

SPORTS PROFILE OF ELITE ATHLETES IN RHYTHMIC GYMNASTICS

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Abstract

Elite athletes are competitors who combine in themselves exceptional talent, many years of hard work and distinctive psychological qualities. Highly qualified rhythmic gymnasts do not differ from this definition, as their sports profile includes all these characteristics. The aim of this study is to develop a methodology to create the sports profile of elite competitors in rhythmic gymnastics on the basis of current competitors from the USA, Singapore and Taiwan and to compare the obtained results. This could help us assess the current habits of these gymnasts, the positive or negative impact of those habits on their performance, and the necessary changes that need to be made to optimize the training process. The results of the current study and the statistical data processing from the conducted experiment showed that the three studied teams of elite athletes (total of 63 gymnasts) demonstrated strong commitment and engagement in the training process. Generally, the Singaporean and Taiwanese athletes had difficulties in communication with their coach and lagged behind in the development of technical qualities and mental skills for effective adaptation compared to their colleagues from the United States. At the same time, however, they showed a higher degree of self-awareness for improvement. On the other hand, the athletes from the US demonstrated shortcomings in Consistency in training. The numerical values also showed that some of the US athletes demonstrated limitations in the development of physical qualities which could affect their professional sports development in the future.

Keywords: *Elite rhythmic gymnasts, Sports profile, Characteristics..*

INTRODUCTION

Modern rhythmic gymnastics challenges athletes due to the high standards and requirements for success it sets. Only those who pursue maximum difficulty and perfectionism of performance and manage to conquer the audience with virtuosity and artistry can qualify for a prestigious ranking in this sport. It should not be forgotten that even the smallest inaccuracy is punished severely today. This further brings a great risk and tension and requires specific, not

only physical but also mental, characteristics that elite athletes should possess. The abundance of so many training and performance aspects makes rhythmic gymnastics an exciting and appealing discipline for both researchers and athletes.

Who are elite athletes in rhythmic gymnastics?

Elite athletes are those who pursue top results in competitions at the professional or Olympic level. With the number of

medals and awards won, they represent themselves and their country in the world. The responsibilities of elite competitors in this sport are exceptional. The relatively young female gymnasts are expected to perform their competitive routines perfectly in many aspects: technically, artistically, musically, and expressively (Gantcheva, Borysova & Kovalenko, 2021). Highly qualified gymnasts are distinguished by their talent, attitude to the sport, hard work, and by their way of responding to their surroundings.

Many studies focus on athlete's morphological and physiological characteristics for successful performance (Claessens et al., 1999), but the relevant aspects of elite gymnasts' profile include much more than that. They include genetics, mental state, technical and physical skills, all developed and demonstrated in perfect symmetry and synchrony. The problem of optimal development that covers physical, technical, and mental qualities, simultaneously with the development of recreational opportunities, is multifactorial. This motivates many researchers to analyze it by looking at various indicators and using different methodological tools (Ivanova, 2017; Dimitrova, 2020; Ignatova, 2020; Ignatova & Iliev, 2020). However, all these tools should be adapted to the specifics of this elite sport and the associated long and heavy workloads that include many training hours per week, repetitions of elements, parts and routines of competition exercises, measuring of the total time for each task (Burt et al., 2010), etc.. Successful performance in rhythmic gymnastics requires many years of practice and consistency in training, which usually starts from a very early age (4-5 years) and continues until adolescence (21-25 years). Athletes who wish to reach top competitive levels should develop their cardiovascular and musculoskeletal systems (Douda et al., 2002), but also build their character, show personality, set concrete objectives and know how to achieve them.

Elite gymnasts should be able to plan and organize their time perfectly, which adds another quality to the list. Despite the duration of rhythmic gymnastics trainings and that everything in the gymnasts' professional life is focused on delivering the best possible sports performance at the international level (Verkooijen, Van Hove & Dik, 2012; Cosh & Tully, 2014), academic achievements, adaptation of their social life, and the optimization of the well-being of these girls are an integral part of their life which also needs to be taken into account. This requires strict discipline, perseverance, and an incredible spirit for dealing with challenges.

