

What are the most important activities in a rhythmic gymnastics coach profession? An exploratory analysis of coaches' opinions

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Abstract:

Establishing importance rankings of professional activities in the context of success in rhythmic gymnastics is essential for developing valid educational programs for coaches. The aim of this study was to 1) Obtain the actual knowledge based on rhythmic gymnastics coaches' opinions on the hierarchy of importance of various professional activities for training high-level gymnasts, and 2) compare coaches' opinions according to region (country), level of coaching achievements, coaching experience, competitive achievements in order to explore the effect of these moderators on the importance ranking. A sample of 70 licensed rhythmic gymnastics coaches, consisting of 30 Polish and 40 Serbian women aged 34.86 ± 11.01 years, with coaching experience of 10.26 ± 9.05 years, participated in the cross-sectional survey. Twenty professional activities were rated using a 4-point Likert-type scale. The total sample was subdivided according to the aforementioned criteria of country, level of coaching achievements, coaching experience, and competitive achievements. Friedman's test was used to find mean rank for each professional activity. The hierarchical agglomerative method of clustering was utilized. Clusters were compared using a Kruskal-Wallis test, and subgroup comparisons were performed using a Mann Whitney U test. The importance ranking of 20 professional activities was established (Friedman's test=406.253, $p < 0.001$). The top-ranked activities were "Working out competitor's physical preparedness," "Control over technical schooling," "Planning the training process," "Working on competitor's motivation sphere." Combined with next three activities – "Control over the training process and the state of competitor's body," "Monitoring competitors during tournaments," and "Recruitment and selection to gymnastics club" – formed Cluster 1 characterized by no differences according to coach's country, level of coaching achievements, coaching experience, or competitive achievements, and it was significantly different from Clusters 2, 3, and 4 ($H=226.114$, $p < 0.001$). Statistically significant differences between subgroups fell within the lower ranked professional activities, grouped in Clusters 2, 3, and 4 ($p < 0.05$). The study results provide the specific hierarchization of professional activities of RG coaches, as well as emphasize those that are subjectively most important. The rankings indicate consistency of views concerning the most important professional activities, but also the discrepancies between subgroups regarding those activities with lower ranks. The established activity model can be useful for data driven optimization of already-existing programs intended for educating future rhythmic gymnastics coaches and professional improvement of novice RG coaches.

Key Words: aesthetic sport, sport coaching, occupational descriptors, trainer education

Introduction

Sport coaching is defined as 'the guided improvement, led by a coach, of sports participants and teams in a single sport and at identifiable stages of the athlete/sportsperson pathway' (ENSSE, 2007, 5). The International Sport Coaching Framework clarifies coaching roles, competencies, and qualifications needed to fulfill professional duties (ICCE, 2013). These standards are general and may vary in each sport and country. Furthermore, the range of coaches' competencies differ according to coaching role (Duffy, Hartley, Bales, Crespo, Dick, Vardhan, Nordmann, & Curado, 2011). Generally, the coach is responsible for establishing goals and strategy, as well as planning, guiding, monitoring, and controlling the training process. Moreover, by using adequate methods, the coach is able to holistically impact the athlete's physical, mental, intellectual, educational, and social development (Smith 2003; Mallet, 2012). The coach works in the cultural and social environment, including organizational, institutional, financial circumstances, and is required to build positive relationships with the staff involved in sport system and athletes' parents as well. Moreover, coaching effectiveness is closely linked with the coach's resources of knowledge, skills, competencies, and experience (Gilbert & Côté, 2013; Abraham, Jiménez Sáiz, Mckeown, Morgan, Muir, North, & Till, 2015). The broad range of knowledge required for decision-making process includes sport-specific knowledge, sport sciences knowledge, and pedagogical knowledge. The studies examining sources of coaches' knowledge demonstrated that beside formal education (academic qualifications, courses), experience and learning from other coaches were recognized as being

important part of professional improvement. (Abraham, Collins, & Martindale, 2006). Furthermore, the sport coaching profession require applying knowledge, skills and leadership competencies in practice to build strong coach-athlete relationships and effectively lead the athlete development process (Gilbert & Côté, 2013).

