Review of Selected Studies on Aesthetic Sports and Creative Arts

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Abstract

There are different classifications of sports and disciplines. The division into individual and collective is considered fundamental. From the aspect of all divisions, they are mainly bipolar (like Men/Women Artistic Gymnastics) instead of the psychological typology of sports activities, where certain individual sports belong to the group of aesthetic-coordination ones. Rhythmic gymnastics (RG) is the most typical representative in this group, where complex movements predominate most acyclic type. Activities in RG occur in several disciplines with different apparatus (rope, hoop, ball, clubs, and ribbon), and only younger age categories have exercises without apparatus. In each domain, many elements are performed, which differ according to their structural groups, although exercises of a dynamic character prevail over static ones. Previously, the structure of sports achievement was determined based on the so-called Equation of success specification, which assessed the contribution of specific segments of the anthropological status of athletes in the prediction of sports results. However, when the result depends on the subjective assessment of the judge, the structure is proposed through the Code of Points (CoP). The decisive factors that prevail in line on the Rules of Assessment, which accurately considers the difficulty of the elements for free routines, musical accompaniment, and the appearance throe the artistic impression of the gymnast. In general, it is a sports activity in which a perfect symbiosis of music and movement is achieved, with a solid aesthetic impression when performing free routines. These characteristics are also present in other sports within this group, with similarities in the methodology of training, the elements of technical difficulties, and the way of assessing the athletes' achievements. Where looking at specific segments of the anthropological status of rhythmic gymnasts, the determinants of sports achievement are pointed out, viewed, first of all, from the aspect of assessment rules (CoP), which has undergone significant changes in recent years to encourage the rapid development of RG and its inclusion in the Olympic sports family.

Keywords: rhythmic gymnastics, analysis, development, determinants, success, assessment

Introduction

Rhythmic gymnastics (RG) belongs to the group of poly-structural movements sport, most of the acyclic type. Activities in RG take place in five different disciplines of gymnastic all-around: rope, hoop, ball, clubs, and ribbon (although competitions take place as a quadruple, so that in each Olympic cycle, four prescribed disciplines change. Many elements have performed in each gymnastics all-around, which differ according to their structural characteristics, although exercises of a dynamic character prevail over static ones. In general, RG is a movement activity that has a comprehensive impact on the anthropological status of individuals, so there is no dimension that this activity, to a greater or lesser extent, does not affect.

From the psychological typology of sports activities (Kodým, 1978), RG belongs to the aesthetic coordination type of expressive sports. In addition to RG, this sports group includes artistic gymnastics, sports dancing, figure skating, artistic/synchronized swimming, and the like.

The main characteristic of the activities in RG is the determination in the exercise to master the moving structures (structural groups) that are selected in advance and practiced concerning their external aesthetic impression. Therefore, athletes must have a high level of sensorimotor abilities, which enable the perfect performance of exercises in prepared compositions, of which practised is in collaboration with a choreographer and a music expert. Furthermore, the excellent composition requires a high culture of movement (kinesthetic) and an aesthetic impression on the viewer. Therefore, both of these requirements (perfect performance technique and aesthetic appearance) have evaluated during the jury's evaluation. Therefore, the trainee must meet specific requirements regarding suitable personality traits. It seems to be dominated by artistic abilities (sense of creation and interpretation), the ability to aesthetically experience and value, a sense of rhythm and culture of movement, kinesthetic sensitivity, spatial orientation, and perfect motor memory. Artistic performance usually relies on artistically performed musical accompaniment and requires a sense of aesthetic connection of music and motion into one harmonious and effective whole/composition.

The competition in RG consists of general individual and team all-around in four disciplines in which the competition takes place in free routines and group exercises. Free routines represent the highest achievement in every competitive discipline/event, and they are a reflection of the development of this sport and the technical achievement and talent of each competitor. Therefore, each competitor's individuality and style must be maximally expressed in free formations but limited by the rules for

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evaluation, which are prescribed and adopted by the International Gymnastics Federation (FIG).

Gymnasts compete for team and individual rankings. The team consists of 3+1 members for each Federation, although not every country must participate in a team competition. The assessment method of the composition and number of judges' commissions frequently changed during the development of RG. The evaluation system is based on subjective assessment by a qualified judge, based on objective criteria prescribed by FIG Technical Commission. International regulations are analyzed, amended, or corrected after each Olympic cycle.

