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Science of Gymnastics Journal (ScGYM®)

Science of Gymnastics Journal (ScGYM®) (abrevated for citation is SCI GYMNASTICS J) is an international journal that provide a wide range of scientific information specific to gymnastics. The journal is publishing both empirical and theoretical contributions related to gymnastics from the natural, social and human sciences. It is aimed at enhancing gymnastics knowledge (theoretical and practical) based on research and scientific methodology. We welcome articles concerned with performance analysis, judges' analysis, biomechanical analysis of gymnastics elements, medical analysis in gymnastics, pedagogical analysis related to gymnastics, biographies of important gymnastics personalities and other historical analysis, social aspects of gymnastics, motor learning and motor control in gymnastics, methodology of learning gymnastics elements, etc. Manuscripts based on quality research and comprehensive research reviews will also be considered for publication. The journal welcomes papers from all types of research paradigms.

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Fundacija za šport

J A K

CONTENTS

EDITORIAL

Dear friends,

Wish New Year started well for all of you, so did for us, as new seven articles are in front of you. Last year we started to use ScholarOne; we have new experiences, so do authors, and as we are all beginners in this field please be patient as we are all "exercising in new gym hall". For those of you who would like to quote the Journal – its abbreviation in Web of Knowledge is SCI GYMNASTICS J.

Last year FIG voted president and prof. Bruno Grandi was reelected, for what we congratulate him. Also new committees were elected and we hope we can cooperate with them as we did in past. After all we do share passion for gymnastics and we want gymnastics to improve.

The first article in this issue is from Brazil by Myrian Nunomura, Mauricio Santos Oliveira. They researched how parents support influence child sport achievements. They have found that parental support enabled and greatly influenced the child's entering into sports, their access to the practice of a sport, their level of participation, their degree of involvement, and their physical and emotional wellbeing. Moreover, the parental support is crucial to the commitment and dedication of the young gymnast. However, when this support is perceived in a negative way it can result in stress, conflicts between parents and children, burnout and may provoke dropout.

The second article is from Germany. Thomas Heinen, Stefanie Mandry, Pia M. Vinken and Marc Nicolaus contributed from motor learning area. Final conclusion is that when a learner acquires a motor skill in gymnastics, this changes the way the learner perceives that skill. Important outcome for P.E. University courses where practice is regarded as less important than theory.

The third article comes from Slovenia. Bojan Leskošek, Ivan Čuk and Maja Bučar Pajek analyzed how open ended Code of Points at example of European Championships between 2005 and 2011 works. Difficulty rises, execution falls, importance of execution is dropping. Is this really what we want?

For the first time we have contribution from Mexico. Authors Antonio Pineda-Espejel, Jeanette López-Walle, José Tristán Rodríguez, Mireya Medina Villanueva and Oswaldo Ceballos Gurrola during Pan American Games investigated how are related self confidence and prestart anxiety. Worth to read results in article.

The fifth article is from Slovenian Karmen Šibanc, she was interested how P.E. students evaluate gymnastics as a sport and how they compare it with other sports. Female students rank gymnastics higher than male students, however despite huge results of Slovenia gymnasts, gymnastics is still less interesting as other team sports.

The sixth article comes from Greece; authors Mavrovouniotis Fotios, Proios Miltiadis, Argiriadou Eirini and Soidou Andromahi were comparing rhythmic gymnastics and Greek folk dance program influence on dynamic balance ability. Interesting both has significant improvement on dynamic balance.

The last article comes from Brazil. Rio de Janeiro Olympic Games are getting closer, and Kizzy Fernandes Antualpa and Roberto Rodrigues Paes made analyze what they have and what need to be improved in their rhythmic training centers if they want to have good results at home Olympic Games.

I wish you pleasant reading and a lot of inspiration for new research projects and articles,

Ivan Čuk
Editor-in-Chief

PARENTS' SUPPORT IN THE SPORTS CAREER OF YOUNG GYMNASTS

Myrian Nunomura, Mauricio Santos Oliveira

State University of São Paulo, Brazil

Original research article

Abstract

From the very first moment of entrance in sports up to the time of their successful achievements, parents have a pronounced influence on the sport's career of their children. This influence is readily seen when the parent's dedicated involvement and investment, both emotional and financial, put into the support they give to their children in sports is taken into account. This is all done with the objective that their young athlete may stay involved and reach their full potential. To describe the parental support in the context of Brazilian Artistic Gymnastics in formative categories, this study addressed the perceptions that young gymnasts have toward the behavior and attitude of their parents through a field research conducted among 29 sport institutions involving a total of 163 athletes. We have found that parental support enabled and greatly influenced the child's entering into sports, their access to the practice of a sport, their level of participation, their degree of involvement, and their physical and emotional wellbeing. Moreover, the parental support is crucial to the commitment and dedication of the young gymnast. However, when this support is perceived in a negative way it can result in stress, conflicts between parents and children, burnout and may provoke dropout.

Keywords: *artistic gymnastics, parents, youth sports.*

INTRODUCTION

To achieve high performance in Artistic Gymnastics (AG), young gymnasts need to develop complex motor coordination that is associated with the technical accuracy, strength, endurance, speed, flexibility and persistence needed to withstand long hours of training. The technical mastery, virtuosity and courage of the great icons of AG fascinate children and many of them get motivated to be like the new star or gymnastics pro.

The young gymnasts get into the gymnastic culture and soon they are challenging the laws of physics as they learn to execute technical and precise movements that are only possible with a lot of discipline, commitment, determination and passion.

This passion is defined by Gustafsson, Hassmén and Hassmén (2011) as a strong interest by the individual for the activity that he enjoys and considers important and in which he invests time and effort. Although children and young people can find their own passions in sports for themselves, they need the support of parents so that their participation and athletic success to be possible.

Parents, in their many different ways, play a vital role in supporting the involvement of their children and young people in competitive sports (Côté, 1999). According to Fraser-Thomas and associates (2008), parents are responsible for introducing their children to practice sport and provide the necessary means and resources so that the children remain active in it.

In addition, parents play an important role in the wellbeing of their young athletes. Cogan and Vidmar (2000) considered that without parental support and assistance, both emotional and financial, it would be very difficult, if not impossible, for a gymnast to achieve success. Shannon Miller, the great star of women's AG in the U.S. during the nineties, exemplified the importance that parents have in the life of an athlete: "My parents supported me throughout my journey. (...) they made sure that I knew that no matter what happened; I knew they loved me, as a daughter, not only as a gymnast" (Cogan & Vidmar, 2000, p.112).

Parents are a great source of support during childhood and, in AG, they are essential and are the primary reason for children entering this sport, since, the initiation to this sport must occur at a tender age due to its specific demands. Baxter-Jones and Maffulli (2003) reported that 42% of the interviewed gymnasts in their study attributed their inclusion in sports to the influence of parents. Furthermore, children depend on the parents to transport them to practices, to encourage a correct diet, to give emotional support, to cover costs of training, among other factors.

Although the involvement and support of parents in sports, to a large extent, are associated as being positive, Karen and Vidmar (2000) warn that many parents who are overly enthusiastic in their support of their children, can damage the careers of their young athletes. Some parents have difficulty perceiving that their degree of involvement in sports can be understood by the children, in some cases, as a source of stress (Kanters, Bocarro & Casper, 2008).

According to Nunomura (2008), some parents require results, impose strict diet rules and interfere with the work of the coaches. Although the goal of these parents is to provide everything that can help and encourage the athlete to achieve their sporting potential, their involvement can harm and negatively influence the child's participation in sports (Woolger & Power, 1993). Jowett and Timson-Katchis (2005) and Hellstedt (1987) point out that when parental influence becomes excessive and negative, it can cause anxiety, stress, sport fatigue, burnout and dropout.

Many parents are influenced by the contemporary sporting culture and establish standards of success in which victory is over emphasized, and, in some cases, they use their children's progress for their own status and personal objectives. According to Doherty (1999), this parental attitude has consequences that can cause physical and psychological damage that will last the entire lifetime of the athlete.

Hoping to ascertain what parental support does in the context of Brazilian formative categories in competitive AG, this study addressed the perceptions of young gymnasts as to the behavior and attitude of their parents through a field research conducted in 29 sports institutions that involved a total of 163 athletes.

Through the interviews it will be possible to better understand how the gymnasts perceive parental support and how their attitudes and behaviors can influence, positively or negatively, the process of the training of their athletes. The data obtained in this study may provide a basis for the work of coaches and parents in order to provide positive experiences that can contribute to success in sports and other areas of life of the young gymnasts.

METHODS

In this study, we chose the qualitative research approach. Data collection was conducted through semi-structured interviews, for we believe that this technique with the presence of the

researcher enhances and allows individuals to have the freedom and spontaneity necessary to collaborate with the study (Triviños, 1987).

For the selection of participants in the research, we consulted the state federations aiming to identify the sports institutions who had participated in the state and national competitions in the age-group categories of our research scope. In men's AG the Pre-Infant[1], Infant[2], Infant-Juvenile[3] and Juvenile[4] categories were addressed; and in women's AG Pre-Infant[5], Infant[6] and Juvenile[7].

The range of the study was restricted to the State of São Paulo and the cities of Rio de Janeiro, Curitiba and Porto Alegre due to the representativeness of these places in the competitive scenario of Brazilian AG. The subjects were presented by the abbreviation A (athlete) followed by a number, a feature adopted for purposes of organization and identity secrecy.

The participation of the gymnasts was of a spontaneous nature and the interviews were conducted on-site. Thus, we interviewed 163 gymnasts that were distributed in 29 sport institutions, as follows: 40 boys and 123 girls.

For data processing we used the Content Analysis technique proposed by Bardin (2010). The collected data was organized and analyzed in three steps: pre-analysis, the study of the material and then inference. We emphasize that our interest was not to perform a quantitative analysis of the testimony of the gymnasts, but to analyze and expound on the latent content of the messages given.

The study was submitted to the Ethics and Research Committee of the School of Physical Education and Sport, University of São Paulo, and received a favorable assent for its realization. It also received financial support from the São Paulo Research Foundation (FAPESP).

According to Van Rossum (2004), sport performance is influenced by the result of the interaction of factors relating to the quantity and quality of training, besides the innate talent of the individual. However, the authors affirm that social and cultural factors and parental support are essential to achieve the sport's high level of performance, an opinion corroborated by Hedstrom and Gould (2004) and Côté (1999).

In recent decades, sports for the Children and Pre-Teen were being constituted in practices that have become "increasingly privatized, regionally located, expensive, performance-oriented, and highly structured in terms of participation schedules" (Coakley, 2006, p. 159). These factors make the children to be more dependent on parental involvement so that their participation in sports is possible. According to Cogan (2008), in the case of AG, parents are always involved, because the gymnasts start their systematic training at a tender age.

In literature, authors such as Holt et al. (2009) cited in Ede et al. (2012) define this parental involvement as the level of interest, the degree of their knowledge and the active role that parents play in the participation of sports for their children. And, according to Hedstrom and Gould (2004), this involvement may vary from a driver to a role such being an assistant coach or official.

The parental involvement can influence the career of the young gymnasts in different ways. In the opinion of Vilani and Samulski (2002), a successful career in sports depends, to a large extent, on the family members because they can provide a favorable environment conducive to the development of the athlete. This can be proved by analyzing the athlete process of training, because we realize that parental involvement is proportional to the competitive level of the children. This fact is evidenced by the massive involvement, dedication and emotional and financial

[1] 9-10 years of age
[2] 10-12 years of age
[3] 12-14 years of age
[4] 14-18 years of age
[5] 9-10 years of age
[6] 10-12 years of age
[7] 12-15 years of age

investment that parents have to apply to provide an environment where young athletes can remain involved and manifest their full potential in sports (Weiss & Weiss, 2007)

In AG, parents are essential in the formation, development and stability of the career of the young gymnast and are considered as a key factor for success in this sport as they are the instruments used as a catalyst for successful sports (Cogan, 2008). Their influence is prominent and, in the opinion of Lally and Kerr (2008), parents are responsible for inserting their children in this sport, and besides that, for encouraging and directing their children and young teens into competitive teams. In the words of the authors, "this early introduction was followed by years of strenuous training and competing for the athlete and years of imposing material, financial, and emotional sacrifices for the parents" (p. 43).

According to Fredricks and Eccles (2004), parents play different roles in the sport life of their children, namely: provider, interpreter and role model.

The role of provider means making the access of children to sports possible. Actions include offering transportation to practices, competitions, training camps and financially supporting the young athlete himself. The function of the interpreter is related to the influence that parents exert in values, beliefs, expectations and the perceptions of competence relative to the involvement in sports. And, being the role model covers that influence the parents have as an example to be followed, including the performance of a motor skill or showing commitment and how to relate to other people in the sport environment (Fredricks & Eccles, 2004).

While performing these roles, parents are involved in the sports career of their children with different intensities. Hellstedt (1987) classifies this parental involvement as being under-involved, moderate, to over-involved. These levels reflect the degree of involvement, interest, knowledge and how the parents act in the sporting lives of their children.

Parents who are under-involved are characterized by the lack of functional support, both emotional and financial. Hellstedt (1987) relates that parents with low levels of engagement show little interest in following competitions, invest fewer resources in the acquisition of sport equipment, do not participate in those actions that are aimed at raising funds for the team and do not seek to discuss the development of children with their coaches.

Moderate parents are characterized by flexibility, but also direct the sports career of their children with much firmness. The decision of the young athlete's participation and performance in sports belongs to the children, although the parents give many incentives. Unlike the parents that are under-involved, moderates seek feedback from the coaches on the development of their children in the sport and they can distinguish their role as parents from that of the coach. In addition, they assist in setting realistic goals by offering financial and emotional support without exaggeration (Hellstedt, 1987).

Parents who demonstrate excessive involvement overemphasize victory and exhibit characteristics of those who cannot distinguish between their needs from those of their children. Part of their own self-esteem is related to the success of their children and they seek to realize their unfulfilled expectations, dreams, and desires through their children by setting goals that, in most cases, are unrealistic. Amanda Borden, one of the stars of the U.S. team for the 1996 Olympics, says "(some parents) live through their kids (...)" (Cogan & Vidmar, 2000, p.114).

According to Hellstedt (1987), parents with these characteristics have expectations that their children's success in sports will bring them financial and/or educational opportunities (such as scholarships). The excessive involvement is reflected also in their monitoring practices and/or competition by offering higher than necessary financial backing as well as interfering in coach-athlete relationships. This comes about because parents with this

over-involved behavior want to make the decisions and play the role of "coach". Cogan and Vidmar (2000) characterize these parents as those who, during practices and competitions, shout more instructions than the coaches do, criticize and over-demand good scores from their children.

Sacks, Pargman and Tenenbaum (2008) point out that we must pay special attention when defining the degree of parental involvement and the use of the definitions cited above because this all reflects a view that is one-dimensional and linear. The authors believe that it would be better to understand the parental involvement in a multidimensional manner in which interactions could be classified and would include "healthy" and "unhealthy" behavior. It is true that a parent can be classified as over-involved, yet in a healthy manner. This means that the important thing is not just the intensity of their involvement, but if their involvement reflects a qualitative and adequate form of interaction.

The multidimensional aspect is also presented in the different ways the children themselves perceive things. One athlete can understand parental support as acceptable and even desirable, while another sees the same type of support as a source of stress (Wuerth et al. 2004). Thus, we can infer that "the impact of parent behaviors is entirely dependent upon the child's interpretation of those behaviors" (Kanters, Bocarro & Casper, 2008, p. 66). Therefore, we agree with Ede et al. (2012) who understand it is fundamental to consider the perceptions of the children to better understand parental involvement in the sporting context, and, in the case of our study, if such is perceived as positive or negative by the children.

RESULTS AND DISCUSSION

WOMEN'S ARTISTIC GYMNASTICS

Baxter-Jones and Maffulli (2003), Headstrom and Gould (2004) and Araujo (2005), see the family environment as the most important source of influence to meet the conditions the child needs for reaching success in his life as an athlete. According to reports obtained in the study, we came to realize that most children perceive their parents as major motivators, which is favorable to progress in the sports career. (Sanmartin, 1995; Baxter-Jones & Maffulli, 2003; Headstrom & Gould, 2004). In Table 1, the positive and negative aspects of parental support as perceived by young gymnasts are listed in the Pre-Infant, Infant and Juvenile.

By analyzing the positive aspects, we found that the Recording Unit "accompany the activities" is present in all three of the women`s categories approached in the study. The gymnasts reported that the parents accompany their workouts and, more frequently, participate in the competition. As examples, we list the following statements: *"always come to watch the* competition *"* (A157), *"they come to see the practices"* (A73), *"come to follow the* competition*"* (A125), *"accompanying the* competition*"* (A152), and others. According to Cogan and Vidmar (2000), some parents engage with great interest when accompanying the practice sessions of their children. And many of them come to know the terminology of the sport and the judging process. When they are present during the competition, the authors believe that "parents can share in the triumphs and accomplishments and assist to cope with the disappointments" (p. 112). Only one gymnast said that she does not appreciate that her parents come to the competition because it is distracting. This may be related to the fear of failure that may come from the parent`s expectations as a source of stress (Gould, Horn & Spreemann, 1983).

Another Recording Unit categorized as positive and that emerged in the three categories was "encouraging". The answers did not have a vast explained content, but they lead us to understand that parental involvement is expressed through different ways and intensity of encouragement such as: *"they support me a lot"* (A47), *"their encouragement gives me strength"* (A35), *"gives strength when I'm tired"* (A68), *"when I want to quit, they say: you have*

chances" (A24), *"wish me good luck in the competition, congratulate me for a good practice"* (A131), *"(encourage me to go to training) saying that I cannot miss"* (A109), among other reports.

Table 1. *Positive and negative aspects of parental support as perceived by the gymnasts.*

CATEGORY	PRE-INFANT	INFANT	JUVENILE
	RECORDING UNIT		
POSITIVE ASPECTS	Accompany the activities Encouraging Concerned with health issues Seek financial resources Have expectations Logistics support	Accompany the activities Encouraging Concerned with health issues Provides Comfort	Accompany the activities Encouraging Concerned with health issues Provides Comfort
NEGATIVE ASPECTS	Concerned with health issues Source of pressure Worry about studies	Concerned with health issues Source of pressure Source of distraction Discouragement	Concerned with health issues Source of pressure
NEUTRAL	Apathetic/Indifferent	-	-
DID NOT KNOW HOW TO RESPOND	Not able to define support	-	-

We observed that the parent's behavior, in a great measure, regard to the emotional support. According to Martens (2001), parents should provide their children with an environment that corroborates with the practice of sports and encouragement is crucial in this context. Babkes and Weiss (1999) quote that the perception of children and young people about the behavior and attitudes of parents, in support of sports, is related to their sense of competence and motivation, something corroborated by Brustad (1988) and this confirms the importance of parental encouragement.

The interviews also revealed the interest of parents for the satisfaction and well-being of their children. In Pre-Infant category, the gymnasts A5 and A50 mentioned that their parents accompany the development of their athletic career and ask them if they feel good about practices and if this is what they really aspire to do. Martens (2001) emphasizes that it is the parents' responsibility to know the philosophy behind the work of the coaches and to know whether their actions are beneficial for their children. In the Pre-Infant category, there was a report about "Concerned with health issues" with emphasis on the gymnast`s diet: *"they say that I need to eat well to be able to do things (skills)"* (A75).

Another form of support reported by the gymnasts is related to the need for financial resources to stay involved in the sport. The youth sport has considerable costs for membership and permanence of the children and teens in the sports programs. Bailey et al. (2010) consider that the socioeconomic status of the family is vital in creating strategies and actions that will support the athlete development from a very early age. The authors relate the expenditures of membership in a club/gym, costs for workouts, transportation costs and the purchase of items/equipment used for practices. In the interviews, this aspect emerged in the categories Pre-Infant and Juvenile, in which the gymnasts mention that parents *"seek for sponsorship"* (A33), *"helped them arrange sponsorship"* (A3). Weiss and Hayashi (1995) show that parents of the children involved with AG dedicate

between 5-25% of the family budget to pay for the gymnastic activities of their children. In analyzing the interviews, we realized that parents engage in actions that aim to seek sponsorships to minimize the burden of these costs on the family.

Some reports indicated that parental support is demonstrated through "comfort" given in times of discouragement and frustration, as can be seen in the following reports: *"when I fail, they, support me"* (A130), *"if you lose, do not be upset, do not get discouraged, keep looking forward "* (A120), *"they give strength; they try to make me feel upbeat"* (A125). According to Cogan and Vidmar (2000), parents should share the victories and the disappointments of the children. "It is natural for parents to want to share in the winning moments and congratulate their child after a stunning performance, but parents also can be there just as strongly for the mistakes and frustrations" (p.112). This positive interaction of parents works with the child's self-esteem and fosters psychological well-being of young gymnast.

"Logistics" support was another aspect mentioned in the interviews. In addition to offering emotional and financial support, parents also help their children on the issue of having access to the sport. Dixon, Warner and Bruening (2008) explain that this form of support ranges from transportation, the cost of classes and even the care for their uniforms. Gymnasts A34 and A21 respectively exemplify this point: *"They come get me* (after practices)*"*, *"pay for everything I need."*

Hoefer et al. (2001) point out that providing transportation to the physical activities is a form of support in the physical and social context in which parents act as facilitators of the sport opportunities. Weiss and Hayashi (1995) and Stein, Raedeke and Glenn (1999) report that the involvement of parents in sports in the offering of transportation to training and competition, is essential for the maintenance of the young athlete, especially in those types in which the initiation and development occurs at a tender age, as is the case with AG.

Gymnasts related "expectation" as another form of support. The athletes reported that parents: *"know that I can be something in life"* (A147), *"keeps saying that I'll earn medals and be able to do things"* (A18). According to Côté and Hay (2002), some studies show a positive relationship between parents' expectations, success and pleasure in their child's sport involvement. Nevertheless, Brustad (1988) states that these parental expectations can become the sources of anxiety, stress, and pressure that would interfere with the athletic experience of their children. We need to be aware that expectations can become pressures and demands that, according to Vilani and Samulski (2002) can "promote an atmosphere of strict rules and unrealistic expectations" (p. 9l). This would jeopardize the future of the athlete if he does not meet those expectations (Candeias, 1998). Nash (1987) cites that it is common for parents to require their children to increasingly try to strive for perfection, and that this pressure, perhaps, is responsible for physical and psychological illnesses.

"Source of pressure" was included among the negative perceptions of parental support. Hellstedt (1990) defines this pressure as the degree of motivational influence that parents have on their child-athlete to participate in competition, to perform on a certain level and to continue in the sport. The gymnasts revealed that parents: *"do not let me quit because otherwise I will lose opportunities to do other things"* (A147), *"tell me to strive harder, bring back a medal, they tell me that I cannot miss (a practice) even when I am tired"* (A117) *"My father says I must stay here (training) until I am 18 and I do not know why"* (A22), *"my father said that if I quit, it might not be a good action towards other people"* (A148).

Wuerth, Lee and Alfermann (2004) relate the pressure to the direction and control of the behavior of athletes by parents. This parental pressure is associated with those who emphasize winning, have high expectations, are very involved in the

sport and require success from their children (Lauer et al., 2010). Brustad (1988) and Anderson, Funk and Smith (2003), state that the pressure exerted by parents is associated with the low levels of motivation and the loss of enthusiasm for sports. This can result in stress, burnout and dropout (Fraser, Thomas, Côté & Deakin, 2008).

Another Recording Unit associated with a negative perception is "concerned with health issues". This item relates to fatigue, the sacrifices and the risks of injury inherent in the sport: *"My father thinks it is tiring"* (A61), *"My father get nervous, he is afraid that I fall"* (A64), *"they think that what I do in practice is too much"* (A63), *"my mother cannot watch me because she is afraid; she gets sick"* (A52). We infer that parents believe it is an exaggeration all the efforts that the gymnastics must to do to be successful, perhaps, because of the canalization of efforts for the sports training, or worries about the trips to compete. In addition, parents are afraid that the gymnasts will get hurt during training and competition due to the characteristics of AG.

In the study by Boufous, Finch and Bauman (2004), the results show that some parents discourage and keep their children back from participating in sports in which they believe that there are issues of safety or risk of injury. According to the authors, "some participants felt that the potential for injury or the seriousness of likely injury associated with some sports was too great and indicated that they had disallowed, or would not allow, their child to participate in playing those sports" (p. 484). Though in fewer in number, AG was listed as one of the sports in which parents discourage or prevent participation. Byrne (1993) cited by Vilani and Samulski (2002) classified these parents as overprotective and they are characterized by constantly threatening to deprive their children to practice sports because they have fears that are associated with the risks inherent in the sport practice.

Lack of support was seen in the item "concern with the studies". One of the gymnasts cited that her parents intend to get her out of sports so she can focus on academics in order to get better opportunities in the labor market in the future.