A gymnast whose sports profile does not include the characteristic features that allow her to withstand heavy loads (both in physical and mental terms) can hardly succeed at the elite, professional, or the Olympic level. Along this line of thinking and according to the studied literature, rhythmic gymnastics scientists have not yet decided what specific percentage of talent, physical and technical qualities are needed to succeed in this sport. However, there seems to be no athlete, coach, or sports researcher who would argue that they are not important. The shortcomings in certain personality traits can help to explain why some gifted individuals don't thrive at the elite level (Dr. Brown from 2017 at ScienceDaily at <https://www.sciencedaily.com/releases/2017/08/170815095019.htm>, 2021). Unlike athletes who only compete at the international level and represent their countries, the top-ranked gymnasts possess stable mental skills with very high level of self-confidence in their own abilities (Jones & Hardy, 1990). According to DeVenzio (1997), the confidence level is a mirror of the skills level, and this reflects in their performance where the connection between talent, previous achievements, and high level of self-confidence are clearly expressed. Another important characteristics\ of an elite athlete (gymnast) is the ability to manage anxiety.

A number of research studies have shown that handling this kind of pressure is an integral part of sports (Hardy et al., 2018). Of course, there are other distinguishing mental features of successful and highly efficient athletes in gymnastics: a huge inner drive to succeed; continuous setting of realistic achievable goals that have a constructive significance; optimism; sense of belonging to the team; leadership skills and decision-making skills under stress; self-criticism and ability to take criticism; focusing; faith in the process and in the team; resilience and ability to cope with failure; search for perfectionism; determination; and ability to evaluate objectively and be grateful to others.

In summary, we will emphasize that an elite gymnast's profile is a rare combination of talent and its development, many years of hard work, and the right psychological profile. The difference between high potential (international) and elite gymnasts (top-ranked) is very delicate and primarily determined by the personal mental qualities, because there are many girls who have the talent to succeed in rhythmic gymnastics, but very few are motivated to do what it takes to succeed.

A good understanding of rhythmic gymnastics as a sport and the principles of sports training would allow coaches to concentrate more on specific components that affect performance and to select the appropriate criteria for better talent identification (Douda, Toubekis, Avloniti & Tokmakidis, 2008). Trainers should not stop working on creating the ideal profile of elite athletes in rhythmic gymnastics according to their understanding. This can only be done through a recognition of gymnasts' individual personality traits and the peculiarities of the sport. Through personality traits, sports results can be predicted (Allen, Greenlees & Jones, 2013), and through the development of sports profile the current personal habits that positively or negatively affect performance can be assessed. The development of sports profile also helps

identify changes that need to be made. Therefore, the development and research of the personal profile of elite rhythmic gymnasts has many advantages in terms of optimizing the individual training methodology and improving sports results (Figure 1).

The current physical, mental, and technical state of an athlete, her strengths and weaknesses compared with the general sports profile determine her specific sports profile. The sports profile helps highlight the features of sports training in relation to the personal qualities, which then draw the overall picture of the competitor's profile. There is a logical bidirectional connection between sports profile and athletes' personal characteristics in the light of the character of training. The study of sports profile points out the individual characteristics (strengths and weaknesses) of the sportsman and of the training. On the other hand, the totality of individual characteristics (of the athlete and of the training) determines the profile of this athlete and explains her results.

METHODS

The aim of this study is to develop a methodology to create sports profile of elite competitors in rhythmic gymnastics on the basis of gymnasts from the USA, Singapore and Taiwan and to compare the obtained results. 63 elite rhythmic gymnasts (14-17 years old) participated in this study. They all competed at the FIG international level. 12 of the gymnasts had 9 years of experience in rhythmic gymnastics, 15 gymnasts 8 years of experience; 25 gymnasts 7 years of experience; and 11 gymnasts had 6 years of experience. The average experience in rhythmic gymnastics for the group was 7.4 years. The number of scheduled training hours per week for each gymnast was 30 hours or 6 days with 5 training hours per day.

