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ACTIVE EXERCISE TIME FOR GIRLS AT RHYTHMIC GYMNASTICS TRAINING

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Abstract
Nowadays, children are most often involved in different sports clubs where they can satisfy their need for movement through recreational activities or the practice of sport on a higher level, and obtain benefits brought by regular physical activity. If the program of these activities is well-organized, its contribution is reflected in the fact that in this manner young people can increase their total time of practicing physical activity during the day. The goal of this research was to establish the active exercise time of female gymnasts in rhythmic gymnastics training sessions, with various apparatuses used in the training, as well as exercises without any apparatuses. A method of descriptive analysis was applied in this paper, with the utilization of objectively acquired data in rhythmic gymnastics training sessions. The data was collected by trained observers by applying the „SOFIT“ instrument, during November and December of 2022. Twelve training sessions were observed and analyzed, performed in three different gymnastics clubs, and attended by a total of 126 girls, aged 7 to 11. Out of the total number of training sessions, there were three that had exercises without apparatus as their content, three with jump rope exercises, three with ball exercises, and three with hoop exercises. The acquired data was first analysed by the methods of descriptive statistics, after which a comparative analysis of gained results was performed. The application of various forms of apparatuses or exercises without apparatuses influences the active exercise time, as well as coach behaviour in rhythmic gymnastics training.

Key words: REQUISITES / TRAINING CONTENT / COACH'S BEHAVIOR / CHILDREN'S SPORTS

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INTRODUCTION

A firm foundation necessary for a normal, high-quality life is set through physical activity, therefore it is considered to be one of the most important health factors alongside a healthy diet (Salam, et al., 2020). A lot is known about the significance of physical activity and its positive effects on all aspects of life, but despite that hypokinesia is one of the biggest problems of the modern age.

The modern way of life of not just adults, but young people worldwide, is characterized by unhealthy diet, excessive use of modern technology, and insufficient physical activity (Magriplis et al., 2020; Kracht, Joseph, & Staiano, 2020). All of the above only increases the significance of organized physical activity. The most frequently stated reasons for a large number of young people being insufficiently physically active are a continuous shrinkage of physical activity and exercise in the family and the wider social community, as well as reduced possibilities for everyday physical exercise in schools (Hardman & Marshall, 2000; Trudeau & Shephard, 2008). The number of obese children is on the rise, as well as the number of children with excessive body weight (Mirilov & Bjelica, 2004; Nikolić, Milutinović, Stojanović, Gligorijević, & Cvetković, 2006).

Besides solving the problem of obesity and other health issues, physical activity is an important factor in the prevention of various negative influences young people face while they are growing up, such as delinquency and different forms of addiction (Pate, Trost, Levin & Dowda, 2000), with emphasis also being placed on a positive influence of exercising on self-esteem, and relationships with one's family and other children (Matejak i Planinšec, 2008). Due to all of the above-mentioned reasons, hypokinesia, as one of the biggest problems of the modern age, demands a permanent search for activities of movement, which would neutralize or at least alleviate its negative effects. Thus, finding adequate activities of movement, especially for children, is a current issue that concerns parents and various organizational structures within social communities alike. In order to make the activities practiced by the child meaningful, they have to be adapted to the child's needs and initiate a certain „amount" movement by the child. That implies good organization, adequate motivation, but also a good knowledge of the structures of motion necessary for the child during the period of its development, and whose level of activity is satisfactory, so as to set certain processes in the organism in motion and for the child to develop properly.

With the aim of increasing the scope of everyday physical activities, aside from regular physical education classes, children are nowadays mostly involved in different sports clubs, where through recreational activities or the practice of sport on a higher level, they can satisfy the need for movement and obtain benefits brought by regular physical activity. One of the branches of sport, mostly meant for the female population, which has a very suitable content for a comprehensive development of a child's organism, is rhythmic gymnastics. This branch of sport, with its abundance and variety of structures of motion, as well as its availability and wide application of its content, offers the possibility to achieve an all-round positive influence on the development of the organism of a child who is engaged in it (Radisavljević, Lazarević & Moskovljević, 2006; Radisavljević i Moskovljević, 2011, Dobrijević, Moskovljević i Milanović, 2015), which is the reason the practice of rhythmic gymnastics is often recommended to girls in the period of growth and development.