One of the gymnasts, A6, cited that her parents do not interfere in her decisions, what we consider a neutral attitude, because the answer did not allow a detailed analysis, which led us to classify it in this category. Another athlete, belonging to the Pre-Infant category, did not know how to give her opinion.

MEN`S ARTISTIC GYMNASTICS

As in the women's category, the results of the men`s point to a range of positive and negative aspects about the support of parents in the practice of sports of the gymnasts. In Table 2, we can see that the number of Recording Units regarding positive perceptions emerged in greater numbers in the interviews of male young athletes.

Just as the women's sector, we can see that most parents were considered supportive and offered positive support to gymnasts, which favors their children's continuity in sports career (Sanmartin, 1995). This aspect was evident because of the frequency of the Recording Unit "encouraging" in all the men's categories addressed in the study. As examples, here are some reports covering this theme: *"They really support me, they like that I train"* (A142), *"they are very supportive"* (A144), *"great encouragement, very supportive, always giving all they've got"* (A1), *"my father is a doting father type, he really cheers for me" (*A2), *"encourages me ever since childhood"* (A81).

Other reports revealed that parental involvement is positively expressed through accompanying competitive events. Only one of the athletes cited the presence of parents in training. We infer, through the reports of the gymnasts, that parents show interest in offering support to their children in competition in the way that they can: *"they come to see competition, training"* (A137), *"they always go to watch my performance"*

(A124), *"when it is not far, they come to the competition"* (A91), *"most of the time they come to the competition"* (A90), among others.

Table 2. *Positive and negative aspects of parental support as perceived by the gymnasts.*

CATEGORY	PRE-INFANT	INFANT	INFANT-JUVENILE	JUVENILE
	RECORDING UNIT			
POSITIVE ASPECTS	Encouraging Accompany the activities Have expectations Provides Comfort Logistic support	Encouraging Accompany the activities Have expectations Financial support Provides Comfort Logistic support Concerned with health issues	Encouraging Accompany the activities Concerned with health issues	Encouraging
NEGATIVE ASPECTS	Concerned with health issues Source of Pressure	Concerned with health issues	Concerned with health issues Worry about studies	Source of Pressure

Three athletes mentioned that their parents have expectations for their sport careers, but they perceive it as a positive support: *"My mother wanted to do AG when she was young. So she likes it, and so does my father"* (A60),*"(they believe) I'll be really good one day and I will have opportunities"* (A59) and *"they think that I have a future here"* (A144). Although parental expectation is beneficial, this can become a source of pressure because some parents relive their own ambitions on the sports field through the children as we identify in the interview of A60. This expectation can become a source of stress and bring about possible anxiety levels, especially during pre-competitive and competitive situations (Nunomura, Araujo & Ferreira-Filho, 2005).

Parental support related to athletes' health emerged also in the men's category. This aspect was linked to nutrition and the benefits of sport for health maintenance, *"(they say) take care of your eating, they say to stop eat this, do not eat that, this helps to control weight, because I will not be able to train"* (A46), *"this side of health, to do sports"* (A124). Parents reinforce the healthy habit of doing sports, which is very favorable for both the continuity of the young athlete in AG, as for an active and healthy life in general.

The unit "provides comfort" reappears as a positive form of support. This fact is very clear in the speech of the gymnasts A8 and A12, respectively: *"They talk to me when I am upset"* and *"if I am sad they ask me what happened, if I cannot do a skill they converse with me and tell me not to quit."* This form of emotional support provides security in times of stress, anxiety and promotes the self-esteem of the children (Côté & Hay, 2002).

As in the women's category, parents really help the male gymnasts on the issue of logistics, as we follow the reports of A163 and A89: *"they bring me to practices"* (A163), *"my father brings me here (to training)"* (A89). This form of support allows young gymnasts to overcome the barrier of access and of opportunity that is imposed on many individuals who would like to practice sport, but face barriers to have access to practice sites, equipment and sports programs (Wiese-Bjornstal, Lavoi & Omli, 2009).

Among the aspects related to the negative perception of parental support, the gymnasts mentioned health considerations, such as: *"My father thinks the sport is a little extreme"* (A137), *"they almost do not come to any of the practices, because they think that it is awful, they sometimes feel pity for me"* (A90), *"they like the sport, but my mother does not come to watch me train because she is afraid (that I got injury)"* (A127), *"they wanted me to stop, but it is my dream"* (A138). The reports of the Recording Unit "concerned with health issues" found in the men's AG resemble the women's category and reflect that the parents have concerns about their children's safety and the risk of injury and therefore they tend to discourage or even prevent their children from participation in sports (Boufous, Finch, & Bauman, 2004). Through analysis of the attitudes mentioned above, we believe that parents may develop a negative image of sports or the AG for their children. Although the volume of training is considerable, parents could help their children to try to balance their sport's activities with their studies and leisure time. They could also talk to their coaches about the risks inherent in this sport and how these are prevented during training.

Another Recording Unit belonging to the negative aspects of parental support covers the issue of "worry about studies". The report of gymnast A127 reveals that his mother believes that his dedication to AG is detrimental to his academic formation and therefore asked the young athlete to abandon it. In the study by Bara Filho and Garcia (2008), the authors cite a lack of time for studies as the reason for the higher incidence of *dropout*.

Although less frequently, compared to the women's sector, parents seen as a source of pressure arises as a negative aspect in the discourse of male gymnasts, *"my mother requires a lot of me; she picks on me"* (A2) *"(if I try to stop) I think they would tell me to keep going, because I would lost the transport, my scholarship, and a lot of other things"* (A152). We agree with Hellstedt (1990, p. 141) which states that "parents who pressure their children excessively take the risk of eliciting a negative response and need to be aware of the possibility that excessive pressure to participate may result in parent-child conflict or youth sport withdrawal". Moreover, the gymnast may feel trapped by this pressure and develop a sense of obligation to continue in AG to satisfy the expectations of parents (Weiss & Weiss, 2003), as in case of A142, who felt pressured not to give up due to material losses mentioned by parents.

CONCLUSION

The results of this study revealed different perceptions of positive and negative support of the parents according to the reports of the gymnasts in formative categories of AG. We found that the amount of the Recording Units that included positive aspects was presented in greater volume and frequency, compared to the negative ones, in male and female categories and in the different competitive levels.

The children appreciate the participation and interest of parents in monitoring their sport activities. However, parents must be alert and aware of the level and manner of their engagement so that the experience of their children in the sport context be positive. As the literature discussed and the results obtained in the study show, depending on the degree and form of this involvement this can be perceived by the child in a negative way.

We also agree with Headstrom and Gould (2004) who claim that children need to feel pleasure and satisfaction in their experience with sports and be involved by their own choice and will. When parents hold high expectations, require too much and push their children to achieve certain results or to continue in the sport, it is very probable that the children will feel trapped and many will remain in sports so to not disappoint their parents or for fear.

We found that young gymnasts rely on parental support to be able to participate and develop their sporting potential. Plus,

parents play different roles in which their actions and interests influence many aspects from the introduction to sports, access to it, the level of participation, the degree of involvement, continuity, to physical and emotional well-being and dedication of their children in it. We note that this support is crucial to the commitment and dedication of the young children and teens in AG.

We emphasize that parents should be aware that their actions may result in negative perceptions that contribute to low levels of motivation and loss of enthusiasm towards AG and, consequently, results in stress, conflicts between parents and their children, as well as burnout and dropout.

We agree with Hellstedt (1990) and Sacks, Pargman and Tenenbaum (2008) that report the necessity of parents to be guided by the coaches or through courses and seminars that can provide support, direction and clarification on why and how they can support and participate in the sport life of their children in a positive and non-invasive manner.

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MOTOR SKILL ACQUISITION INFLUENCES LEARNERS' VISUAL PERCEPTION IN GYMNASTICS

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Original research article

Abstract

Research has shown that perceiving and predicting the actions of others differs as a function of motor expertise. The aim of this study was to address the question if participants who successfully acquired a handspring over a vaulting box exhibit changes in predicting handspring performances of other people. It was hypothesized that participants who successfully acquired the handspring over a vaulting box should outperform participants of a control group in predicting the landing positions of handspring performances in a computer-based perception test. Participants of an experimental group learned the handspring over a vaulting box following a methodical progression. No treatment was given to the participants of a control group. Landing position predictions were evaluated in a computer-based visual perception test prior to, and at the end of the methodical progression. Results revealed that the participants of the experimental group predicted landing positions more precisely in the posttest compared to the pretest. Furthermore, participants predicted landing positions more precisely when video sequences were occluded earlier, arguing in favor of an optimal information density when predicting landing positions in handsprings. It is stated, that as a learner acquires a motor skill in gymnastics, this changes the way the learner perceives that skill.

Keywords: *handspring, methodical progression, motor expertise.*

INTRODUCTION

Perceiving and predicting the actions of other people is an important skill for coaches, judges, and athletes in the sports domain (Heinen, Vinken & Velentzas, 2012; Williams, 2002). Especially in gymnastics, athletes reported the improvement of skill performance as a main reason for observing skill execution (Hars & Calmels, 2007). It was furthermore demonstrated, that gymnasts benefit from observational learning when acquiring complex skills (Baudry, Leroy & Chollet, 2006). Research has shown that visual perceptual processes are not equal among participants with different levels of motor expertise, but rather differ as a function of this expertise (Blake & Shiffrar, 2007; Williams, 2002). One may speculate if the aforementioned statement may be generalized to gymnastics. The aim of this study was therefore to address the question, if participants who learned a novel motor skill exhibited predictable changes in visual perceptual processes when observing the acquired motor skill?

Empirical evidence suggests that experts were better at picking up advance cue information in visual perception tasks (Savelsbergh, Williams, van der Kamp & Ward, 2002; Williams, Davids & Williams, 1999). For example, researchers utilized the temporal occlusion paradigm in which participants were presented video sequences that were selectively edited on their duration, and thus showed different occlusion windows (Mann, Abernethy, Farrow, Davis & Spratford, 2010). The perspective of the video sequences usually represented the participants' view of action when being engaged in the corresponding activity (Farrow & Abernethy, 2003). However, other perspectives such as the perspective of an external observer were used in temporal occlusion studies (Knoblich & Flach, 2001; Loula, Prasad, Harber & Shiffrar, 2005). Participants were required to predict some movement result such as the corner of a goal during a penalty kick or the landing position of a dart on a dartboard. Aglioti, Cesar, Romani, and Urgesi (2008) had expert basketball players predict the success of basketball free throws. Therefore, participants watched video clips of a professional basketball player performing free throws. The video clips were presented with different occlusion windows before the ball either landed in or out of the basket. Athletes exhibited more correct responses under earlier occlusion conditions when predicting the ball in or out of the basket, as compared to participants with comparable visual experience such as coaches or sports journalists, and novices. From the results the authors concluded that motor expertise is of high importance in the perception of motor actions (Aglioti et al., 2008).

The ability to perceive the actions of other people thus seems to stem at least in part from the amount of experience one has gained in observing, planning and executing these actions, because experts are attuned to the most important perceptual information (Raab, de Oliveira & Heinen, 2009; Ward, Williams & Bennett, 2002). There is further evidence that observers' own action system significantly contributes to the visual perception of human movement (Prinz, 1997). Thus, an actor should be more sensitive to the perception of actions that the actor is able to execute by himself than to actions that the actor is unable to execute. To test this hypothesis, Knoblich and Flach (2001) asked participants to predict the landing positions of dart throws at a target board after watching video clips displaying either himself or herself or somebody else throwing the dart. The video clip ended right before the dart left the participants' hand. It was found that the predictions were more accurate when participants watched themselves acting. It could furthermore be shown, that people were able to improve their movement perception when practicing particular movements blindfolded (Casile & Giese, 2006).

Taken together, there is converging evidence, that motor skill acquisition has a direct and highly selective influence on visual action recognition that is not mediated by visual learning alone (Blake & Shiffrar, 2007). However, to the best of our knowledge, there is no study in the field of gymnastics evaluating the latter hypothesis in participants who learned a novel motor skill. Thus in the current study students learned a novel motor skill, namely the handspring performed over a vaulting box. Participants' predictions of handspring landing positions were evaluated in a computer-based visual perception test (see Method section for details). Because participants' motor system is thought to influence visual perceptual processes, it was first hypothesized, that participants who successfully acquired the handspring would outperform participants of a control group in the visual perception test. The second hypothesis was, that participants who learned the handspring should also exhibit better prediction accuracy under earlier occlusion windows compared to participants of a control group.

METHODS

Students of Sport Science (N = 36, age: 23 ± 2 years) were recruited to participate in this study. The number of participants was derived from a power analysis when expecting a medium effect (Cohen's f > 0.25, type I error probability 5%, type II error probability 20%). The participants had no particular experience in gymnastics at the beginning of the study. All participants were asked to participate in a study on motor learning and perceptual processes in gymnastics. They were informed about the procedure of the study and gave their written consent prior to the study. Participants (n = 18) were randomly assigned to a control group and the remaining participants (n = 18) were assigned to an experimental group. The participants of the experimental group were supposed to learn the handspring on vault by means of a methodical progression, whereas the participants of the control group were neither present during the practice sessions nor were engaged in any gymnastic activity. The participants of both, the control and the experimental group were asked to evaluate landing positions of handspring performances in a computer-based visual perception test prior to the methodical progression and at the end of the methodical progression. All participants of the experimental group completed the methodical progression and achieved the handspring. There were no injuries during the experiment.

Experimental task and methodical progression. The experimental task was to learn a handspring on vault. The handspring had to be performed over a vaulting box with the help of a miniature trampoline. The vaulting box was adjusted to a height of 1.10 m, which matched the examination guidelines of the universities' curriculum in the field of 'gymnastics and movement arts'.

The methodical progression was derived from the universities' curriculum in the field of 'gymnastics and movement arts' and consisted of five distinct tasks: (1) swing to handstand on the floor and falling over in a supine position onto a gymnastics mat, (2) jumping to handstand on a vaulting box (height: 1.00 m) from a miniature trampoline and falling over in a supine position onto a stack of gymnastics mats (height: 1.00 m), (3) swinging to handstand on a base of two vaulting boxes and falling over to stand with manual assistance, (4) performing the handspring over a vaulting box with manual assistance during the first flight phase and second flight phase, and (5) performing the handspring over the vaulting box without any further guidance.

Different key instructions were systematically integrated in the methodical progression. The key instructions were: (1) "keep a rigid body and keep your hips and shoulders open" (all steps of the methodical progression), (2) "accelerate back leg/legs to handstand position" (all steps of the methodical progression), (3) "actively push with your arms, enabling you to spring off the take-off surface" (steps 3, 4, and 5), (4) "anticipate floor and actively absorb your energy when landing" (steps 4, and 5), and (5) "perform accelerated, yet controlled run-up" (step 4, and 5). Verbal feedback was provided as summary feedback on the movement quality of three to five observed attempts (Schmidt & Lee, 2005). Task-specific lead-up activities, such as performing a handstand on the floor with manual assistance or running towards the trampoline and performing a straight jump were additionally integrated in the progression (Turoff, 1991). Manual assistance was systematically integrated into the methodical progression and provided when necessary.

Preparation of video sequences. Video sequences for the computer-based perception test were generated on the basis of handspring performances of another six students of Sport Science who were not part of the study sample. The six students had at least two years of experience in performing handsprings over a vaulting box due to their successful participation in the universities' gymnastics courses. It was decided to

recruit students of Sport Science for the preparation of the video sequences because they were most congruent to the sample of our study in terms of their perceptual-motor capabilities and the structure of their motor system, which is thought to be an important precondition when experimentally assessing visual perception related to motor expertise (Blake & Shiffrar, 2007). The six students were asked to perform the handspring on the vaulting box eight times while trying to land in an upright posture according to the judging guidelines (FIG, 2009). This resulted in a total of 48 video sequences. The performances were videotaped with a full HD digital video camera operating at 50 Hz (spatial resolution: 1920 x 1080 pixels). The camera was placed at a distance of 15 m from the vaulting box and orthogonal to the movement direction of the students.

From the eight video sequences of each student, the performances with the best quality and with a stuck landing were selected with the help of one gymnastic coach with national experience. The coach could use a laptop computer to play back the video sequences in slow motion whenever needed. From this, 18 video sequences had to be removed from the experiment, because neither the landing was stuck, nor the quality of the handsprings was rated as sufficient by the coach. In the next step, the absolute landing positions of the remaining 30 video sequences were analyzed for an equal distribution in landing positions. Since the precondition of an equal distribution in absolute landing positions was violated, the amount of video sequences was systematically varied, until two conditions were fulfilled: 1. the absolute landing positions of the handsprings were distributed equally over the landing mat and 2. the amount of handspring sequences was equal among the students. This procedure resulted in three valid handspring performances for each student, leading to a total of 18 handspring performances.

Each of the 18 handspring sequences was cut into three further sequences, with each of the three sequences representing one of three Occlusion Windows (Figure 1): (1) t1 = occlusion began at first video frame after take-off from the vaulting box, (2) t2 = occlusion began after the video frame in which the body of the actor was in an approximated horizontal position, and (3) t3 = occlusion began after the video frame before the feet pass the height level of the vaulting box. This cutting procedure led to a total of 54 video sequences of handspring performances that were integrated into a computer-based perception test.

Computer-based perception test. The aforementioned 54 video sequences were integrated into a computer-based perception test. A trained research assistant introduced the computer-based perception test to each individually tested participant. In the first step, the participant was shown six handsprings on vault, differing in movement quality and movement duration. This was done for orientation and calibration purposes. In a second step, the participant was asked to predict the landing position of each individual performance of the 54 handsprings. Therefore, each of the video sequences of the handsprings was presented in real-time on a computer monitor. After the handspring on vault was shown, the participant predicted the landing position of the toes on the landing mat of the handspring just presented by moving the mouse pointer to the landing mat and confirming this choice by pressing the space key on the computer keyboard. A white cross represented the mouse pointer, and the absolute pixel position of the mouse pointer (mid position of white cross) was recorded for each prediction (Figure 1-c). The test order of the trials was randomized for each participant within each test and between the pretest and the posttest, in order to control for sequence effects. The computer-based perception test took approximately 15 minutes to complete.

The experiment was conducted in three phases. The first phase comprised the first gymnastics lesson of the semester. The students arrived at the gymnasium, completed the informed consent form and the computer-based perception test (pretest).

The second phase was the learning period. It consisted of four training sessions of 80 to 90 minutes per session, carried out over a 4-week period. Each individual session began with a 15- to 20-minute warm-up phase, including physical preparation exercises and lead-up activities. Then, a learning phase of 45 to 60 minutes was conducted, in which the students went through the methodical progression. Each training session ended with a 10- to 15-minute cool-down period. During each session, the students were allowed 20 to 30 practice trials. Different key instructions were systematically integrated in the methodical progression. Verbal feedback was provided as summary feedback on the movement quality of three to five observed attempts. Manual assistance was systematically integrated into the methodical progression, and provided when necessary. In the third phase of the experiment, the participants of the experimental group and the participants of the control group were asked to complete the computer-based perception test for a second time (posttest). The students were debriefed after completing the computer-based perception test.

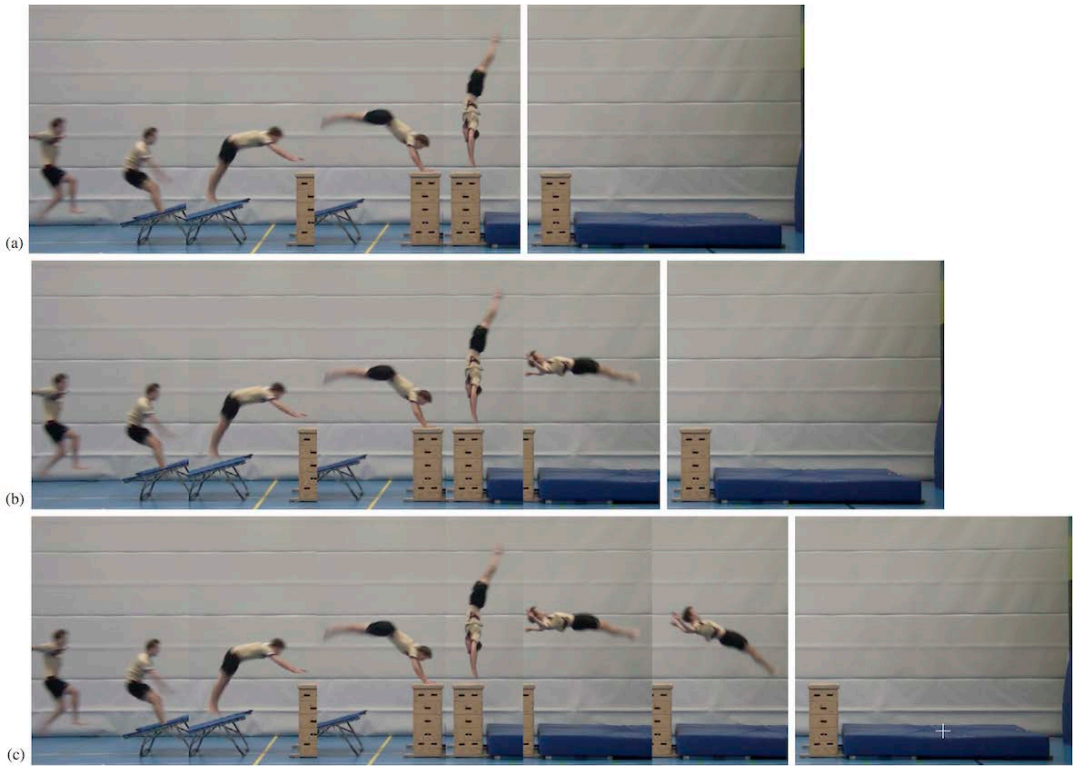

Figure 1. *Picture sequences illustrating the cut handspring video sequences in the three experimental conditions prior to the occlusion: (a) take-off from the vaulting box, (b) actors' body in approximated horizontal position during second flight phase, (c) actors' feet at vaulting box' height level. The white cross on the right side of the Figure characterizes the mouse pointer during the computer-based perception test. During the Occlusion Window, the gymnasts' body was completely occluded in the video sequences while only the vaulting box and the landing mat were visible.*

A significance criterion of $\alpha = 5\%$ was used for all results reported. In a first step, the differences between the values for absolute pixel positions of all landing position estimations and the actual landing positions were calculated for each dataset (Magill, 2011). In a second step, the

differences were averaged for each participant to give a single final value for the precision of the landing position estimations. In a third step, these final values for the precision of the landing position estimations were transformed into real world units (meters). Finally, and in order to assess differences in the estimations of the landing positions between groups, tests, and video durations, a 2 (*Group*: Experimental Group vs. Control Group) × 2 (*Test*: Pretest vs. Posttest) × 3 (*Occlusion Window*: t1 vs. t2 vs. t3) univariate analysis of variance was calculated, taking the precision of landing position predictions as dependent variable. Cohen's *f* was calculated as effect size for all significant *F*-values (Cohen, 1988). In order to explore how overall effects were driven by differences between Test and Occlusion Window for each of the two groups, post hoc analyses were carried out using the Tukeys' HSD post-hoc test (Knudson, 2009).

RESULTS

The first hypothesis was that participants who successfully acquired the handspring should outperform participants of a control group who was not asked to learn the handspring in the visual perception task. The second hypothesis was that participants who learned the handspring should also exhibit better test performance under earlier occlusion windows as compared to participants of a control group. The mean values for landing position predictions are presented in Figure 2.

The ANOVA revealed an interaction effect of Test × Group for the precision of landing position predictions, $F(1, 34) = 4.21$, $p = .048$, Cohen's $f = 0.35$, achieved power > .95. Post hoc analyses revealed that the participants of the Experimental Group exhibited better landing position predictions in the posttest as compared to the pretest for all three Occlusion Windows. Additionally, participants of the Experimental Group exhibited better landing position predictions in the posttest in Occlusion Windows t2 and t3, compared to the participants of the Control Group. The ANOVA revealed an additional significant main effect of Occlusion Window for the precision of the landing position predictions, $F(2, 68) = 14.02$, $p < .05$, Cohen's $f = 0.64$, achieved power > .95. Post-hoc analyses revealed that participants estimated the landing position most precisely in the earliest occlusion window as compared to the remaining occlusion windows.

DISCUSSION

The aim of this study was to address the question if participants who learned a novel motor skill exhibit predictable changes in visual perceptual processes when observing the acquired motor skill? The first hypothesis was that participants who successfully acquired the handspring over a vaulting box should outperform participants of a control group who were not asked to learn the handspring in a visual perception task. The second hypothesis was that participants who learned the handspring should also exhibit better test performance under earlier occlusion windows as compared to participants of a control group. Students were asked to learn the handspring performed over a vaulting box. Participants' predictions of landing positions of the handsprings were evaluated in a visual perception test. The results revealed that the participants of the Experimental Group exhibited more precise landing position predictions in the posttest as compared to the pretest for all three Occlusion Windows. Participants of the Experimental Group also outperformed participants of the Control Group under Occlusion Windows t2 and t3 in the posttest. Furthermore and most surprising, participants estimated the landing positions most precisely when the end of video sequences was one video frame after take-off from the vaulting box (Occlusion Window t1) as compared to the remaining two occlusion windows.