Identification of the key coaching tasks in a given sport discipline is one of the occupational descriptors, and is the third of seven steps, suggested by European Observatoire of Sport and Employment (EOSE) in “The 7 Step Model” (Gittus & Favre, 2014). This model is used for establishing the coaching qualification framework in sport in some countries (Szumilewicz, Makaruk, Perkowski, Krawczyński, Żyśko, Niedzielska, Lewandowska-Plińska, Piotrowska-Całka, Ratajczak, Siniarski-Czaplicki, Rosińska, & Kowalski, 2015). Particular professional activities are to be undertaken by coaches during the long-term training process in order to fulfill job-related tasks (Sterkowicz, Garcia, & Lerma, 2007). Professional activities have been defined by Tumanian (1985), developed by Januszewski & Sterkowicz (1992), and investigated in various sport disciplines over the years. Previous publications have examined coaches’ opinions on the importance of professional activities in ju-jitsu (Sterkowicz, 1999), judo (Sterkowicz, Garcia, & Lerma, 2007), artistic gymnastics and wrestling (Sterkowicz, Biskup, & Ambroży, 2001), cross country skiing and judo (Sterkowicz, & Krasicki, 2011), taekwondo (Bujak, Miler, & Litwiniuk, 2012), and karate (Dobrzycki, 2020), which has resulted in the formulation of a hierarchy of their importance in the context of sport success. These findings ultimately can be used for improving the educational process of future generations of coaches within these disciplines. The need for further investigations in this area to improve existing coaching education programs is still recognized by researchers (Radojević, Grbović, & Jevtić, 2019).

Rhythmic gymnastics (RG) is a female aesthetic Olympic discipline characterized by early specialization of rhythmic gymnasts (RGs) and requirements such as high training volume (Ford & Williams, 2017; Debien, Miloski, Timoteo, Ferezin, & Bara Filho, 2019). In competitions, routines with rope, hoop, ball, clubs, and ribbon are performed by RGs in individual or group exercises. The quality of the performance is judged according to the difficulty and execution requirements (FIG, 2017), and the most valued achievements are those obtained in all-around events. The role of the coach in instructing high-level RGs’ competitive achievements is crucial. An analysis of literature in scientific databases indicates a lack of studies investigating the importance of coaches’ professional activities needed to successfully train highly-competitive RGs. Thus, the aim of this study was to: 1) obtain the actual knowledge based on rhythmic gymnastics coaches’ opinions on the hierarchy of importance of various professional activities for training high-level gymnasts, and, 2) compare coaches’ opinions according to region (country), level of coaching achievements, coaching experience, competitive achievements in order to explore the effect of these moderators on the importance ranking. Establishment of importance rankings of professional activities in the context of success in Rhythmic Gymnastics is essential for developing valid educational programs for RG coaches.

Material & methods

Participants

A total of 70 participants volunteered to participate in this cross-sectional study: 30 Polish and 40 Serbian professionally active RG female coaches, with at least one year of professional coaching in RG. All of the participants were licensed coaches aged 34.86±11.01 years, with an average coaching experience of 10.26±9.05 years working with competitors of individual and group events from youngest to oldest RGs age-group categories.

For the purposes of this study, the subgroups were established from the total sample according to following criteria:

1. Region of Europe: Poland (n=30), Serbia (n=40)
2. Level of coaching achievements: National (n=48), International (n=22)
3. Duration of coaching experience: Shorter than 10 years (n=37), Longer or equal to 10 years (n=33)
4. Duration of competitive experience (as a competitor): Shorter than 10 years (n=29), Longer or equal to 10 years (n=41)

In order to detect potential differences that could affect the results of intergroup comparisons, age, the level of coaching achievements, duration of coaching experience, and duration of competitive experience between Polish and Serbian RG coaches were compared. No significant baseline differences between Polish and Serbian coaches were found for age (years) ($t=1.32$, $p=0.192$), level of coaching achievements ($\chi^2=0.09$, $p=0.766$), or coaching experience (years) ($t=-0.21$, $p=0.904$). However, Polish coaches were characterized by significantly longer competitive experience than Serbian coaches ($t=-2.07$, $p=0.011$).