Apart from the above-mentioned, in available literature we often come across papers discussing the active time children spend exercising in physical education classes in schools. Given the fact that it is very important for children to also be physically active outside of physical education classes, it is necessary to determine the length of the active exercise time in training within different sport programs. In relation to this, the goal of this research was to ascertain the active exercise time of female gymnasts in rhythmic gymnastics training sessions, in which various apparatuses were used, as well exercises without apparatuses.

METHOD

This research was organized as a transversal study during which training sessions of rhythmic gymnastics were observed in three different gymnastics clubs. The research was conducted during November and December of 2022. A total of 12 training sessions were observed and analysed, involving recreational groups that train for 60 minutes twice a week. Out of the total number of training sessions, there were three of each that consisted of exercises without apparatuses, exercises with rope, ball exercises, and hoop exercises.

Sample of respondents

The respondent sample was comprised of girls exclusively, because for now in Serbia there is only a program of rhythmic gymnastics for the female sex. The total number of girls attending the aforementioned training sessions is 126. Girls are aged 7-11 and train according to the rhythmic gymnastics school program, which is in accordance with the requirements and propositions determined by the Gymnastics Federation of Serbia (https://www.gssrb.rs/propozicije-program-takmicenja). A total of six coaches, also female, led the training sessions. Within each training session, the activity and behaviour of five girls, as well as their coach, were observed and analysed. To summarize, during 12 training sessions, the activity and behaviour of a total of 60 girls and six coaches were observed and analysed.

A sample of variables

A total of 18 variables were observed and analysed in this research. Apart from the variable that refers to the total training duration (TD), the remaining 17 variables were divided in three groups according to observed content. The first-group variables refer to the activities of athletes (5 variables), the second-group variables to training content (6 variables) and the third-group variables to coach participation and behaviour (6 variables). System for Observing Fitness Instruction Time was used for monitoring the mentioned variables – the „SOFIT“ instrument (McKenzie, Sallis, & Nader, 1992; McKenzie, & Smith, 2017). This instrument was primarily constructed for research needs in the area of physical education, where lessons last for 45 minutes, therefore the number of observations was increased for the needs of this research, so the 60-minute duration of the rhythmic gymnastics training could be covered fully.

The „SOFIT“ instrument uses 5 codes for **student activity** and they mark the following: **1** – lying down, 2 – sitting, **3** – standing, **4** – walking, **5** – vigorous movement. If a student moves from one category to another during the observed interval, the higher category is recorded.

Context distributed to the majority of participants (51%) involved in specific training in the observed interval was recorded within **the training content** category. Codes within this category refer to the following: „**M“** (*Management)* – choosing a team, equipment change, moving from one place to another, coach explanation, roll-call; „**K“** (*Knowledge*) - information: history, technique, tactics, rules, conduct; „**F“** (*Physical fitness*) – aerobics, form exercises, running, weight exercises, agility exercises, testing, warm-up, relaxation exercises; **„S“** (*Skill practice)* – Practicing technique, studying forms of movement, practicing the learned techniques; „**G“** (*Game*) - games (elementary), competitive; „**O“** (*Other*) – this time looks like rest when athletes can choose whether they want to participate or not.

Coach behaviour is defined through six activities. Codes within this category refer to the following: „**P“** (*promotes fitness*) - promotes fitness, cheers students on, supports activities, encourages and supports the participants; „**D“** (*Demonstrates fitness*) – demonstrates; **I** (*Instructs Generally*) – gives general instructions and knowledge, describes training content (rules, technique, tactics), corrects mistakes; supports the rhythm and tempo of the performance of the exercise with their voice or by giving tempo; „**M“** (*Management*) – sets the equipment, does roll-call, directs the participant to other tasks; „**O“** (*Observes*) – follows the entire class, observes; „**T“** (*other task*) – other tasks.