The study of the sports profile of representatives from these three countries

is not accidental. The choice was motivated by the personal work with these teams and the possibility to control the research as well as to work with the athletes' coaches. We are also interested in the components of the sports profile of other (leading) teams, but we do not have timely scientifically proven information, experimental data or credible statement from specialists.

Creation of sports profile and assessment of its individual components

The structure of the sports profile of elite RG athletes was created on the basis of 6 components. They were determined after a preliminary survey which included views of leading coaches (15 altogether: some of them are coaches of national teams, others of leading clubs; all of them have higher education) on the 25 most important traits of successful athletes in this sport. 18 traits, mentioned by all coaches, were used in our structure. The most common traits were called indicators and subsequently combined into 6 main components. An assessment of individual components (Figure 2) was made by evaluating all indicators that characterized them. Each coach used a score of 1 to 5 for every indicator. The component score is the average result from coaches' evaluation of all indicators.

The research methods used in this study were observation, discussion, survey, testing, expert evaluation, variation analysis, and comparative analysis. The collected data was statistically analyzed.

RESULTS

Participation and commitment (Component 1 – C1)

Participation and commitment in the training process are measured by two leading indicators. The first indicator (I1) is related to training *attendance* of elite athletes. Minimum score 1 requires a minimum of 90% attendance, and this percentage does not exclude absenteeism

due to illness or injury. This means that the gymnasts had to demonstrate at least 90% training attendance for the study period (3 months), regardless of the nature of their absence. Only the planned rest days in these 3 months of testing were not taken into account. The second indicator (I2) determining C1 is *accuracy*. From the results obtained for this indicator (score 5 for the gymnasts from all three countries) it can be concluded that the girls are disciplined in terms of their involvement in the training process. According to the expert evaluation and observation of their coaches, the American gymnasts arrived in good time and often stayed after the training; Singaporean gymnasts were rarely late and always stayed after the training; Taiwanese were rarely late and always stayed after the training as well. The average scores for C1 (Table 1), taken from the arithmetic averages of the two indicators, show that the highest result in *Participation and commitment* was obtained by the Singaporean team (4.92). This score comes from high evaluation Singaporeans received for attendance (4.85).

Table 1
Average final scores for C1 (Participation and commitment).

| 1. | 2. | 3. |
|------------|---------|---------|
| Singapore: | Taiwan: | USA: |
| I1-4.85 | I1-4.8 | I1-4.75 |
| I2-5 | I2-5 | I2-5 |
| C1-4.92 | C1-4.90 | C1-4.87 |

Attitude to the training process (Component 2 – C2)

The second component was measured by evaluating 4 indicators on a scale of 1 to 5. The first indicator refers to *receptiveness to the coach's feedback* (I1). The best average result for this indicator was received by the USA team (3.75 out of maximum of 5) as these girls showed the highest ability for quick self-assessment and reaction after the coach's correction compared to the other two teams. The second indicator *is related to the*

motivation for hard work and improvement of skills (regardless of the coach's current attention focus) – I2. The lowest result in this indicator was shown by the Singaporean team (3.42). According to the coaches' opinions and experts' assessments, these gymnasts do not have such a well-developed sense of quality self-improvement without support. The third indicator refers to the *support for teammates and the creation of a favorable environment for training* (I3). The best score (5) for this indicator was shown by the Taiwan team (4.8). The Taiwanese are well aware that they must contribute to the growth of the team by supporting each other, both in trainings and in competition. The last – 4th indicator, for C2 is related to the *abilities of gymnasts to maintain a certain quality of communication (verbal and nonverbal) with the coach* (I4). The lowest numerical value for this indicator (1.42) was posted by the Singapore team; as shown in Table 2, this result is assessed as very weak. Table 2 clearly displays that the Taiwanese also achieve a weak average score for I4. This gives reason to believe that the traditions in the culture of communication among girls in the two Asian countries create difficulties, expressed in the lack of utterance of opinion and creative initiative. The average scores of all indicators (I1-I4) show that the highest score for C2 was achieved by the US team (4), followed by Taiwan (3.65), and Singapore ranking the last (3.28).

