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# Training and health in gymnastics

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## ABSTRACT

Coppola, S., Vastola, R., Scatigna, M., & Fabiani, L. (2015). Training and health in gymnastics. *J. Hum. Sport Exerc.*, 9(Proc1), pp.S391-S398. The aim of this study was to analyze the training regimens of top level rhythmic gymnasts and their state of health. The research also focused on the information provided to the athletes about the relationship between sport and health. The sample consisted of fourteen high-level Italian gymnasts aged thirteen to eighteen. The instrument used was a structured medical history interview conducted by a doctor and a graduate student in physical education. A descriptive approach was used for the data analysis. The distribution of the variables collected in the group of athletes was studied. The results showed that, on average, throughout the year the athletes do from three to five hours of training five days a week, and travel from two to sixteen days a year for competitions. Given the age of the gymnasts in particular ten to fourteen who are under fifteen years old, it is a major undertaking. Gymnasts complained some non-specific symptoms, such as weakness and dizziness, with frequencies among more than half of the sample interviewed, especially close to competition dates. This finding suggests a reaction to stress, although the simple detection is insufficient for a correct interpretation. The data collected regarding the information provided to athletes on the risks associated with strenuous and demanding exercise shows that female athletes were not informed enough about the consequences. Self-assessment of health status is within the range of 6 to 10 (mean 7.7), despite the fact that they were not undergoing any kind of treatment at the time of the assessment and the medical history did not reveal any indication of disease or injury. In conclusion, based on the results obtained in this study it can be stated that: the young athletes need an approach to education / teaching that would enable them to deal consciously and adequately the competitive commitments, which are demanding in relation to the resources of pre-teens; the critical aspects regarding the non-specific signs and symptoms of health problems that emerged from the self-report and from the perception of health status scale need to be studied in further depth; the scientific debate on the problematic aspects with regards to the protection and promotion of the health of young athletes may provide those elements of knowledge, health education and support to growth, which can improve the overall management and self-awareness of the athlete without compromising the performance. **Key words:** RHYTHMIC GYMNASTICS, TRAINING, SPORT, HEALTH.



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## INTRODUCTION

In rhythmic gymnastics intense training usually begins at age six; the first sports competitions begin from the age of eight (Federation Internationale de Gymnastique, 2013). This discipline has grown since it became an Olympic sport in 1984. In Italy, in recent years, the number of registered gymnasts to the National Federation of Gymnastics amounts to over two hundred thousand (Comitato Olimpico Nazionale Italiano, 2015). The increase of the gymnasts involved in intense athletic training at a young age has aroused the interest of researchers as can be observed from the literature on the argument (Georgopoulou et al., 2012; Rutkauskaitė & Skarbalius, 2012; Tournis et al., 2010; Kwitniewska et al., 2009; Cupisti et al., 2007; Georgopoulos et al., 2002).

The training of high-level gymnasts consists of six phases that include neuromuscular activation, stretching, ballet, technique training, apparatus manipulation and, finally, the execution of routines (Miletić et al., 2004). The program provides national and international competitions individual and team exercises. The program of the individual gymnasts consists of four exercises with four of the five tools: rope, hoop, ball, clubs and ribbon (Heather, 2003). The program of the team, however, is composed of two routines, one with only one type of tool, the other with two types of tool. The choreography contains a balance of jumps, leaps, pivots, balances and flexibility movements. Each movement involves a high degree of athletic skill. Physical abilities needed by a rhythmic gymnast include strength, power, flexibility, agility, dexterity, endurance and coordination (Kwitniewska et al., 2009).

Training of top level gymnasts are held on average four times a week for three hours; increasing age and level workouts become daily and last for more than four hours in order to implement the provisions of the federal programs and achieve the performance objectives required by programming agonistic. The athletes of international level also train two times a day (Bertulli et al., 2008).

The practice of rhythmic gymnastics at a competitive level can cause changes in health status, including those in relation to intensive training at a young age (Jayanthi et al., 2013; Law et al., 2011). Hence, the detection of training regimens and any health problems in order to identify possible strategies for promoting the health of young gymnasts is essential. In recent years the attention of researchers focused on some characteristic factors of this discipline: dietary, anthropometric characteristics, the triad of athletes and frequency of injuries to the expert level rhythmic gymnasts' female. The results of studies related to the anthropometric characteristics and power showing a BMI lower than controls not practicing this discipline and a diet characterized by a low fat content (Gómez-Campos et al., 2013; Filaire & Lac, 2002; Cupisti et al., 2000). Other studies have evaluated the prevalence of delayed menarche and menstrual abnormal patterns, as well as the association of menstrual status with the physical training in elite rhythmic gymnasts (Márquez & Molinero, 2013; Georgopoulos et al., 2013; Roupas & Georgopoulos, 2011; Torstveit & Sundgot-Borgen, 2004; Brasili et al., 2003; Klentrou & Plyley, 2003). As a result, it is not uncommon for female athletes to train at very high intensities, to have same healthy problems. This study aims to analyze the training regimens of top level gymnasts and investigate any issues related to the health of young athletes. It also proposes to examine the knowledge possessed by athletes in reference to the health risks of intense physical activity and the source of such information in order to identify any training needs on the theme of competitive sport at a young age and health.