Data acquisition protocol

Five previously prepared observers performed the observation of student activity, training content, and pedagogical activity of the coaches by applying the „SOFIT“ instrument. All training sessions were recorded in the form of video material (Crotti, Rudd, Weaver, Roberts, O'Callaghan, Fitton Davies, & Foweather, 2021; Fairclough, Weaver, Johnson, & Rawlinson, 2018), that was later analysed in accordance with standard procedures (McKenzie, Sallis, & Nader, 1992; McKenzie, & Smith, 2017). Each observation phase lasted for 20 seconds, divided into 10 seconds of observation and 10 seconds of coding. The trained observer followed the events of the training for 10 seconds, and then in the following 10-second interval recorded the observed parameters (codes) in the tracking form (Table 1). In order not to disrupt the continuity of the observation and writing down the data, a sound signal announced the beginning and the end of an interval to the observers.

Table 1: Form for following participant activities, training content, and coach behavior

Intervals	Participant activity	Training content	Coach behavior
1	1 2 3 4 5	M K F S G O	P D I M O T
2	1 2 3 4 5	M K F S G O	P D I M O T
…	1 2 3 4 5	M K F S G O	P D I M O T

Statistical data analysis

Statistical data analysis was performed in programs SPSS 21 and Excel 2015. Standard descriptive indicators are displayed for all the observed variables, these being the mean value (Mean), standard deviation (SD), minimum value (min) and maximum value (max). The normality of the result distribution was tested by the *Kolmogorov-Smirnov* test. The significance of the differences in the values of variables between training sessions with different apparatuses was tested by applying the univariant ANOVA. *Bonferroni* post-hoc test, as an integral part of ANOVA, was applied for all the variables that had mean group values that proved to be significantly different, in order to determine the individual differences between pairs of training sessions with different apparatuses. Differences in acquired results for the whole training were tested, as well as for each of the training phases individually. All values smaller than 0.05 were considered significant.