Table 2
Average final scores for C2 (Attitude to the training process).

| |
|-------------------------------------|
| USA: |
| I1-3.75; I2-3.75; I3-4; I4-4.5 |
| C2-4 |
| Taiwan: |
| I1-3.6; I2-3.8; I3-4.8; I4-2.4 |
| C2-3.65 |
| Singapore: |
| I1-3.71; I2-3.42; I3-4.57; I4-1.42; |
| C2-3.28 |

Consistency in training (Component 3 – C3)

The arithmetic mean of the scores of two indicators was used for the assessment of C3: I1 – *Level of concentration in each training*; I2 – *Possibility to fix skills or techniques and their constant performance*. In I1, the highest result was shown by the Taiwan team (3.6), and the lowest by the USA (3). It should be noted that the American gymnasts perform more difficult routines than their colleagues from the other two countries. Their competition program is saturated with elements with an apparatus and body (almost twice as many as those of the Taiwanese), their execution speed and reaction speed is significantly higher compared to the other two researched groups. For this reason, it is more difficult for the American athletes to maintain a stable level of concentration during each training for the period of 3 months. On the second indicator, determining C3, the Taiwanese team is the highest evaluated and the Singaporeans scored the lowest (2.85). The Singaporean athletes experienced difficulties in focusing on the techniques and skills shown by their coaches. During the study period, they failed to perform the tasks set both in trainings and in competitions, without demonstrating anxiety or concern. There was uncertainty in Singaporean gymnasts' implementation of the exercises, which was reflected in the training diaries and in the expert evaluation, accordingly. Table 4 shows that for Component 3 – Consistency in training the Taiwan team achieved the highest score (3.50) from maximum 5, whereas the US team scored the lowest. The difference in scores between the US and the Singaporean team is only 0.01.

Table 3
Average final scores for C3 (Consistency in training).

| | |
|------------|-----------------------------|
| Taiwan: | I1-3.6; I2-3.4 C3-3.5 |
| Singapore: | I1-3.42; I2-2.85 C2-3.65 |
| USA: | I1-3; I2-3.25 C3-3.12 |

Health status (Component 4 – C4)

The Health Status component (C4) is measured by two indicators: The first one (I1) is *Minimal propensity to injury that could disrupt the training process*, and the second one (I2) is *Ability to work with high intensity*. In C4 (Table 4), all studied gymnasts showed minimal propensities to injury and good ability to work with high intensity, i.e., they have enough strength and endurance to train productively throughout the whole training session.

Table 4
Average final scores for C4 (Healthy status).

| | |
|------------|-----------------------------|
| USA: | I1-4.25; I2-5; C4-4.62 |
| Taiwan: | I1-4; I2-5 C4-4.5 |
| Singapore: | I1-3.57; I2-4.28 C4-3.92 |

Technical qualities and skills (Component 5 – C5)