The great diversity of elements and structural groups in RG, concerning the number and level of mandatory technical difficulties, are a significant burden to gymnasts. In addition, the requirements of this sport imply that gymnasts are versatile, physically and mentally developed, and healthy, which is a prerequisite for successful resistance to adverse influences that may occur during the competition and rapid adaptation to such influences. These refer primarily to the biological characteristics of female athletes (anatomical, physiological, morphological, motoric) and psychological characteristics. In addition, these include the ability to cope with stress due to the oversized load, so gymnast must have a high individual degree/level of tolerance to the effects of the situational variable.

Every active sports participant, whether competitor, judge, or spectator, faces the problem of evaluation every day - that is, the evaluation of competitors (who is better and by how much compared to the previous or next). Determining the order of competitors can always lead to doubt whether someone was damaged or not and whether it is possible to assess correctly at all, given the means used by judges and elements that make judging difficult or more accessible. Expression is primarily due to the imperfection of the rules and the inability to control external factors: the place, the size of the space, and the number of events that must be considered in uncertain situations.

In order to be able to study assessment at all, it is necessary to know the subject being assessed and who is considering it. Judge, as an evaluator, is a very rough registror of external events because he can realistically classify individuals according to quality in at most three categories, i.e., give three different grades. However, the proper size of the subject of measurement can be found only by evaluation so that a more significant number of judges perform the evaluation. This number is replaced with a final number in practice, depending on the complexity of the evaluated phenomenon. Grading can be facilitated or improved by setting standards for each possible grade. If necessary, for some reason, a more nuanced differentiation between grades can be determined. The assumption of relatively accurate and consistent assessment is the training of evaluators, i.e. knowledge of the criteria according to the assessment. Of course, the criterion is never fully known, or evaluators cannot adhere to it for various reasons. If the criteria were fully known, the grades would depend exclusively on the subject that has been graded (competitor), not on the one that grades (judge).

Research Conducted in the Field of Creative Arts (Music, Rhythmic, Dances) and Sports of Aesthetic-Coordination Type

The first attempt to systematize published material in creative arts (music, rhythmic, dances) and in sports activities primarily with a unique symbiosis of movement, music, dance, and rhythmic abilities, are bibliographic studies, which considered period of publication from 1950 to 1975: Rhythmic and Sports Gymnastics (Lomen, 1977) then in the field of Dance and exercise compositions (Lomen, 1978a), and finally in the area of "Sletske"/Festive exercises and events (Lomen, 1978b) for the same period. Thus, the total published material was made available to the general public, which, in most cases, represents the so-called static publications, insufficiently accessible to users.

The group of authors continues to study current issues in the coming period, until today, on differently defined samples of respondents, both by size and by age and gender, or subject of the study.

In this period, especially during the last two decades of the last century, the appropriate methodology of scientific research was harmonized and applied a good selection of statistical procedures for data processing in the field of study. Furthermore, various aspects of physical activity, with an interdisciplinary approach that can provide a reasonable basis for considering the problems and analysis of the obtained research results, both through quantitative and qualitative methods, were made.

Scientific and professional works in the field of creative arts, as well as of aesthetic-coordination activities, realized during the 90s of the last century, until today, have been enabled by significant progress in the development of, above all, social dances, which have grown into a competitive form as a sport dance (Standard dance, Latin American, Combinations, Modern dances), as well as the progress of RG (former names: artistic, aesthetic, modern, rhythmic-sportive gymnastics), in the former period since its recognition and confirmation, as a competitive sport. During that period, due to significant development and progress, especially in the countries of the Eastern Bloc (especially in the former USSR, Czechoslovakia, Bulgaria, and East Germany), this sport experienced and was widely recognized by its inclusion in the family of Olympic sports, first time included in the Program of the Olympic Games, held in Los Angeles (USA) in 1984. As a sport, RG experienced the most remarkable progress in former Yugoslavia (YU) in the 1980s, when this former country was rewarded by holding the World Cup in RG (Belgrade, 1983) and then the World Championship in RG (Sarajevo, 1989).

During the last decade of the twentieth century, various RG clubs began to forme in the cities contributing to youth's mass involvement. Along with increased competition events, significant progress and success occured with the participation of our competitors. That was confirmed in numerous European and World Championships in RG, as well as at the Olympic Games, such as those in Los Angeles (1984), where Milena Reljin achieved great success in Individual All-Around (fifth place), and she also participated in the Olympics in 1988 (Seoul, South Korea) and the World Championships in RG (Sarajevo, YU, 1989).