RESULTS

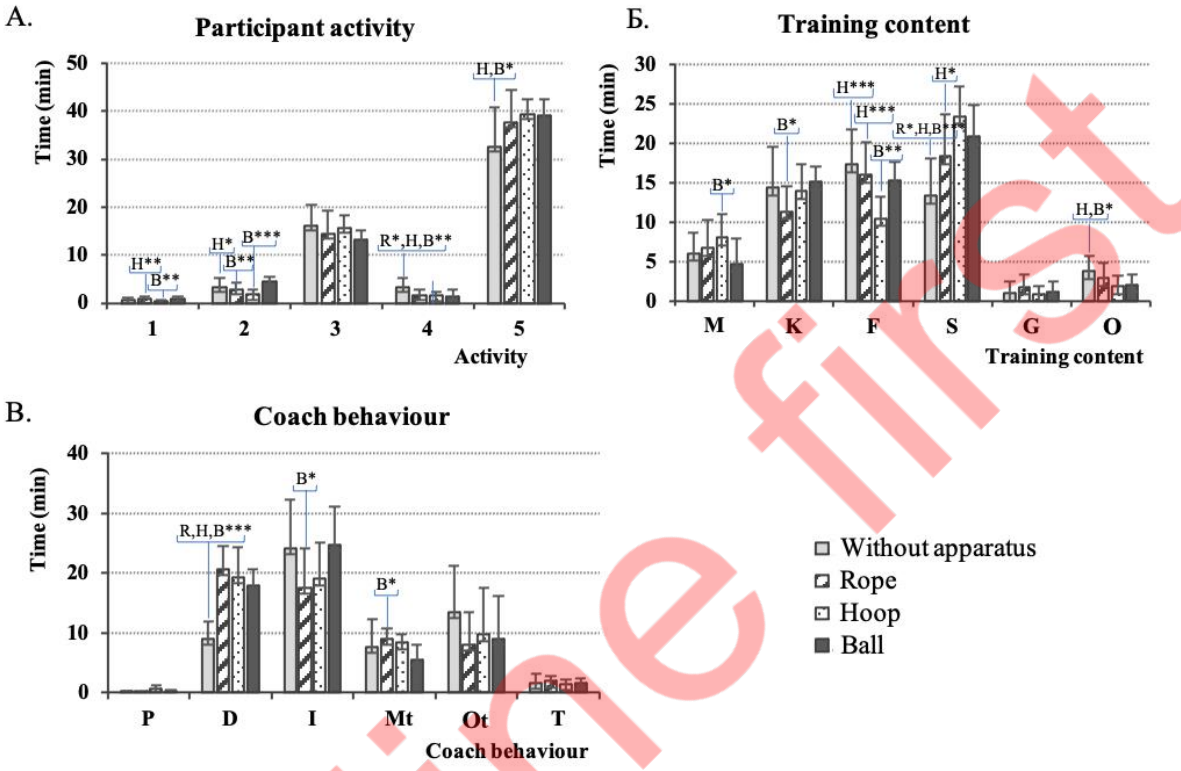
Table 2 and Graph 1 show analysis results of the complete training based on apparatuses used in the training. The total (absolute) training time amounted to 58.5 minutes on average and did not show a dependence on the type of apparatus or exercises without apparatus used within the framework of the training. Out of the total time provided for the training, girls were vigorously active between 54.4 and 65.7% of the time. The results also show that time spent being active is greater in training sessions using apparatuses, compared to those whose exercise content was without apparatuses, and significant differences were registered in relation to training sessions in which the techniques of hoop and ball were trained. When it comes to the average time spent lying down and sitting, the greatest values were observed in sessions with ball exercises. The average standing time is approximately the same in all the sessions regardless of their content.