## MATERIAL AND METHODS

### *Participants*

The sample consists of professional gymnasts in the "top level" category belonging to several Italian clubs. The sample was selected by category and by voluntary enlistment and consisted of six gymnasts of a club in central Italy, which represents one of the largest "nurseries" of national gymnasts and eight gymnasts participating in the National Championship. The majority of the sample (71.4%) are less than or equal to 14 years, the remainder is 15 years old and over. In particular, two athletes are older and this difference, detectable by the high variability (SD 1.9 years CV - coefficient of variation of 7.6%), can be considered significant in view of the low sample size.

More than half (57.1%) of the respondents attended secondary school, while the remaining gymnasts attended high school (Classic, Scientific, Linguistic in all cases except one); thus presenting rather a homogeneous sample with respect to the type of school. The family status was identified on the basis of the level of education and professional status of the parents. Both among mothers, as well as between the fathers prevail university degrees and high school diplomas also prevail specific professions related to the standards of income and upper-middle level (e.g. teachers, doctors, entrepreneurs). In summary, despite the size of the sample, it can be concluded that gymnasts are often from a medium-high socio-economic and cultural background.

### *Measures*

The study predicted the development and administration of structured medical history interview conducted by a physician and a graduate in Science and Sport. The interview was structured in several sections: the first section requested information relating to demographic data; the second referred to the sports-related commitments in different periods of the year and the competition commitments off site; the third section included a self-report of symptoms and signs of fatigue, a perception of health status measured with self-rated health status (SRHS) (Manzur Farazi & Shamsunnahar, 2014; Mikolajczyk, 2008) and history on drug therapies; the fourth and final section covered information received from athletes about the health risks associated with intense physical activity and possible sources of information they had availed of.

### *Procedures*

The interviews were conducted by the research group on two occasions: Chieti, during training of collegiate athletes of a company in central Italy; Fano, during the National Championship of Rhythmic Gymnastics.

### *Analysis*

Descriptive statistics were used for the analysis of data. The distributions of the variables in the group of athletes were measured.

## RESULTS

Mean age 14.5 years

SD 1.9 years

Range from 13 to 18.9 years

Table 1. Age distribution of the gymnasts

Age class	N	Freq. (%)
≤ 13,5 years	5	35.7
13,5 - 14years	5	35.7
≥ 15 years	4	28.6
Total	14	100.0

The sample consists of professional gymnasts in the "top level" category belonging to several Italian clubs: six belonging to a company in central Italy, which represents one of the largest "nurseries" of the national (III Championships Italian A1 series) and eight participants in the National Championship.

The majority of the sample (71.4%) of the sample are less than or equal to fourteen years, the remainder is fifteen years old and over. In particular, two athletes are older and this difference, detectable by the high variability (SD 1.9 years CV - coefficient of variation of 7.6%), can be considered significant in view of the low sample size.

Table 2. Distribution of the sample according to the type of education

School	N	Freq. (%)
M.S. lower (11-13 years)	8	57.1
M.S. superiors (≤14 years)	6	42.9
High School (Grammar school)	3	
High School Science	1	
Language High School	1	
Institute for Tourism	1	

More than half (57.1%) of the respondents attended secondary school, while the remaining gymnasts attended high school (Classic, Scientific, Linguistic in all cases except one); thus presenting rather a homogeneous sample with respect to the type of school.

Table 3. Distribution according to the qualification of parents

Parents	Mother	Father
Average age (mean ± SD)	46,0 ± 3,4	47,8 ± 3,8
Qualification	N (%)	N (%)
Degree / University Diploma	5 (35.7)	4 (28.6)
High Schools	9 (64.3)	7 (50.0)
Secondary Schools	--	--
NR	--	--
Total	14 (100.0)	14 (100.0)
Professional status	N. (%)	N. (%)
Occupied	12 (85.7)	14 (100.0)
Housewife	2 (14.3)	--
Total	14 (100.0)	14 (100.0)

The family context has been detected on the basis of the level of education and professional status of the parents. Both among mothers, as well as between the fathers prevail university degrees and high school diplomas also prevail specific professions related to the standards of income and upper-middle level (e.g. teachers, doctors, entrepreneurs). In summary, for the sample of gymnasts outlining a socio-economic and cultural extraction medium-high particularly homogeneous despite the low number.