Ethical considerations

The study protocol was approved by the Bioethics Committee at the Regional Medical Chamber in Kraków, Poland (No. 289/KBL/OIL/2020). Written requests were promptly sent to the Expert Committees of the Gymnastics Federation of Poland, as well as to the Gymnastics Federation of Serbia, and, after being informed about the study, its purpose and scientific value, approvals were given for the survey to be conducted during national Gymnastics Federations’ meetings.

Procedure

The survey was based on the same structure employed by Sterkowicz, Garcia, & Lerma (2007) and was conducted using Polish (Sterkowicz, & Krasicki, 2011) and Serbian (translated by native speaker coach with PhD in Sport Sciences) versions in the present study. Participants were asked to give their fully anonymous opinion on the importance of 20 professional activities in context of sport success, using a 4-point Likert-type scale (4 – very important, 3 – important, 2 – less important, 1 – unimportant, and without possibility to choose the middle): Q1. Organizing your competitor's rest and recovery process, Q2. Improving your competitor's personal manners, Q3. Control over your competitor's technical schooling, Q4. Control over your competitor's tactical schooling, Q5. Giving first-aid, Q6. Report writing and paperwork, Q7. Working out your competitor's physical preparedness, Q8. Organizing gymnastics camps, Q9. Control over the training process and the state of your competitor's body (organism, constitution), Q10. Solving training related organization problems, Q11. Planning the training process, Q12. Organization and refereeing of competitions, Q13. Recruitment and selection to your gymnastics club, Q14. Conducting research work for scientific and methodological studies, Q15. Working on your competitor's motivation sphere, Q16. Monitoring your competitors during tournaments, Q17. Monitoring your competitor's progress at school, Q18. Work on your competitor's theoretical preparation, Q19. To educate, prepare assistant-coaches and referees, Q20. Organization of your pedagogical work. The respondents were also asked to add any other components they find important in RG coach profession. This instrument showed acceptable internal consistency in the present study (Cronbach's $\alpha = 0.74$).

Statistics

For ordinal scaled results, medians (Mdn) and interquartile ranges (IQR, 25% to 75%) were calculated. Friedman's test was used to find mean rank for each professional activity and to compare ranked data. A post-hoc Bonferroni test at the 95% confidence level for pairwise comparisons between the average ranks of the 20 professional activities, with the Bonferroni correction statistical significance set at $\alpha = 0.0025$, was also used. The hierarchical agglomerative method of clustering (Furthest Neighbor, and City Block Distance- Complete linkage) was used. Clusters were compared using the Kruskal-Wallis test. For subgroup comparisons, the Mann-Whitney *U* test was used, with a level of significance of $p < 0.05$. The *r*-effect size was computed based on the equation: $r = z/\sqrt{N}$, where *z* is the value of *z* statistic, *N* is the group size, and *r* is interpreted as follows: small effect for $r = 0.10$, medium for $r = 0.30$, and high for $r = 0.50$ or higher. Data were analyzed using the Statgraphics Centurion XVIII software.

Results

The importance ranking of RG coaches' professional activities and the percent of all coaches that rated each activity as very important, are presented in Table 1. The comparison of ranked data indicated overall statistically significant differences amongst the medians (Friedman's test=406.253, $p < 0.001$). By using the Bonferroni procedure, 61 of the pairwise comparisons were statistically significant at the 95% confidence level.

Table 1. Ranking of rhythmic gymnastics coaches' professional activities.