Table 2. Time parameters of activities during rhythmic gymnastics training

Variables		All training		Without apparatus		Rope		Hoop		Ball	
		Mean ± SD	min - max	Mean ± SD	min - max	Mean ± SD	min - max	Mean ± SD	min - max	Mean ± SD	min - max
TTD		58,5 ± 2,1	54,3 - 61,7	58,1 ± 3,1	54,3 - 61,7	57,8 ± 1,3	56,0 - 59,0	58,9 ± 1,2	57,3 - 60,0	59,3 ± 2,0	56,7 - 61,0
Participant activity	**1**	0,7 ± 0,5	0,0 - 2,3	0,6 ± 0,4	0,0 - 1,7	0,8 ± 0,5	0,0 - 1,7	0,3 ± 0,3	0,0 - 0,7	0,9 ± 0,6	0,3 - 2,3
	2	3,1 ± 1,7	0,0 - 7,7	3,4 ± 1,9	1,0 - 7,7	2,8 ± 1,5	0,3 - 5,3	1,8 ± 1,0	0,0 - 3,7	4,5 ± 1,0	2,7 - 6,3
	3	14,9 ± 3,8	6,3 - 21,7	16,2 ± 4,3	10,0 - 21,7	14,4 ± 5,0	6,3 - 21,3	15,6 ± 2,7	10,0 - 20,0	13,2 ± 2,0	10,3 - 16,0
	4	2,0 ± 1,6	0,0 - 6,0	3,3 ± 1,8	1,0 - 6,0	1,6 ± 1,2	0,0 - 3,7	1,5 ± 0,9	0,0 - 3,3	1,5 ± 1,4	0,0 - 4,7
	5	37,2 ± 6,3	13,3 - 48,3	32,6 ± 8,3	13,3 - 45,7	37,7 ± 6,7	26,3 - 48,3	39,4 ± 3,2	33,0 - 45,3	39,0 ± 3,3	33,7 - 44,0
Training content	**M**	6,4 ± 3,2	1,3 - 13,3	6,1 ± 2,6	2,7 - 12,3	6,8 ± 3,5	2,0 - 12,7	8,0 ± 3,0	3,0 - 13,3	4,7 ± 3,1	1,3 - 11,3
	K	13,7 ± 3,8	6,3 - 22,0	14,4 ± 5,1	9,0 - 22,0	11,4 ± 3,1	6,3 - 16,0	14,0 ± 3,4	7,0 - 17,7	15,1 ± 2,0	12,7 - 18,3
	F	14,8 ± 4,3	6,0 - 22,7	17,4 ± 4,4	7,3 - 22,0	16,0 ± 4,1	11,7 - 22,7	10,5 ± 2,7	6,0 - 15,3	15,2 ± 2,5	11,7 - 20,3
	S	19,0 ± 5,8	7,0 - 30,3	13,3 ± 4,8	7,0 - 20,3	18,4 ± 5,3	12,3 - 27,7	23,4 ± 3,8	17,0 - 30,3	20,8 ± 4,0	12,0 - 27,3
	G	1,2 ± 1,4	0,0 - 3,7	1,0 ± 1,5	0,0 - 3,3	1,8 ± 1,5	0,0 - 3,7	0,8 ± 1,0	0,0 - 2,7	1,1 ± 1,4	0,0 - 3,7
	O	2,7 ± 1,8	0,3 - 7,0	3,8 ± 2,0	0,7 - 7,0	2,9 ± 1,8	0,7 - 5,7	1,8 ± 1,4	0,3 - 5,0	2,1 ± 1,2	0,3 - 4,0
Coach behaviour	**P**	0,3 ± 0,4	0,0 - 1,7	0,1 ± 0,1	0,0 - 0,3	0,0 ± 0,1	0,0 - 0,3	0,7 ± 0,5	0,0 - 1,7	0,2 ± 0,2	0,0 - 0,7
	D	16,7 ± 5,9	4,7 - 27,3	9,0 ± 2,9	4,7 - 14,0	20,6 ± 4,0	15,0 - 27,3	19,3 ± 5,0	13,0 - 25,3	17,9 ± 2,7	14,3 - 22,7
	I	21,4 ± 7,4	7,7 - 33,3	24,1 ± 8,2	12,3 - 33,0	17,6 ± 6,6	7,7 - 29,3	19,0 ± 6,1	7,7 - 27,7	24,7 ± 6,4	13,7 - 33,3
	Mt	7,6 ± 3,1	2,0 - 15,7	7,7 ± 4,7	2,3 - 15,7	9,0 ± 1,8	6,3 - 12,0	8,3 ± 1,5	6,3 - 11,3	5,5 ± 2,5	2,0 - 10,3
	Ot	10,1 ± 7,2	0,3 - 23,0	13,6 ± 7,7	0,7 - 22,7	8,0 ± 5,3	0,3 - 16,3	9,7 ± 7,8	1,7 - 23,0	9,0 ± 7,1	0,3 - 20,7
	T	1,7 ± 1,0	0,0 - 5,0	1,6 ± 1,6	0,0 - 5,0	1,9 ± 0,9	1,0 - 3,7	1,5 ± 0,7	0,3 - 2,7	1,7 ± 0,8	0,0 - 3,0

Legend: TTD – total training duration; Mean – mean value, SD – standard deviation, min – minimum value, max – maximum value; M – management; K – knowledge; F – Physical fitness; S – skill practice; G – game; O – other; P – promotes fitness; D – demonstrates; I – instructs generally; Mt -management; Ot – observes; T – other tasks

When looking at training content, the biggest average value of active exercise time is spent on teaching and practicing the learned techniques (Table 2). The average active time spent on play is not long, it amounts to barely more than a minute and is approximately the same in all sessions regardless of their content.



