presented in the calendar, and the need to be present at a competitive level on the international scene, the coach's choice to devise an extended competitive block of 12 weeks was justified. In order to understand the periodization planning, we started by analyzing the competition calendar for the Olympic year (Table 1), in an attempt to coincide the performance peaks with target events (Bompa, 1999; Verkhoshanski, 2001; Weineck, 1999).

Due to competition distribution in this calendar, the double annual periodization (Weineck, 1999) with two competitive periods or macrocycles was used in the planning, using three blocks in the two macrocycles (Siff & Verkhoshansky, 2004; Verkhoshanski, 2001). In a year composed of two macrocycles, the first cycle presents approximately seven months and comprises a preparatory period (Block A and B in the present study) and another competitive period (Platonov, 2008) (Block C in the present study).

In the case of the present study, the training loads, normally considered for the basic stage, were developed already with technical elements of a high contemporary competitive level. This was possible due to the relative strength values already found close to the body weight (reason one) in the basic exercises. Additionally, it was considered that the gymnast had many years of preparation and international results, such as world championships, already behind him.

This physical-technical basis allows for more complex technical elements to be developed more quickly (Siff & Verkhoshansky, 2004; Smolevskiy & Gaverdovskiy, 1996). We emphasize the importance of a long-term training plan (Bompa, 1999). In the case of gymnasts in different technical conditions, it would be interesting to observe the development of relative strength for the consolidation of technical elements and their inclusion in the routine (Smolevskiy & Gaverdovskiy, 1996).

Table 3
Macrocycle worksheet.

MONTHS	**JAN**			**FEB**				**MAR**				**APR**					**MAY**				**JUNE**					**JULY**		
WEEKS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
BLOCKS	BLOCK A									BLOCK B													BLOCK C				
STAGES	A1			A2				RA		B1				B2			RB						C1				
Duration (weeks)	3			4				1		4				3			1						12				
Controls	A			A						C		A	C			C			A			C	C		A				C
Volume Control				▲								►											▼				
Intensity Control				▲								▲											▲				
Methodologic Variation				▲								►											►				
Dynamic Maximum Strength				XXX								XX											XX				
Explosive Strength				XX								XX											XXX				
Isometric Maximum Strength				X								XXX											XX				
Static Resistance Strength				X								XX											XXX				
Dynamic Endurance Strength				X								X											XX				
Anaerobic endurance				X								XX											X				
Speed				X								X											X				
Flexibility				XX								X											X				

Legend: AR=Block A Regenerative BR= Block B Regenerative E=Evaluations, C=Competitions, Importance of the capabilities: X=not very important, XX=important, XXX=very important, ▲=increased, ►=maintenance, ▼=decreased.

Table 4
Distribution of physical preparation in the training blocks.

	BLOCK A			BLOCK B			BLOCK C
STAGE	**A1**	**A2**	**A Regenerative**	**B1**	**B2**	**B Regenerative**	**C1**
VARIABLES							
Main Capacity	Maximum Strength			Explosive Strength			Explosive Strength
Means	Weight training			Weight training		i) Specific exercises on the apparatus ii) Weight-training[d]	Technical elements of the test
Method	Multiple sets			Multiple sets	Contrast	Multiple repetitions	Multiple repetitions
Series	3 to 4	3 to 4	3 to 4	3 to 4	i) 3 to 4 ii) 3+1+1+1+1+1 iii) 1+1+1+1+1+1	i) 1 ii) 1	1 to 2
Repetitions	Maximum	4 to 6	6 to 8	6 to 8	i) 4 to 6 ii) 2+3+1+3+1+3 iii) 3+2+2+2+1+3[c]	i) 1 ii) 2 to 3[e]	1 to 2
Load (%)	75[a]	85[b]	85	90	i) 70 ii) 90+50+90+50+80+40 iii) 85+60+90+40+80+40	i) additional load on the body up to 103 ii) 85 to 95[d]	- body weight - additional loads
Rest	90 s	120 s	180 s	180 s	i) 120 s ii) 180 s to 240 s iii) 180 s to 240 s	180 s to 300 s	180 s to 300 s

Legend: a=load referring to the last test of the previous year, b=load referring to the new test of the current year, c=at the end of high loads performs isometric of 2-3 seconds, d= Weight work only 2 x per week, e= isometrics of 3 seconds at the end of each exercise.