Professional activities	Friedman's mean rank	Mdn (IQR)	Percentage (%) of all coaches that rated as very important ("4")
Q7. Working out your competitor's physical preparedness	14.49	4.0 (4.0-4.0)	87.14
Q3. Control over your competitor's technical schooling	14.36	4.0 (4.0-4.0)	85.71
Q11. Planning the training process	13.7	4.0 (4.0-4.0)	78.57
Q15. Working on your competitor's motivation sphere	13.37	4.0 (4.0-4.0)	75.71
Q9. Control over the training process and the state of your competitor's body (organism, constitution)	12.42	4.0 (3.0-4.0)	62.86
Q16. Monitoring your competitors during tournaments	12.23	4.0 (3.0-4.0)	61.43
Q13. Recruitment and selection to your gymnastics club	11.84	4.0 (3.0-4.0)	60.0
Q20. Organization of your pedagogical work	11.04	4.0 (3.0-4.0)	50.0
Q5. Giving first-aid	10.98	4.0 (3.0-4.0)	52.86
Q1. Organizing your competitor's rest and recovery process	10.91	4.0 (3.0-4.0)	51.43
Q19. To educate, prepare assistant-coaches and referees	10.86	3.0 (3.0-4.0)	48.57
Q4. Control over your competitor's tactical schooling	10.47	3.0 (3.0-4.0)	50.0
Q2. Improving your competitor's personal manners	10.46	3.0 (3.0-4.0)	45.71

Q8. Organizing gymnastics camps	10.26	3.0 (3.0-4.0)	42.86
Q10. Solving training related organization problems	9.82	3.0 (3.0-4.0)	40.0
Q12. Organization and refereeing of competitions	8.74	3.0 (3.0-4.0)	34.29
Q18. Work on your competitor's theoretical preparation	7.66	3.0 (3.0-3.0)	18.57
Q17. Monitoring your competitor's progress at school	7.39	3.0 (3.0-3.0)	18.57
Q6. Report writing and paperwork	4.83	3.0 (2.0-3.0)	7.14
Q14. Conducting research work for scientific and methodological studies	4.17	2.0 (2.0-3.0)	8.57

The four highest ranked (Mdn=4.0, IQR: 4.0-4.0) professional activities according to RG coaches' opinions were the following: "Working out competitor's physical preparedness" (mean rank: 14.49), "Control over competitor's technical schooling" (mean rank: 14.36), "Planning the training process" (mean rank: 13.7), and "Working on competitor's motivation sphere" (mean rank: 13.37). The percentage of all coaches that rated the aforementioned four professional activities as "very important" varied from 75.71 to 87.14.

The following six activities were also "very important" (Mdn=4.0), but opinions about their importance were more variable (IQR: 3.0-4.0): "Control over the training process and the state of competitor's body" (mean rank: 12.42), "Monitoring competitors during tournaments" (mean rank: 12.23), "Recruitment and selection to gymnastics club" (mean rank: 11.84), "Organization of pedagogical work" (mean rank: 11.04), "Giving first-aid" (mean rank: 10.98), "Organizing competitor's rest and recovery process" (mean rank: 10.91). The percentage of all coaches that rated the above-mentioned six professional activities as "very important" varied from 51.43 to 62.86. RG coaches evaluated the following nine professional activities as "important" (Mdn=3, IQR: 3.0-4.0): "To educate, prepare assistant-coaches and referees" (mean rank: 10.86), "Control over competitor's tactical schooling" (mean rank: 10.47), "Improving competitor's personal manners" (mean rank: 10.6), "Organizing gymnastics camps" (mean rank: 10.5), "Solving training related organization problems" (mean rank: 9.2), "Organization and refereeing of competitions" (mean rank: 8.40), (Mdn=3, IQR: 3.0-3.0): "Work on competitor's theoretical preparation" (mean rank: 7.66), "Monitoring competitor's progress at school" (mean rank: 7.39), and (Mdn=3, IQR: 2.0-3.0): "Report writing and paperwork" (mean rank: 4.83). The percentage of all coaches that rated the above-mentioned nine professional activities as "very important" varied from 7.14 to 50. "Conducting research work for scientific and methodological studies" was ranked lowest (mean rank: 4.17). In coaches' opinions this professional activity was "less important" (Mdn=2.0, IQR: 2.0-3.0), i.e. only 8.6% of coaches rated this activity as "very important". Only 7.7% of respondents added other components they found very important ("4"). These open-ended responses included the following: "Relations between the gymnasts," "Continuous knowledge improvement," "Good cooperation with gymnasts' parents (their support)," "Giving information about proper diet and nutrition of gymnasts," "Exchange of coaching experience with colleagues," "Assessment of gymnasts' psychological and physical abilities," and "Personal improvement." Two activities – "Improvement of apparatus techniques," and "Family involvement and support" – were provided as important ("3") activities.