Graph 1. Time parameters of observed categories:

Legend: A. – participant activity, Б. – training content, B. – coach behaviour; R – rope, H - hoop, B – ball; M – management; K – knowledge; F – Physical fitness; S – skill practice; G – game; O – other; P – promotes fitness; D – demonstrates; I – instructs generally; Mt - management; Ot – observes; T – other tasks;
**p<0,05, **p<0,01; ***p<0,001*

The average teacher active time spent on demonstration is great and approximately the same in working with apparatuses, whereas it is considerably smaller in working without apparatuses. Time that the coach spends on giving instructions and correcting mistakes is greatest in sessions where technique without apparatuses and technique of ball handling are practiced, although significant differences were recorded only between sessions with rope and ball.

DISCUSSION

Looking at the results, it is noticeable that the utilization of available time in rhythmic gymnastics training is on an admirable level. Absolute training time comprised 96 – 98.8% of the total planned time, which is 60 minutes. It did not display a dependence on the type of apparatus or exercises without apparatuses used within the scope of the training, which is to be expected, because it is mostly conditioned by organizational factors. Compared to physical education classes where the total class time makes for 73 – 82 % (Levin et al, 2001; McKenzie et al., 2004; Marković i sar., 2013), it is evident that rhythmic gymnastics training sessions are much better organized with respect to time utilization. Some of the reasons for this difference could be the smaller number of children in sessions, compared to the number of students in a class in a physical education lesson, then a greater motivation of coaches to use up every minute of the training in order to better prepare the children for performance in competitions. Conditions in which the training sessions are conducted greatly contribute to this, first of

all the time at which the sessions are held, which fits the girls' daily and weekly schedule, as well as availability of dressing rooms for a minimum of 15 minutes before training, so that the girls have enough time to prepare for the training.

As part of the apparatus training, children learn to use their body in a fun and interesting way, while at the same time manipulating various apparatuses (Moskovljević i Dobrijević, 2018), which makes the training sessions very interesting and motivates them to be active. It was observed that during the moments in which the coach demonstrates or gives instructions, girls often manipulate the apparatus trying to perform a certain technique, which also contributes to their greater activity in apparatus training. Taking into account that the active time of students in physical education classes is considerably smaller, mostly between 26 and 42 % of the total time (Lučić, 1975; Mišković, 1978; McKenzie et al., 2006; Levin i sar., 2001; Marković i sar., 2012, 2013), teachers are recommended to use different apparatuses while working with children, at least as a supplementary exercise which was even previously proven to be a good method for increasing the students' activity time in class (Stanojević,1965; Kostić, Milanović, Radisavljević Janić, Marković, 2020).

Various types of apparatuses differ according to their physical properties, and consequently according to the specificity of technique performance (Chiriac et al, 2019; Dobrijević & Moskovljević, 2021, Dobrijević, Moskovljević, & Purenović-Ivanović, 2019). All this can influence different aspects of activity during training. This is why the greatest values of the average time spent lying down and sitting in sessions where a ball is used, can be explained by the specificity of the exercises using this apparatus. Fundamental technical ball exercise groups, above all rolling on the ground and along the body. While working with beginners or younger categories rolling the ball on the ground is practiced first, because it is a less complex technique when compared to rolling on the body, given that the surface on which the ball rolls is flat (Moskovljević i Dobrijević, 2018). In relation to this, girls often assume different positions on the ground, and in periods when the coach demonstrates or explains an exercise, they stay in those positions, inactive. Girls find themselves in the standing position most often when they observe a demonstration or listen to the coach's instructions, as well as during periods of rest, which is the case in all training sessions regardless of their content.