The dances developed simultaneously, primarily in the capital city, and afterwards in smaller and larger urban areas, with numerous participations of dance couples at various levels of competition, organized primarily in our country. Representatives from Serbia, who gradually reached the competitive level of dance couples from Slovenia (in sports dance), participated in various international competitions and won awards, contributing to significant interest, especially among children and youth. That enables researchers to study issues in this area due to the availability of more significant respondents within specific competition categories. One the first researches in this field was realized by Popović (1995), with the aim of determining the relationship between school and competitive success in young dance couples, participants of the regional championship of primary schools in social dances, held in both competition categories (Standard and Latin American dances). The analysis has been performed on a sample of children involved in particular dance clubs, "Step" and "Swing" (Niš, Serbia) as the most prominent and most trophy-winning in that period, or sports sections of particular dance schools, along with many other sections or clubs that continued their tradition, until today, but with some different shaped, contemporary forms of dance, current and popular with young people today. The sample of respondents included 250 dance couples, participants in the regional competition held in 1993. Since, according to the propositions of the competition for beginners, dance couples of the same gender (girls) were allowed to participate in that period, due to the lack of male dancers, the actual number of mixed dance couples was 1/3 less than the stated number. Research aimed to determine the impact and assess the importance of individual and general school success for placement in a dance competition. The predictor set of variables for the assessment of individual school success was divided into four sets of variables: 1) social subjects, 2) natural subjects, 3) areas that assess specific skills and abilities of students, 4) general student's achievement. The criterion variable was formed based on the results achieved in the current competition, where the collection points have achieved in the preliminary part of the competition and the finals, since dance competitions are

usually organized in several elimination rounds (1/16, 1/8, 1/4, and 1/2) when a large number of dance couples are registered. Those dance couples who did not make it to the next round of the competition received the lowest number of points, while the finalists collected the highest number of points. The regression analysis has been used to evaluate the research results, and in this paper, only data for boys were considered (leaders in the dance couple). The applied multiple regression analysis indicates that the correlation between school and competitive success is statistically significant at the level p = .05. The multiple correlation coefficient explains the common variability with approximately 20%. According to the author, other elements vital for success in social dances must be sought in other segments of the anthropological status of students (morphological characteristics, motor, and functional capacities, conative and sociological characteristics), as well as on other method defined variables for assessing cognitive abilities.

The same author, with the cooperation of the sports medicine co-author (Popović & Đurašković, 1995), expands the domain of interest and conducts research that determines the connection between the sense of rhythm and music with children's psycho-physical health and success in sports dance. The subject of this research is musical and specific rhythmic abilities, as a potential stimulant of psycho-physical health of school children and success in selected sports activities. This research aimed to determine the relationship between the mentioned segments of the anthropological area of students (multidimensional predictor set of variables) and success in sports dance (criterion variable). The sample of respondents in this study included 37 dance couples, students of younger school age (from 7 to 10 years). The criterion variable was formed based on the result of the sport achieved at national competition, where the points obtained in the preliminary rounds and the finals were collected (so that six final pairs have collected the most points, compared to semi-finalists and participants in elimination rounds, which have been organized according to the cup system of the competition). The research results were analyzed using unilabiate (ANOVA) and multivariate analysis of variance (MANOVA) and regression analysis. The applied MANOVA did not find statistically significant differences between boys and girls when the predictor set of variables observed as a whole. However, ANOVA indicated some differences in variables for assessing some somatic characteristics. The applied multiple regression analysis indicated a significant correlation between the predictor set of variables and success in sports dance, which was contributed primarily by variables for assessing musical and rhythmic abilities, as well as some personality traits, which assessed temperament traits (using Eysenck's Personality Inventory and Eysenck-Junior MPI for younger juniors). The authors of this study noted that the results differ from previous studies conducted in other countries, in whixh, for the most part, very low correlations of tests for the assessments of rhythmic, musical, and intellectual abilities with sports success were found, and suggest their re-examination on different age and competition group categories of dance couples.

The group of authors continues to study music and movement as a means of stimulating the psychomotor development of preschool children in the next period (Đorđević & Popović, 2009; Popović & Vukašinović, 2005; Popović et al., 2005).

Rhythmic and dances are the subject of a comprehensive teaching publication, which considers their universal applicability within physical culture in general, and in its specific areas: Physical Education - Sports – Recreation - Kinesitherapy (Popović, 1997).