The results of the cluster analysis are illustrated in Fig. 1. Professional activities are grouped in four clusters characterized by decreasing level of importance in the RG coaching profession. Kruskal-Wallis test results showed a significant difference between clusters ($H=226.114, p<0.001$). Using the Bonferroni procedure, five of the comparisons are statistically significant at the 95% confidence, except for Cluster 3 and Cluster 4 that were similar.

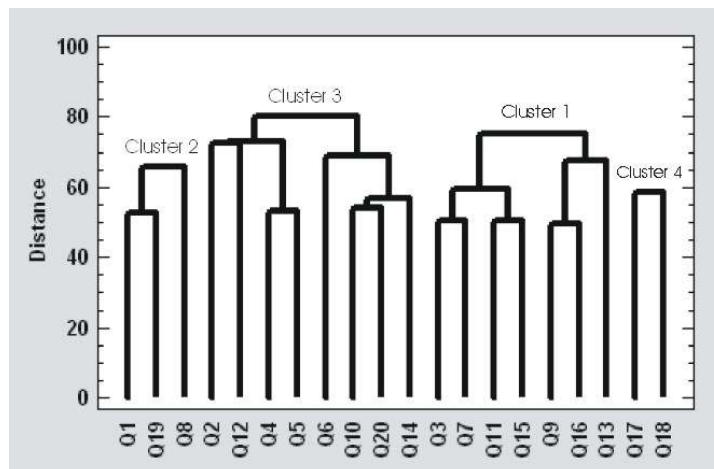


Fig. 1. Dendrogram of rhythmic gymnastics coaches' professional activities.

The results of comparisons between Polish and Serbian RG coaches' opinions are presented in Table 2. The exploratory Mann-Whitney *U* test indicated that the following professional activities were more important for Serbian than Polish coaches (i.e., "very important" vs. "important"): "Organizing competitor's rest and recovery process," "Giving first-aid," "Solving training related organization problems," "To educate, prepare assistant-coaches and referees," and "Organization of pedagogical work." Further, the following activity had less overall importance, but was again rated higher by Serbian compared with Polish coaches (i.e., "important" vs. "less important"): "Conducting research work for scientific and methodological studies".

Table 2. Significant results of the Mann-Whitney *U* test: differences between RG coaches from Poland and Serbia.

Professional activities	Poland	Serbia	U	p	r-effect size
Q1. Organizing your competitor's rest and recovery process	3.0 (3.0-4.0)	4.0 (3.0-4.0)	332.00	0.001	0.38
Q5. Giving first-aid	3.0 (3.0-4.0)	4.0 (3.0-4.0)	404.50	0.009	0.28
Q10. Solving training related organization problems	3.0 (3.0-3.0)	4.0 (3.0-4.0)	369.00	0.002	0.33
Q14. Conducting research work for scientific and methodological studies	2.0 (2.0-3.0)	3.0 (2.0-3.0)	375.00	0.004	0.32
Q19. To educate, prepare assistant-coaches and referees	3.0 (3.0-4.0)	4.0 (3.0-4.0)	425.50	.02	.25
Q20. Organization of your pedagogical work	3.0 (3.0-4.0)	4.0 (3.0-4.0)	369.00	.001	.33

The results of comparisons between coaches, stratified by lower and higher levels of coaching achievements, are presented in Table 3. The following professional activities were rated as more important by coaches with higher levels compared with lower levels of coaching achievement: "Conducting research work for scientific and methodological studies" ("important" vs. "less important") and "Organization of pedagogical work" ("very important vs. important").