Participants seem to improve their ability to visually perceive a gymnastic skill by acquiring the skill by themselves, thus

arguing in favor of a selective influence of motor skill acquisition on visual perception of the acquired motor skill (Casile & Giese, 2006). This result is in line with the assumption that observers' own action system contributes to the visual perception of motor skills (Blake & Shiffrar, 2007). Skilled observers are able to better estimate the landing position of a handspring, even when the handspring is depicted from an external perspective, as compared to unskilled observers, which is similar to empirical evidence provided by Loula et al. (2005). Further research emphasizes, that this result may not be explained by visual experience alone but is rather a result of both, motor and visual experience (Loula et al., 2005).

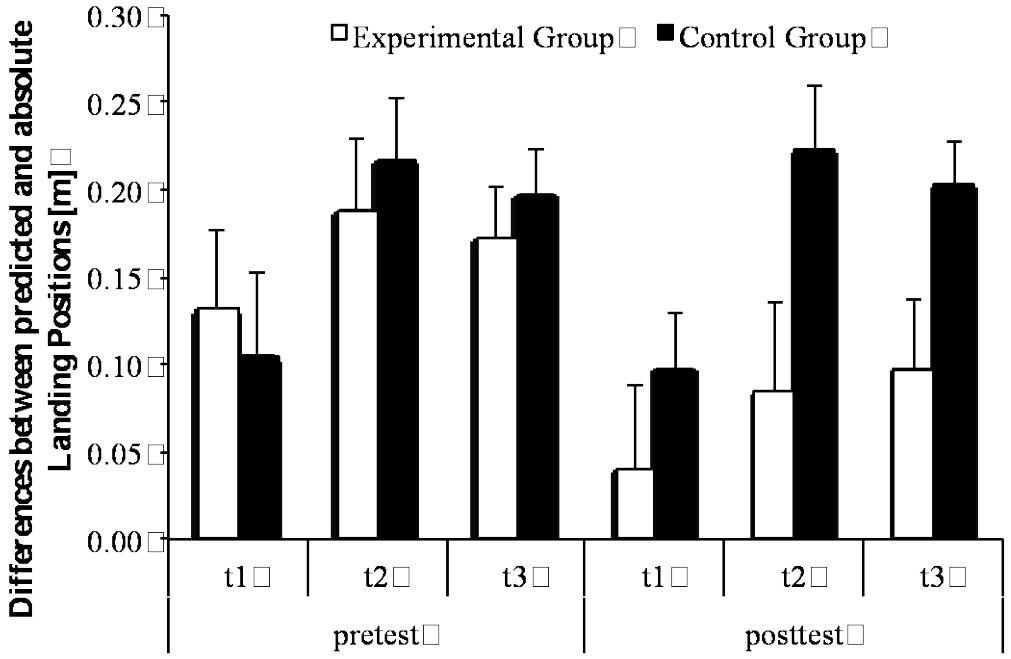

*Figure 2. Differences between predicted and absolute landing positions in meters. Zero values denote exact prediction of absolute landing position. The larger the values, the less precise the landing position predictions were. t1 to t3 denote the different occlusion windows: t1 = occlusion began at first video frame after take-off from the vaulting box, t2 = occlusion began after the video frame in which the body of the actor was in an approximated horizontal position, and t3 = occlusion began after the video frame before the feet pass the height level of the vaulting box' (see Figure 1). Note: * denotes significant difference according to post-hoc test ($p < .05$).*

Experts are thought to be better at picking up advance information in visual perception tasks (Blake & Shiffrar, 2007; Raab et al., 2009; Savelsbergh et al., 2002; Williams et al., 1999). However, and most surprising, the participants of the experimental group and the control group exhibited the best estimations of landing position under the earliest occlusion window. Comparing the handspring over a vaulting box with skills that were used in previous experiments, such as tennis services or penalty kicks in soccer (Mann et al., 2010; Savelsbergh et al., 2002), the handspring may contain a different information structure for observers, which may at least in part be grounded in the biomechanics of the skill.

From a biomechanics point of view, the landing position is determined by the bodies' take-off velocity at the end of the repulsion phase, the bodies' angular

momentum during the flight phase, and the control of the bodies' moment of inertia, leading to a particular posture prior to touch-down (Prassas, Kwon & Sands, 2006). The bodies' angular momentum is constant during the flight phase and the bodies' moment of inertia is usually only subjected to small changes until touch-down (Heinen, Jeraj, Thoeren & Vinken, 2011). Therefore, one may speculate that information is already optimal for an observer at the end of the repulsion phase to estimate landing position in handspring, with a higher information density (e.g., 'seeing' more of the flight phase before predicting the landing position) leading to a reduced performance in predicting landing position (Ma, 2012; Luis & Tremblay, 2008). However, if information from the second flight phase is missing to the observer, he/she may not be able to estimate the quality of the second flight phase, which could also be an important aspect for coaches, judges and spectators.

There are some critical issues within the design of this study that need to be taken into account in further experiments and three specific aspects will be highlighted. First, handspring performances of gymnasts not belonging to the study sample were used to prepare the video sequences in the visual perception test. However, assuming, that an actor is most sensitive to his or her own actions (Blake & Shiffrar, 2007), a subsequent study should incorporate this distinction on a methodological level by evaluating the landing position predictions in video sequences where the participants observes his-/herself as compared to video sequences in which the participant observes other gymnasts (Knoblich & Flach, 2001). Second, neither participants' gaze behavior when watching the video sequences was measured, nor spatial occlusion techniques were utilized in the visual perception test. Measuring gaze behavior and/or using spatial occlusion techniques in a subsequent study could answer the question on which informational sources the participants based their landing position predictions (Mann et al., 2010). It could furthermore be of interest to systematically manipulate the duration of the occlusion windows in order to explore the relationship between the occlusion window duration and the likelihood of significant differences in estimating landing positions between participants and groups. Third, one may argue, that the students in this experiment also acquired visual experience just by taking part in the lectures and thereby observing other students performing the handsprings. However, during practice, the amount of visual experience in observing handspring landings was rather minimal due to the fact, that the students always started from the running track, far behind the vaulting box, and were therefore not able to observe the exact landing position of other students. Nevertheless, it is argued, that the distinction between visual and motor experience is an important one, and should be addressed in further studies.

There are some practical consequences of this study so far. First, it is argued that the results of this study reveal implications for motor skill acquisition in general. Participants were able to better predict specific aspects of a complex gymnastic skill, an aspect that is especially of high relevance in school and training settings, when teacher or coaches have to promote motor learning of others (e.g., students/pupils). It is therefore argued, that teachers and/or coaches are potentially better in teaching and/or coaching skills which belong to their own motor repertoire, thus resulting in better instructions and more precise feedback. Second the results underline the importance of motor expertise when estimating specific parameters in the motor behavior of others. In technical sports such as gymnastics, one could at least speculate about the potential positive effects of implementing motor skill learning in the education and training of judges and referees. Taken the results of our study together, it is stated, that as a learner acquires a motor skill in gymnastics, this changes the way the learner perceives that skill.

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TRENDS IN E AND D SCORES AND THEIR INFLUENCE ON FINAL RESULTS OF MALE GYMNASTS AT EUROPEAN CHAMPIONSHIPS 2005–2011

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Original research article

Abstract

The aim of the study was to investigate the trends in execution and difficulty scores of routines on all apparatus and in both qualification and final rounds of male European championships just before and during a 5-year period after the introduction of new "open-ended" Code of Points (CoP) in 2006. It was found that the new CoP solved the problem of invariant difficulty scores, most efficiently toward the end of the observed period (2011). Execution scores showed a clear decreasing trend, both in absolute value and also in it's ratio with difficulty score. A question arises, if the decreasing influence of execution on final score (and therefore ranking of competitors) is the desired outcome of the new CoP and future evaluation of gymnastic routines. It was also questioned if the decrease in execution score should be solely explained by the increase of difficulty (which probably means more deductions) and some minor changes in CoP after year 2006, or it showed (possibly unjustified) changes in applying the CoP.

Keywords*: Artistic gymnastics, European Championship, Males, Judging, E-score, D-score*

INTRODUCTION

As in several other "esthetic" sports, e.g. figure skating, diving, rhythmic gymnastics, and synchronized swimming, a score given to a competitor in artistic gymnastics also depends both on difficulty and the execution (flawlessness) of a routine. What part of the final score is given to each of these two components depends on sport rules (Čuk, Fink & Leskošek, 2012).

In artistic gymnastics a major revision of Federation Internationale de Gymnastique (FIG) Code of Points (CoP) occurred in year 2006. Old CoP (FIG, 1997; 2001) follow a "perfect 10" format, where a *start value* (SV) of 10 was the highest possible score of a routine, given to a gymnast with a "hard enough" routine with all *required* elements and no deductions in execution.

A new open-ended format was introduced in year 2006 and revised in year 2009 CoP (FIG, 2009). The final jury score is a sum of difficulty (D) score and execution (E) score, each of which is given by different panel of judges. The D score starts at 0 points and has no *upper* limit. Except for vault, where each element has it's own difficulty value (until 2011 the highest value given to a gymnast at EC was 7.0), the 10 most difficult elements are counted, each from 0.1 (A elements) to 0.7 (G elements). Each apparatus has four *element groups* designated as I, II, III, IV, and, except for floor exercise, a dismount

group designated as V. A gymnast is awarded 0.5 for each element group, if he performs at least one element from that group, no matter of its difficulty (except for the dismount where an element must be at least D to receive a 0.5 points). Additional points are awarded for connections of high valued elements. The E score starts from 10 (if at least 7 elements are performed) and has a lower limit of zero, but is usually around 9 points at major competitions (Olympic Games, World and continental championships, World cup).

Several other changes were introduced in the new (2006) CoP. Perhaps most influental for E score, deductions for small, medium and large errors and a fall changed from 0.1, 0.2, 0.4, and 0.5 (FIG, 1997) through 0.1, 0.2, 0.3, and 0.5 (FIG, 2001), 0.1, 0.3, 0.5, and 0.8 (FIG, 2006), to 0.1, 0.3, 0.5, and 1.0 (FIG, 2009), respectively. From year 1997 the upper limit of scale of difficulty was extended from super E (F) to G in year 2009 (FIG, 1997; 2009). Several other minor changes in the CoP were introduced in year 2009, e.g. E jury score deductions for too short exercises. In concordance with Boen, Van Hoye, Auweele, Feys, & Smits (2008), who found open feedback causes conformity bias in judges' scores, after year 2009 only final E jury scores (i.e. average E jury score of middle four judges) are displayed to the public and later published in the official results.

Several gymnasts, coaches and officials opposed CoP changes in year 2006, especially omitting the traditional 10.0 points format. Although analysis of officiating some major gymnastics events held after 2006 showed metric characteristics (reliability, validity) are generally acceptable (Bučar, Čuk, Pajek, Karacsony & Leskošek 2011; Leskošek, Čuk, Pajek, Forbes & Bučar Pajek, 2012), some other problems arose, which may or may not originate from CoP changes. Thornton (2010) noted, the *highest* execution score given in the both men and women event final contested at the World Championships or Olympic Games between 2006 and 2009 shows a clear trend of declining and 2009 scores seem to be "trapped" between an 8.5 and a 9.0 points regardless of the performance. Thornton found little justification of this trend in rules changes (apart from women's floor) and speculates the problem lies in *application* of those rules.

The purpose of this paper is to quantify trends in E and D scores in the last year before rule change (2005) and in period after that (2006-2011) at male European Championship as one of the most important gymnastic competitions and possibly find reasons for those changes and their consequences.

METHODS

Data: All E and D scores from Competition I (qualification) and III (apparatus finals) were retrieved from FIG officials and Internet (Longines timing 2008, 2010, 2011). 2007 scores are missing as they are not published on the FIG Internet site and authors were not able to obtain them from UEG officials. Additionally, 4 routines with zero final scores (all from vault, 3 from qualification and one from apparatus finals) were excluded.

Data analysis: The E score was computed as (10–deductions–penalties) for period after 2005. In 2005, E deductions were computed as (Start value-Final score). D score in 2005 was computed as (Start value–4) to make this score more comparable with D scores in 2006-2011. From so defined E and D scores, the gap behind the best E and D scores for each apparatus, session and year (competition) were computed. Basic distributional parameters of E and D scores and their ratios and gaps behind the best score were computed and plotted.

RESULTS

The number of competitors in the qualification round (Table 1) is different between years 2005 and 2011 and on different apparatuses, but it mostly ranges

between 80 and 100, except for 2010 where it is slightly lower. The number of competitors that perform also the second vault varies from 13 (2010) to 35 (2005). The scores from both vaults were joined before the further analysis. In apparatus final, on all apparatus eight gymnasts competed and on vault all perform two vaults except for 2007 where one of the competitors performed only one vault (for the second he received a score of zero, which was excluded from analysis).

Table 1. *Number of competitors in qualification round by year and apparatus.*

	Year						
Apparatus	2005	2006	2008	2009	2010	2011	Total
Floor	87	87	96	87	75	94	526
Pommel horse	89	92	100	84	73	94	532
Rings	95	88	96	83	77	93	532
Vault 1	86	85	96	80	73	86	506
Vault 2	35	23	26	33	13	27	157
Parallel bars	86	93	99	79	76	92	525
High bar	94	88	97	80	76	89	524
Total	572	556	610	526	463	575	3302

Although some irregularities exist, there is a general tendency of an increase in difficulty score and a decrease in execution scores between 2006 and 2011 (Table 2, Figure 1). This is not only true for the central tendency (median, mean) of scores, but also for maxima. In the year 2011, in both sessions and on all apparatus (except for a tie on parallel bars in qualification), the E score was lower than in the first year after the major rules change (2006); in the D score, in only 2 out of 12 cases, lower scores were observed in 2011 than in 2006. In 2005, the last year of closed-ended system, many routines were awarded the highest possible score for difficulty, i.e. a start value of 10; e.g. in 2005 apparatus finals, three out of 16 vaults and 22 out of 40 routines on other apparatus were given this value. In most cases the decrease in E score was higher than the increase in D score, resulting in a weak trend of decreasing final scores (Figure 1).

In most cases differences (variability) between competitors in both E and D score increased in the period 2006-2011 compared to 2005, while there is no clear trend in variability change within the period 2006-2011 (Table 2, Figure 1).

Although E scores remained higher than D scores, the ratio between them has decreased between 2005 and 2011. Although the ratio is much higher in qualification sessions than in apparatus finals, this decrease is similar on all apparatus, i.e. from around 1.5 to 1.8 in the qualification round and from around 1.3 to 1.6 in apparatus finals (Figure 2). Extremely high variability in same cases is mostly due to single extreme outliers (most notably in rings qualifications in 2006, where one of the competitors received a D score of 1.0 and E score of 8.925), which probably arose from too short of an exercise that was penalized only after the revision of the CoP in year 2009.

At the beginning and at the end of the observed period, i.e. in years 2005 and 2011, in qualification sessions, competitors are much more heterogeneous in the D score than in the E score, while in apparatus finals in 2005 and 2011 the situation is the opposite, most notably on rings in 2005 where all but one finalists had the same D score, i.e. start value of 10 (Table 3). In intermediate years (2006-10) the variability in the D score is, especially in apparatus finals, only slightly higher than in the E score.

Table 2. *Medians, interquartile ranges and maxima of D and E score by year of competition, session and apparatus.*

		Year of competition																	
		Median						Interquartile range						Maximum					
		05	06	08	09	10	11	05	06	08	09	10	11	05	06	08	09	10	11
		Difficulty score																	
Qualification	Floor	5.00	5.40	5.40	5.50	5.40	5.50	.80	.90	.98	.80	1.00	.90	6	6.6	6.5	6.4	6.7	6.7
	P.horse	5.30	5.10	5.15	5.30	5.20	5.20	.90	.88	1.20	.90	1.10	1.13	6	6.3	6.5	6.8	6.7	6.9
	Rings	5.10	5.20	5.30	5.50	5.30	5.40	1.20	1.38	1.30	1.10	1.05	1.20	6	7	7.3	6.9	6.8	6.8
	Vault	5.70	6.60	6.20	6.20	6.20	6.20	.50	.60	1.20	.80	.80	.80	6	7	7	7	7	7
	P.bars	5.00	5.10	5.50	5.50	5.20	5.55	.83	1.10	1.20	1.00	1.10	1.00	6	6.5	6.7	6.5	6.5	6.7
	H.bar	5.10	5.50	5.40	5.40	5.40	5.70	.90	.98	.85	1.00	1.08	1.20	6	6.4	7	6.9	7	7.2
Apparatus finals	Floor	5.85	6.15	6.15	6.25	6.40	6.40	.17	.35	.45	.25	.43	.37	6	6.4	6.6	6.5	6.7	6.7
	P.horse	6.00	5.70	6.20	6.50	6.30	6.40	.15	.83	.30	.27	.43	.68	6	6	6.7	6.7	6.7	6.7
	Rings	6.00	6.55	6.70	6.70	6.50	6.70	.00	.85	.75	.18	.78	.18	6	7.1	7.3	7	6.8	6.8
	Vault	5.90	6.80	7.00	6.60	6.60	7.00	.00	.15	.40	.40	.00	.35	6	7	7	7	7	7
	P.bars	5.80	6.25	6.60	6.20	6.05	6.00	.75	.40	.40	.50	.43	.18	6	6.4	6.7	6.5	6.5	6.7
	H.bar	6.00	6.15	6.60	6.55	6.85	6.65	.25	.45	.48	.60	.35	1.00	6	6.3	7	7	7.1	7.7
		Execution score																	
Qualification	Floor	9.26	8.70	8.50	8.40	8.25	8.34	.35	.73	.72	1.15	.63	.88	9.675	9.425	9.225	9.2	9.125	9.125
	P.horse	9.14	8.21	8.20	7.73	7.90	7.53	.58	1.06	1.13	1.16	1.23	1.24	9.75	9.5	9.425	9.2	9.025	9
	Rings	9.25	8.43	8.35	8.15	8.23	8.00	.32	.69	.52	.87	.74	.85	9.712	9.15	9.075	8.925	8.85	8.875
	Vault	9.51	9.40	9.23	9.08	8.98	9.15	.29	.34	.41	.89	.51	.39	9.75	9.8	9.575	9.575	9.45	9.6
	P.bars	9.28	8.85	8.58	8.58	8.33	8.51	.49	.66	.60	.80	.85	.70	9.587	9.525	9.525	9.55	9.125	9.525
	H.bar	9.21	8.88	8.28	8.25	7.83	8.18	.43	.68	.64	.79	.92	.75	9.675	9.575	8.925	9.1	8.625	8.975
Apparatus finals	Floor	9.47	9.16	8.84	8.94	8.73	8.90	.44	.40	.43	.21	.14	.86	9.637	9.275	9.25	9.15	8.95	9.2
	P.horse	9.58	8.64	9.04	8.69	8.54	8.43	.42	.82	.73	1.65	.54	1.36	9.775	9.45	9.325	9.05	8.9	8.925
	Rings	9.63	9.05	8.81	8.76	8.25	8.80	.16	.28	.43	.36	.46	.52	9.712	9.425	9.2	9.15	8.575	9.15
	Vault	9.65	9.43	9.41	9.30	9.30	9.04	.06	.23	.25	.15	.31	1.11	9.762	9.725	9.6	9.45	9.475	9.5
	P.bars	9.51	9.21	9.14	8.94	8.94	8.85	.88	.41	.34	.38	.30	.37	9.712	9.625	9.425	9.325	9.1	9.3
	H.bar	9.65	8.78	8.38	8.23	8.30	8.06	.46	1.31	1.00	.91	.50	.66	9.75	9.425	9.05	8.675	8.5	8.775

Table 3. *Interquartile range for the ratio between D and E score by year of competition, session and apparatus.*

		Year					
Session	Apparatus	2005	2006	2008	2009	2010	2011
Qualification	Floor	2.29	1.24	1.36	.70	1.60	1.03
	P. horse	1.55	.83	1.06	.78	.90	.91
	Rings	3.69	1.98	2.51	1.26	1.42	1.41
	Vault	1.70	1.78	2.91	.90	1.58	2.06
	Parallel bars	1.69	1.66	2.00	1.25	1.29	1.43
	High bar	2.10	1.44	1.33	1.26	1.17	1.60
	(average)	2.17	1.49	1.86	1.02	1.33	1.41
Apparatus finals	Floor	.40	.88	1.04	1.21	2.96	.43
	P. horse	.35	1.00	.41	.17	.78	.50
	Rings	.00	3.02	1.76	.49	1.70	.34
	Vault	.00	.67	1.60	2.67	.00	.32
	Parallel bars	.85	.97	1.16	1.33	1.42	.47
	High bar	.54	.34	.48	.66	.70	1.51
	(average)	.36	1.15	1.08	1.09	1.26	.60

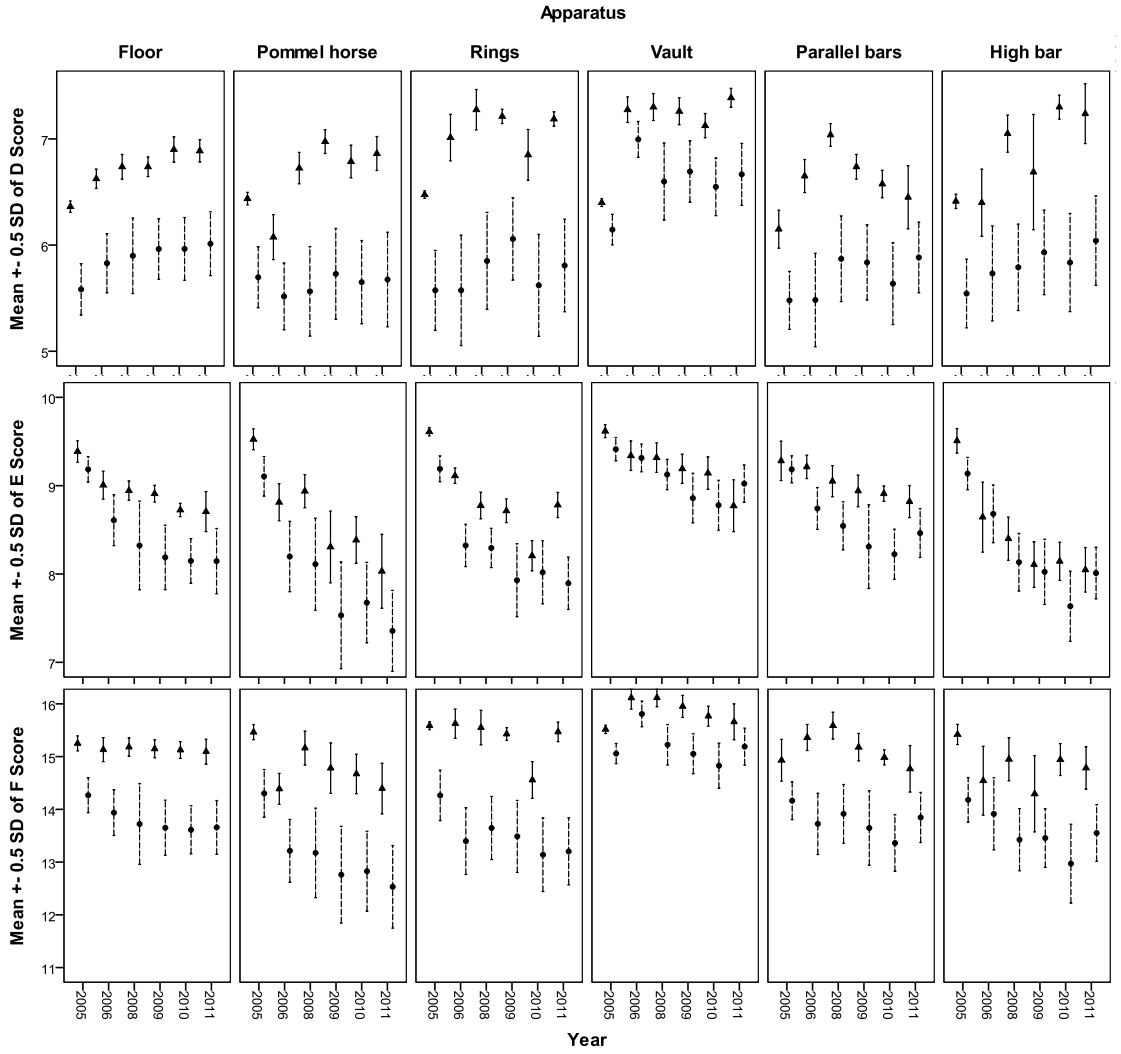

Figure 1. *Error bars (mean ± 0.5 standard deviation) of difficulty, execution and final scores at European Championships 2005-2011 by session (solid line=apparatus finals, dashed line=qualification), year and apparatus.*