The following research has been conducted on specifically selected samples of respondents of different ethnic origins (Popović & Kocić, 1996). This research aimed to diagnose musical abilities in physical education (PE) university female students and determine possible relationships with practical mastering of the RG curriculum, using the Seashore test of musicality. The sample of respondents consisted of PE female students from University of Priština. The first group (N = 45) consisted of female students of YU citizenship; The second group (N = 77) consisted of female students of foreign (GR) citizenship. The particular goal of the research was to determine possible differences in the level of musical abilities and the structure of musical abilities. The criterion variable was defined by the final grade on the RG exam.

The research results were processed using basic descriptive statistics, ANOVA, t-test, MANOVA, factor and regression analysis. Based on the established basic statistical parameters, in the evaluation of sub-samples and all applied variables, numerically better results are shown within students of YU-citizenship. ANOVA indicated that the found differences were statistically significant in five out of seven of the examined variables. MANOVA showed that the groups of respondents were statistically significant different (p = .00; F = 4.513).

In the following research, the authors (Dimova & Popović, 1986) emphasized that music is an unavoidable and inseparable part of education and improvement of movement expression in RG. At the initial level of training, the movement of gymnast is mainly passive and instinctive, and in agreement with music in terms of division into beats. A higher level of practice is understanding with conscious moving reactions. The highest degree is the enthusiastic reception of music and the perfect unity of music and movement when the practitioner can understand music's message and emotional values, and express them with action mastered to technical perfection. The musical accompaniment in RG is important. A melody is a carrier of lyrical content. Other elements of music (tact, tempo, dynamics, rhythm) contribute to and enrich the movement expression of the gymnasts. Free routines in RG should reflect the independent work of the trainees, with adequate encouragement and direction of their creativity by trainers and choreographers. The ultimate goal and scope are individual expressiveness and own style, which characterizes certain female practitioners. The path to its realization was presented in this paper, and separated phases of training and development of unique creative expressiveness in RG female practitioners are elaborated (Popović, 1996a).

The authors continue to deal with this issue, with the analysis of judges' grades achieved in competitions of the highest rank, such as the Olympic Games, held in 2000 in Sydney (Popovic, 2000) or the World Championship (Popović & Đorđević, 2005). Positive and negative bias in the evaluation, which is present in the assessment of free group routines was considered since they are a combination of subjective decisions of judges based on predetermined criteria prescribed in the CoP.

The first experimental plan and program for the development of RG was proposed by the Expert Committee of the Gymnastics Federation of YU. Moreover, it was accepted at the State level Seminar, held in Priština in 1978 (during the National Championship). A group of authors (Popović et al., 1996) then point out that the obligation was transferred to experts in clubs to conduct it and check it in practice. Finally, this task was realized in academic institutions through the mandatory professional training of female students within the RG classes to train future PE teachers to work with beginners in school sections extracurricular activities, and within preschool and younger school age children.

The first attempt to apply the preparatory phase of the RG School's experimental program was realized during 1979 in Niš (YU), and was finalized by the defense of bachelor's thesis (Filipović, 1980). Then, the implementation and realization of various modified plans and programs, adjusted to the existing working conditions in sity of Niš, and in the region, within certain preschool institutions and in the lower grades of primary school, continued. About ten experimental programs were conducted, with different goals and tasks and research methods were applied under the guidance of RG teacher and the finalization followed in bachelor's thesis (Kocić, 1986), and doctoral dissertations (Dimova, 1983; Popović, 1986). All results indicated the positive transformational effects of applied content on morphological and motor status of participants. However, there were no satisfactory results in terms of final competitive achievement of participants, which would significantly contribute to the development and improvement of this sport in Niš. Unfortunately, the authors have not analyzed this situation or list factors to increase motivation. However, they believe that there is not enough interest and stimulation of the family environment and positive impact of social and environment factors, especially in the sport's governing bodies.