Table 5
Distribution of technical preparation in the training blocks.

	BLOCK A			BLOCK B			BLOCK C
Day	**ME A1**	**ME A2**	**A Regenerative**	**ME B1**	**ME B2**	**B Regenerative**	**ME C1**
Monday	Hirondelle, ESG, Elevation, Inverted Cross			Hirondelle, ESG, Elevation, Inverted Cross	Hirondelle, ESG, Inverted Cross Azarian, Dorsal legs, Cross	Hirondelle, ESG, Elevation, Inverted Cross	Rest
Tuesday	Specific: cross with rubber and in the cart, Hirondelle in the cart and sequence in the rings with pulleys			Specific: cross with rubber and in the cart, Hirondelle in the cart and sequence in the rings with pulleys			*
Wednesday	Azarian, Triceps, Dorsal Leg and Cross.			Azarian, Triceps, Dorsal Leg and Cross.	Elevation, Azarian, Triceps, Dorsal Leg and Cross.	Azarian, Triceps, Dorsal Leg and Cross.	*
Thursday	Specifics: Hirondelle and extended ascent in the parallel bars, inverted cross on the cart and sequence in the rubber rings			Specifics: Hirondelle and extended ascent in the parallel bars, inverted cross on the cart and sequence in the rubber rings			*
Friday	Elevation, Inverted Cross, ESG, Hirondelle.			Elevation, Inverted Cross, ESG, Hirondelle.	Triceps, Elevation, Inverted Cross, ESG, Hirondelle.	Elevation, Inverted Cross, ESG, Hirondelle.	*
Saturday	Cross, Triceps, Dorsal Leg, Azarian.			Cross, Triceps, Dorsal Leg, Azarian.	Varied Specifics from 3rd to 5th	Cross, Triceps, Dorsal Leg, Azarian.	*
Official Apparatus	- new elements - maintenance and improvement of the elements already acquired.	- linking elements and sequences - new elements - combinations.	- 3part routines - new combinations of technical elements	- 2-part routines - sequences and combinations of technical elements	- full routines - new combinations of technical elements	- full routines - new combinations of technical elements	- full routines - combinations

*Legend: MS= Micro Stage, ESG= erector spinae group *= Test Specific Test Exercises.*

The organization of training in blocks (Verkhoshansky, 1990) is based on the premise that high performance athletes have an extremely high level of special preparation and that the use of complex and non-specific loads may cause negative changes in physiological functions. Thus, when high performance athletes have their competitive capacity increased, training conditions must simulate the competitive demands (Verkhoshansky, 1990).

In Table 3, the disposition of a higher loads volume is aimed at training localized anaerobic muscular endurance and maximum strength. In Block A it is justified by the need to create a solid muscular and joints structural basis with the purpose of ensuring a simultaneous development of specific loads with technical quality. The duration of Block A was between six and 12 weeks, the same as Block B (Issurin, 2016).

Block C with 12 weeks seems long, which allows us to speculate about stabilization or adaptation to this training block. The competitive period is characterized by the high volume of competitive loads, that is, where the main competitions of the year are concentrated (Platonov, 2008). Thus, this period is characterized by a noticeable decrease in volume and a considerable increase in intensity combined with complete rests (Platonov, 2008). However, when considering the number of competitions in this block, it contributes to the destabilization of the training routine (Kraemer & Ratamess, 2004). Competitions, especially international ones, involve trips of approximately 24 hours due to the distance from Brazil to the competition venues, as well as acclimatization to another time zone and adaptation to a different training and competition environment, another gymnasium and apparatuses.