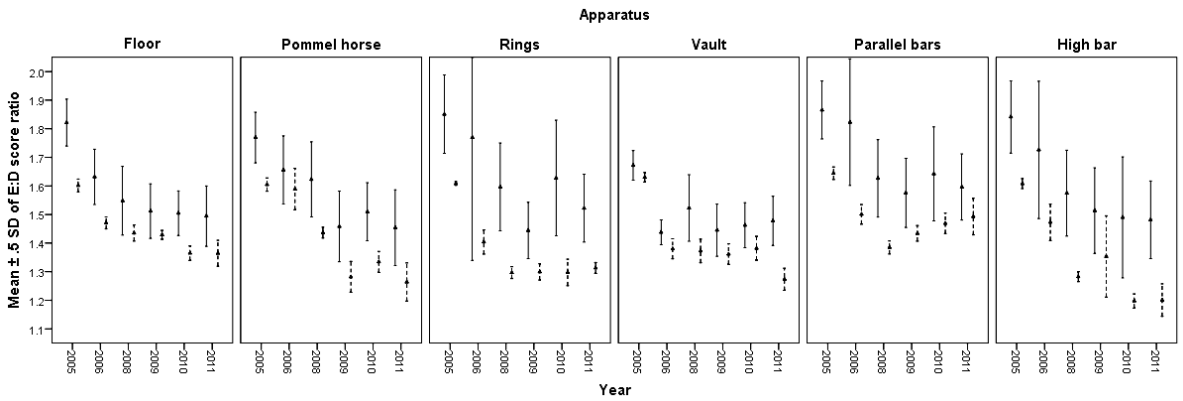

Figure 2. *Error bars (mean ± 0.5 standard deviation) of execution/difficulty scores ratio at European Championships 2005-11 by session (solid line=apparatus finals, dashed line=qualification), year and apparatus.*

Table 4. *Pearson correlation coefficients between D in E score by session, apparatus and year of competition.*

Session	Apparatus	Year 2005	2006	2008	2009	2010	2011
Qualification	Floor	.43	.17	.58	.29	.38	.14
	Pommel horse	.56	.39	.62	.56	.60	.50
	Rings	.61	.29	.48	.45	.38	.49
	Vault	-.04	.12	-.11	-.12	.20	-.06
	Parallel bars	.37	.42	.33	.44	.26	.21
	High bar	.34	.55	.29	.05	.51	.10
	(All)	.47	.52	.50	.43	.48	.43
Apparatus finals	Floor	.23	.65	.21	.66	.29	-.13
	Pommel horse	.20	-.03	.83	.55	.58	.22
	Rings	.73	.54	.86	-.47	.42	.48
	Vault	-.05	.08	-.32	.01	-.27	.42
	Parallel bars	.93	.47	.61	.53	-.18	.69
	High bar	.68	.68	.89	.57	.65	.14
	(All)	.70	.57	.40	.38	.11	.15

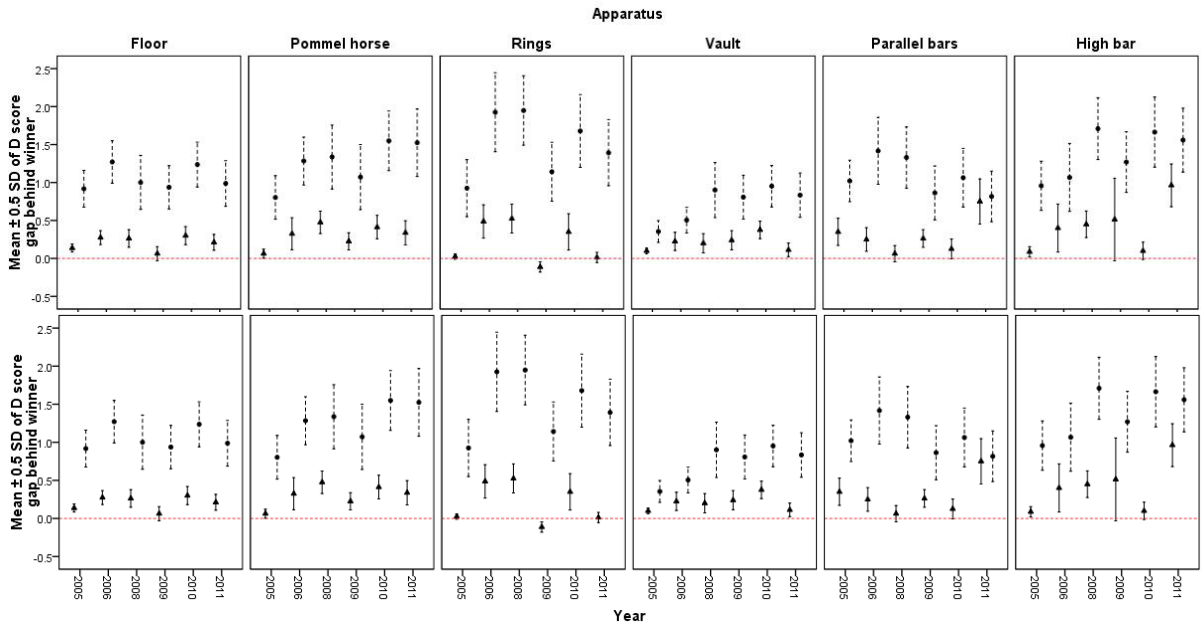

Figure 3. *Error bars (mean ± 0.5 standard deviation) of lag (gap) of E and D score behind the competitor with the highest final score (red dashed line) by session (solid line=apparatus finals, dashed line=qualification), year and apparatus.*

Table 5. *Proportion (in qualifications) and number of competitors (in apparatus finals) that received higher E or D score than the "winner" (competitor with the highest final score in particular session).*

		D score Year						E score Year					
Session	Apparatus	05	06	08	09	10	11	05	06	08	09	10	11
Qualification	Floor			1%			2%		1%	2%	2%		7%
	Pommel horse			2%	12%		1%						1%
	Rings				4%		2%		1%			14%	
	Vault								3%	2%	3%	24%	2%
	Parallel bars		1%		4%	1%	3%	6%		1%			2%
	High bar		1%		3%		1%			1%		1%	10%
	Total	0.0%	0.4%	0.5%	3.4%	0.2%	1.6%	0.9%	0.9%	1.0%	1.0%	7.1%	3.7%
Apparatus finals	Floor			1	2		1		2	1			3
	Pommel horse		2						1		2		
	Rings		1		5	1	3					1	
	Vault										1	3	
	Parallel bars			3		2						1	5
	High bar				1	2				1			5
	Total	0%	5%	7%	15%	9%	7%	0%	5%	4%	5%	14%	23%

Except for the vault, a general tendency exists that competitors with a higher D score also received a higher E score (Table 4). While the correlation between D and E in qualification session score is of moderate height (around .5) throughout the period 2005-2011, in apparatus finals this correlation has become lower and is almost non-existent in the last two years (2010, 2011).

The gap of D and E scores behind the winners (competitors with highest final score) of each event (session) was generally smaller in 2005, but later seems to have no systematic trend (Figure 3). In 2009, however, the gap behind the D scores tend to be somewhat lower, while the gap behind E scores tend to be somewhat higher than in years before and after 2009. Winners usually received the highest scores both for difficulty and execution (Table 5). Exceptions were rare at the beginning of 2005-2011 period and became more frequent at the end, especially in E scores at apparatus finals, where in parallel bars and high finals bar at 2011 EC only two of 8 finalists received lower E scores than the winner.

DISCUSSION

Although the start value (SV) in 2005 is not directly comparable to the difficulty score, it's obvious that the difficulty of routines at EC is increased constantly in the period 2005-2011. This is true not only for mean or median D scores but also for maxima D scores. Somewhat specific in this context is vault, as mean scores were similar and maxima scores were the same in the period 2006-2011.

On the other hand, E scores is generally decreased from 2005 to 2011. The latter finding is in agreement with Thornton (2010), who found a similar trend in *maxima* E scores at World Championships and Olympics Games from 2006 to 2009. In contrast to Thornton, however, no evidence was found that E scores are being "trapped" between 8.5 and 9, namely, the variability (as measured with interquartile range) of E scores is higher in 2006-2011 than in 2005

and between 2006 and 2011 even showed a vague trend of increasing. Again, vault is somewhat specific, as it has generally high E scores with small variability, but interestingly shares the trend of decreasing mean E scores with other apparatuses, despite that the D score is not increasing on this apparatus.

The drop of E scores and increase in D scores may also indicate that the difficulty of routines in the 2005-2011 period were probably increasing even more as indicated by the increase in D scores, as it seems that in many cases the flaws in *execution* of elements resulted not only in deductions in E-scores but also in non-recognition of the difficulty of those elements.

The drop in E score between 2005 and 2006 could probably be explained in great part by rule changes, i.e. increasing the deductions from 1, 2, 3 tenths of a point to 1, 3, 5 tenths for small, medium or large errors, respectively, and increasing the deductions for a fall from the apparatus from 0.5 points in 2005 to 0.8 in 2006-2008 and 1.0 point in 2009-2011. However, the reasons for the drop in E scores between 2006 (the first year after introduction of the new CoP) and 2011 is less clear, and could not be explained solely by an increase in D scores; specifically, the drop in E scores was bigger than the increase in D scores, resulting in a weak trend of decreasing final scores. If one assumes that the performance of gymnasts is improving over time, this decreasing trend in final score is quite contrary to what one would expect. As there were probably no important rule changes in the CoP between 2006 and 2011 (apart from an increase in the deduction for a fall from 0.8 to 1.0 point), it is reasonable to speculate that the decrease in final scores is at least partly a result of changes in *applying* the code. Since there is rarely a doubt of the fair application of rules for the difficulty of the routines, changes probably occurred in more rigorous or more frequent deductions for routine execution. Considering the latter, it's worthwhile to notice the opinion, that officiating by the current rules is so demanding, that execution can no longer be accurately measured by human eyes (Thornton, 2010). In addition, it seems that judges are afraid of not noticing some errors and therefore make more deductions than they actually see; typical in that sense is the statement of one the most experienced brevet judges, who awarded Xiao Qin's routine in qualification on pommel horse with an E score of 10, the only one at the World Championship in Anaheim 2003, as he saw no errors, but he "... was tempted to take a .10 deduction because I suspected that none of the other judges would be prepared to go out on a limb and award a perfect score" and "When you have a very strong performance (higher than 9.5), you are only allowed a .20 deviation from the final score or your score is considered 'out of range'. This means that for exceptional performances, the safe score is a 9.8. This gives you a full .40 range in your score. If you award a 10.0, the average has to be 9.8 or higher ... I think that most judges, recognizing this, are reluctant to give a score much above 9.8" (Turner, 2003).

As a result of decreasing E scores and increasing D scores, the ratio between those two scores also decreased in the period 2005-2011. Although the E score is even at the end of this period around 1.5 times higher than the D score, it's probably wrong to conclude, that the E score is more *important* for the final score than the D score. Namely, what decides the winner is not an absolute value, but the variability of E and D scores, which is similar or sometimes even higher in D than in E scores. The probable higher importance of the D score may also be seen in the gaps between competitors' E and D scores behind the winner (i.e. the competitor with the highest final score in each session); in qualification sessions those gaps are even higher in D scores than in E scores; however the difference between E and D score gaps was found similar (around 0.3 points in qualifications and around 0 points in apparatus finals) throughout the observed period.

E and D scores are modestly correlated in qualification sessions in all competitions

from 2005 through 2011, while in apparatus finals they decreased from 0.7 in 2005 to almost no correlation in 2010 and 2011. The decreasing correlation in apparatus finals is probably due to increased difficulty of routines resulting in more deductions, and probably also in the higher risk competitors are willing to take in order to take the winning positions. It should also indicate the shift in focus of preparation for major gymnastic events, namely from perfect execution of "hard enough" routine to hardest routine possible with "reasonable risk" for "not-too-large" deductions for flaws in execution.

CONCLUSIONS

Although the design of the study (i.e. observational, not randomized) does not allow to exactly quantify the influence of rule change from old, close-ended ("perfect 10") rules that were valid until 2005 to the new open-ended rules (introduced in 2006 and revised in 2009), some trends are quite obvious. The difficulty of routines generally increased in the period 2005-2011, probably even more than is indicated by the increase in the D score itself. On the other hand, the E score decreased in the observed period. There is no doubt that the new rules efficiently solved the problem of almost invariant D scores: in 2005, most of the finalists had equal or at least very similar start values, while afterwards the variability of D scores (and gaps behind the winner's D score) was much higher.

According to these results it's not possible to unequivocally evaluate the influence of the new rules on gymnast's performances as "bad" or "good" as this evaluation depends on what someone expected from the new rules. Although many may agree that trends found in this study are positive, they are probably contrary with some expectations that caused or at least initiated the introduction of the new rules, e.g. the expectation that the new rules will prevent the cases of "sacrificing execution for difficulty" (as seen at 2004 Olympics in Athens).

The study also showed that the changes in scores are probably not only due to changes in the code itself but also to changes in *applying* the code. In this sense someone may agree with the arguments of "stricter judging" trends as made by Thornton (2010). This and some other statements (e.g. of judge Grabowecky following Anaheim 2003) confirm the thesis, that judges are not only unable (partly because of complicated rules) to judge in accordance with the code, but sometimes also make "adjustments" of their "fair" scores in order to stay within allowed deviations from the final score. It seems that the ultimate goal of the E-score given by a judge is not to simply to sum up the actual flaws that they *see* in the execution of the routines, but also to speculate what *other* judges have seen *and* how many *additional "strict judging"* points *other* judges would subtract from this "initial" E-score. Although this study is unable to scientifically confirm this thesis it seems that it's worthwhile to do this in another study as it may supply the strong arguments for rule changes and the introduction of "real time judging" systems.

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PRE-COMPETITIVE ANXIETY AND SELF-CONFIDENCE IN PAN AMERICAN GYMNASTS

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Original research article

Abstract

This study aimed to examine the intensity and direction of pre-competitive anxiety indicators (both somatic and cognitive), as well as self-confidence, in gymnasts participating in the 2011 Pan American Games. Sixty male and female artistic gymnasts participated, with ages ranging from 15 to 30 years (M = 21.04 years, SD = 4.016). The Revised Competitive State Anxiety Inventory-2 (CSAI-2R, Andrade, Lois, & Arce, 2007; Cox, Martens, & Rusell, 2003) and the direction scale by Jones and Swain (1992) were both administered. The results revealed that the intensity and direction of cognitive anxiety were positively correlated with the intensity and direction of somatic anxiety (r = .55 and r = .53, respectively), while self-confidence was negatively correlated with the intensity of cognitive anxiety (r = - 305) and also predicted it (β = - .192). Women reported significantly higher perceived somatic anxiety levels (2.79) than men (2.48). In conclusion, high levels of self-confidence decreased the perception of cognitive anxiety as being debilitative to gymnasts competing at the Pan American level.

Keywords: *artistic gymnastics, CSAI-2R, intensity and direction*

INTRODUCTION

On some occasions, participating in sport requires intense physical demands and high psychological pressures that some athletes perceive as a struggle to handle, potentially leading to negative consequences (Balaguer, González, Fabra, Castillo, Merce & Duda, 2012). The stressful nature of elite sport, and the competitive environment surrounding it, places many demands on participating athletes (Jones, 1995). In sport psychology many researchers are interested in assessing anxiety responses of athletes to competitive events (Woodman & Hardy, 2001).

The world of high-level gymnastics is characterized by intensive practice demanding competition, the public display of skills, and evaluation by others. This environment may be overwhelming for gymnasts of all ages but less is known about the nature in elite competitors (Duda & Gano-Overway, 1996a).

Anxiety was defined by Weinberg and Gould (1996) as a negative emotional state that is characterised by nervousness, worry, and apprehension and is associated with activation or *arousal* of the body. Anxiety is triggered by stressful stimuli and manifests itself in an individual's lack of adaptability on physiological, behavioural, and cognitive levels. In this way, it also hinders athletic performance (Tamorri, 2004).

Competitive anxiety is the tendency to assess confrontational situations as

dangerous and respond accordingly with feelings of tension and apprehension (Martens & Bump, 1998). This anxiety quickly escalates immediately before competition and quickly decreases afterwards (Gould, Petlichkoff & Weinberg, 1984). This specific sensation, which typically occurs during the 24 hours leading up to a competition, is known as pre-competitive anxiety. Pre-competitive anxiety has been a major focus of research in the field of sports psychology. Studies have verified that a high level of anxiety prior to competition can hinder athletic performance (Burton, 1988).

In an effort to comprehend this anxious state, the multidimensional theory (Martens, Vealey & Burton, 1990) posits that subjective manifestations of anxiety involve cognitive and somatic components, as well as self-confidence. The somatic element includes the physiological and emotional components of anxiety and stems directly from organismic activation (Martens et al., 1990). It entails a series of physical symptoms (heightened levels of activation of physiological functions) that are automatically produced by the demands of competition (Dosil, 2004); these symptoms are accompanied by nervousness and tension. The cognitive anxiety state, however, refers to the mental component of anxiety and is caused by negative expectations or low levels of confidence in oneself and in one's abilities (Martens et al., 1990). A third component has been termed self-confidence; while it is not a direct measure of anxiety, its absence can lead athletes to experience cognitive anxiety. Woodman and Hardy (2001) suggest that self-confidence is an individual's belief that he or she is able to control his or her environment and self. This theory proposes that cognitive and somatic anxieties are correlated with one another. Additionally, cognitive anxiety correlates negatively with self-confidence. This relationship has been empirically demonstrated by the findings of Craft, Magyar, Becker, and Feltz (2003) and Besharat and Pourbohlool (2011) who found that self-confidence before and during competition is correlated with low anxiety levels. As for the effect the type of sport has on anxiety, Martens and his collaborators (1990) propose that athletes in individual sports who are subjectively judged in competition exhibit more intense symptoms of cognitive anxiety and lower self-confidence.

With regard to gender, Martens and his collaborators (1990) reported that women exhibit higher cognitive anxiety and lower self-confidence than men. The findings of Vosloo, Ostrow and Watson (2009) support that claim. In a study of 151 young swimmers, they reported that the women exhibited higher levels of somatic anxiety and lower levels of self-confidence than the men. Krane and Williams (1987) found that the same was true in their study, and they ascribed this finding to their participants' low levels of competition and experience. Tabernero and Márquez (1993) argued that women, to a greater extent than men, tend to attribute their competitive anxieties to doubting themselves and their potential, an effect that becomes more pronounced with age.

How such athletes view and respond to stress in some ways will determine their success in gymnastics as well as the quality of their gymnastics experience. Al respect, it has been proposed that in competitive sports, high levels of stress can negatively affect athletes' cognition, physical state, and, ultimately, their results. Nevertheless, some researchers have corroborated the idea that athletes need not necessarily perceive pre-competitive anxiety as unfavourable; rather, it can encourage positive results. Jones (1995) built his *directional interpretation of anxiety model* on those notions, positing that anxiety's impact on sports performance does not depend on the anxiety's intensity but, rather, upon whether the athlete perceives it as facilitating or debilitating in relation to their performance of a positive outcome. Thus, an increase in anxiety could, for some athletes, be perceived as favouring good performance, while others might interpret it negatively, which has an impact on cognition.

Individual differences in perceiving and interpreting anxiety may attenuate the associations among anxiety's somatic aspects.

Certain studies have found that elite athletes score low on measures of anxiety symptoms' intensity, but high on perceived self-confidence. Those factors increase the tendency to perceive anxiety symptoms as facilitative to competitive performance (Bejek & Hagtvet, 1996; Jones & Hanton, 1996; Jones, Swain & Hardy, 1993; Kais & Raudsepp, 2004; León-Prados, Fuentes & Calvo, 2011; Lundqvist, Kentä & Raglin, 2011; Spink, 1990), downplaying the threatening aspects of anxiety and increasing their own sense of control.

A study conducted by Hanton and Jones (1994) established that high- and low-level athletes do not differ from one another in terms of cognitive and somatic anxiety levels but that high-level athletes interpret their symptoms as more facilitative of their sports performance. Those authors concluded that this may be due to high-level athletes' higher reported self-confidence. In the same vein, Jones (1995) argues that athletes who perceive themselves as capable of achieving the goals they strive towards interpret their anxiety symptoms as facilitative. Meanwhile, athletes with negative expectations about achieving their goals interpret their symptoms as detrimental to performance. Woodman and Hardy (2001), meanwhile, report that people with high anxiety levels (high intensity) usually perceive them as debilitative or as negatively affecting performance.

Raising the issue of gender, Mellalieu, Hanton, and Jones (2003), and Pozo (2007) no observed differences in the intensity and directions of anxiety and self-confidence. Studies of team sports by Ntoumanis and Biddle (1997) and Kais and Raudsepp (2005), as well as studies of players of individual sports (none being elite athletes) by Pozo (2007), related the intensity of anxiety components to their directions found that self-confidence correlated negatively with the intensities of cognitive and somatic anxieties and correlated positively with their directions. Therefore, high levels of self-confidence were linked to low levels of anxiety intensity and to the perception of cognitive and somatic anxieties as facilitative. The intensity of cognitive anxiety was positively correlated with the intensity of somatic anxiety and negatively correlated with the direction for both types of anxiety. The intensity of somatic anxiety was negatively associated with the direction of cognitive anxiety, while the direction of cognitive anxiety, in turn, was linked to that of somatic anxiety. Ntoumanis and Biddle (1997) added that such subjects seem to direct their feelings of pre-competitive cognitive and somatic anxiety towards improving their performance. However Mellalieu, Hanton, and O'Brien (2004) reported that the type of sport and competitive experience influences how people interpret their symptoms.

However, high-performance artistic gymnasts are required to execute highly difficult tasks with impeccable technique, many of which defy gravity and can trigger emotions such as anxiety and/or worries about failing in competition. The study of Duda and Gano-Overway (1996b) with young gymnasts revealed that the feeling of apprehension was strongly associated with performing skills involving learning new skills, performing a difficult or scary skill or doing skills for the first time in a meet. On the other hand, since the tasks are a artistic performance and are watched and evaluated by any number of individuals such as parents, judges or coaches, these gymnasts mentioned that they feel nervous in a competitive environment (especially those deemed as important) when there are judges. And that is hardest when they try their hardest and their coaches say they are doing bad, or when in a very big meet and they know that their biggest competitor is there. In moderate form the anxiety was generated by falls a lot during warm-ups or for the rushing in timed warm-ups. It should be noted that these same situations are present during podium training.

Jones and his collaborators (1993) conducted a study of gymnasts and suggested that exhibiting sustained, low anxiety levels with a perceived facilitative direction was the best predictor of optimal competitive performance. Lundqvist and her collaborators (2011), however, argued that high levels of self-confidence were also influential.

In the literature there are a few research about psychological parameters on podium training, and in line with recent research on pre-competitive anxiety's intensity and how to interpret its symptoms in high-performance athletes and given that more research is needed to determine the impact of such athletic competition on gymnasts' psychological parameters (Donti, *et al.*, 2012), this study's objective was to determine how the intensity and direction of pre-competitive anxiety behaved in a sample of Pan American gymnasts during podium training.

METHODS

A sample of 60 artistic gymnasts (29 men and 31 women) was gathered through convenience sampling during the XVI Pan American Games in Guadalajara, México. They ranged in age from 15 to 30 years old (M = 21.04; SD = 4.016). The gymnasts trained from 8 to more than eleven hours; and they train in average for 30 hours a week (SD= 6.44). The participants' nationalities were distributed with the following frequencies: Argentina, n = 8; Brazil, n = 7; Chile, n = 1; Colombia, n = 6; Costa Rica, n = 2; Cuba, n = 3; Ecuador, n = 2; El Salvador, n = 1, Guatemala, n = 2; Mexico, n = 10; Peru, n = 3; Puerto Rico, n = 6; Dominican Republic, n = 2; Trinidad and Tobago, n = 1; and Venezuela, n = 7. Together, these different nationalities made up 56% of the total sample of gymnasts participating in the event.