The following research (Popović, 1996b) has been conducted on a sample of 60 female, PE students from University of Priština, at the end of the 1992/1993 school year. The subject of this research

were the musical abilities of PE students, which were assessed based on the results achieved by Seashore test, which examines the elementary components of musicality: pitch and volume, rhythm, length, and timbre and tone memory test. Students were placed into appropriate classes (A to E) according to the number of points won. Classification in the lowest category (E) implies reaching a certain threshold, which, depending on the type of test and age, in the current sample of respondents (over 18 years of age), ranges between 40-50% of points scored, from the maximum possible for each test. PE students, as a rule, are classified in lower classes, so this test can be considered very demanding for such a defined sample of respondents, of which approximately 1/3 fail to reach the level (E), the lowest class. This research aimed to modify the scoring method to optimize the objectivity of assessing musical abilities using this test. Unfortunately, statistical data analysis did not give the satisfactory results, so further researches are need to study the metric characteristics of this test on the specifically selected samples of respondents, and to determine the other factors that contribute to the correct assessment of respondents, one of which is inadequate testing conditions in an inappropriate environment (in the presence of possible disruptive factors), which could be avoided only with a study recording and individual testing of participants, which was technically impossible to achieve in the existing study conditions.

During the first decade of the XXI century, the efforts of presenting the areas of creative art from a qualitative aspect are continued, using the adequate scales for attitudes assessment and the artistic component, which were neglected concerning schooling education. Thus, the realization of several pilot studies was initiated and was finalized in bachelor's thesis of female students, one of which was realized at University of Niš (Nikolić, 2008) on a suitable sample of respondents, within primary and secondary schools from a small town (Grocka, Belgrade suburb). The research subject was defined as an Examination of the attitudes of school children and youth towards artistic component of the movement in activities of aesthetic-coordination character.

The following bachelor's thesis was realized the same year, at University of Priština (Pavlović, 2008), with the application of adequate questionnaires, on specially selected samples of children from the inner sity, as well as a group of RG competitors, with the aim to comparison and qualitative evaluation of the attitudes of primary school students from different backgrounds towards the aesthetic component of the movement. Both of these bachelor's thesis were presented at scientific conferences of international (Popović et al., 2012) and of national importance, one of which was thematic ("Art in Teaching Methods"), organized by the Faculty of Teacher Education in Jagodina (University of Kragujevac, Serbia), where the results of these researches are presented in the form of a plenary lecture (Popović et al., 2008).

Structure of Achievement Factors in Rhythmic Gymnastics

The process of planning and programming activities in sports is primarily carried out to achieve maximum individual and social effects with minimal use of the unlimited resources available to this area of activity. Essential components of this process are the procedures for directing and selecting athletes. The problem of directing and choosing athletes can be reduced to the problem of determining differences in the characteristics of athletes, i.e., differences in the specific structure and level of development of certain characteristics relevant to success in a particular sport.

The characteristics of athletes in certain sports disciplines can be assessed based on applying very different choices of measuring instruments. The basis for the formation of models, based on which their characteristics will be determined, is to determine the part of the anthropological status relevant to success in a specific sports discipline. When describing the anthropological status of athletes it is necessary to include morphological characteristics, motor abilities, cognitive abilities, conative characteristics, functional abilities, and sociological characteristics. When it comes to RG, it is necessary to consider the gymnast's musical abilities.

From the area of anthropological characteristics defined in this way, it is necessary to choose the part that is sufficient to describe the specifics of a particular sport.

The starting point for forming an appropriate model in the selection process must rely on scientific analysis of sports, which must take into account the following elements:
1. First of all, the structure of factors that determine sports achievement must be determined, i.e., those factors that limit and optimally determine the achievement of top sports achievement must be known.
2. Then, the genetic conditionality of the factors that make the structure of top sports achievement must be considered.
3. Knowledge of the predictive value of the factors that determine sports achievement is also necessary.

The hierarchy of the factor structure of the predictor of sporting achievement must be taken into account when determining the importance of eligibility requirements. In addition, dominant, complementary, and accompanying factors need to be identified. Dominant factors are genetically determined and crucial for top sporting achievement, and cannot be compensated. Complementary factors are also genetically determined and essential, but not necessary, and can be compensated to some extent. However, one should consider that compensation has its limits and that the current level of world sports requires from an athlete to have a unique set of all the necessary features and abilities to attain top sporting achievement. Accompanying factors are also important, although they belong to the group of compensated factors, and it is possible to replace or develop them to the optimal level.

The formation of the achievement factors in RG is gradual depending on the dialectic of internal and external factors, the most important of which is the process of learning, i.e., mastering the requirements. The first circumstance is that the selection process starts at relatively early age when suitable qualities necessary for success in RG are not yet sufficiently expressed. That means it is necessary to consider both age and individual differences when determining the structure of achievement factors, i.e., determining selection predictors and criteria, especially the level of learning, quality of training, and quantity of exercise units. It is also necessary to consider the uneven development of certain factors in the structure of gymnastic achievement and the individual development trend of these factors.