The evaluation of C5 included an examination of 6 indicators. The final result was obtained by calculating the arithmetic mean of the sum of the results for all 6 indicators for each individual gymnast, and for each team. In the first indicator – *Ability to quickly learn new skills with body* (I1), the American team received the highest score (3.5 – Table 5). However, in order to achieve the maximum score of 5, experts pointed out

that more expeditious work is needed for learning complicated body difficulties. This is especially valid for rotations, since there is a growing trend to change the body figure during rotation, as the heel remains raised all the time and there are no movements that could interrupt the rotational movement. In the second indicator (I2) for this component – *Ability to quickly learn new skills with apparatus* (rope, ball, hoop, clubs, ribbon), the weakest result was posted to by the Taiwanese group (2.8). It should be noted that most girls managed to do new exercises well in the first few attempts but failed to maintain stability of performance as the training went on. The Taiwanese gymnasts failed to fully understand specific techniques to perform exercises with the apparatus correctly, through well-formed logical connections, and not at random. The third indicator refers to *Ability to perform body difficulties and handlings with the apparatus in one routine as per or close to the "ideal model" as accepted by judges* (I3). Once again, the US team was rated the highest (3.5 – Table 5). In the control trainings, these gymnasts received higher final scores for their routines than the Singaporean and Taiwanese teams. Ultimately, the goal at competitions is this – to perform as many elements as possible correctly in a single routine. Indicator number 4 (I4) is *Ability to perform routines with a high level of musicality and expressiveness*. In I4 the gymnasts from the two Asian countries showed very poor results (Taiwan – 1.4; Singapore – 1.42). Most of the tested athletes experienced extreme difficulties when trying to express emotion through face or body. They did not manage to reproduce the character of the music, and this led to lack of expressiveness of movements. One reason for this could be the fact that gymnasts from Singapore and Taiwan do not work constantly under supervision of a ballet teacher, which could help them develop rhythm and musicality. Indicator 5 – *Potential for*

future development based on physical qualities (I5) was evaluated by experts after preliminary testing (which included a total of 10 tests, 2 for each motor quality – Ivanova, I., 2016); they also provided their overall impression of the gymnasts. The highest score was given to the United States (3 – Table 5). According to Table 1, the US team result is average, which comes to show that a large number of physical qualities of the tested gymnasts are not optimally developed which could limit also their potential for excellence in this sport. The last indicator for C5 was *ability to perform a wide range of valid exercises with body and apparatus* (I6). The lowest result in this indicator was achieved by the Taiwan team (2.4). This underlines the current inability of the Taiwanese to perform a wide variety of mistake-free exercises. Eventually, this will lead to lack of variability of exercises, attractiveness, and a variety of differently structured motor activities in their competition programs that will certainly be taken into account by judges during competitions. Despite these deficiencies, the Taiwanese girls tried to be competitive with the set scores for difficulty (D) in their routines. It should be noted that according to the requirements of the Code of Points, non-performance of exercises leads to penalties and to lower scores for execution (E).

Table 5
Average final scores for C5 (Technical qualities and skills).

| | |
|------------|--|
| USA: | I1-3.5; I2-4; I3-3.5 I4-4; I5-3; I6-3.5; C5-3.58 |
| Taiwan: | I1-2.85; I2-3.42; I3-2.71 I4-1.42; I5-2.85; I6-2.85; C5-2.68 |
| Singapore: | I1-2.8; I2-2.8; I3-2.2 I4-1.4; I5-2.4; I6-2.4; C5-2.33 |

Mental skills for effective adaptation (Component 6 – C6)

Two indicators were used to assess the mental skills for effective sports adaptation in the studied gymnasts: *Ability to cope with stress and pressure* (I1) and *Ability to demonstrate resilience in difficult situations* (I2). The competitors from the US team were rated the highest in each indicator (I1-4; I2-3.5) and as a result, the average score of their sum was the best score for C6 (Table 6). The gymnasts from Singapore received the lowest marks in both indicators (I1-2.85; I2-2.57). Most of them failed to stay calm and focused in the face of difficulties, both in training and in competition. Moreover, this group did not show a distinct fighting spirit in the crucial or most challenging moments.

