

**ICPESK 2017**  
**International Congress of Physical Education, Sport and**  
**Kinetotherapy**

**CORRELATIVE STUDY REGARDING INTELLIGENCE LEVEL**  
**AND SPORTS PERFORMANCE IN WOMEN'S ARTISTIC**  
**GYMNASTICS**

Ana-Maria Gavojdea (a)\*

\*Corresponding author

(a) National University of Physical Education and Sports, 140 Constantin Noica Street, Bucharest, Romania,  
[anagavojdea@gmail.com](mailto:anagavojdea@gmail.com)

*Abstract*

The aim of this study is to highlight the influence of intelligence on sports performance in Women's Artistic Gymnastics for gymnasts aged 8 to 11-and-a-half years old. The subjects of this study were 15 gymnasts between the ages of 8 and 11 and a half. They are members of the following Artistic Gymnastics sports clubs in Bucharest: CSS Steaua, CS Dinamo and CSS no. 2. The research methods used were the test and statistical and mathematical methods. For this study, the gymnasts were applied the Raven Standard Progressive Matrices (RSPM) test. The results obtained from this test were correlated with the results achieved by the athletes in competitions, both at each apparatus and the individual all-around. The correlation test used was Spearman, performed with the help of IBM SPSS Statistics software (version 20.0). The analysis of the results has shown that, at the uneven bars and the floor exercise, there are significant positive correlations between the level of intelligence and the achieved performance, with a correlation coefficient equal to  $r = 0.563$ ,  $p = 0.029$  for the uneven bars, and  $r = 0.548$ ,  $p = 0.034$  for the floor exercise. In the other events (vault, balance beam and individual all-around), there were no significant correlations. We believe this is caused by the fact that, in the vault event, movements are automated. At the balance beam, sports performance is influenced by several factors, such as: level of balance, great courage, self-control, stress, emotions, degree of concentration.

© 2018 Published by Future Academy [www.FutureAcademy.org.UK](http://www.FutureAcademy.org.UK)

**Keywords:** Intelligence level, sports performance, Women's Artistic Gymnastics, Standard Progressive Matrices.



## **1. Introduction**

Artistic Gymnastics has developed greatly over time, the number of elements that can be performed on each apparatus increasing considerably. In addition to motor and psychomotor qualities, Artistic Gymnastics also develops the psychological and moral-volitional qualities of the gymnast. Noticing the increased demands of performance sports in general and Artistic Gymnastics in particular, the domain specialists have recognised the need and importance of psychological training.

Psychological training also includes intellectual preparation, which consists in forming the functions of knowledge, decision, appreciation and development of memory and imagination necessary for exercise composition and execution and reproducing the elements (Grigore, 2001, p. 133).

The main manifestations of intelligence are the following: perception, attention, logical and creative thinking, memory and analytical skills. These are also the primary components of sports activity. Intelligence is displayed in sport as the ability to assimilate the technology of comprehensive coordination, multidirectional exercises; learning the laws of growth of sports skills, achieving a high level of stability and reliability of competitive activity, objective, critical analysis and synthesis of personal achievements and failures during competitions, as well as actively seeking the ways to correct them (Nazarenko & Hab, 2013).

In psychology, intelligence appears both as a process and a skill or ability, as a form and an attribute of mental organization and behavioural organization as well (Păunescu et al., 2013).

It is accepted that participation in elite sport, especially in competitions, demands intellectual efforts in addition to motor efforts. Athletes must analyse the situation and give motor responses, understand their opponents' behavior and react to very frequent and quick changes. Therefore, one of the factors in the diagnosis and selection of athletes is evaluation of their intellectual abilities. (Levin, 1981)

A sport participant having the ability to identify relevant clues, patterns of play and behaviours, use short-term and long-term memory, make effective decisions and possessing a minimal level of knowledge about the sport-specific tasks is thought to have sport intelligence (Fisher, 1984).

The psychological conditions or characteristics in the course of performing motor skills and mastering them are defined as sport intelligence (Junwu, 2013).

Sport intelligence consists of raw data responses, such as the ability to make the right decisions, be innovative, analyse, be a sports student, be a quick learner and understand the nature of the elite sport (Gould, Diefenbach, & Moffet, 2002).

## **2. Problem Statement**

Studies performed so far on athletes' intelligence were mostly conducted from the psychological perspective. This paper aims to address the issue from a new perspective, which is closer to performance sports. This topic has not been largely explored in general. In the context of Artistic Gymnastics in Romania, this study offers a valuable insight.

## **3. Research Questions**

The problems researched in this paper make us ask the following questions:

- Is sports performance in Women's Artistic Gymnastics influenced by the level of intelligence of the individual?
- At which apparatus and how much is performance influenced?

#### **4. Purpose of the Study**

The aim of this study is to highlight the influence of intelligence on sports performance in Women's Artistic Gymnastics for gymnasts aged 8 to 11-and-a-half years old.

#### **5. Research Methods**

##### **5.1. Study place and subjects**

The subjects of this study were 15 gymnasts between the ages of 8 and 11 and a half. They are members of the following Artistic Gymnastics sports clubs in Bucharest: CSS Steaua, CS Dinamo and CSS no. 2.

The intelligence tests were carried out in the gymnastics halls of the above-mentioned sports clubs, at the end of the training, during the period 01-05.06.2015, and the sport results were those obtained at the Junior III National Championship of Buzău, 27-30.05.2015, for level 1 and 2 gymnasts, and the Junior I and II National Championship of Onești, 29.06-01.07.2015.

##### **5.2. Methods**

The research methods used were the test and statistical and mathematical methods. For this study, the gymnasts were applied the Raven Standard Progressive Matrices (RSPM) test.