Table 3. Significant results of the Mann-Whitney *U* test: differences between RG coaches of lower and higher level of coaching achievements.

Professional activities	National coaching achievements	International coaching achievements	U	p	r-effect size
Q14. Conducting research work for scientific and methodological studies	2.0 (2.0-3.0)	3.0 (2.0-3.0)	350.00	0.02	- 0.27
Q20. Organization of your pedagogical work	3.0 (3.0-4.0)	4.0 (3.0-4.0)	377.50	0.03	- 0.23

Table 4 presents the results of the Mann-Whitney *U* test obtained by comparing RG coaches with shorter and longer coaching experience. Differences were found for the importance of "Organization and refereeing of competitions" and "Monitoring competitor's progress at school". Both of items were rated as "important" by two subgroups of coaches (Mdn=3.0). However, opinions of coaches with longer coaching experience were characterized by lower IQR for Q12 and higher for Q17, in comparison to opinions of coaches with shorter coaching experience.

Table 4. Significant results of the Mann-Whitney *U* test: differences between RG coaches with shorter and longer coaching experience.

Professional activities	Shorter coaching experience	Longer coaching experience	U	p	r-effect size
Q12. Organization and refereeing of competitions	3.0 (3.0-4.0)	3.0 (2.0-3.0)	799.00	0.02	0.26
Q17. Monitoring your competitor's progress at school	3.0 (2.0-3.0)	3.0 (3.0-3.0)	453.00	0.03	- 0.22

The results of comparisons between coaches with shorter and longer competitive experience are presented in Table 5. The item "Improving competitor's personal manners" was more important for coaches with longer compared with shorter competition experience ("very important" vs. "important"), whereas "Organizing gymnastics camps" and "Conducting research work for scientific and methodological studies" were more important items for coaches compared with longer competition experience ("very important" vs. "important" and "important" vs. "less important", respectively).

Table 5. Significant results of the Mann-Whitney *U* test: differences between RG coaches with shorter and longer competitive experience.

Professional activities	Shorter competitive experience	Longer competitive experience	U	p	r-effect size
Q2. Improving your competitor's personal manners	3.0 (3.0-4.0)	4.0 (3.0-4.0)	442.50	0.04	0.22
Q8. Organizing gymnastics camps	4.0 (3.0-4.0)	3.0 (3.0-4.0)	752.00	0.04	- 0.22
Q14. Conducting research work for scientific and methodological studies	3.0 (2.0-3.0)	2.0 (2.0-3.0)	796.50	0.009	- 0.29

Discussion

We found a specific hierarchy of professional activities based on the RG coaches' views. Nineteen out of 20 items rated according to their importance were evaluated as "very important" (10 items) or "important" (nine items), which indicates the broad range of job-related activities needed to be undertaken in the context of sport success in RG. Only one item was rated as "less important" and none of the professional activities proposed for evaluation were rated as "unimportant." The items such as "Working out competitor's physical preparedness," "Control over technical schooling," "Planning the training process," and "Working on motivation sphere" consistently appeared as top ranked activities. These four items, combined with the next three activities ["Control over the training process and the state of competitor's body (organism, constitution)", "Monitoring competitors during tournaments," and "Recruitment and selection to gymnastics club"] formed Cluster 1. Coaches' opinions concerning the importance of respective activities listed above were homogenous, i.e., no differences occurred between subgroups. These activities, which were highlighted by respondents, without regard to their country, level of coaching achievements, duration of coaching experience, or duration of competitive experience, and verified by cluster analysis, can be considered as a model of the most important activities for the coaching profession in RG. Furthermore, comparative analysis between clusters demonstrated that Cluster 1 was significantly different from Clusters 2, 3, and 4.