Table 6
Average final scores for C6 (Mental skills for effective adaptation).

| | |
|------------|------------------------------|
| USA: | I1-4; I2-3.5; C6-3.75 |
| Taiwan: | I1-3.4; I2-3.2; C6-3.3 |
| Singapore: | I1-2.85; I2-2.57; C6-2.71 |

DISCUSSION

The studied gymnasts from the US showed the highest results in all 19 indicators and 3.79 average result score for a single criterion from a maximum score of 5 (Figure 3 & Figure 4).

As evidenced by the results above, the gymnasts from the three groups need to work on improving each of the mentioned indicators of individual components in order to optimize their performance. Achieving best results for certain indicators (I) as parts of the components (C) of sports profile cannot guarantee that these results will last over time. According to O'Donoghue (2005), individual athletes'

indicators are not stable. They vary, depending on the current physical and mental readiness, motivation for the set

goals, and the right approach for their realization.

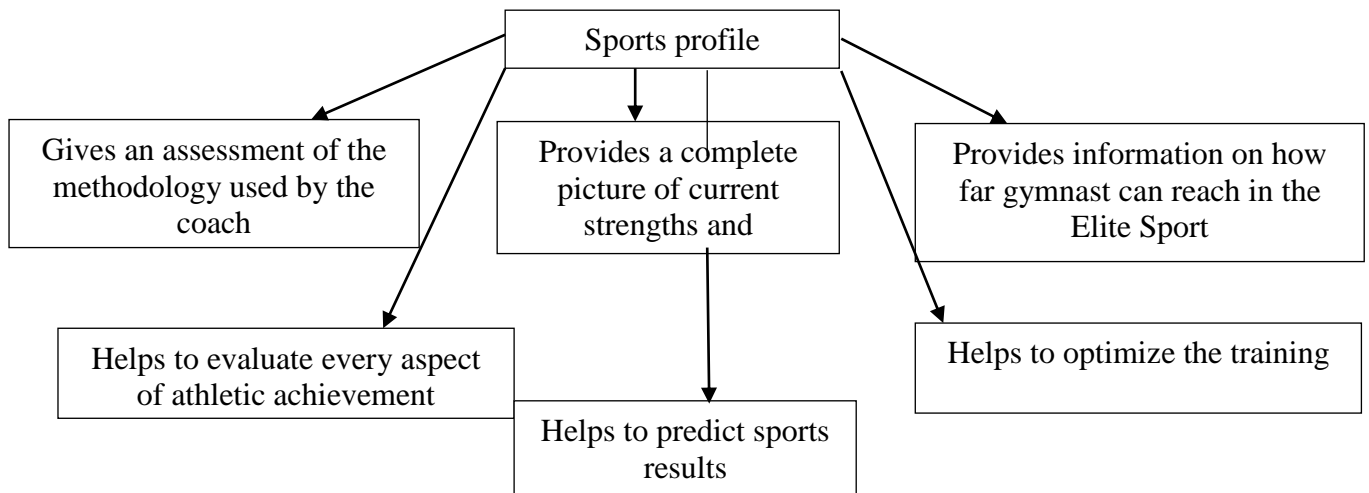


Figure 1. Advantages of creating sports profile.