RSPM is an assessment tool widely used in the measurement of several abilities. It is very popular as a test that measures fluid intelligence. RSPM is a standardized intelligence test consisting of 60 problems. It has 5 sets (A, B, C, D and E) of 12 items each, visually presenting geometric-parallel-like problems. The A and B sections each contain 12 2x2 matrices, and the C, D, E sections each contain 12 3x3 matrices. The first section, A, only involves filling in the missing part of an image, but the other sections require more abstract reasoning. There are 6 possible answers for the 2x2 matrices and a set of 8 possible answers for the 3x3 matrices from which the correct missing entry must be selected. (Lynn, Allik, & Irwing, 2004)

The results obtained from this test were correlated with the results achieved by the athletes in competitions, both at each apparatus and the individual all-around. The correlation test used was Spearman, performed with the help of IBM SPSS Statistics software (version 20.0).

#### **6. Findings**

Table 01 shows both the results of Raven Standard Progressive Matrices Test and the sports performances obtained by the gymnasts at the National Championships, at each apparatus and all-around.

**Table 01.** The results obtained in the Raven Test and in competitions

No.	Name (Initials)	Final testing			Ranking				
		Score	IQ	Intelligence level	Vault	Uneven bars	Balance beam	Floor exercise	All-around
1	D.B.	20	85	Below average	10	11	5	3	8
2	M.A.	47	123	Superior	4	2	3	3	2
3	N.D.	37	110	Above average	12	4	2	12	7
4	D.A.	37	104	Average (good)	24	15	12	29	20
5	M.L.	42	109	Average (good)	4	4	13	7	8
6	C.I.	52	134	Superior	27	39	6	17	38
7	L.E.	41	125	Superior	8	35	6	8	12
8	A.G.	49	127	Superior	22	22	30	31	27
9	S.M.	54	137	Superior	16	24	54	30	35
10	M.A.M.	46	125	Superior	1	1	9	9	3
11	N.C.	35	103	Average (good)	2	1	33	8	9
12	K.S.	41	117	Above average	12	14	21	12	13
13	B.L.	50	127	Superior	9	6	7	9	7
14	H.M.	39	107	Average (good)	3	1	4	14	4
15	C.M.	25	95	Average (good)	1	1	15	1	1

Table 02 presents the results of the correlation between the level of intelligence and the sports performances obtained by the gymnasts in competitions, performed using the Spearman correlation test.

**Table 02.** The Spearman correlation test for the intelligence level and sports performances

			IQ	VT	UB	BB	FX	AA
Spearman's rho	IQ	Correlation Coefficient	1.000	.426	.563*	.121	.548*	.436
		Sig. (2-tailed)		.113	.029	.668	.034	.104
		N	15	15	15	15	15	15

VT = Vault; UB = Uneven Bars; BB = Balance Beam; FX = Floor Exercise; AA = All-Around

\* Correlation is significant at the 0.05 level (2-tailed).

## 7. Conclusion

Table 01 shows the gymnasts' results in the Raven Intelligence Test. We notice that 1 gymnast (6.67%) has a below-average intelligence level, 5 gymnasts (33.33%) have an average intelligence level, 2 gymnasts (13.33%) have an above-average intelligence level and 7 gymnasts (46.67%) have a superior intelligence level.

The analysis of the results has shown that, at the uneven bars and the floor exercise, there are significant positive correlations between the level of intelligence and the achieved performance, with a correlation coefficient equal to  $r = 0.563$ ,  $p = 0.029$  for the uneven bars, and  $r = 0.548$ ,  $p = 0.034$  for the floor exercise.

For the other events (vault, balance beam and individual all-around), there were no significant correlations. Finally, we believe this is caused by the fact that, in the vault event, movements are automated. At the balance beam, sports performance is influenced by several factors, such as: level of balance, great courage, self-control, stress, emotions, degree of concentration.

Although the results of the correlation were not statistically significant for all apparatus, we recommend using the Raven Intelligence Test in the gymnasts' evaluation during the training program. Also, this test can be introduced as an assessment method in the selection programs for gymnasts, given the young age at which the Raven Test can be applied.

## References

- Fisher, C. (1984). Sport intelligence. In W. Strub & J. Williams (Eds.), *Cognitive sport psychology*. New York: Lansing.
- Gould, D., Diefenbach, K., & Moffet, A. (2002). Psychological characteristics and development in Olympic athletes. *Journal of Applied Sport Psychology*, 14(3), 172-204.
- Grigore, V. (2001). *Gimnastica artistică – Bazele teoretice ale antrenamentului sportiv*. București: Semne.
- Junwu, D. (2013). The research on sports intelligence in China. *Advances in Intelligent and Soft Computing*, 117, 743-752.
- Levin, Z. (1981). Intelligence in children participating in sport. In *Children in sport – Psychosociological characteristics* (pp. 64-71). The Wingate Institute for Physical Education and Sport Netanya. [Wingate Monograph Series no. 11]
- Lynn, R., Allik, J. & Irwing, P. (2004). Sex differences on three factors identified in Raven's Standard Progressive Matrices. *Intelligence*, 32, 411-424.
- Nazarenko, L. D., & Hab, D. (2013). The role of intelligence in sport. *Theory and Practice of Physical Culture*, (10)2. Retrieved from <http://www.teoriya.ru/ru/node/1664>
- Păunescu, M., Gagea, G., Păunescu, C., Pițigoi, G., & Nicolae, E. (2013). Relationship between general intelligence and motor skills learning specific to combat sports. *Procedia - Social and Behavioural Sciences*, 84, 728-732.