In RG is crucial to know the share of heredity and social environment in forming achievement factors, the sensitive period of their development, and the degree of stimulation of talented individuals in the social environment.

The difference in the efficiency of athletes is conditioned, above all, by the following factors:
1. Sports differ in terms of the requirements they set concerning the athlete;
2. Athletes differ in terms of individual characteristics that determine athletic performance.

In sports belonging to the group of female aesthetic sports, such as RG, success is strongly influenced by visual appeal and body aesthetics, and one of the main reasons is that body size, build, and composition influence sport performance. Also, it is a well-known fact that every sport has its (desirable) morphological prototype. In studies conducted with the aim of identifying the predictors of success in RG, the prevailing views are that in RGs, concerning the anthropometric characteristics, moderate and below-average adipose tissue is desirable, as well as below-average body weight and height (Miletić, 2005).

The objectives of the research conducted by Purenović-Ivanović et al. (2019) were to establish body composition profile in Serbian RGs of different age group categories so as to test and/or determine the possibility of predicting success in RG performance on the basis of gymnasts' body composition parameters. Eighty-four elite and sub-elite RGs (age: 12.94 ± 3.13 years, body height: 152.51 ± 14.61 cm, body mass: 40.59 12.24 kg), distributed in five age categories (10 beginners, aged 7-9 years; 22 intermediate, aged 9-12 years; 18 advanced, aged 12-14 years; 19 juniors, aged 14-16 years; 15 seniors, aged 16 years and older), volunteered to participate in the study. Their baseline characteristics (age, body height, body mass, body mass index, years of training experience, Success) were established, as well as their body composition profile (body fat, muscle mass and skeletal mass percentage). By means of Multiple regression analysis the body composition

profile's statistically significant influence on Success was established only in the group of junior and intermediate gymnasts ($p < .03$ and $p < .004$, respectively), with explanation of 46%, i.e. 51% of Success in RG. Also, Regression analysis emphasized the significant independent contributions, to the prediction of the dependent variable, of two independent variables: skeletal mass percentage (juniors: $p = .02$, and intermediate RGs: $p = .005$) and muscle mass percentage (intermediate RGs: $p=.03$), with negative relationship among these independent variables and the dependent one.

Few years earlier, a group of authors (Purenović-Ivanović et al., 2013) examined the influence of the sports experience length on the body composition parameters (BF%, Muscle%) of 85 Serbian RGs of national and international rank, aged 6-17, classified into four different age group categories. The statistically significant influence of sports experience length on BF% was recorded in the group of beginners, aged 6-9 (17.15±6.98%, $p <.05$), and on Muscle% in the group of cadets, i.e. advanced-level RGs, aged 11-13 (34.06 ± 3.38%, $p < .05$).

When it comes to Serbian RGs somatotype, the mesomorphic ectomorph dominates, as well as balanced ectomorph; but there are also endomorphic ectomorph (Purenović-Ivanović & Popović, 2014), and central somatotype (Purenović-Ivanović & Popović, 2013, 2014). This diversity is a consequence of differences in the age of RGs, but also in the competition rank, which makes it difficult to determine the only desirable biotype in this sport.

In their study of somatotype of 85 Serbian RGs of national and international rank, aged 6-17, classified into four different age group categories, Purenović-Ivanović & Popović (2013) established balanced endomorph (5.4-3.33-3.16) as the dominant somatotype, and according ANOVA results there are no statistically significant differences in the somatotype of different age group categories. The authors cam to conclusion that the somatotype of Serbian RGs (dominance of the endomorphic component) differs from the somatotype of RGs from other countries, which can be attributed to the fact that most of the respondents are girls competing in the "C" program, which is low-level program with the purpose of popularizing this sport in Serbia and the selection process does not apply at this competitive program level.

On the same sample, the group of authors (Purenović-Ivanović et al., 2013) examined the influence the sports experience length on the somatotype components (endo, meso and ecto). The statistically significant influence of sports experience length on ectomorph component was recorded in the group of beginners, aged 6-9 (2.99 ± 1.3, $p < .05$), and on mesomorph component in the group of cadets, i.e. advanced-level RGs (3.25 ± 1.43, $p < .05$).