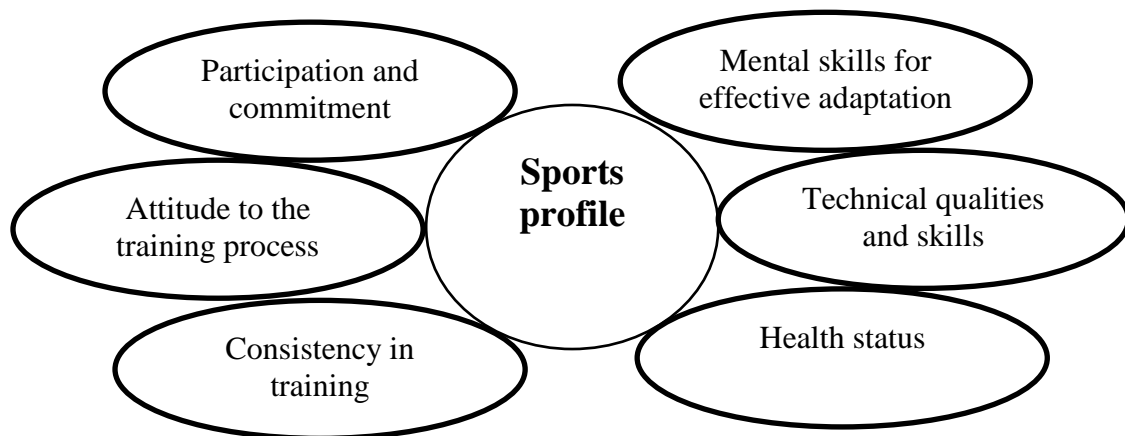


Figure 2. Components of sports profile.

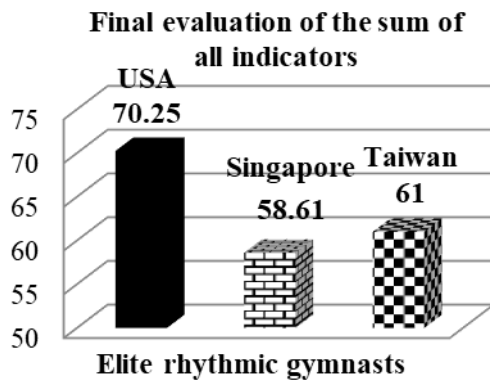


Figure 3. Sum of the C1-C6 indicators.

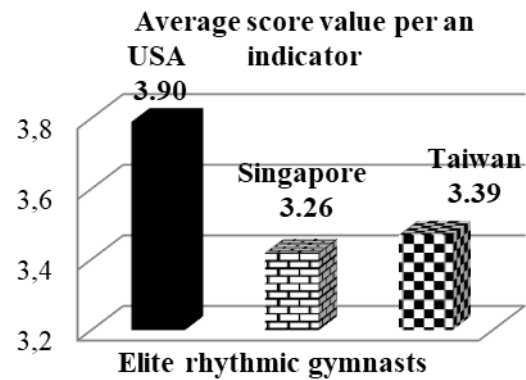


Figure 4. Average score value per an indicator.