To determine the intensity and direction of pre-competitive anxiety, the Revised Competitive State Anxiety Inventory-2 (CSAI-2R; Cox et al., 2003) was utilised. The instrument consists of 17 items distributed across three subscales: somatic anxiety, cognitive anxiety, and self-confidence. The original version's reliability falls between α= .81 and α = .86 on the three subscales. On the Spanish and Mexican version (Andrade et al., 2007; López-Walle, Ramírez, Tristán, Pérez y Ceballos, 2011), the scales' reliabilities were as follows: α = .80 (Sp) - .89 (Mx), somatic anxiety; α = .82 (Sp) - .83 (Mx), cognitive anxiety; and α = .78 (Sp) - .90 (Mx), self-confidence. Each item began with the question "how do you feel right before podium training?" Answers were given on a four-point Likert-type scale, where "*not at all*" corresponds to a value of 1 and "*very much so*" a value of 4. This assessment was accompanied by the direction scale developed by Jones and Swain (1992), which was included with the cognitive anxiety, somatic anxiety, and self-confidence items. The English version has reliability coefficients with values of α = .87 for cognitive and somatic anxiety (Jones & Hanton, 1996) and α = .90 for self-confidence (Hale & Witehouse, 1998). On this scale, the athlete assesses to what point their experience of each symptom's intensity is facilitating (beneficial) or debilitating (detrimental) to their athletic performance, using a scale of -3 "*very detrimental*" to +3 "*very encouraging*." Therefore, the direction scale can range from -27 to +27. A negative score indicates an unencouraging state and a positive score an encouraging one. A score of zero would indicate that the participant's intensity is unimportant to their performance. The self-confidence scale usually shows high correlations between intensity and direction, such that they can be interpreted as the same state (Jones & Hanton, 2001).

Before administering the questionnaires, we contacted the XVI 2011 Pan American Games General Director and Operations and Sports Management, the presidents of the ODEPA Medical Committee, the Pan American Gymnasts

Union, and the Mexican Federation of A.C. Gymnastics. They were informed of the research project and acquiescence was requested from each one in carrying out the study. The first people personally contacted and informed of the study were government employees in the athletic delegation's mission and vision departments. Next, we contacted the coaches to explain specifics about the study and to ask for their collaboration.

Research findings from Wiggings (1998) and Kais and Raudsepp (2005) convey that while the intensities of self-confidence and cognitive anxiety remain stable before competition, somatic anxiety increases between 24 hours and 1 hour before the event, indicating that once an athlete evaluates his or her anxiety symptoms as either facilitative or debilitative, the symptoms persist during the 24 hours leading up to the competition. Conversely, the direction scale remains stable throughout the 24 hours prior to competition on all three anxiety subscales (Wiggins, 1998). Next, data were gathered during the 23 hours before podium training at the XVI Pan American Games. This training is every bit as demanding as the competition itself. In fact, the podium training schedule follows the exact same rotation of gymnasts and order of passage. The gymnasts wear their competition uniforms and frequently execute similar routines as in competition, and are observed by D-Panel judges present for taking notes of the routines in symbols.

The questionnaires were administered in both English and Spanish before podium training in rooms at the Pan American Villa, which was where the gymnasts were being housed. That way, they could respond in a calm, peaceful environment, free from any potentially distracting stimuli.

Out of respect for research ethics, informed consent forms were read and signed by the participating gymnasts, their coaches, and, in the case of underage participants, their delegates. It was made clear to them that participation was entirely voluntary and anonymous and that their answers would remain strictly confidential. Questionnaires were administered with authorised personnel present so they could explain how to complete the questionnaires and answer any questions that arose.

RESULTS

Tests of the instruments' reliabilities yielded acceptable values for most subscales, with the exception of the intensity of somatic anxiety (see Table 1).

In addition, descriptive evaluations of the intensity and direction components (facilitative or debilitative, respectively) of pre-competitive anxiety reflected high average self-confidence and moderate somatic anxiety. As for how the participants perceived their symptoms, we found they tended to perceive cognitive and somatic anxieties as non-facilitative and self-confidence as facilitative.

Factor analysis confirmed that each questionnaire is made up of three subscales that together explain 57.62% of total variance in the intensity dimension, with a KMO measure of sampling adequacy of .646; Bartlett's test of sphericity was significant (p = .000). The total explained variance in the direction dimension was 51.21%, with a KMO measure of sampling adequacy of .652. Bartlett's test of sphericity was significant (p = .000).

Because the Kolmogorov-Smirnov test revealed that the data were normally distributed, to determine the connections between the different components of anxiety, a bivariate correlation analysis was carried out using Pearson's r. This test yielded a significant correlation between the intensities of cognitive and somatic anxieties, as well as a negative correlation between the respective intensities of self-confidence and cognitive anxiety. Furthermore, positive correlations occurred between the intensity and direction of self-confidence and, lastly, between the directions of cognitive and somatic anxiety.

Table 1. *Reliability and Descriptive Statistics.*

	α	*M*	*SD*
Somatic Anxiety Intensity	.67	2.64	.93
Cognitive Anxiety Intensity	.77	2.04	.51
Self-confidence Intensity	.70	3.02	.82
Somatic Anxiety Direction	.79	-.58	1.07
Cognitive Anxiety Direction	.80	-.72	1.17
Self-confidence Direction	.82	1.96	1.04

Table 2. *Matrix of Correlations between Intensity and Direction of the Components of Pre-Competitive Anxiety.*

	1	2	3	4	5
1. Cognitive Anxiety Intensity					
2. Somatic Anxiety Intensity	.550**				
3. Self-Confidence Intensity	-.305*	-.126			
4. Cognitive Anxiety Direction	.035	.076	.013		
5. Somatic Anxiety Direction	.044	.135	-.125	.537**	
6. Self-Confidence Direction	-.258	-.167	.564**	-.163	-.161

** Correlation is significant to the level of .01.
* Correlation is significant to the level of .05.

A simple linear regression analysis established that cognitive anxiety's intensity is a useful predictor of somatic anxiety's intensity ($\beta = .306$, $p = .000$) and that cognitive anxiety's direction predicts the somatic component's direction ($\beta = .493$, $p = .000$). Meanwhile, the intensity of self-confidence predicted its direction ($\beta = .705$, $p = .000$) and negatively predicted the intensity of cognitive anxiety ($\beta = -.192$, $p = .019$).

We went on to examine the differences between the men's and women's groups in terms of average somatic anxiety, cognitive anxiety, and self-confidence for both intensity and direction. The Student's *t*-test only indicated statistically significant differences for the intensity of somatic anxiety ($p = .017$), with women experiencing it more intensely ($M = 2.79$) than men ($M = 2.48$).

DISCUSSION

In the interest of examining the intensities and directions of the indicators of pre-competitive anxiety (somatic and cognitive) and self-confidence in Pan American gymnasts during podium training, the study conducted was grounded in the multidimensional theory of anxiety (Martens et al., 1990) and Jones's control model (1995). The results of correlational analyses are consistent with those published by Notumanis and Biddle (1997), Kais and Raudsepp (2003), Pozo (2007), and Besharat and Pourbohlood (2011); however, in our study, self-confidence did not correlate statistically significantly with somatic anxiety. Thus, the present research has upheld those theories' postulates about the relationships among anxiety's components, previously exposed, and their claims that it is not enough to measure

intensity alone; the direction of these components must be included as well. The findings of Jones and Hanton (2001) have also been reiterated, in that self-confidence's intensity and direction can be interpreted as a single state.

Our results also clarify that cognitive anxiety predicts the direction and intensity of somatic anxiety and reiterates the findings of Craft and her collaborators (2003), which suggests that self-confidence is associated with low levels of cognitive anxiety (even predicting them) and lends support to the notion that they are opposing constructs.

In light of the descriptive patterns observed in the study's variables, these results differ from what Martens and his collaborators reported (1990) about this type of sport, in that our participants exhibited higher self-confidence and lower cognitive anxiety in the present competitive situation. However, this sample did not have the features that predict optimal performance according to Jones and her collaborators (1993). On the contrary, the study exhibited that moderate anxiety levels and symptoms were not perceived as facilitative, which had an impact on sports performance during podium training. These data tend more towards what Woodman and Hardy (2001) reported, which is that high anxiety levels are perceived as non-facilitative. In other words, increased arousal was not perceived as harmful overall, considering that average somatic anxiety was moderately high. This perspective may have been influenced by higher self-confidence levels (Lundqvist et al., 2011); therefore, feeling capable of achieving one's objectives and gaining control over oneself and one's environment was high. Other factors that may have contributed to this inconsistency are individual perceptions of the stressful event, as well as perceived ability or competence. According to Ntoumanis and Biddle (1997), perceiving oneself as having little skill cause one to become prone to anxiety symptoms.

Thus, we have partially corroborated what Landers and Bouchard argued (1991). Our participants reported less tolerance for somatic anxiety by tending to perceive high levels of it as non-facilitative. However, it could be that these athletes' performances were less influenced by anxiety, as noted by Craft and her collaborators (2003). This leads us to reflect on the role of podium training. It has the potential to flush out adverse sensations so that they are better managed by the time the official competition begins. Should be remembered that this situation generates anxiety because it has some features similar to those of a gymnastics competition described by Duda and Gano-Overway (1996b) such as the presence of judges (D-panel judges), being in the company of great competitors, may falling during warm-up, is possible to test new skills, and it was an important event for the area . So that simulated or podium training can have the advantage to help gymnasts to familiar with the demands of a particular competitive situation.

Regarding high self-confidence levels, those are consistent with the findings of other studies conducted in international-level competitive athletes and specifically gymnasts (Bejek & Hagtvet, 1995; Besharat & Pourbohlool, 2011; León-Prados et al., 2011). Comparing signs of anxiety and self-confidence according to gender, the findings were in line with what Vosloo and her collaborators reported (2009). Women exhibited significantly higher somatic anxiety and self-confidence levels than men, although in our study, that last comparison did not produce a statistically significant result. One possible alternate explanation for these differences is that women are more inclined to express their feelings than men, especially unpleasant ones (Briscoe, 1985).

There are certain discrepancies between these findings and those of prior studies; this could be the result of different instruments being utilised, or perhaps due to having used a podium training and not competition, while not an official competence if a simulation of one, and is related to the situations that arouse feelings of anxiety, which were mentioned above. It could also be because the studies above

were conducted using samples of college, national, and mixed-level groups of athletes, with some at the international level; players of team and other sports were included, as well, and the competitions were national. Furthermore, the anxiety was evaluated instead of trait dimension. Some studies also refer to participants' experiences, which is one variable that the present study did not examine; this component will be important to consider in future research. It could be that even though the sample was widespread and comprised of international competitive gymnasts, they did not have enough experience competing in such important tournaments.

So that further research is required to elite athletes in international official competitions and compare psychological parameters of the same athletes during podium training and competition; further to assess also the ability perception, competitive experience and the meaning of competition among athletes from the state dimension to glean better understanding of precompetitive anxiety.

CONCLUSIONS

In light of the above results and considering the particular set of circumstances and conditions under which this study was conducted, we confirmed that moderate anxiety levels are associated with less favourable perceptions of performance outcomes. However, people with high levels of self-confidence, which these international-level gymnasts exhibited, tend to perceive cognitive anxiety as less debilitative but are much less able to handle somatic anxiety.

Furthermore, high levels of self-confidence negatively predict cognitive anxiety levels.

Female gymnasts reported significantly higher somatic anxiety levels than male gymnasts, at least in this competitive situation.

Finally, we recommend that future research be conducted to address these variables, assess perceived ability, and the meaning of competition among athletes.

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HOW P.E. STUDENTS EVALUATE THEIR INTEREST AND POPLARITY OF ARTISTIC GYMNASTICS

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Original research article

Abstract

In Slovenia gymnastics is covered on public and private television. Gymnastics in comparison to other sports is not very often shown on screens. The aim of our study is to find out, 'How future physical education teachers evaluate gymnastics according to their gender and sport knowledge.' We used 111 first grade students as a sample (76 males and 35 females). These students did not have any previous gymnastics experience. They had to complete a questionnaire where they evaluated gymnastics characteristics and also compared their interest for gymnastics with other individual and team sports popular in Slovenia. Results show that gymnastics especially on male student's opinion is not very popular, female students like it more. Most of the students prefer to watch other popular sports. Student's grades of gymnastics characteristics which are according to previous researches not what audience require. The expected conclusion is that gymnastics is one of less popular and lower rated sports in Slovenia. This is shown by the rating data from RTV Slovenia, even though Slovene gymnasts have always achieved good results and been very successful in international area.

Keywords: *audience, gymnastics, students, television.*

INTRODUCTION

Medium is part of our everyday lives. The word "medium" of Latin origin means resource, mediator, and conductor. It is an important source of information and entertainment, and also a part of cultural and educational participation. We continue to use it as it's a necessity of our lives. One of the most important is definitely television. (Dodič & Nastav, 2011)

We cannot imagine medium without sport contributions and shares. Local news pays more attention to sports rather than other topics. Cashmore (1996) says sport watched live on the field is for TV spectator insufficient. TV spectator wants sport presented as other kind of product that enable him comfort. Presence of TV on sport events seems inevitable. TV coverage in sport events changed the expectations, perception, patterns of viewing and rules in sport. That would be for example game length, shorter half-time brakes, night ski races (Oblak, 2007).

There are many sports which are specific to certain Countries and Cultural Areas. These sports have become more known and popular throughout the world with assistance of television. Sport events have been moved from local areas and became available to mass audience all over

the world (Larsen, 2002). Sport that does not get presented on TV cannot count on support of bigger crowd. Sports such as bowling where Slovenians achieve top scores will never get the attention of the general public. We can claim that TV has big influence in popularity of certain branches in sport (Oblak 2007).

In relation to the amount of time sport airs on Television it increases the amount of sports fans for the particular sports. Characteristics of sports include investment of time, money, feelings, knowledge of athletes, statistics, strategies, and emotional loyalty to some athletes or teams. These characteristic are used in conversations. (Wenner, 1998). Wenners position of this case can be illustrated in Europeans most rated soccer. For Instance the characteristics of soccer can include knowledge of rules in the game, feeling of membership to a certain team and good connoisseurship for players, their roles in the team and their placement on the field. Wenner (1998) also explains that these feeling and experiences contribute to making broadcasted sports immeasurably important and pleasant for admirers.

Wenner (1998) describes findings of different authors. He uses their finding to create an overall conclusion of the difference between audience genders. Male and female had different way of socializing, learning about sport and coincidently their experiences are different. The ideals of sport usually are based upon manhood (aggression, courage, rivalry and strength). This is an enabler to get people involved in sport.

Sports commentators' style of reporting tends to lean more towards the male audience. Their comments show aggression levels in sport which males enjoy more than females because of the larger percentage of males in the audience. Men insist in sport which is fast-paced and involved physical contact, while women tend to enjoy slow-paced and less brutal sports like baseball and tennis. Men usually enjoy action oriented and informative contents, while female like dramatic, musical and comic content. Sport is watched mostly in meeting situations (living rooms, bars, in groups). This way sport gets new meaning. Watching sport in groups and then talk about it all day long. For this identification scene has created pleasure in sport viewing. Wenner also mentions TV sport as »male-centered genre« which is based on traditional concept of manhood and womanhood and men prefer to watch sport topics more than women. Men have no problem watching their wives favorite sport with them while women rarely watch husband favorite sport with their husband. But there are also existing evidence of great numbers of women enjoying TV sport program (Wenner 1998). Gantz and Wenner (1991), in Wenner (1998) discovered that females watch sport for something to do with friends and family, while male act like sport fans and lovers. Comparing to women, there is a lot more men who watch sport for relaxation, relief and alcohol consumption. "Men probably watch sport repeatedly because they enjoy the tension and drama in sport competitions, and they get new topics for conversation".

Sport broadcasts are a rich, yet often overlooked source of views and ideas about the human being and its place in society. Certainly, the fundamental purpose of sports contents is not to provide "serious" contents, but to entertain the audience. By professional leagues and athletes doing well in their sports they entertain the audience. The numbers of people they reach, or maybe even because of it, are remarkable and many sport contents achieve significantly greater viewership figures than other types of programming. Like all television content, sports broadcasts contribute to the cultivation of the viewer's perception of society (Ličen, 2011). Viewing of gymnastics on television has recently reached average results regarding to ratings of other sports represented by public TV Slovenia. We assume that gymnastics is one of the attractive sports, but according to the mentioned facts it does not belong to the group of sport. Which means it is not given as much airtime. That is seen in Table 1. Gymnastics was in the year of 2010

broadcasted 13 times, when for instance soccer games were broadcasted 382 times and got the most aired space. Soccer was followed by the winter olympics (220) and alpine skiing (101). In order following handball, basketball, formula 1, cross-country skiing, tennis, ski jumping, volleyball, and athletics. Artistic gymnastics shares 17th place with ski flying. According to most spectators watching an sport event the highest score got soccer and Olympics, following by ski jumping and Alpine skiing, 5th is boxing despite only five broadcasted fights in whole year. Gymnastics was placed 26th out of 48 disciplines. Highest rating reached soccer which according to viewership occupies first three places with soccer world championship in South Africa where Slovenia played against USA, England and Algeria. Higher on scale are exchanging ski jumping, alpine skiing and soccer. High rating achieved the fight Zavec vs. Jackiewicz. Soon after those appears cross-country skiing (world cup in sprint and run on 9km track). Only just on 65th place comes basketball which scored high rating in our survey. Sportscasters offer what they think viewers want, and very little more. Naturally, the major sport broadcasts are relatively safe and efficient means of securing high rating figures and consequently high marketing incomes." A sportscaster's audience is very loyal and predictable, making it easier for network producers to seek new approaches in sports reporting (Ličen, 2011). Gymnastics offers dozens of performances in a given night, particularly in team and individual event competitions, which give commentators lot to talk about (Angelini & Billings, 2010), consequently less time for "fun" is available.

Comparing the number of broadcasts of gymnastics to soccer, we can in this context mention also the question of connoisseurship of sport itself and massive participation in certain sports. There are 41 gymnastics clubs in Slovenia, including clubs for rhythmic gymnastics (Members of GZS, 2012), and there are 317 soccer clubs in Slovenia (Clubs NZS, 2012). From this data we can see in Slovenia there is huge amount of people and children interested in playing soccer, which brings more audience and viewers, but in case of gymnastics that part is missing and there is less interested people and consecutively we can see there might be a connection with knowledge about connoisseurship of gymnastics in general.

Thus gymnastics should be explained to people in their childhood and explaining the rules through the process of growing up, because they are often pretty complicated and tricky, but we have to know it for the understanding of gymnastics. Researches with questions for including children into gymnastics training have started quite some time ago. Binter (1978) in his bachelor's thesis made a conclusion that the most important indicators for elementary school youth to choose a sport are "the financial wellbeing of the family and the socio-political situation of their parents. Children are stimulated for gymnastics by parents or the teachers of physical education (P. E.) at school".

School teachers many times create opinions of children and future grown up persons. Current attention of people is directed towards two actual questions, ´What is the quality of life?´ and ¨How is it determined by individual profession route and their free time.¨ That is why it matters what kind of habits and values an individual gets while growing up and how he/she learns to spend his/her free time. Systematic sport education process is during compulsory education familiarized to all children. Physical education has a special meaning, during involvement in sport every child must be comfortable. This depends on childs attitude towards sport and how the child will include sport in his/her free time later on (Kovač & Jurak, 2010).

Table 1. *Individual viewed sports on RTV Slovenia in 2010 (RTV Slovenija Sport department, 2011).*

		no. of viewers			rating			share		
sport	N	mean	max	min	mean	max	min	mean	max	min
aerobic gymnastics	4	21277.3	30984.8	13540.1	1.1	1.6	0.7	4.75	6	3
alpine skiing	101	128659.7	326896.7	27080.2	6.651	16.9	1.4	34.873	64	4.1
artistic gymnastics	13	29758.4	52226.1	13540.1	1.538	2.7	0.7	8.308	17	3
athletics	23	35237.9	77372	9671.5	1.822	4	0.5	8.483	19	0
basketball	53	64415.8	220510.2	5802	3.33	11.4	0.3	12.634	40	1.5
beach volley	2	29014.5	30948.8	27080.2	1.5	1.6	1.4	7.25	7.7	6.8
best athlets	1	75437.7	75437.7	75437.7	3.9	3.9	3.9	11	11	11
biathlon	22	65150.7	150875.4	11605.8	3.368	7.8	0.6	19.773	39	7
boxing	5	144685.6	321093.8	42554.6	7.48	16.6	2.2	23.28	52.4	7
canoeing	2	21277.3	25145.9	17408.7	1.1	1.3	0.9	4	5	3
canoeing - flat water	2	6770.0	9671.5	3868.6	0.35	0.5	0.2	3	3	3
canoeing - slalom	8	25387.6	42554.6	13540.1	1.313	2.2	0.7	10.85	15	6
cross country	1	17408.7	17408.7	17408.7	0.9	0.9	0.9	3	3	3
cross country skiing	39	101476.4	307553.7	23211.6	5.246	15.9	1.2	23.485	57	8
cycling	20	36364.8	83174.9	5802.9	1.88	4.3	0.3	11.715	21	3
equestrian	1	79306.3	79306.3	79306.3	4.1	4.1	4.1	15	15	15
equestrian - dressage	1	36751.7	36751.7	36751.7	1.9	1.9	1.9	8	8	8
figure skating	14	38133.3	96715	17408.7	1.971	5	0.9	8.021	16	4
soccer	382	67467.5	518392.4	1934.3	3.488	26.8	0.1	15.071	82	1
formula 1	42	81562.9	185692.8	5802.9	4.217	9.6	0.3	24.995	47	9
Futsal	3	53515.6	75437.7	32883.1	2.767	3.9	1.7	7.5	12.5	3.5
handball	58	67800.5	205035.8	11605.8	3.505	10.6	0.6	11.848	28.5	1.5
ice hockey	6	93813.5	143138.2	44488.9	4.85	7.4	2.3	14.033	20	10.7
judo	7	23211.6	38686	13540.1	1.2	2	0.7	6.057	12	2.4
marathon	1	30948.8	30948.8	30948.8	1.6	1.6	1.6	4	4	4
Moto Grand Prix	18	81670.4	235984.6	25145.9	4.222	12.2	1.3	23.389	38	14
motocross	8	20551.9	44488.9	3868.6	1.062	2.3	0.2	4.875	9	2
mountain bike	2	30948.8	48357.5	13540.1	1.6	2.5	0.7	6	10	3
mountain running	2	29981.6	50291.0	9671.5	1.55	2.6	0.5	2	4	
Olympic games	220	77758.8	408137.3	0	4.02	21.1	0	17.692	63	0
Paralympics games	7	32883.1	58029	11605.8	1.7	3	0.6	11.286	29	3
Rally	9	21922.0	46423.2	5802.9	1.133	2.4	0.3	5.556	10	3

Legend: N – number of covered events in individual sport event, mean – average value, max – maximum value, min – minimum value.

Media impact, structure of movement, and the way of how things work is easier to present for example soccer instead of gymnastics to a child. While understanding is better, the learning is easier and you can do it with less effort. Bučar (2003) states that: "In Slovenia a lot of elementary schools didn't realise the goals of physical education in part of gymnastics with rhythmical expression at all". Even though gymnastics is placed in the curriculum of physical education on all levels and forms of education and the selection of goals, contents and standards of knowledge is adjusted to the level of development of students (Novak, Kovač & Čuk, 2008). So apparently most of P.E teachers are perfunctory at teaching the basics of gymnastics, what shows in later attitude towards it. Also Tome has already in the year of 1983 researched Realization of physical education in schools. In SR Slovenia, in elementary and high schools. It was found that in elementary schools 8.8% and in high schools 30.3% did not even learn to roll over. In elementary schools 31,1% did not learn a handstand, in high school that percentage was 35,9. 38,2% of students in elementary school did not learn the cartwheel and 46,2% in high school (Jakše, 2007). So we can see the huge percentage of Slovenian population who do not know anything about the basics gymnastics and acrobatic skills.

Teacher is the one who coordinates and adjusts learning goals, content and learning technologies to students and is directly responsible for learning process (Strmičnik, 2001). Every teacher's basic tasks are upbringing and education which cannot be separated in practice. The professional abilities and features depend on teacher education. School teachers need to be intellectual, bright and comprehensive. That is why he/she has to take the teaching knowledge and supplement the students with other sciences. Teacher's profession is performed by motivated and highly educated experts and has essential meaning in education of youth. Role of teaching is based on learning goals, content and chosen activities. According to inner lesson, from a teaching point of view organization is a very important teacher's choice of study forms and methods (Jakše, 2007).

Jakše's conclusion was in elementary school the teachers think that being involved in gymnastics is important for moving and coordination. The elements of gymnastics continue increase in difficulty from beginning to the end of elementary school. The content of gymnastics has a positive effect on the development of moving abilities and has great influence on improving coordination skills, balance, flexibility and strength. It positively effects the psychophysical development of a child, because it teaches obedience, determination, diligence, precision, independence, involves confidence and influences on consistent body development. Despite all positive effects teachers has in last triad succeeded to infer less than 10 hours of gymnastics in whole school year (Jakše, 2007). The lack of realisation in the complex of performing gymnastics skills notices also in knowledge of P.E. students in the first year on faculty (Bučar, 2003).