Training the technique, studying the forms of movement, as well as practicing the learned technique take the most important place in the young gymnasts' training. This is especially the case for sessions using apparatuses, where a large number of exercise repetitions is necessary in order to master certain apparatus techniques. When the coach motivates the girls in the right way, they often practice this content additionally during periods of rest or in moments when they wait their turn for performing a technique. In training sessions without apparatuses, more time is spent on exercises which enhance the general fitness of an individual. Exercises used for the development of motor abilities are extremely important as a basis for learning and mastering certain specific techniques, so in sessions without apparatuses they are often used for the girls to adequately prepare for learning one of the subsequent techniques.

Compared to physical education classes, where students spend 20 – 28 % of their time playing (McKenzi et al., 2010; Marković i sar., 2017), time spent playing in a rhythmic gymnastics training seems negligibly small, a mere 2-3%. However, the rhythmic gymnastics content is such that learning and perfecting a great number of techniques is organized through different forms of cooperation and mutual interaction between practitioners, and so they often contain elements of playing and bring many benefits which are characteristic of playing.

Coach activity is for the most part reflected in demonstration and giving instructions. When it comes to demonstration, it is significantly more represented in sessions where apparatus technique is learned when compared to content without apparatuses. In a way, it is not expected that the coach performs a great number of exercises without apparatuses in every training, especially since certain techniques are very intense or demand a great amplitude of movement, so these techniques are often demonstrated by girls that have mastered them well. When it comes to working with apparatuses, the coach has to demonstrate the majority of exercises numerous times, with an accent on particular details, so the practitioners could see the position of body parts or the movement of the apparatus. Compared to teachers in physical education classes (Marković i sar., 2012), the time that rhythmic gymnastics coaches spend demonstrating certain techniques is around ten times greater.

Giving instructions and error correction is always present in training sessions of rhythmic gymnastics, because the nature of this branch of sport is such that the result depends on the quality of the performance of a given technique. Still, it turned out that the coach spends most time on these

activities in sessions in which technique without apparatuses and the technique of ball handling are trained. When body technique is concerned, it is important to point out that it is the foundation on which apparatus work is later added (Moskovljević i Dobrijević, 2018) and as such it must be properly mastered, including the smallest details, which demands constant error correction and frequent giving of instructions by the coach. The observed differences in time spent on giving instructions and error correction between the training sessions with rope and ball indicate the influence of specificity of the types of apparatus (Chiriac et al, 2019; Dobrijević & Moskovljević, 2021, Dobrijević, et al, 2019). What is specific about the ball is that its technique demands the most body contact (rolling, „eights" etc.) and thus implies the performance of the technique using the body at a high level for it to be successful. All this requires constant control by the coach and timely error correction so they do not become a habit and slow down the learning process. When training sessions with rope are concerned, results indicate that coach provides the least instruction and error correction during these, however here it is primarily the matter of the specificity of the apparatus technique. Namely, the basic group of rope exercises consist of passing through the apparatus, which demands a lot of movement through space, so the coach uses the opportunity to give instructions and correct mistakes in periods when girls are resting between series of running, hopping, and jumping.

CONCLUSION

This research was conducted with the aim of establishing the active exercise time in training sessions of rhythmic gymnastics, in which different apparatuses were used, as well as exercises without apparatuses. Generally speaking, the application of different kinds of apparatuses or exercises without apparatuses influences the active exercise time, its content, as well as the activity; in other words, the behaviour of the coach in rhythmic gymnastics training.

The use of apparatus can significantly increase the active exercise time in training, especially if the coach carefully plans all the activities. So, for example, training or practicing certain apparatus techniques can find its place as a supplementary exercise or as a separate task that athletes perform in periods between the series of basic exercises.

This is the first study in which the „SOFIT" instrument was used for researching the active exercise time within sport programs, outside of physical education classes. Since its application has yielded good results in researches of this type, active exercise time should be researched in further studies, as well as other parameters of training within other branches of sport. When it comes to rhythmic gymnastics, some future studies could deal with researching the aforementioned training parameters within individual phases of training, on a sample of different categories of athletes according to age and the level of competition.

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