The purpose of the research Purenović-Ivanović et al. (2016) was to test and/or determine the possibility of predicting success in RG performance on the basis of RGs' somatotype. One hundred and twenty-six national- and international-level RGs (age: 11.95 ± 3.09 years, body height: 147.76 ± 14.61 cm, body mass: 37.75 ± 11.72 kg, BMI: 16.79 ± 2.26 kg/m2, menarcheal age: 13.57 ± 1.18 years, sports experience length: 5.88 ± 2.79 years), divided into five age group categories (22 beginners, aged 7-9 years; 38 intermediate, aged 9-12 years; 26 advanced, aged 12-14 years; 25 juniors, aged 14-16 years; 15 seniors, aged 16 years and older), volunteered to participate in the study. The obtained results show the central somatotype as the dominant type (except for the seniors: mesomorphic endomorph). By means of a Multiple regression analysis the RGs' somatotype statistically significant influence on Success was established only in the group of advanced RGs and when considering the sample in total ($p <. 00103$ and $p < .00325$, respectively), with an explanation of 51%, i.e. 11% of variance, respectively. Also, the Regression analysis emphasized the significant independent contribution of endomorphy to the prediction of Success within each of five age group categories, except the beginners, with negative relationship among variables (except the seniors). When considering sample in total, endomorphy and mesomorphy gave the significant independent contribution to the prediction of Success in RG ($p = .012$ and $p = .009$, respectively), with negative relationship among these independent variables and the dependent one. This research has confirmed the importance of endomorphy for RG performance, and thus unambiguously emphasized the lack of subcutaneous fat as desirable factor for success in RG.

In her doctoral disertation, Purenović-Ivanović (2017) was investigating the significance of the influence of somatotype, body composition, sexual maturity and specific coordination abilities on the RGs' sports performance. One hundred and twenty-six national and international level RGs (age: 11.95 ± 3.09 years, body height: 147.76 ± 14.61 cm, body mass: 37.75 ± 11.72 kg, BMI: 16.79 ± 2.26 kg/m², menarcheal age: 13.57 ± 1.18 years, training experience: 5.88 ± 2.79 years), divided into five age group categories (15 seniors, aged 16 years and older; 25 juniors, aged 14-16 years; 26 advanced, aged 12-14 years; 38 intermediate, aged 9-12 years; 22 beginners, aged 7-9 years), volunteered to participate in the study. Multiple regression analysis was applied to determine statistically significant influence of each of the selected kinanthropometric factors on the "Success". Namely, RGs' somatotype, body composition, sexual maturity and specific coordination abilities are significant predictive factors for their performance, with a variance explanation of 11%, 13%, 14% and 38%, respectively. At univariate level, regression analysis highlights the statistically significant independent contribution of endomorphy (at all categories, except for the beginners) to the prediction of RGs' Success. This research has confirmed the importance of endomorphy for the performance in RG, and the negative relations among this predictive and criterion variable unambiguously emphasized the lack of subcutaneous fat as desirable factor for the success in RG. Also, the negative relations of almost all of the body composition parameters and the competition results indicate that the low percentage of body fat, long and thin limbs, and low body mass, are desirable morphological characteristics among successful RGs.

RG is a sport discipline with specific physiological, biomechanical and aesthetic requirements which change with the level of skills, training load, and they usually increase with the competition level. Serbian Gymnastics Federation formed three competition programs ("A", "B" and "C", i.e. high-, medium- and low-level program), which differentiate in the competition rules, and it is legitimate to expect differences in gymnasts' kinanthropometric variables. The main objective of the study of Ranđelović (2019) was to examine and compare somatotype of RGs competing in different programs. The sample consisted of 249 RGs distributed in five age group categories (23 seniors, aged 16 years and older; 30 juniors, aged 14-16 years; 42 advanced-level RGs, aged 12-14 years; 96 intermediate-level RGs, aged 9-12 years; 58 beginners, aged 6-9 years) and three competition programs ("A" = 82; "B" = 97; "C" = 70). Research results showed statistically significant ($p < .001$) differences in endomorphy and ectomorphy of advanced- and intermediate-level RGs, as well as beginners. The differences in mesomorphy were established in every age group category, but advanced-level RGs, competing in "A", "B" and "C" program. Somatotype of the youngest age group categories (i.e. intermediate-level and beginners) discriminates significantly "A", "B" and "C" RGs. Advanced-level RGs of different competition program differentiate significantly in values of endomorphy and ectomorphy, while the mesomorphy is one that stands out when it comes to RGs from the oldest age group categories (i.e. seniors and juniors).