According to findings of Wenner (1998) artistic gymnastics does not have a lot of potential for success in male audience. Kane (1995, in Angelini & Billings, 2010) marks it as prototypically feminine sport. It is supposed to be more suitable for female audience because of its peacefulness. Binter (1978) also found out that mother education is an important factor for including children into gymnastics. But we have to make sure to include even more children into gymnastics for development of their motion skills which are needed for implementation in other sports. P.E teachers mostly take care of that. Therefore are the students of faculty of sport who are to become P.E. teachers are supposed to have extremely positive opinion about gymnastics so they will be able to provide the knowledge to younger generations. In this article the view of faculty of sport's students about gymnastics and how popular gymnastics is on their opinion is researched.

METHODS

In the research all students who visited the first year of faculty of sport in 2011/2012 have been included. They are attending the class of artistic gymnastics 1. There were total of 111 interviewed students (35 females and 76 males, whose average age is 19,48 years) who were present on the teaching process. Students were ensured that the intention of the survey was for the purpose of scientific research and their identity will not be revealed.

The interviewing took place in the first hour of the teaching process in October 2011. The students were not familiar with gymnastics and hadn't yet had any classes at the faculty of sport. All students gave written consent for interview.

Variables sample represents a survey questionnaire that includes questions which are everyone's three most and less viewed sports and knowing of the rules for those sports. Students evaluated on their own opinion of which sports they prefer watching on TV and defines themselves for knowing the rules for chosen sports. They could choose any sport they could think of and their knowledge of rules answered with "yes" or "no".

In the second part of questionnaire they estimated on their opinion which sport from the table they prefer watching on TV comparing to gymnastics. On one side of the table there was gymnastics and on the other side there were athletics, swimming, nine pin bowling, bowling green (boules), soccer, basketball, handball, volleyball, alpine skiing, ski jumping, biathlon and cross-country skiing.

In the third part they graded gymnastics characteristics with grades form 1-5 (1-the least, 3-medium, 5-the most). Available characteristics for gymnastics were: gymnastics is beautiful, difficult, attractive, violent, aggressive, artistic, boring, nationalistic, calm, chauvinistic, cheerful, traditional, gymnasts are crazy, following the same scale grades for male and female gymnastics and for individual events. In this part students evaluated gymnastics characteristics based on their own opinion based on their own experiences. Survey questionnaire is not standardised; it is formed on the basis of already made research and analysis by Wenner (1998) with the purpose of verifying points of view.

Data collected by surveys were processed with SPSS program (Statistical Package for the Social Science), frequency and chi square test were performed. Frequencies and Chi Square were calculated, level of significant Chi square was set to 0.05

RESULTS

Students were comparing artistic gymnastics with athletics, swimming, bowling, bowling green (boules), soccer, basketball, handball, volleyball, skiing, ski jumping, biathlon and cross-country skiing. Answers are shown in table 2. Results show that gymnastics is rather viewed than bowling, Bowling Green (boules), biathlon and cross-country skiing. In other cases they rather watch other sports except in case of swimming the score is tied. The biggest difference occurs by watching basketball games, followed by soccer games. If we separate the data by gender we get a rather different image. Female rather watch gymnastics than swimming, bowling, Bowling Green (boules), handball, biathlon and cross-country skiing. In case of athletics and ski jumping they can't decide. Statistically typical difference between male and female occurs in case of soccer (sig. 0,001), basketball (sig. 0,001), handball (sig. 0,001), ski jumping (sig. 0,012), biathlon (sig. 0,019) and cross-country skiing (sig. 0,020); while female rather watch gymnastics than any of these sports. The smallest difference is in case of bowling where 86% of male and 94% of female would rather watch gymnastics.

More than half of students chose soccer, followed by basketball and athletics for their favorite three sports. More popular are also tennis, skiing, handball, gymnastics and volleyball. Middle observed sports are ice skating, swimming, martial arts,

American football and ski jumping. Rarely chosen are mostly extreme sports, Motor Grand prix and Formula 1, dancing, cycling, horseback riding, climbing or rock climbing, ice hockey, kayaking, water diving, triathlon. The rules for chosen sports are usually well known but there can still be found a difference between male and female students. While most male students mostly choose to watch soccer, basketball, athletics, tennis and handball, female students rather choose gymnastics, basketball and athletics over other sports. Well observed are also soccer, volleyball and skiing. We notice the difference in knowing the rules. Male students mostly know the rules for all the sports they choose while female students have poor knowledge or do not know the rules for the second or the third sport chosen.

Table 2. *Comparison of TV watching of gymnastics against other sports according to gender.*

N	Sport	more	same	less	sport	$\chi 2$ (Pearson)	sig. χ^2
M=74	Gymnastics	16%	35%	49%	Athletics	4.270a	0.118
F=34		32%	35%	32%			
M=74	Gymnastics	26%	42%	32%	Swimming	2.710a	0.258
F=34		41%	35%	24%			
M=74	Gymnastics	86%	11%	3%	Bowling	1.683a	0.431
F=34		94%	6%	0%			
M=74	Gymnastics	86%	14%	0%	Bowling green	2.847a	0.092
F=34		97%	3%	0%			
M=74	Gymnastics	16%	7%	77%	Soccer	14.387a	0.001
F=34		32%	26%	41%			
M=74	Gymnastics	9%	11%	80%	Basketball	14.182a	0.001
F=34		32%	24%	44%			
M=74	Gymnastics	16%	15%	69%	Handball	14.418a	0.001
F=34		50%	15%	35%			
M=74	Gymnastics	16%	28%	55%	Volleyball	2.132a	0.344
F=34		18%	41%	41%			
M=74	Gymnastics	12%	18%	70%	Alpine skiing	6.773a	0.034
F=34		24%	32%	44%			
M=74	Gymnastics	14%	27%	59%	Ski jumping	8.784a	0.012
F=34		38%	24%	38%			
M=74	Gymnastics	31%	31%	38%	biathlon	7.954a	0.019
F=34		50%	38%	12%			
M=74	Gymnastics	31%	38%	31%	Cross-country skiing	7.786	0.02
F=34		56%	15%	29%			

Legend: F –number of female students; M – number of male students; N – number of participants; sig. – Significance of parameter $\chi 2$; $\chi 2$ (Pearson) – Pearsons correlation coefficient.

Table 3. *Gymnastics characteristics grades according to gender.*

Properties	N	1	2	3	4	5	$\chi 2$	sig. χ^2
Beautiful	M=75	2.7%	8.0%	30.7%	30.7%	28.0%	9.316a	0.054
	F=35	0.0%	2.9%	11.4%	34.3%	51.4%		
Interesting	M=75	2.7%	13.3%	40.0%	32.0%	12.0%	20.898a	0
	F=35	0.0%	11.4%	11.4%	28.6%	48.6%		
Hard	M=76	0.0%	0.0%	2.7%	13.3%	85.3%	0.488a	0.783
	F=35	0.0%	0.0%	2.9%	8.6%	88.6%		
Attractive	M=75	4.0%	6.7%	22.7%	24.0%	42.7%	4.049a	0.399
	F=34	0.0%	2.9%	32.4%	32.4%	32.4%		
Violent	M=76	81.3%	14.7%	4.0%	1.3%	0.0%	4.455a	0.348
	F=35	85.7%	5.7%	5.7%	0.0%	2.9%		
Aggressive	M=76	68.0%	24.0%	6.7%	1.3%	1.3%	3.404a	0.493
	F=35	74.3%	14.3%	5.7%	0.0%	5.7%		
Artistic	M=76	0.0%	5.3%	22.7%	45.3%	28.0%	3.715a	0.294
	F=35	0.0%	2.9%	25.7%	28.6%	42.9%		
Boring	M=76	20.0%	36.0%	37.3%	5.3%	2.7%	8.233a	0.083
	F=35	42.9%	25.7%	22.9%	8.6%	0.0%		
Nationalistic	M=76	56.0%	22.7%	16.0%	5.3%	1.3%	1.322a	0.858
	F=35	60.0%	17.1%	14.3%	8.6%	0.0%		
Calm	M=75	6.7%	22.7%	44.0%	20.0%	6.7%	4.326	0.364
	F=35	17.1%	22.9%	31.4%	17.1%	11.4%		
Chauvinistic	M=75	45.3%	24.0%	20.0%	8.0%	2.7%	2.519a	0.641
	F=35	37.1%	17.1%	31.4%	11.4%	2.9%		
Cheerful	M=76	24.0%	36.0%	33.3%	6.7%	1.3%	7.378a	0.117
	F=35	8.6%	37.1%	34.3%	20.0%	0.0%		
Traditional	M=75	5.3%	17.3%	42.7%	20.0%	14.7%	13.043a	0.011
	F=35	20.0%	28.6%	28.6%	22.9%	0.0%		
Can identify with gymnasts	M=76	17.3%	49.3%	33.3%	1.3%	0.0%	22.440a	0
	F=35	42.9%	20.0%	20.0%	11.4%	5.7%		
Gymnasts are madman	M=76	22.7%	14.7%	28.0%	22.7%	13.3%	5.179a	0.269
	F=34	35.3%	20.6%	26.5%	14.7%	2.9%		
Mgym_whole	M=53	0.0%	2.7%	30.7%	30.7%	6.7%	5.350a	0.148
	F=24	0.0%	0.0%	25.0%	50.0%	25.0%		
Mgym_Floor	M=76	6.7%	16.0%	37.3%	25.3%	14.7%	4.776a	0.444
	F=35	2.9%	20.0%	25.7%	22.9%	28.6%		
Mgym_Pommel horse	M=76	5.3%	29.3%	52.0%	12.0%	2.7%	11.506	0.021
	F=35	5.7%	11.4%	42.9%	25.7%	14.3%		
Mgym_Still rings	M=75	4.0%	8.0%	22.7%	49.3%	16.0%	3.153a	0.533
	F=35	8.6%	8.6%	14.3%	42.9%	25.7%		
Mgym_Vault	M=76	2.7%	12.0%	30.7%	34.7%	21.3%	2.175	0.704
	F=35	0.0%	11.4%	34.3%	25.7%	28.6%		
Mgym_Parallel bars	M=76	4.0%	13.3%	22.7%	37.3%	24.0%	9.486a	0.05
	F=35	2.9%	0.0%	25.7%	25.7%	45.7%		
Mgym_High bar	M=75	4.0%	4.0%	26.7%	29.3%	36.0%	0.420a	0.981
	F=35	5.7%	2.9%	22.9%	31.4%	37.1%		
Fgym_whole	M=52	1.3%	8.0%	33.3%	21.3%	5.3%	20.239a	0
	F=24	0.0%	8.3%	12.5%	29.2%	50.0%		
Fgym_Vault	M=76	6.7%	21.3%	44.0%	25.3%	4.0%	6.924	0.14
	F=35	5.7%	5.7%	40.0%	37.1%	11.4%		
Fgym_Uneven bars	M=76	4.0%	18.7%	37.3%	29.3%	12.0%	17.595a	0.001
	F=35	8.6%	2.9%	14.3%	37.1%	37.1%		
Fgym_Balance beam	M=76	6.7%	30.7%	36.0%	22.7%	5.3%	33.697	0
	F=35	5.7%	8.6%	11.4%	25.7%	48.6%		
Fgym_Floor	M=76	0.0%	25.3%	18.7%	34.7%	22.7%	14.487	0.006
	F=35	5.7%	5.7%	20.0%	22.9%	45.7%		

Legend: F – Number of female students; M – Number of male students; Mgym_ - Male gymnastics; N – Number of participants; sig. – Parameter significance $\chi 2$; Fgym_ - Female gymnastics; $\chi 2$ (Pearson) – Pearsons correlation coefficient.

Between unwanted sports is golf that reaches the highest percent, followed by soccer and ice skating. Relatively high percentage is also reached by swimming, tennis and formula 1. Several times were marked also handball, cycling, American football, marathon, chess, dancing and sometimes chosen gymnastics too. According to the survey for most unpopular sport students don't even know the rules. If the score is divided by gender the top unpopular sport remains golf. For male students the second place is shared by soccer and ice skating and for female students soccer shares first place with golf, followed by ice skating. High percentage for both genders is reached by formula 1, cross-country skiing and tennis. For female students basketball also reached a pretty high percent.

At characteristics score for gymnastics (Table 3) students most agree for gymnastics to be beautiful, medium interesting, pretty hard and attractive. Mostly it is considered to be non-violent, unaggressive, rather artistic and relatively boring. Gymnastics is not nationalistic and cheering. About tranquility and traditionalism the answers were normally divided. Students cannot identify themselves with gymnasts and only one third of students think that gymnasts are not crazy. In general they do not like the characteristics of gymnastics events. Although only a few answered that they don't like any of the events in gymnastics but they are mostly tending to the middle answer. In male gymnastics the least popular is pommel horse and the most popular are parallel bars and high bar. Female gymnastics is in average more poorly graded than male gymnastics but a little better result is achieved by the floor. Separated by gender are seen differences by the beauty (sig. 0,054), attractions (sig. 0,000), traditionalism (sig. 0,011), able to identify with gymnasts (sig. 0,000), different opinion about pommel horse (sig. 0,021), male parallel bars (sig. 0,050), female gymnastics in general (sig. 0,000), and the rest of female gymnastics events except vault. Female students have more positive opinion than male students about beauty and points of Interest in gymnastics. They marked it as less traditional and that it is harder to identify themselves as gymnasts than male students do. Pommel horse and parallel bars were also better graded by female students than male and the grades about female gymnastics practical aren't comparable. Male students graded female gymnastics pretty low, especially uneven bars and balance beam while female students assessed balance beam and floor very positively. The least difference in grading is in male high bar (sig. 0,981) which everyone like. Male vault also got good grade from both gender (sig. 0,704). Almost everybody agree on gymnastics being a very difficult sport (sig. 0,783). Male students agree in 85, 3% and female students in 88, 6%.

DISCUSION

Contribution of gymnastics to harmonized movement of whole body and its individual parts is priceless. Variety of motions that is consistent with gymnastics and the control of your own body in movement contribute to wide effect of gymnastics on evolvement of our physical ability (Novak idr. 2008). It's about the basics that should be learned by every child. Within familiarization of gymnastics as well as learning various motions and control of our own body, the rules of gymnastics should also be included. As the results of the questionnaire show, that student's knowledge of rules for sports they like to watch on TV in good. We cannot say the same for the knowledge on sports they do not prefer watching. Gymnastics does not stand out as a sport that popular to watch, but it is also not an unpopular one. Therefore we can´t say that the students do or don't know the rules of gymnastics. If we use only male student results, where Wenner (2008) also states that TV sport is centered to male population, from our questionnaire we can see that males indicate gymnastics as middle interesting, pretty

attractive, totally unaggressive and pretty boring. In the same work Wenner notes that men watch sports because sport ideals are connected with masculinity – aggression, courage, rivalry and strength. Therefore gymnastics because of its natural characteristics cannot be one of most viewed sports on TV.

According to the Table 1 we can see that results from the survey differ from general rating in Slovenia. In Slovenia skiing and ski jumping were always very popular sports, as also shown in data from RTV Slovenia. We can link that up with success of Slovene athletes in those sports. Names like Boris Strel, Bojan Križaj and Mateja Svet have marked Slovene and worlds skiing, and currently one of world's most successful skiers is Tina Maze. Gymnastics was marked by Leon Štukelj and Miro Cerar with great achievements and there were Mitja Petkovšek and Aljaž Pegan on the top of world's gymnastics. Now other Slovene gymnasts are reaching for the top. But still we figure out that achievements of the nation can help to rise up the ratings, but cannot stand out of its range. We can compare the number of matches broadcasted according to mentioned comparison between skiing and gymnastics. There were 101 skiing races in 2010 and only 13 gymnastics competitions. With that attitude gymnastics cannot compete with more popular and established sports. For that, in the background there are probably many reasons. We assume that one of the most important is connected with general opinion of boringness of this sport, for which lack of knowledge about the rules in gymnastics could be the reason. Rules in gymnastics are quite complicated and most viewers do not even try to understand them. Everyone understands that who gets higher score wins. In comparison to soccer or handball the philosophy in background seems quite simple. In soccer you run after the ball, dribble opposing defenders, find the closest and easiest route to the goal and score. In this part of game the tension increases, viewers are excited and expecting either goal or goalkeepers defense. In the case of success for the favorite team even more. But in the world of gymnastics that part is missing. Gymnastics is interesting if you live with it, you know the rules, you know the difficulty of single elements and at least the approximate score of gymnast's routine.

The audience does not understand how the results of a gymnasts performance can end up quite similar when they do different level of difficulty for there routines. One gymnast may accolmplish astonishing routine by performing a simple routine well. Another may perform one which has more difficult skill level but then making some faults. That example shows us the importance of TV commentator who tries to explain the rules of gymnastics to viewers and introduces gymnastics as interesting, fun and attractive sport. In Beijing Olympics there were the biggest part of subjective comments in gymnastics and least in soccer. Journalists and media commentators claim, that objectiveness is the essential thing to guide their work. But some part of subjective comments is included, well accepted and unavoidable (Ličen, 2011).

Consideration about reorganizing gymnastics competition might be required. According to Wenner's analyzes audience like attractive show, increasing tension, cheering on social meetings and possibility of relaxation during watching the competition. Regarding to this, when organizing a gymnastics competition, organizers should concentrate to female audience population. In this sport there is no aggressiveness and brutality, unnecessary strength demonstration and competitiveness. When watching gymnastics elements be performed it's not what meets the eyes of the television veiwers. A lot of strength is needed to accomplish these. The rules of gymnastics tend to light, gentle and soft movement. A lot of extremely attractive elements look very easy to accomplish because of these. According to the statements above most of Slovene population who do not have experience with practicing gymnastics and do not have

notion about the difficulty involved means cannot valuate the sport as accurately.

Gymnastics association of Slovenia (GZS) started to realize the problem for lack of knowledge about gymnastics in general population. The project »Gymnastics in elementary school« is the result of many years of tendencies to popularise gymnastics to children and increase the numbers of children that would like to practice gymnastics. Gymnastics lost its mass recognition; less and less children are practicing recreational gymnastics in organized groups. Results of Fišer research (2008) indicated that the most important motive of why parents include children into the program is because "Sport benefits to the help of my child" with head motives "The child wants to visit the exercise" and "with gymnastics improves his/her personal abilities". Statistically there is no difference between genders in including children into gymnastics. We found out that parents are aware of positive influences and usefulness of gymnastics content on children development (Fišer, 2008).

According to the opinion of the relatively small amount of female students, there is a future for gymnastics in Slovenia. As it seems for the male to become more interested in watching gymnastics there needs to be initiated some innovations into broadcasts of gymnastics competitions from the attractiveness and rising the tension point of view in gymnastics halls. Future research should be focused on wishes of gymnastics audience, to improve attractiveness, to make more people watch gymnastics and enjoy it. As shown in Ličen's (2011) research and Billings, Angelini & Wu (2011) analysis, audience like nationalistic comments when watching sports. Billions of viewers from all nations watch Olympic games with a sense, that they are watching countries compete for dominance (Billings, Angelini & Wu 2011). Because Slovenia is such a small country, number of medals in important competitions like Olympic Games, World and European championship means a lot and general knowing that good results might be achievable, number of interested audience increases.

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DYNAMIC BALANCE IN GIRLS PRACTICING RECREATIONAL RHYTHMIC GYMNASTICS AND GREEK TRADITIONAL DANCES

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Original research article

Abstract

Balance ability influences learning and implementation of new skills, constitutes the basic factor for success in all athletic activities, and is a reliable predicting factor regarding the development of basic motor skills, academic success and risk of athletic injuries. The purpose of the present study was to examine the effect of a rhythmic gymnastics program and of a Greek traditional dances program on the dynamic balance ability of girls. Twenty-seven girls took part in the study. They were divided in two groups: Group A, received a 12-week program of Greek traditional dances at a frequency of one lesson per week for 90 minutes, while Group B, received a 12-week program of rhythmic gymnastics at a frequency of three lessons per week, each for 60 minutes. The frequency of the lessons was the accustomed one to the clubs of Greek traditional dances as well as to the clubs of rhythmic gymnastics with no competitive purpose. The methods of data collection included pretest and posttest measurements of the dynamic balance for the subjects of both groups. Dynamic balance was measured by the stabilometer platform (Lafayette Instruments). The results showed that after the 12-week intervention programs dynamic balance increased from 33.31±9.51 sec to 38.24±9.46 sec (z=-2.67, p<0.01) for Group A and from 30.83±5.57 sec to 36.69±7.68 sec (z=-2.44, p<0.01) for Group B. Consequently, rhythmic gymnastics, as well as Greek traditional dances are two activities that, even in a non-competitive form, could be used in order to improve children's dynamic balance ability.

Keywords*: non-competive rhythmic gymnastics and dance, abilities, children.*

INTRODUCTION

Balance can be defined as the ability to maintain the body's center of gravity over its base of support within minimal way or maximal steadiness (Emery, 2003) and is distinguished into static and dynamic. Static balance is the ability to balance on a stable surface without any other movement, whereas dynamic balance is the ability to balance on a moving surface or to maintain balance while moving (Fleishman, 1972). Postural regulation is organized in hierarchic and stereotypic patterns (Horak &

Nashner, 1986) and requires the integration of afferent information from the visual, vestibular, and proprioceptive systems (Massion, 1998).

Balance ability considerably influences learning and implementation of new skills, constitutes the basic factor for success in all athletic activities (McGuine, Greene, Best & Leverson, 2000) and is a reliable predicting factor regarding the development of basic motor skills such as walking, running, and throwing, academic success and risk of athletic injuries (Butterfield & Loovis, 1994). Moreover, dynamic balance is strongly associated with wrist and forearm fracture risk in children, and may effect on fracture prevention strategies in children (Morley & Jones, 2004). Balance improvement is considered to be most important because its acquisition even at a minimal level provides the opportunity to walk, run, and jump in various ways, whereas individuals with good balance can turn their attention in more complex and demanding activities (Keogh & Sugden, 1985).

Regular participation in physical activity has a positive impact on balance. More specifically, sport training enhances the ability to use somatosensory and otolithic information, which improves postural capabilities (Bringoux, Marin, Nougier, Barraud & Raphel, 2000). Postural changes are different according to the sport practiced (Davlin, 2004). For example, judo training leads to greater importance being placed on somatosensory information, whereas dance training results in more attention to visual information (Perrin, Deviterne, Hugel, & Perrot, 2002). Moreover, nonspecific tasks such as bipedal stance are typically used in activities of daily living, (Asseman, Caron & Cremieux, 2004).

In agreement, Steadman, Donaldson and Kalra (2003) evaluated the effectiveness of a balance training program to see if it improves mobility in adults with balance issues. They concluded that an exercise program can significantly improve balance and mobility in people with balance problems and training may improve confidence and quality of life. In addition, Clary, Barnes, Bemden, Knehans and Bemden (2006) found that 'Ballates' training effectively improved dynamic balance, while step aerobics and walking programs improved both static and dynamic balance.

Static balance and dynamic balance are basal abilities for sports like gymnastics, rhythmic gymnastics, dance etc. (Fleishman, 1972). It could be said that performing complex motor skills, such as those performed by gymnasts or dancers, requires a great sense of balance. However, it still remains unclear if the dance- or rhythmic gymnastics-based training can improve balance. Moreover, although numerous studies have examined the effectiveness of many motor programs in improving balance (Bologun, Adesinasi & Marzouk, 1992; Fotiadou, Giagazoglou, Kokaridas, Angelopoulou, Tsimaras & Tsorbatzoudis, 2002; Freeman, Dean & Hanham, 1965; Gross & Thompson, 1957; Seidler & Martin, 1997) almost no study has examined the effectiveness of a Greek traditional dances program in comparison with a rhythmic gymnastics program as for the balance improvement in children. Thus, the purpose of the present study was to examine the effectiveness of a rhythmic gymnastics program and of a Greek traditional dances program on girl's dynamic balance.

METHODS

From all the members of a Fitness Club and a Greek Dance Club, thirty (30) healthy girls, fifteen (15) girls of each club, were selected randomly and participated in the study voluntarily. All the subjects fulfilled the inclusion criteria such as being 6-to-12 years old, being member only in a Fitness Club or in a Greek Dance Club for non-competitive purpose and having a certification of medical control so that it could be certified that they could participate in exercise.

The subjects were assigned to two groups. Group A was consisted of fifteen girls (15), members of the Greek Dance Club and group B was consisted of fifteen girls (15), members of the Fitness Club. At the end of the research, the data of three participants of Group A were excluded because, due to illnesses, they were missing for more than two dance sessions. Finally, the studied subjects of Group A were twelve (12) girls, and of Group B were fifteen (15) girls. The two groups were in all respects identical. The somatometric characteristics of the two groups are presented in Table 1.