In the present study some significant differences were observed between subgroups, which were established for more detailed analysis of coaches' opinions. The results show the country, level of coaching achievements, coaching experience, and competitive experiences as valid moderators differentiating rankings. Serbian coaches significantly higher than Polish coaches rated six professional activities. Three of these activities were located in Cluster 2 and three in Cluster 3. It is likely that the detected differences could be dependent on varying job-related organizational and professional circumstances between these two countries. But these results suggest the need of further international investigations. In contrast, the level of coaching achievements affected the opinions concerning the importance of only two professional activities (both of which formed part of Cluster 3). Coaches with international coaching achievements paid more attention to "Conducting research work for scientific and methodological studies" and "Organization of pedagogical work" than those with lower coaching achievements. Bishop, D. (2008) emphasizes the importance of coaches and scientists working together in creating new solutions for training and high sports performance. For comparison of our results with others, "Organization of pedagogical work" is considered as one of six most important activities in cross country skiing coaching (Sterkowicz, & Krasicki, 2011).

To fulfill very important professional activities such as "Working out gymnasts' physical preparedness" and "Control over technical schooling" for enhancing long-term performance development in RGs, coaches should consider the document approved by FIG containing detailed instructions for coaches, with ballet, physical, and technical ability testing programs as well (Dias, Aleksandrova, Lebre, Bobo, & Fink, 2019). Previous studies demonstrate that the optimal level of motor abilities, i.e. flexibility, strength, explosive strength, motor coordination, rhythmization, balance, having regard to appropriate sensitive periods for their development, significantly affect sport achievements in RG (Bologon, Deprá, & Rinaldi, 2015; Purenović-Ivanović, Popović, Stanković, & Bujanj, 2016; Santos, Lebre, & Carvalho, 2016; Sterkowicz-Przybycień & Fundament, 2020). Furthermore, the above-mentioned motor abilities are recognized as essential for excellent technical performance of body and apparatus difficulties (Donti, Bogdanis, Kritikou, Donti, & Theodorakou, 2016). "Control over technical schooling" in RG can be assessed through the evaluation of fitness test results and achievements in competition. Moreover, observation and analysis of execution of elite RGs' competitive routines and expertise in sport rules and Code of Points enables coaches and gymnasts to fulfill actual technical requirements, both in individual and group exercises (Ávila-Carvalho, da Luz Palomero, Klentrou, & Lebre, 2012; Leandro, Ávila-Carvalho, Sierra-Palmeiro, & Bobo-Arce, 2016; Batista, Garganta, & Ávila-Carvalho, 2017; Batista, Garganta, & Ávila-Carvalho, 2019). "Planning the training process" encompasses setting long-term goals, including an annual cycle, meso- and micro-cycles, that determine training loads. The periodization of proportions between volume and intensity affect the level of trainability (Issurin, 2008). Analysis of training

loads in age groups has demonstrated that sport performance is highly influenced by the time for practicing competitive routines in gymnasts aged 11–12 years, 13–14 years, and 14–15 years. Additionally, determination of optimal training loads in the youngest group (11.5 ± 2.8 hours per week) and the effect of integral training in the middle group on performance was observed (Rutkauskaitė & Skarbalius, 2009, 2011, 2012).

“Working on motivation sphere” is based on the psychological preparation of an athlete as a long-term process, but not always supported by a professional psychologist, especially at early stages of sport development. At the elite level, the framework of the four-year psychological preparation period before Olympic Games – based on mental skill techniques, such as imagery, focusing attention, relaxation, and self-talk – has been used to surmount psychological barriers including low levels of motivation, lack of concentration, mental fatigue, and the need to overcome injury (Blumenstein, & Lidor, 2007).