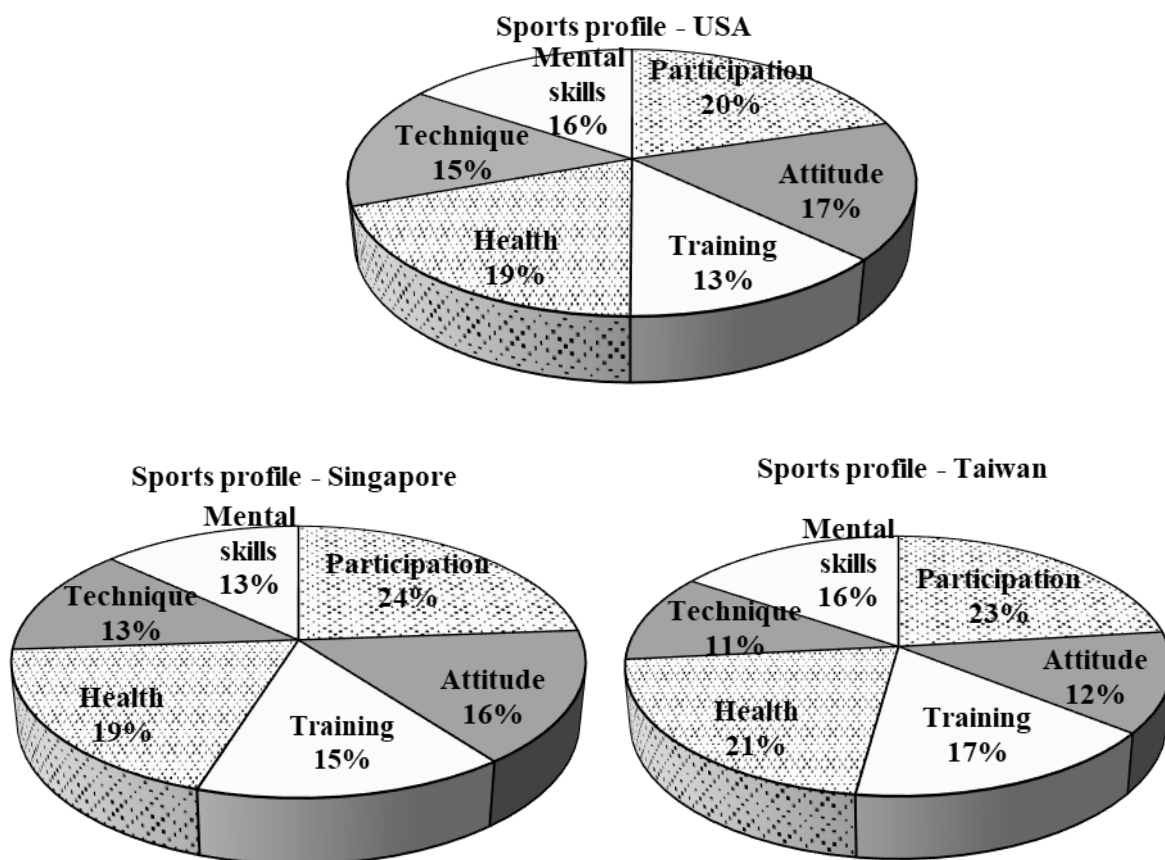


Figure 5. Percentage proportion of the components of the sports profile.

Figure 5 clearly shows the differences in percentages for individual components in the profiles of the study groups. For the United States group, the lowest percentage is achieved in *Consistency in training* (C3). Consistency in training is an extremely important component for building and optimizing sports results in

any sport. Training programs are designed to improve performance by developing appropriate physical and technical qualities (muscle groups, neuromuscular skills, energy sources etc.), as well as mental skills for successful handling of stressful situations during training and competition. The Singaporean gymnasts obtained the

lowest percentage in *Mental skills for effective adaptation* (C6) and *Technical skills* (C5), while the Taiwanese gymnasts got the lowest percentage in *Technical skills* (C5). Technical skills can only be improved by *optimizing technical training*. According to C. E. Moraru et al. (2015), the optimization of technical training is an essential requirement; it is represented by a precise approach to the structure of the training process in rhythmic gymnastics. It is founded on the sports training principles, on the set of means and methods to be used, and on the athletes' actual abilities.

We believe that by developing and implementing a tailor-made methodology for optimization of the underdeveloped components in the sports profiles of gymnasts (emphasizing the individual approach), their sports results can improve.

CONCLUSION

Our analysis of the results shows that the studied elite gymnasts demonstrated strong commitment and engagement in the training process. The final values of C2 (I4), C5, and C6 indicate that the gymnasts from the two Asian countries have communication problems in their relationship with their coach and progress slower in the development of technical qualities and mental skills for effective adaptation compared to their colleagues from the USA. Nevertheless, the Singaporean and Taiwanese athletes showed high level of self-awareness for improvement. The studied US gymnasts have certain gaps and received scores that are far from the maximum (5) for *Consistency in the training process* (C3). Most of them demonstrated limitations in the development of natural qualities (C5 – I5) which could limit their potential in the future. On the other hand, the American athletes succeeded to maintain quality communication (verbal and nonverbal) with their coach.

The author's methodology for development of a sports profile helps

identify the negative traits in gymnasts' approach to the sport. By mitigating these shortcomings, the training process of elite athletes in rhythmic gymnastics could be optimized while the positive traits that need further development could bring out each gymnast's sports potential to the greatest possible extent. The benefits of the current methodology are that it can be applied to every sport and can also be adapted to different spheres of other professional activities.

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