Table 1. *Sample's somatometric characteristics.*

Variables	Group A Greek traditional dances (N=12)		Group B Rythmic gymnastics (N=15)	
	M	SD	M	SD
Age (years)	7.83	1.99	8.10	1.75
Height (cm)	130.33	12.30	131.15	11.78
Weight (kg)	30.83	10.17	31.15	11.05
Body Mass Index (kg/m^2)	17.77	3.32	18.11	3.21

As for age, height, weight and body mass index (BMI), the *Mann Whitneytest* revealed no significant differences between the two groups.

Dynamic Balance was assessed by the stabilometer platform (Lafayette Instruments). Two electronic clocks recorded the duration of the trial (60 sec.) and the subjects' performance in sec. The performance clock stopped each time the platform deviated more than 15° from horizontal. A practice of 30 sec was given before the initiation of the test.

Physical measurements. - Measurements of girl's height and weight were performed. Height was measured using a portable stadiometer, to the nearest 0.1 cm. Weight was measured using an accurate scale, to the nearest 100g. All the girls removed their shoes and wear only light indoor clothing. Moreover, BMI was calculated dividing the weight in kg with height^2 in m.

An approval for the conduct of the research was given from the Fitness Club manager and Greek Dance Club manager, after the aim and the design of the research were described. Procedures were in agreement with ethical standards of the Declaration of Helsinki of the World Medical Association (2000).

Before the beginning of the research, a description of general requirements was given and, still, the aim of the research was described to the participants and their parents without any briefing relative to previous research findings. The need for regular participation was particularly emphasized on subjects of both groups. It was, also, noted that a subject missing for more than two exercise bouts, for any reason, would excluded from the research. In addition, a written informed consent for the participation in the research was obtained from the parents of each girl.

Group A, received a program which was constituted by the performance of Greek traditional dances, whereas Group B received a program which was constituted by the performance of rhythmic gymnastics. Teaching of the performed Greek traditional dances, as well as rhythmic gymnastics was conducted by teachers of physical education with extensive practical experience in the two forms of physical activity.

As for Group A, the duration of the Greek traditional dances program was 12 weeks, at a frequency of one lesson per week, for 90 min. The frequency of the lessons was the accustomed one to the clubs of Greek traditional dances. The performed Greek traditional dances were from all Greek geographic areas with music accompaniment. The program was designed according to certain basic dances, while the purpose was to enrich the program with a

variety of dances, regarding the rhythm, the kinetic repertoire, the style, the handgrips etc.

In order to begin to dance the subjects were holding each other using a variety of handholds, creating a hemi-cycle. Instead of warm-up exercises, each session started with one-or-two slow dances of 5 min duration aiming at the body preparation for avoiding possible injuries. Next, the main part of each session included Greek traditional dances (~80 min) from different areas of Greece and included a variety of simple kinetic patterns and alternations. The dances intensity ranged from low to vigorous (Pitsi, 2005). The duration of each dance was about 2.5 to 3.5 min. Essential breaks of approximately 10 sec in between dances in order to change dance and to give a fast verbal feedback as for the following dance were made.

The selection of Greek traditional dances was made according to the following criteria: (a) Simple steps and shapes in space, and more demanding movements (e.g., hops-rebounds). (b) A variety of handholds (simple -arms down-, W-shape, shoulder grip, etc) was preferred so as to increase participants' interest. (c) Familiar, desirable or pleasant hearings for participants. d) The selected dances were the appropriate, as for the degree of difficulty, according to the subjects' skill level.

Table 2. *The main part of the rhythmic gymnastics program.*

Exercises	Initial Position	Exercise Description
1) with Running	a) Upright standing:	With the command- perform a turn and run forward.
	b) Prone- with the feet infront:	With the command- stand up and run forward.
	c) Supine- with the back infront:	With the command- stand up and run forward
2) with Music	Colorations: Running with music.	Stop unmoved with feet closed.
	Colorations: Running with music.	Stop on releve - hands on first position.
	Colorations: Running with music.	Stop with foot on passe.
3) with Ball	Upright standing:	Throw the ball up - Catch with the eyes closed.
	Upright standing:	Throw the ball up - perform a half turn and catch.
	Upright standing:	Stroke the ball down - Catch behind the back.
	On knees:	Roll the ball from one hand to the other.

The balls were rhythmic gymnastics balls.

Each training session concluded with a 5-minute cooldown period with one-or-two slow dances. All participants wore athletic shoes and sport clothes during each session.

As for Group B, the duration of the rhythmic gymnastics program was, also, 12 weeks, at a frequency of three lessons per week, for 60 min. The frequency of the lessons was the accustomed one to the clubs of rhythmic gymnastics with no competitive purpose. The selection of rhythmic gymnastics exercises was made according to the following criteria: (a) Familiar, desirable and pleasant music for the girls, (b) Simple steps and simple combinations of steps. (c) Basic body movement techniques, apparatus techniques and rhythm elements. (d) The selected elements in rhythmic gymnastics were the appropriate, as for the degree of difficulty, according to the subjects' skill level.

Each session started with a 5-minute warm-up period that included stretching exercises for avoiding possible injuries.

Next, the main part of each session included rhythmic gymnastics movements (~50 min). More specifically, the rhythmic gymnastics program contained exercises with running, music and ball, that repeated eight times each one (Table 2).

Essential breaks of approximately 10 sec in between exercises in order to change exercise and to give a fast verbal feedback as for the following exercise were made. Each training session concluded with a 5-minute cooldown period including stretching exercises. All participants wore special shoes and clothes for rhythmic gymnastics during each session.

The training sessions of both Groups were organized at the indoor gymnasium of the participants' club. The safe and comfortable environment provided by the indoor gymnasium facilities and minimum means (a CD player and a CD disc) required for running the whole program contributed to the trouble-free conduction of the program.

Testing for the participants of both groups included the same two (2) measurements (initial and final). More specifically, for Group A two measurements were carried out, that is before and after the application of the 12-week Greek traditional dances intervention program and for Group B before and after the application of the 12-week rhythmic gymnastics intervention program. The measurements of dynamic balance ability took place at the indoor gymnasium of the participants' club.

For the statistical analysis the Statistical Package for Social Sciences (SPSS) ver. 18.0 for windows was used. Descriptive analysis was used. In addition, a test was made in order to evaluate possible differences between initial and final measurements, that is before and after the 12-week participation in the two intervention programs. For this purpose the *non-parametric test Wilcoxon*, for correlated samples or samples from the same population for the test of statistical difference, was used. Moreover, a test was made in order to evaluate possible differences between groups, that is between Group A- that participated in the Greek Traditional Dances program and between Group B that participated in the rhythmic gymnastics program, as for somatometric characteristics and the studied variables before and after the 12-week intervention programs. For this purpose the *non-parametric test Mann Whitney*, for two independent samples for the test of statistical difference, was used. The level of significance was set to $p<0.05$.

RESULTS

In Figure 1, the mean difference as well as the Standard Deviation of the dynamic balance alteration after the Greek traditional dances program and the rhytmic gymnastics program are presented. It is obvious that there were similar increases in the dynamic balance scores after the 12-week programs of Greek traditional dances and rhythmic gymnastics, as well (Fig. 1).

In addition, the scores of the dynamic balance ability of the two groups, before and after the application of the intervention programs and the significance of any demonstrated change are presented in Table 3. As shown from the *Mahn Whitney test*, comparing the values of dynamic balance between the two groups before and after the application of the programs, no statistical difference was found ($p>0.05$).

In contrary, the *non-parametric Wilcoxon signed rank test* revealed that Group A and also Group B were significantly superior at the final measurement. Thus, after the 12-week dance program, as well as after the rhythmic gymnastics program there was a significant improvement in terms of dynamic balance ability (Table 3).

DISCUSSION

The primary objective of the present study was to examine whether a Greek traditional dances program, as well as a rhythmic gymnastics program results in positive effects on girls' dynamic balance.

Moreover, the effectiveness of the Greek traditional dances program was contrasted with that of the rhythmic gymnastics program. Thus, girls taking Greek dance training were compared to girls who were taking rhythmic gymnastics training. The results overall indicate that Greek traditional dances and, also, rhythmic gymnastics possess properties improving young girls' dynamic balance. In addition, the results of the Greek traditional dances are comparable to those of the rhythmic gymnastics. So, it could be said that practice or experience appears to modify scores on abilities needed for skilled performance (Magill, 1993; Regnier & Salmela, 1987; Schmidt, 1991; Thomas & Halliwell, 1976).

Table 3. *Values of dynamic balance pre and post the Greek traditional dances program (Group A) and the rhythmic gymnastics program (Group B).*

Measures	*Pre-program*		*After-program*		*p*	
	M (sec)	*SD*	*M (sec)*	*SD*	*z & p*	
Group A	33.31	9.51	38.24	9.46	-2.67	<0.01
Group B	30.83	5.57	36.69	7.68	-2.44	<0.01
*p**	*NS*		*NS*			

p: between measurements pre/post, *p**: between groups

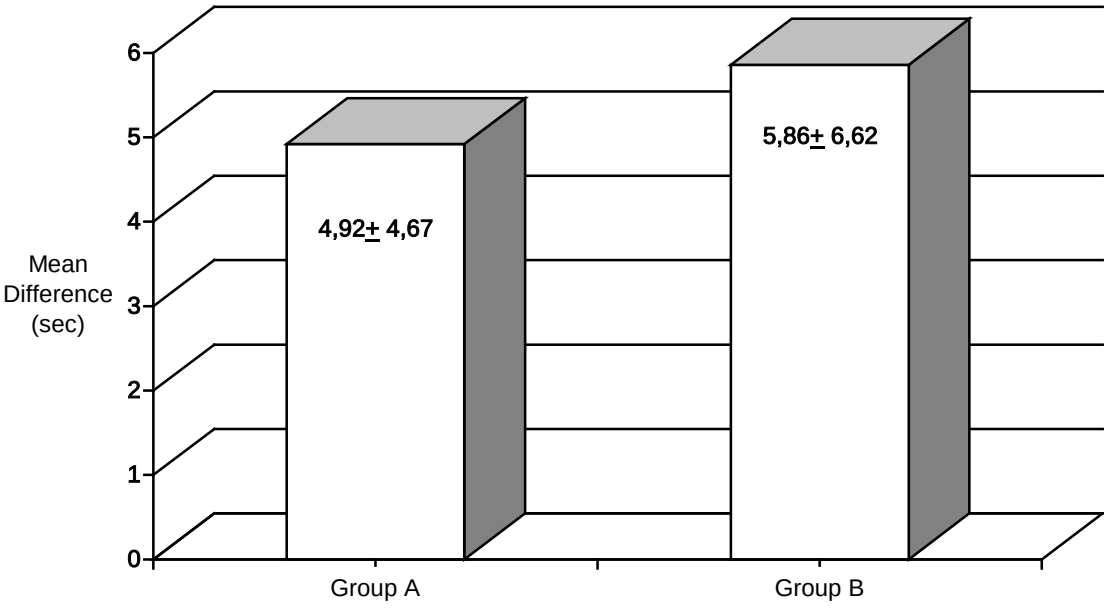

Figure 1. *Mean Difference of the Dynamic Balance alteration after the Greek traditional dances program-Group A and Rhytmic Gymnastics program-Group B.*

More specifically, in the present study was found out that Greek traditional dances increased dynamic balance. In agreement, Mouchnino, Aurenty, Massion and Pedotti (1992) found that the lateral sway of the center of pressure, during unilateral leg movements performed while standing was smaller in dancers than in untrained subjects, indicating the effect of dance practice. Dancers maintain balance when turning by using a technique called spotting. The eyes focus on a stationary object and the head turns slightly ahead of the rotation of the body (Horvat, Ray, Ramscy, Miszko, Keeney & Blasch, 2003). So, dance and creative dance, influences static and dynamic balance to a great extent, affects motor performance and self-concept and consequently seems to be an ideal physical activity for children (Loeffler, 2007), for older people (Birkel, 1998; Federici, Bellagamba & Rocchi, 2005; Kravitz, 1994; Mavrovouniotis & Argiriadou, 2008; Mavrovouniotis, Argiriadou & Papaioannou, 2010), for persons with balance, and/or kinaesthetic problems (Kephart, 1971; Pennella, 1979), or for hearing impaired persons (Reber & Sherrill, 1981; Wisher, 1979). Thereby, dance can be considered not only as a supplementary vehicle in the learning process, but also as an indispensable tool that facilitates self-actualization, especially the awareness of the body to appreciate its ability for movement (Hottendorf, 1989; Wisher, 1979).

In addition, via dancing a safety and confidence climate created in which sentiments expression attained via movement (Cooper & Thomas, 2002). An environment, absolutely adapted to young girls' faculties was offered. This happened because the Greek traditional dances program included a variety of simple kinetic patterns, was of low, moderate and high intensity, depending on the participants' capacities, with appropriate intervals and frequent rhythm alternations.

Moreover, in the present study was, also, found out that rhythmic gymnastics increased dynamic balance. In agreement, other authors suggest that gymnasts or/and subjects who are training in gymnastics have better dynamic and static balance than inexperienced athletes and than novices (Kioumourtzoglou, Derri, Mertzanidou & Tzetzis, 1997; Robertson, Collins, Elliot & Starkes, 1994), indicating the effect of rhythmic gymnastics practice. On the contrary, Vuillerme, Danion, Martin, Boyadjian, Prieur, Weise and Nougier (2001) showed no direct evidence that gymnasts would possess a better sense of balance than any other sportsmen during bi- and unipedal standing. Nevertheless, gymnasts present the particularity of being less dependent on visual cues than other sportsmen for maintaining balance in challenging postures.

Age and more practice improve balance control, leading to better postural control and decreased postural sway (Rival, Ceyte & Olivier, 2005). In agreement, the girls in the present study after practising in Greek traditional dances, as well as in rhythmic gymnastics for 12 weeks achieved significant improvement in terms of dynamic balance ability, proving that practice is an important element to balance improvement. However, it is not only the practice but mainly it is practicing on dance and on rhythmic gymnastics, the performance of complex motor skills that require a great sense of balance (Vuillerme, Danion, Martin, Boyadjian, Prieur, Weise & Nougier, 2001), that improved girl's balance. According to Shumway-Cook and Woollacott (2001), creative movement helps children to control their bodies and develop awareness of moving in a space with other children.

In addition, optimally coordinated functioning of the muscles and the entire kinetic chain is important for balance and effective walking. Optimal twist of the trunk, shoulder rotation and reciprocal arm swings are necessary for good balance and gait (Whittle, 2007). In optimal posture and balance, body segments are aligned one on top of the other, so that the centre of gravity of each segment is directly above the centre of gravity of the one below (Rosen, 1997).

Body segments are sequentially activated to perform functional or athletic tasks (Kibler, 1998**;** Kibler, McMullen, & Uhi, 2001).

So, practice in a task like dance or rhythmic gymnastics can help girls to demonstrate a better sense of balance in non-dancing tasks, like standing on the platform of the stabilometer. Thus, the present revealed balance improvement, as a result of the two different 12-week programs- Greek traditional dances and non-competitive rhythmic gymnastics- can be supported by the theory for the transfer of motor abilities. That is the capability for performance in one task could be a result of practice on some other task. Thereby, based on the general motor ability hypothesis (Adams, 1987), the better sense of balance as a human motor skill, should remain observable among various tests requiring balance skills. In addition, Hatzitaki, Zisi, Kollias and Kioumourtzoglou **(**2002) found out that balancing under static conditions was strongly associated with the ability to perceive and process visual information, which is important for feedback-based control of balance. On the other hand, when greater task demands were imposed on the system under dynamic balancing conditions, the ability to respond to the destabilizing hip abductions–adductions in order to maintain equilibrium was associated with motor response speed, suggesting the use of a descending, feedforward control strategy.

Moreover, music contribution is also important. Music is an integral element of dance and of rhythmic gymnastics. Music and movement are linked even from birth and infancy (Kulich, 1989). Undeniably, music in many forms is an accessible accompaniment to either improvised or more structure movement sequences (Loeffler, 2007). It has, however, been proved that rhythmical music improves walking co-ordination and movement proprioceptive control and leads in increase of stability and mobility (Kravitz, 1994; Staum, 1983).

Consequently, from the results of the present study it is clear that the dynamic balance ability can be significantly and, also, similarly improved for these two groups of girls, after a Greek traditional dances program, as well as after a rhythmic gymnastics program.

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STRUCTURE OF RHYTHMIC GYMNASTICS TRAININGS CENTER IN BRAZIL

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Original research article

Abstract

This study was elaborated with the purpose of knowing and describing the context of rhythmic gymnastics (RG) training centers (TC) in Brazil. This paper discusses the training centers, contextualizing the topic of this study, and configuring its scenario in Brazil. Qualitative research has been used, in order to meet the needs of the study. Data collection was done by non-participant observation, by means of a field journal, as well as by the description of the obtained data. Finally, data discussion was done, showing similarities and differences between the training centers assessed, always approaching the discussion of the physical structure of these places, and aiming, at the end of the discussion, to focus on the usefulness of these centers for the growth and development of the sport.

Keywords*: rhythmic gymnastics, training centers, structure.*

INTRODUCTION

Rhythmic gymnastics has been developing over the decades. Its inclusion in the Olympic Games (OG) took place in 1984 in Los Angeles/USA, only with individual routines. In that occasion, Canada won the Olympic medal and Brazil had its first representative, gymnast Rosane Favilla, who was invited to take part in the competition but did not make it to the finals.

In the 1988 the Olympic Games held in Seoul/Korea, the champion gymnast was from former Union of Soviet Socialist Republics (USSR). In these games no Brazilian gymnast was eligible to take part. In 1992, the Games were held in Barcelona/Spain, and the champion was from Commonwealth of Independent States (CIS). In this edition of the Olympic Games there was a Brazilian gymnast, Marta Cristina Schonhorst, who finished the competition in 51st place, with individual performances. As time passed, RG has drawn more and more admirers and, consequently, more support. In Atlanta/USA, 1996, FIG, the International Gymnastics Federation, introduced group routine competitions, and in this occasion the Spanish group won the competition.

Table 1 describes the Brazilian participation in Pan-American and Olympic Games as of 1995.

In the 1990s the Brazilian RG presented an increase in international results, getting good ranking in the South-American and Pan-American games, as well as good results in the world classification cups in both, individual and group competitions. The third place in the Pan-American Games in Mar Del Plata (Argentina/1995) and the first place in the Winnipeg (Canada/1999)

Pan-American Games, both in group competition category, support the idea of technical growth experienced by the Brazilian gymnasts in the international scenario.

Table 1. *Brazilian participation in the Pan-American and Olympic Games and in World Competitions.*

Competition	Venue	Year	Category	Ranking	Observations
Pan-American Games	Mar Del Plata (ARG)	1995	Group	3rd place	
Pan-American Games	Winnipeg (CAN)	1999	Group	Champion	
World Cup (Olympic Classification)	Osaka (JPN)	1999	Group	8th place	Classification for the OG
			Individual	34th place	
Olympic Games	Sidney (AUS)	2000	Group	8th place	
Pan-American Games	Santo Domingo (DOM)	2003	Group	Champion	Classification for the OG
World Cup (Olympic Classification	Budapeste (HUN)	2003	Group	9th place	
			Individual	27th place	
Olympic Games	Atenas (GRE)	2004	Group	8th place	
Pan-American Games	Rio de Janeiro (BRA)	2007	Group	Champion	
World Cup (Olympic Classification)	Patras (GRE)	2007	Group	11th place	Classification for the OG
			Individual	21st place	
Olympic Games	Pequim (CHN)	2008	Group	12th place	
World Cup	Mie (JPN)	2009	Group	21st place	
			Individual	29th place	
World Cup	Moscou (RUS)	2010	Group	26th place	Not Classified for Olympic Classification Cup
			Individual	22nd place	39 groups
Pan-American Games	Guadalaraja (MEX)	2011	Group	1st place	Not Classified for Olympic Games
			Individual	3rd place	General Classification

Such classification, together with the ranking achieved in the World Cup in the same year (Osaka/Japan), helped the Brazilian group to guarantee its qualification in the Olympic Games held in Sidney/Australia (2000). During these games in Sydney/Australia, the Russian group won the gold medal, but the Brazilian group, for the first time, got 8th place. There were no Brazilian gymnasts in individual competition.

Despite not having gymnasts in the individual competition, these games were the moment in which the Brazilian RG consolidated its position among the international competitors, being respected and thus listed among the 10 best groups in the world.

This status was reinforced when, in 2003 (Santo Domingo/Dominican Republic), the Brazilian group won the Pan-American 1st place for the second time and once again was classified for the Olympic Games held in Athens/Greece, 2004. During these games the Russian team reestablished its leading position in RG, and Brazil was again represented by its group which again achieved the 8th place, reassuring its position in the world. Once again, there were no Brazilian gymnasts in the individual competition.

In 2007, during the Pan-American games in Rio de Janeiro/Brazil, the national group won first place for the third time and was again eligible for the following Olympic Games, in Beijing/China. However, in the World Cup (qualifying for the Olympic Games) of that year, the group ranked 11^{th} and 12^{th} in the Olympic Games in 2008.

Table 1 provides a brief picture of the Brazilian RG in the world scenario. It is possible to observe the importance of the group competition for the development of the sport nationally and internationally.

Nevertheless, despite the evolution that took place and that enabled the Brazilian group to participate in three editions of the Olympic Games, it is also noticeable an improvement in regard to the individual category.

Nowadays, the best gymnasts compete in the individual category, while the remaining "B" gymnasts comprise the group category, allowing more improvement in the individual category in international competitions.

Currently, the Brazilian gymnasts seek for internal restructuring of its organization, taking advantage of the change of the head of the Brazilian Gymnastic Confederation to also reorganize the technical committees

and renew the gymnasts who comprise the national representative team.

In 2009, the permanent national gymnasts who would represent Brazil in both, group and individual competitions, were defined. However, after their performance along the year, the team suffered some changes after the qualifying cup held in Aracaju, SE / Brazil, headquarters of the Brazilian Gymnastics Confederation (CBG) and of the National Training Center (CNT).

The results achieved by the Brazilian Rhythmic Gymnastics National Team in the year 2010 required another revamp, changing some gymnasts. The following table relates the gymnasts who currently belong to the permanent national team with their geographical location.

Table 2. *Gymnasts from the 2012 national team and their locations.*

Gymnast	Category	Club	State
Angélica Kvieczynski	Individual	Sadia	PR
Rafaela Pedral Costa	Individual	Arquidiocesano	SE
Eliane Rosa Sampaio	Individual	GNU	RS
Drielly Neves Daltoe -	Individual	Clube dos Oficiais	ES
Emanuelle Leal Lopes Lima*	Individual	Clube dos Oficiais	ES
Natalia Gaudio	Individual	Escola de Campeãs	ES
Amanda Pfleger	Group	Norsul	SC
Beatriz Pomini	Group	UNOPAR	PR
Débora Falda	Group	UNOPAR	PR
Isabelle Andriotto	Group	UNOPAR	PR
Jéssica Sayonara Maier	Group	Guairacás	SC
Bianca Mendonça	Group	UDESC	SC
Carolina Garcia	Group	Escola de Campeãs	ES
Dayane Amaral	Group	Agir	PR
Fabielle Cassol	Group	Agir	PR
Bruna Bialecki	Group	Agir	PR
Mayra Gmach	Group	Sadia	PR

Source: Adapted from: CBG, 2012"Place Table 2 here"

Table 2 shows a real picture of the Brazilian Rhythmic Gymnastics and how it is distributed throughout the Brazilian territory. Notice that gymnasts who stand out in the national scenario come mainly from the south of the country, where we can see twelve gymnasts. The northeast region is represented in this table by one gymnast who competes individually. The southeast region, that in the past was responsible for 90% of the composition of the national team, currently has only four gymnasts join it, all from the State of Espírito Santo.

It is clear that the Brazilian RG stands out in the States of Santa Catarina (SC), Espírito Santo (ES) and Paraná (PR), which are states that have invested more in Training Centers and whose gymnasts have achieved the best results in recent Brazilian competitions. It is necessary to mention that Sadia (PR), Agir (PR), UNOPAR (PR) and Clube dos Oficiais (ES) teams have their own training centers, what probably implies better results in important national championships.

Training Centers are understood as areas destined to sports practice and aimed to incentive the development and engagement of high performance athletes in Brazil, providing infrastructure compatible with their needs.

It is worth stressing the need to better understand what these Training Centers mean, since this will help understand the purpose of these centers as well as their specific function. After in loco visits, associated with my experience as gymnast and coach, I was able to notice that the increase in the number of training centers may bring significant experiences to gymnastics.