In Table 4, for considerable improvement in the sport, it is necessary to create a "power reserve" of the locomotor potential, that is, the development of motor skills to a desirable level to perform new motor tasks. This ensures that new movements can be learned within the limits of the locomotor potential (Siff & Verkhoshansky, 2004). Thus, to improve the gymnast's performance, it was necessary to develop his strength capacity to levels that would allow him to improve the execution technique and to include some element of higher difficulty.

Regarding Table 5, the routine presented at the Olympics was already outlined from the beginning of the periodization planning. In the World Championships held the previous year, the coach observed that the best gymnasts scored 6.8 points for Difficulty on rings. Thus, the new objective was to adjust the Brazilian gymnast’s Difficulty score by replacing some technical elements for others of higher difficulty. This is an example of annual planning in AG (Arkaev & Suchilin, 2004; Smolevskiy & Gaverdovskiy, 1996).

A noteworthy point of this tactical strategy was the coach’s visualization about the gymnast characteristics, that is, his condition and needs, weaknesses and strengths.

This anticipated planning provided the physical-technical basis to fulfill the sequence of technical elements with quality execution, and allowed the goal to be reached, with higher difficulty and thus routine value. Currently, the value of execution penalties influences how coaches compose the routines, which is determined by the relation between the highest difficulties a gymnast can perform over the lowest penalty (Carrara & Mochizuki, 2011).

The gymnast’s technical ability is measured by competition results, in addition to control test results in the technical preparation (Gomes, 2009). To measure the competitive performance, the difficulty and execution scores during the competitions in the macrocycle were used (Smolevskiy & Gaverdovskiy, 1996). When comparing the scores of the first competition of the year - 15.533 (6.5 of

difficulty plus 9.033 of execution) and the Olympic final - 15.900 (6.8 of difficulty plus 9.100 of execution), we have an increase in both the Difficulty score and the Execution score, which indicate that the planning using the MAG performance parameters at the Olympic level was appropriate.

The investigations aimed to intensify the training process have suggested that competitive activity should be simulated under training conditions (Verkhoshansky, 1990). Thus, the use of the means of special physical preparation on a large scale is indicated to ensure that similar stimuli to those found in competitions contribute to the simultaneous resolution of tasks related to technical, tactical, physical and psychological aspects (Verkhoshansky, 1990).

The concentrated loads training strategy is suitable for sports that require one main fitness component, or are based on some targeted abilities (Issurin, 2016). It was well adapted to the present work for the rings event in MAG, with similar movements among the ten valid skills.

In the pre-competitive stage B1, the gymnast was already prepared to present the routine with higher difficulty, but the coach understood that it would be better to present it at the end of the B2 stage, to maintain the quality of the presentation, seen by the execution score identical to the first competition of the year with lower difficulty.

The goal of the Brazilian gymnast was to win one of the first three places in all competitions in the year of the Olympic Games. At the World Cup in Cottbus, the gymnast qualified in the first place with a difference of 0.10 points over the second place, won by the Chinese gymnast. However, the Brazilian coach chose not to compete with new routines with 6.8 points Difficulty score, so that the Chinese gymnast would not have enough time to overcome it for the Olympics. Thus, in this World Cup final, the Brazilian gymnast lost the first place to the Chinese gymnast by 0.10 points. This was the only competition before the Olympics in which they faced each other. This is an interesting point as it is crucial to know how to apply information assertively to the individuality and specificity of the athlete and the objective that is being sought.

Therefore, to accomplish the Olympic result, the participation of the Brazilian gymnast was planned technically and tactically, so he would get to the podium and be seen by the judges as a potential champion in the Olympic Games. For this reason, all coaches should be concerned with defining long-term objectives in competitive sports, to establish and facilitate long and realistic sports career plans with training conditions adapted to the characteristics of their gymnasts (Araújo, 1998).