Identification of somatotype in early age of life is important because it provides a possibility of timely and appropriate lifestyle modifications of an individual, according to her needs, in order to avoid health complications and enabling better quality of life. Genetic background, nutrition, so as level of physical activity, form the basis of population difference in somatotype, so the main objective of the study Пуреновић-Ивановић et al. (2021) was to examine and compare somatotype of 32 female Serbian RGs and 42 female non-athletes, aged 6-10 years. Research results showed the presence of differences (not statistically significant) between RGs and non-athletes which are "in favor" of non-athletes when it comes to endomorphy, i.e. in favor of RGs with regard to the remaining two somatotype components.

Sports differ in structure and characteristics, which are necessary for their performance and in the level of representation of suitable segments within a given structure. Athletes differ in the structure of their traits and the level of development of the available characteristics, so it is evident that each athlete is characterized by a specific profile of the structure of the traits he has.

When deciding about the appropriate RG model, the starting point are similar models, previously defined in related sports disciplines. Theoretical considerations and some experimental data enable the creation of an idea of the "ideal model" of top-level RGs. In reality, each individual has specific characteristics that manifest differently in the corresponding achievement. Those traits that are especially important for the results in the RG, and are less developed in some athletes, can be successfully compensated by other traits.

In related sports, such as artistic gymnastics, some studies conducted on the national teams of former Czechoslovakia indicate that they, compared to athletes in other sports, have higher average intelligence, greater self-confidence, emphasize their logic, are more restrained, phlegmatic, and introverted. Similar data have been confirmed by research conducted on the CSSR Olympic team members in artistic gymnastics (Kodým, 1972; according to Kodým, 1978). This research indicated a higher level of intelligence (IQ range 102-132, average 112), a tendency towards introversion, slightly increased neuroticism, and above-average motivation to achieve sports achievements.

A longitudinal study, conducted in the experimental department for motor-talented youth in the former CSSR (Kodým, 1967, 1968), determined the structure of the sport achievement of talented gymnasts. Among the dominant factors, the following have been confirmed: sensorimotor coordination, sense of rhythm, and aesthetics of movement. Leading factors were then confirmed: static and dynamic flexibility, precision, motivation to achieve maximum achievement, as well as many tactile factors, including Katel factor A (closeness, reticence, criticality) and factor F (excitability, optimism, prudence, and sharpness).

According to Ekmekçi (2021), mentally successful athletes can maintain their positive attitudes and behaviors. A high level of personal motivation forms the basis of an athletes success. When realistic goals, the proper concentration, reasonable emotional control, and the ability to cope with stress have been added, it is inevitable that someone will always be one step ahead of the others. To realize all these features, athletes need to discover themselves mentally. Developing skills requires long training and lots of repetition. However, to maintain these skills well and exhibit the desired high-level performance in every competition, the mental control and mental preparation must be very good or excellent.

Conclusion

The formation of achievement factors in the RG is gradual depending on the dialectic of internal and external development factors, and the most important is the learning process. Therefore, starting from this thesis, several circumstances influence talent choice. The first circumstance that should be taken into account when selecting novices in RG is the fact that it is necessarily performed at a relatively early age (the initial stage of selection process falls on a period of 6-8 years of age, and recently it starts even earlier- the preschool age). At this age, the process of sports training has not advanced enough, so the factors of achievement cannot be sufficiently defined.

Another circumstance that must be considered when choosing talents in RG is that various characteristics desirable for RG have not been sufficiently developed at young age. All this means that in RG is necessary to consider the age and individual differences when determining selection predictors and criteria and when interpreting the obtained data on all determinants of sports achievement. It is also necessary to consider the uneven development of certain factors in the structure of gymnastic achievement and the individual development trend of these factors. It is essential to know the share of heredity and the influence of the environment in the formation of achievement factors, the sensitive period of their development, and the degree of stimulation of a talented individual in the social environment.

The personality type plays a significant role- temperament of the athlete, which largely determines the characteristics of activities during training and competition (e.g., complete psychosomatic abilities, work pace, quality of achievement, ability to overcome fatigue). Furthermore, temperament, as the most biologically dependent personality trait, affects, above all, the

emotionality and essential characteristics of the athlete (in terms of extroversion - introversion). As a result, top RGs who manage to overcome frustrations are emotionally stable, which allows them to compete with maximum effort without feelings of depression and fear.

This complex connection of determining factors makes selecting talents in RG very demanding. Therefore, specialists from medicine, psychology, and pedagogy must participate in it in addition to experts from this sport discipline.

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