Such centers are, in general, designed to make possible an evolvement of the sport in all its scenarios: educational, leisure and high performance. After investigating which sports would share this concept of training centers, it was verified that different team and individual sports share it. There is not, however, unanimous consensus, since different sports have different structural requirements, inherent to their practice.

There are in Brazil, nowadays, 18 different federations recognized by the Brazilian Gymnastics Confederation, with 224 branches associated or linked to them (Schiavon, 2009). It is noticed a higher number of entities linked to the federations from the south and southeast regions, but it is not possible to precisely know which of them are responsible the rhythmic gymnastics.

Nevertheless, when analyzing data related to national championships (Brazilian Gymnastics Confederation [CBG](2012) it is noticeable that the entities located in the south and southeast regions have better performance, with the States of Paraná and Espírito Santo standing out, reassuring one of the premises from Sports Pedagogy which expresses that the higher the number of participants, the better the results achieved, thus corroborating the presence of gymnasts from these states in the national team.

It is important to stress that the Brazilian championship comprises the elite of the national competitions and is responsible for the selection of gymnasts to represent Brazil in international competitions. The good performance presented by entities such as Sadia (PR), UNOPAR (PR). Agir (PR) and Oficiais (ES) show that they take turns in the different categories and competitions.

What would be, however, the justification for this occurrence? What factors contribute for the constant good performance of these teams in the different competing age groups? It is believed that investment in infrastructure, coach capacitation, and other structural matters would be helpful; nevertheless, matters of training methodology, pressure, planning and other interests are other factors that might affect their good performance.

The main goal of this research is to get to know and describe the environment of the rhythmic gymnastics training centers and, thus, address the following specific objectives:

1. Check the physical structure of the training centers through inspection visits;
2. Survey the organization of the training centers through supporting documentation and oral reports;

METHODS

Aiming at understanding the training centers, the approach of our study was qualitative since the number of training centers studied is small, comprised of only three. Addressing the objectives of the qualitative research, our goal was to interpret the data on physical structure and training content through a descriptive research, following the reasoning of observing, describing, and thus understanding.

Indirect and direct documentation was the means used to carry out the research. First we carried out a bibliographical research and after, in accordance with Marconi and Lakatos (2003), we gathered data in loco.

In our study we carried out direct documentation through field journal that, according to Chizzoti (2003), is used to gather information on the problem surveyed. During our study we observed the facts as they spontaneously occurred in the environment under investigation, with all relevant data being recorded.

Once the data was collected, it was possible to delimit the subjects of the study. After gathering information on the teams that stand out in the Brazilian scenario it was possible to determine which training centers would be analyzed. Then, we observed the organization that:

- pioneered the implementation of a training Center in Brazil;

- hosts or hosted the Brazilian national Rhythmic Gymnastics team;
- has gymnasts comprising the Brazilian team;
- has physical structure specific and exclusively for Rhythmic Gymnastics.

DISCUSION

Once the criteria for choosing the training centers that would be analyzed was defined, we found five centers that met the criteria, three from the State of Paraná, one in Vitória, in the State of Espírito Santo, and another from the State of Sergipe. It is important to point out that the training center in Vitória (ES) was the previous headquarters of the Brazilian group team from 2005 to 2008, before it was transferred to Aracaju (Sergipe). From this moment on the training center in Vitoria has become "Clube dos Oficiais do Exército".

So, we carried out our study analyzing two centers from the south of Brazil and one from the northeast. Nevertheless, the remaining training centers can become future research environments.

The first one, in Londrina (PR), is located in a University – Universidade do Norte do Paraná (UNOPAR). The second one is located in Toledo (PR), a training center sponsored by the group Sadia/Toledo City Hall/SESI. And the third one, the national training center in Aracajú, headquarter of the Brazilian group gymnasts, supported by the Brazilian Gymnastics Confederation (CBG).

The methodology chosen was the non-participant observation, by means of a field journal, in order to register the physical structure of the centers. These registries where done using images (photos) taken with a Sony Ericsson – DSC-W30 digital camera. In order to make it possible to quantify the infrastructure of the training centers, guidelines were prepared aiming to observe necessary items for the implantation and sustainability of a training center.

Prior to this study it was necessary to present the scope of our project to the Ethics Committee of the Medical Science School at Unicamp, as well as all authorizations provided by the centers visited.

In the present study, from data interpretation and tabulation, and from the images registered it was possible to point out relevant points regarding the organizational and physical structures of the training centers. Finally, we present and discuss the data collected during our study.

UNOPAR – North Parana University

From the observation protocol it was verified the presence of three kinds of gymnasiums that make up UNOPAR training center (figure 1). Two of them are considered to be for multiple uses; however the third one is used only by the RG competing group. So, the first two are shared with other sports, whereas the later is exclusive for rhythmic gymnastics.

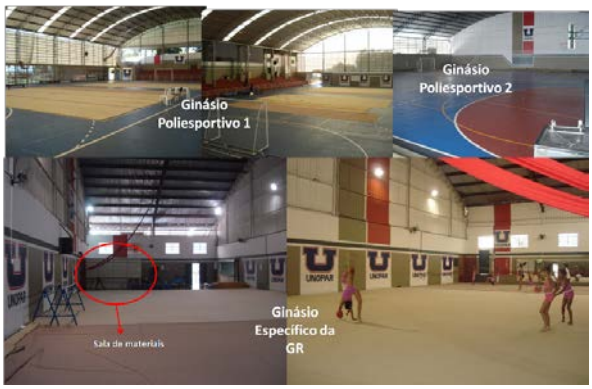

Figure1. *UNOPAR gym halls.*

The specific area destined for RG has two types of ballet bars, one fixed on the wall along the back of the room and the side wall and other two that are movable, manufactured exclusively for rhythmic gymnastics. The mirror, which is an important item for the gymnasts' development, also occupies the back wall of the room, allowing several athletes to use it at the same time. The carpet, essential for the practice of RG, occupies the entire training area; in order to meet the demands from the international competitions, the training center has acquired an official carpeted floor, simulating an ideal competitive situation.

All apparatus are distributed throughout the gymnasium and can be seen on figure 2.

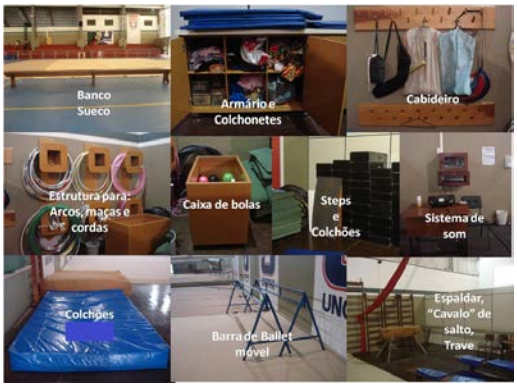

Figure 2. *Apparatus available in UNOPAR.*

There is a total of five wall bars distributed along the gymnasium, and the same happen to beams and chairs. The official apparatus and other important sporting accessories are located in the storage room. The rhythmic gymnastics center is also equipped with sound system and chairs for the coaches.

Sadia/Toledo City Hall / SESI

The gymnasium was rebuilt, financed by a partnership between Sadia/Toledo City Hall/SESI, for rhythmic gymnastics usage. It was named "Centro de Excelência no Treinamento de Ginástica Rítmica de Toledo", and opened on April 7, 2010, aimed at both, training and competition. It features bleachers for the audience as well as ramps to allow wheelchair access, and heating/cooling system.

Regarding its general structure, the training center has areas to please the professionals and gymnasts, and the audience whenever there is a competition there. There are rooms (figure 3) for administration, storage, kitchen and dining, physical therapy, maintenance, ballet, dressing rooms, as well as male and female restrooms and restroom accessible to wheelchairs.

Figure 3. *Centro de Excelência no Treinamento de Ginástica Rítmica de Toledo – Sadia.*

The ballet classroom is rectangular and presents one wall covered by mirrors and two other walls have ballet bars. This room also has air-conditioning, a desk, a chair and a portable sound system.

The specific training area, shown in figure 4, was conceived, according to the officials, to be an international training center, equipped with three official carpeted floors placed on a special wooden platform for absorbing impact. These areas can be separated, when necessary, by screens that carry the logo of the partnership funding, allowing not only to separate gymnasts by competitive categories, helping their concentration, but also to hold a special area for sport initiation, which takes place twice a week.

Figure 4. *Centro de Excelência no Treinamento da Ginástica Rítmica – Sadia.*

In this center there is equipment to be used during physical preparation, such as wall bars (total of ten, with mirror behind), mats, and beams for RG, as we can see on figure 5.

Figure 5. *Centro de Excelência no Treinamento de Ginástica Rítmica de Toledo – Sadia.*

Rhythmic Gymnastic National Training Center/Centro Nacional de Treinamento de Ginástica Rítmica (CNT) – Aracaju (SE)

Centro Nacional de Treinamento was the last training center visited. It is a center exclusively built for practicing rhythmic gymnastics.

CNT was built in 2006 by the Government of Sergipe, with support from the Brazilian Gymnastics Confederation that at that time was based in Curitiba (PR), in order to house the Brazilian individual gymnasts, however housing nowadays the group.

The ventilation is done through a large door and windows made from hollow cement blocks aimed at allowing intense air circulation.

Although some rooms are under repair, the operational structure of the center holds seven different rooms, besides the training area itself. There is an anteroom for visitors since the entrance to the TC is restricted. The seven rooms are comprised of two restrooms (being one of them exclusively for the Brazilian team), a dressing room, a general storeroom, kitchen, storage for equipment, and a room under repair.

The center has two official carpet floors and carpeted areas for warming up and also for ballet practice. There are benches that simulate bleachers in case of sporadic presentations or open practice, as can be observed on figure 6.

Figure 6. *Rhythmic Gymnastic National Training Center - Aracaju (SE).*

Regarding equipment for training, there are two tables (one for each carpeted floor) where there are two sound system available (a portable radio and a mini system), and other relevant documents about the gymnasts training. There are other equipment such as treadmill, indoor cycling bikes, mats, plinth (Gymnastics apparatus), wall bars, a cot and plastic chairs to help with the training.

Following the presentation of the three training centers, we will proceed with the discussion.

In regard to similarities:

- All three centers have infrastructure specific and exclusively for rhythmic gymnastics;
- They all have official carpeted floor and adequate height for practicing RG;
- Ballet bars and mirrors are available in all the training centers;
- Benches, mats, wall bars, among other equipment are present in all the three locations;
- There are tables and chairs and other important accessories for the sports in all centers;
- They all have storeroom, or storage.

In regard to differences:

- Considering the number of official carpeted floors.
  - UNOPAR – 1
  - Sadia/ Toledo City Hall/SESI – 3
  - CNT – 2

- Only two of them have dressing room for gymnasts;
- The two centers financed by private initiative have a significant amount of equipment/material available;
- Considering light, sound and ventilation systems:
  - UNOPAR and CNT depend on fans and air gaps whereas the Sadia/Toledo City Hall/SESI training center has a heating/cooling system;
  - All three training centers have bleachers, however in UNOPAR the bleachers are in an auxiliary multi sports gymnasium;
- Ballet exclusive and fully equipped classroom was found in only one of the TC;

CONCLUSIONS

After data presentation and discussion it is possible to design an overview about the physical structure of the different rhythmic gymnastics training centers in Brazil and to make considerations about the implications of these initiatives for the promotion of GR in the country.

The goal of visiting and describing the rhythmic gymnastics training centers was accomplished by visiting three TC, allowing us to get to know different actual realities of the Brazilian rhythmic gymnastics.

By checking out the different centers it was possible to observe their physical structure and also compare the equipment they provide. Despite differences in size, quality and quantity of equipment (which was not focus of this survey), all centers presented specific infrastructure for the practice of rhythmic gymnastics, as well as adequate height for high performance gymnasts, official carpeted floor, and also infrastructure for ballet classes.

The storage room, however, was an item observed. Although it is comprised of small apparatus, their correct storing is necessary for better care and, consequently, better performance of the gymnasts. UNOPAR and Sadia/Toledo City Hall/SESI training centers present a similar organizational structure and both host competitive categories, from initiation to high performance levels.

Regarding the gymnasts, it was noticed that most athletes who make up the Brazilian team come from the South and Southeast regions of the country. Nevertheless, the presence of gymnasts from the Northeast shows that other regions and states are being able to promote RG in Brazil, having also gymnasts who participate in National Cups and even in the Brazilian RG Championship.

The current configurations of the Rhythmic Gymnastics Brazilian team, in both categories, individual and group, meet the expectations of this study. The construction and maintenance of RG training centers can contribute to the development and improvement of this sport. Thus, the creation of new centers would improve the technical level of our gymnasts, incentive a bigger number of athletes, therefore making the sport more competitive, and consequently improving our national representation.

It is important to stress that this statement is ratified by the fact that there are today 10 gymnasts in the Brazilian team, in individual and group competitions, who come from these training centers.

It is our expectation that this survey will spur the creation of new training centers in Brazil, since we believe that this may promote de democratization of RG in the country, thus allowing children to practice this sport, stimulating their participation in regional, state and national events, generating the development of rhythmic gymnastics and consequently better national and international results.

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Slovenski izvlečki / Slovene Abstracts

Myrian Nunomura in Mauricio Santos Oliveira

POMEN PODPORE STARŠEV PRI RAZVOJU TELOVADCEV IN TELOVADK

Od vstopa otroka v športno okolje do njegovih vrhunskih dosežkov, imajo starši poudarjeno vlogo pri oblikovanju otrokove športne poti. Ta vloga se opazi takoj, ko začne starš vlagati svoja čustva in denar v podporo otrokovi športni dejavnosti s ciljem, da bi otrok v polnosti razvil svoje sposobnosti. Da bi obrazložili starševsko podporo v okviru Brazilske gimnastične zveze v uradni obliki je bila opravljena raziskava na vzorcu 29 športnih društev in 163 telovadcev in telovadk. Ugotovili smo, da obstaja visoka podpora staršev pri vplivu na vključenost otroka v šport, pomoč pri prihajanju na vadbo, stopnjo udejstvovanja, in stopnjo telesnega in psihičnega dobrega počutja. Še več, njihova podpora je odločujoča na usmerjenost in privrženost mladih telovadcev. Kadar je pomoč negativna, se lahko izkaže kot stres, nasprotovanje staršem, pregorelost in lahko povzroči, da otrok preneha s športno dejavnostjo.

Ključne besede: športna gimnastika, starši, šport otrok in mladine.

Thomas Heinen, Stefanie Mandry, Pia M. Vinken in Marc Nicolaus

PRIDOBIVANJE GIBALNIH ZNANJ VPLIVA NA VIDNO ZAZNAVO VADEČIH

Raziskave so pokazale, da zaznavanje in napovedovanje gibanja drugih je odvisno od poznavanja gibanja. Cilj raziskave je bil ugotoviti ali vadeči, ki uspešno izvajajo premet naprej preko skrinje lahko napovedujejo uspešnost premeta naprej drugih vadečih. Osnovna teza je bila, da vadeči, ki uspejo izvesti premet naprej bodo bolj uspešni pri napovedovanju doskoka kot kontrolna skupina (brez znanja premeta naprej) pri računalniško pripravljenem testu zaznavanja. Pri skupini z znanjem premeta naprej je bila uporabljena učna metoda postopnega napredovanja. Napovedovanje doskoka je bilo izvedeno pred učenjem premeta naprej in po učenju premeta naprej. Rezultati so pokazali, da so tisti z znanjem premeta naprej po naučenem premetu naprej bolje znali napovedovati doskok, in to že tudi v predhodnejših delih premeta naprej. Lahko zaključimo, da znanje prvine, spremeni zaznavanje le-te.

Ključne besede: premet naprej, učne metode, gibalno znanje

Bojan Leskošek, Ivan Čuk in Maja Bučar Pajek

RAZVOJ E IN D OCEN IN NJIHOV VPLIV NA KONČNO OCENO V MOŠKI ŠPORTNI GIMNASTIKI NA PRIMERU EVROPSKIH PRVENSTEV 2005 - 2011

Cilj raziskave je bil ugotoviti razvoj težavnosti in izvedbe na vseh orodjih moškega mnogoboja v predtekmovalnih in finalnih nastopih na Evropskih prvenstvih pred zaključkom 5 letnega obdobja uporabe pravil FIG za ocenjevanje brez navzgor omejene težavnosti (2006). Ugotovili smo, da so ta pravila rešila problem slabe spremenljivosti ocen za težavnost, najuspešneje pred zaključkom opazovanega obdobja (2011). Ocene za izvedbo imajo izrazito smer nazadovanja, tako v absolutnem merilu kot tudi v odnosu z oceno težavnosti. Pojavlja se vprašanje ali je zmanjševanje vpliva ocene za izvedbo na končno oceno željeni rezultat novih pravil in bodočega ocenjevanja sestav. Pojavlja se tudi vprašanje ali zmanjševanje ocene za izvedbo lahko opredelimo kot izključno posledico povečanja težavnosti (ki neposredno pomeni več odbitkov) in manjših sprememb pravil po letu 2006; ali pa predstavlja (morda tudi neupravičeno) spremembe v uporabi pravil.

Ključne besede: športna gimnastika, moški, sojenje, E ocean, D ocean.

Antonio Pineda-Espejel, Jeanette López-Walle, José Tristán Rodríguez, Mireya Medina Villanueva in Oswaldo Ceballos Gurrola

PREDŠTARTNI STRAH IN SAMOZAVEST PRI PAN AMERIŠKIH TELOVADCIH

Namen raziskave je bil ugotoviti jakost in smer predštartenga strahu (somatskega in razumskega) ter samozavest pri telovadcih, ki so tekmovali na Pan ameriških igrah. Šestdeset telovadcev in telovadk starih med 15 in 30 let (XA=21.04, SD= 4,016) je sodelovalo v raziskavi. Uporabljen je bil vprašalnik CSAI-2R (Andrade, Lois, & Arce, 2007; Cox, Martens, & Rusell, 2003) in lestvica Jonesa in Swaina (1992). Rezultati kažejo na rahlo pozitivno povezanost med razumskim in somatskim predštartnim strahom (r=,55 in r=,53), medtem ko je samozavest negativno povezana z jakostjo razumskega predštartnega strahu (r=-,305) in tudi značilno napovedna (β = -,192). Ženske so izkazovale bistveno večji somatski predštartni strah (2,79) kot moški (2,48). Višja stopnja samozavesti zmanjšuje razumski predštartni strah pri telovadcih, ki tekmujejo na Pan ameriških igrah.

Ključne besede: športna gimnastika, CSAI-2R, napetost, smer.

Karmen Šibanc

KAKO ŠTUDENTI FAKULTETE ZA ŠPORT OCENJUJEO NJIHOVO ZANIMANJE IN PRILJUBLJENOST GIMNASTIKE

V Sloveniji je gimnastika prisotna na javni in zasebni televiziji. V primerjavi z ostalimi športi ni prav pogosto na malih zaslonih. Cilj raziskave je bil ugotoviti kako bodoči profesorji športne vzgoje ocenjujejo gimnastiko glede na njihov spol in športno znanje. Vzorec merjencev je obsegal 111 študentov prvega letnika (76 moških in 35 žensk). Študenti niso bili vključene v nobene izvenšolske programe gimnastike. Z anketo smo ugotavljali kako ocenjujejo značilnosti gimnastike ter kako primerjajo svoj interes do gimnastike v primerjavi z drugimi priljubljenimi športi v Sloveniji. Med študenti gimnastika ni zelo priljubljena, medtem, ko jo imajo študentke raje. Ocene študentov o gimnastiki so v skladu s predhodnimi raziskavami gledalcev in niso take, kar gledalci najbolje ocenjujejo. Gimnastika je v Sloveniji srednje priljubljen in gledan šport, čeprav slovenski telovadci dosegajo odlične mednarodne rezultate.

Ključne besede: gledalci, gimnastika, študenti, televizija

Mavrovouniotis Fotios, Proios Miltiadis, Argiriadou Eirini in Soidou Andromahi

RAZLIKE V DINAMIČNEM RAVNOTEŽJU PRI DEKLETIH KI VADIJO RITMIKO IN GRŠKI LJUDSKI PLES

Ravnotežje vpliva na hitrost učenja novih gibanj in zato je ravnotežje osnovna sposobnost za vse športne dejavnosti ter je hkrati dober napovednik razvoja osnovnih gibanj, uspešne športne dejavnosti in zmanjševanja možnosti za poškodbe. Namen raziskave je bil ugotoviti vpliv vadbe ritmike in grškega ljudskega plesa na dinamično ravnotežje deklic. Sedemindvajset deklet je bilo razdeljenih na dve skupini. Skupina A je sodelovala v 12 tedenski 90 minutni vadbi grškega ljudskega plesa in skupina B je sodelovala v 12 tedenskem trikrat tedenski 60 minutni vadbi ritmike. Obseg dela je bil prilagojen klubom, ki se ukvarjajo z netekmovalno ritmiko oz. plesom. Meritve so bile izveden pred in po programu vadbe, ravnotežje je bilo merjeno z ravnotežno deskom (Lafayette Instruments). Rezultati kažejo da sta obe skupini napredovali 33.31$\pm$9.51 sekund to 38.24$\pm$9.46 sekund ($z=-2.67$, $p<0.01$) za A skupino in 30.83$\pm$5.57 sekund to 36.69$\pm$7.68 sekund ($z=-2.44$, $p<0.01$) za B skupino. Obe vrsti dejavnosti značilno razvijata ravnotežje ter sta primerni sredstvi za razvoj ravnotežja.

Ključne besede: rekreativna ritmična gimnastika, ljudski ples, gibalne sposobnosti otroci reakcije.

Kizzy Fernandes Antualpa, Roberto Rodrigues Paes

CENTRI ZA RITMIKO V BRAZILIJI

Cilj raziskave je bil ugotoviti stanje centrov ritmike v Braziliji, njihovo velikost, opremljenost in možnosti nadaljnjega razvoja ritmike v luči prihajajočih olimpijskih iger 2016 v Rio de Janeiru. Uporabljena je bila kvalitativna analiza, podatki pa pridobljeni iz literature in lastnih izkušenj. V razpravi so pokazane razlike in podobnosti med centri, upoštevajoč fizikalne značilnosti centrov ter ciljev, ki jih zasledujejo. Uporabna vrednost analize je v bodočem načrtovanju centrov ritmike v Braziliji.

Ključne besede: ritmika, vadbeni center, sestava

III INTERNATIONAL SEMINAR OF COMPETITIVE ARTISTIC AND RHYTHMIC GYMNASTICS - SIGARC 2012

The third edition of the bi-annual scientific event International Seminar of Competitive Artistic and Rhythmic Gymnastics (SIGARC 2012) took place on October 5th and 6th, 2012, at State University of São Paulo/Campus Rio Claro, in Sao Paulo State, Brazil, with about 200 participants (researchers, coaches and referees), consolidating its position as a scientific reference in the competitive gymnastics in Brazil and in Latin America.

Taking into consideration the expansion of the competition sports in Brazil, the aim of the event was to make room for thinking and for technologic and theoretical fields presentations in order to enable the continuity of the development process of these modalities in Brazil. The seminar was organized by a partnership between Sao Paulo´s three state universities: State University of São Paulo (UNESP), State University of Campinas (UNICAMP) and University of São Paulo (USP), through their research groups: Gymnastics Research Group of UNESP, UNICAMP and USP.

SIGARC 2012 had the following guest speakers: Keith Russell (University of Saskatchewan/Canada), Thomas Heinen (University of Hildesheim, Institute of Sport Science - Germany), Jean François Robin (INSEP - France), Melix Avilés (UCCFD /Cuba), Gareth Irwin (Cardiff Metropolitan University/Wales), Laurita Schiavon (UNESP/Brazil), Marco Bortoleto (UNICAMP/Brazil), Myrian Nunomura (USP/Brazil), Márcia Lourenço (UNOPAR/Brazil), Marcos Goto (Technical committee – Brazilian Men's Artistic Gymnastics team and Arthur Zanetti coach), Cristina Vital (Olympic Games Judge - Brazil) and Robson Caballero (Olympic Games Judge - Brazil). The speakers discussed about "how to plan training for high-performance gymnastics and the recent scientific advances in this field", "the contribution of sports psychology to competitive gymnastics" and "preparing for the Olympic Games and the role of sports science".

We would like to send our acknowledgment to the Science of Gymnastics Journal which will publish the best two papers presented in the Seminar, as well as to Cirque du Soleil that was also one of the supporters of the event.

Laurita Marconi Schiavon – PhD - UNESP/Rio Claro - Brazil
Marco Antonio Coelho Bortoleto – PhD - UNICAMP/Campinas - Brazil
Myrian Nunomura – PhD - USP/Ribeirão Preto - Brazil
Eliana de Toledo – PhD - UNICAMP/Limeira - Brazil
SIGARC 2012 Organizing Committee