After this Cup in Cottbus, the Brazilian gymnast began to compete with a new routine with 6.8 points difficulty. The first test was a meeting in Brazil. There were still three more World Cup stages before the Olympics, and the goal in this phase was to win these events. In addition, the gymnast who wins familiarises himself with being on the podium, and this would induce his desire to focus on training and keep him motivated to continue this cycle (Nunomura, Okade, & Carrara, 2012).

The strategy at the Olympics was to compete in the qualifying competition with a difficulty score of 6.5 points, which placed the Brazilian gymnast in the fourth place. This was planned so that in the draw for the finals the gymnast would not qualify in the first place. If this happened, he would be the first to perform in the finals and would be a reference for other finalists. This situation would not be favourable, because the next gymnasts could try to raise the value of their routines to overcome the Brazilian gymnast.

The coaches observed that there was usually constancy in the deduction for execution errors from the qualifying to the final phase in the rings event in former Olympics editions. This was also expected

for the Brazilian gymnast, due to little variability in the execution of technical elements, which is typical at this high-level (Carrara, Amadio, Serrão, Irwin, & Mochizuki, 2016). Thus, by raising the difficulty score to 6.8 points, his final score would also increase proportionally, and would lead to the coach and gymnast becoming champions. After testing combinations of technical elements during all the Blocks of the macrocycle, it is important to point out that it is a must for the coach to know the Code of Points in depth, and to use this knowledge for the benefit of his gymnast.

In summary, the Block periodization would have greater effectiveness in the development of maximum and fast strength compared to the traditional periodization system for the upper limbs, but not for the lower limbs (Bartolomei et al., 2014), in which the weekly undulating model would be more effective (Bartolomei, Stout, Fukuda, Hoffman, & Merni, 2015). Therefore, studies are needed to verify the applicability of this Block periodization in other MAG events, such as in floor exercises, where the demand for strength in the lower limbs is predominant for the execution of technical elements (FIG, 2018).

Moreover, the general concept of concentrated loads postulates the selective development of one main skill (strength, in the case of the present work) and is, therefore, basically indicated for sports that demand small numbers of target skills (Issurin, 2010, 2016). Thus, more research on block periodization with other MAG events would be needed, such as preparing generalist gymnasts, i.e., those who compete in all MAG events at a high level and consequently perform a greater number of skills to participate in the six apparatuses.

Given the training principles of biological individuality, specificity, overload, and reversibility, probably every preparation model in MAG should consider adjustments and adaptations to suit each gymnast individually.

CONCLUSION

The division of physical preparation into three Blocks favoured the development of the gymnast, as it allowed for controlling the training in greater detail, as well as by being better adapted to the annual calendar of competitions. The complex system of Blocks used for the MAG contemplated the programming based on the competition calendar, the organization according to the technical elements to be included in the routine of the competition, and control in accordance with the results of the competitions in the macrocycle.

The Block periodization presented in this paper for the high-level gymnast specialized in the rings event contributed to the improvement of competitive performance during the competitions of the macrocycle, through the strategy of raising both the Difficulty and the Execution scores. The practical and detailed application of this model added important knowledge to the limited existing specific literature on the subject, and may support other coaches in the development of their athletes, as long as they consider factors such as the physical condition and the technical level of their athletes, hence, their individuality.

We must also consider that the coach in this study dedicated a lot of time to studies, believed in science, integrated a multidisciplinary team, and relied on the discipline and commitment of the gymnast. These are complementary factors, whether in the scope of the training or not, that need attention for the coach and gymnast to achieve the desired result.

The competitive results obtained lead to the conclusion that the proposed periodization was adequate to provide the optimal physical and technical condition to increase gymnast's competitiveness in the proposed macrocycle.

We conclude that, with the achievement of the Olympic gold medal, this periodization model made it possible to

accomplish the goal and the final result of the referred gymnast. However, it would not be possible to affirm that other gymnasts would obtain the same success in the application of the same method, because it would depend on the training conditions available, the gymnast's individuality and the coach himself, and the general support provisions for the whole preparation process.

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Article received: 7.9.2021
Article accepted: 3.1.2022