Table 4. Distribution according to the place of residence of the sample

Permanent Address	N	(%)
In town	10	71.4
In village	4	28.6
Total	14	100.0

The majority of the sample 71.4% resided in the city whereas 28.6% resided in villages.

Table 5. Time commitment related to the activities of training and the competitive commitments / sports off site by the sample of gymnasts.

Average number of hours of training a week	N	Average	SD	Min	Max
Beginning of season	13	19.0	4.7	10	25
The pre-race	13	23.6	7.8	10	35
Post-race	13	14.7	7.9	0	23
Number of days of traveling for sports / competitions annually	13	5.9	4.4	2	16

Periodization of the sporting reported to several months of the year that corresponds to: normal workout, intense activity (pre-race), rest.

The athletes reported that, on average, they did nineteen hours of training a week at the beginning of season with a maximum of twenty five hours; during the period of pre-race the gymnasts, on average, did twenty three hours of training a week with a maximum of thirty-five hours.

They did three to five hours of training for five days a week and they travel from two to sixteen days a year for athletic activities.

Table 6. Self-reports of signs and symptoms of fatigue and / or overtraining

Signs and symptoms	During the normal training	During the period of intense activity
Dizziness	35,7 % (5)	50,0 % (7)
Muscle cramps	35,7 % (5)	35,7 % (5)
Weakness	64,3 % (9)	71,4 % (10)
Nausea	14,3 % (2)	7,1 % (1)
Nervousness	Not required	35,7 % (5)
Drop in performance	Not required	35,7 % (5)

The table shows the reporting rate of self-referential signs / symptoms of clinical fatigue due to overtraining or referred to two regimes of physical activity, normal training and intense sports activity. The events most

frequently reported are the "physical weakness" (the complaint 64.3% [9] of the gymnasts during the normal training and 71.4% [10] in the period of most intense activity) and "dizziness" (admitted by 35.7% [5] of the gymnasts in the period of normal activity and 50% [7] in the period of most intense activity).

#### *Drug therapies in the past and present*

Nearly half of the respondents (42.9%) reported the use of anti-inflammatory medication in the past and antipyretic hypothetically related to the usual nosological employ of girls in this age group (febrile episodes, menstrual pain) and perhaps partly inflammatory musculoskeletal apparatus skeletal arising from sport. However, there were no data on the frequency / dose of intake so any assumptions about the therapeutic motivations or possible misuse or excessive use, is quite unlikely.

Table 7. Information on risks to health (N. 12 interviews)

Information on the risks ... in an intense sport	
Athletes who have received information	16,7 % (2)
Athletes who have not received information	83,3 % (10)

The table shows the frequency of athletes who claim to have received information on issues concerning relations between sport and health. Only two say they were informed about the risks of an intense sports activity (16.7%).

#### *Scale perception of health status*

*The self-rated health status (SRHS) was evaluated using a rating scale. The gymnasts assess their state of health with an average of  $7.7 \pm 1.0$  (range 6-10).*

## DISCUSSION

The results show a remarkable homogeneity of the sample with respect to socio-economic status.

The difference in the ages of the athletes makes it difficult to consider a homogeneous group.

The athletes reported that, on average throughout the year, they did three to five hours of training for five days a week and they travel from 2 to 16 days a year for athletic activities. Given the age of the gymnasts, especially 10 to 14 who are less than 15 years of age, is a major undertaking.

Gymnasts complain some nonspecific symptoms, such as weakness and dizziness, with frequencies greater than half of the sample, especially at periods of intense activity. This figure suggests, rather, a reaction to stress, although the simple detection is insufficient for a correct interpretation.

A reading can be shown in table 1.7 on the information received, in particular with regard to the risks associated with a sport intense and demanding, which shows that the athletes are just as prepared to face.

A similar uncertainty demonstrates the self-assessment of health status in the range of 6 to 10 (mean 7.7). Neither the recognition of therapies, either by history emerges any indication of disease states.

## CONCLUSIONS

In relation to the relatively low number and the relative homogeneity of the sample and the impossibility of repeated detections makes this a pilot study. The results are, therefore, rather suggestive than conclusive, and open up the field to the need for further investigation.

In particular, many aspects of the analysis of training regimens and any signs and symptoms of overtraining of young athletes could be clarified by examining a broader sample of athletes belonging to different categories and in different stages of their athletic growth.

Based on the results obtained in this study, in conclusion, we can say that:

- The young athletes need an educational approach/teaching that would enable it to deal consciously and serenely the competitive commitments, which are heavy in relation to the resources of pre-adolescents;
- The critical aspects emerged from self-report on the signs and symptoms of overtraining and scale perception of health status deserve a deepening and a specific reflection;
- The scientific debate on the problematic aspects of the protection and promotion of the health of young athletes, would make the elements of knowledge, health education and support to the growth, which can improve the overall management and self-awareness of the athlete without compromising performance.

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