According to the current findings, coaches also view “Control over the training process and the state of competitor’s body” as very important in RG because of the need of girls to specialize at a very young age. Previous findings indicate that late maturation is desirable in RG, as it positively influences performance scores (Purenović-Ivanović, Popović, & Moskovljević, 2017). Further, a thin body shape with low fat content is preferable in this sport; the significant influence of somatotype on success in RG has been previously well-established (Purenović-Ivanović, Popović, Bujanj, & Stanković, 2016). According to Czajkowska, Plinta, Rutkowska, Brzęk, Skrzypulec-Plinta, & Droszol-Cop (2019), in comparison with non-athletes, peer RGs were characterized by delayed menarche and suffered from premenstrual syndrome and premenstrual dysphoric disorder significantly more often. Constant monitoring of the health of female athletes, including proper nutrition in order to avoid eating disorders while maintaining low body mass, is crucial for success. Di Cagno, Fiorilli, Iuliano, Tsopani, Buonsenso, Piazza, & Calcagno (2018) indicated that Italian and Greek coaches ($n=169$) were aware of importance of this aspect in sport performance. Additionally, coaches in the present study recognized “Monitoring competitors during tournaments” as very important in their professional work. Generally, coaches’ decisions during competition should be based on the knowledge of the athlete and reinforced by supportive coaching that positively influences task-oriented coping and sport performance (Nicolas, Gaudreau, & Franche, 2011).

The essence of “Recruitment and selection to gymnastics club” is talent identification, based on the early stage on recruitment of girls characterized by adequate age, somatic and motor predispositions. This professional activity is organizationally difficult and, at least in the latter stages of selection, requires assessment of the gymnast’s progress and mental toughness. Further, talent identification often requires use of a multistage approach in order to be effective and valid (Syvash, Balazh, Yurchenko, Shcherbashyn, Khurtyk, Kormiltsev, Bekas, Korolchuk, & Alla, 2019). According to di Cagno, Battaglia, Fiorilli, Piazza, Giombini, Fagnani, Borriore, Calcagno, & Pigozzi (2014), talent identification and selection process in cadets and junior competitor categories should include evaluation of coordination and motor learning ability in the context of future performance capabilities.

The hierarchy of professional activities established by RG coaches in the present study is distinctive from other sports. For example, the three most important activities for artistic gymnastics expert coaches were “Control over technical schooling,” “Recruitment and selection to gymnastics club,” and “Working out competitor’s physical preparedness,” while the fifth highest ranked activity was “Control over the training process and the state of competitor’s body”. The other highly ranked activities in the present study achieved lower positions in favor of “Organizing gymnastics camps,” “Organizing competitor’s rest and recovery process,” and “Solving training-related organization problems” (Sterkowicz, Biskup, & Ambroży, 2001). In contrast, coaches of combat sports, in addition to “Planning the training process,” “Working out physical preparedness” and “Control over technical schooling,” also emphasize “Control over tactical schooling” which usually take second or third place in the hierarchy of their professional activities (Sterkowicz, Garcia, & Lerma, 2007; Bujak, Miler, & Litwiniuk, 2012; Bujak & Gierczuk, 2013). Tactical preparedness in RG can be expressed by using new and original elements in routine composition or by improving stability and reliability of competitive exercises, and some researchers report its significantly contributes to elite-level achievements. A questionnaire-based study conducted in a group of Ukrainian coaches ($n=41$) showed that the implementation of tactical training is mainly based on the experience and observations of high-level trainers and athletes. The authors point to a lack of scientific sources of information and low attention of coaches to this type of training to explain these findings (Kozhanova, Gavrilova, & Tsykoza, 2019). In the present study, 50% of the participating coaches rated “Control over tactical schooling” as “very important,” with no significant differences in opinions between established subgroups.

Conclusions

The targeted development of knowledge, skills and competencies needed to fulfill most important professional activities we pointed in the present study should be considered as a valid part of educational programs for RG coaches. Moreover, the results of our research may be used to support the process of professional development of coaching staff in RG. The results of this investigation indicated the existence of specific hierarchy of professional activities of RG coaches, as well as emphasized those activities that are subjectively most important in RG coaching as they relate to instructing high-level athletes. The detailed

exploration of coaches' opinions showed that region, coaching achievements, coaching experience and competitive experience moderated the hierarchy of activities' importance. However, the rankings largely indicated consistency of views regarding the most important professional activities, but differences between subgroups regarding those activities with lower ranks. The established activity model can be useful for data driven optimization of already-existing programs intended for educating future rhythmic gymnastics coaches and professional improvement of novice RG coaches.

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