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LEVEL OF INTELLIGENCE: A COMPARATIVE STUDY OF INDIVIDUAL vs. TEAM SPORTS ATHLETES

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Abstract: *In this research Level of Intelligence: A Comparative Study of Individual vs. Team Sports Athletes we compared the level of intelligence of individual sports (swimming) versus team sports (soccer). The research subjects are child athletes (swimmers and soccer players) aged between 6.0 and 9.11 (M = 7.08; SD = ±0.63) years who practice these sports at sports clubs in the Municipality of Iasi. The hypothesis of the research is there is no statistically significant difference in the level of intelligence that swimmers have compared to footballers. The research results show that the hypothesis is disproved, and the difference in the intelligence level that footballers have (M = 103.25; SD = ±12.86) is statistically significantly higher (t = 3.05; p = 0.003) compared to the intelligence level of swimmers (M = 97.08; SD = ±9.15). This difference may be due to genetic inheritance, but also to the fact that soccer is a team sport that requires more psychomotor processing due to aspects such as: execution technique, teammates and the presence of direct opponents.*

Key words: *level of intelligence; swimming; football; children.*

1. Introduction

Sports represents one of the biggest challenges for the human brain as it demands a range of multifaceted aspects [5], [20]. Engagement in physical activity and sports has been associated with various cognitive abilities and other personal characteristics [6].

Practicing in performance sport or leisure-time physical activities (leisure) are of fundamental importance during childhood and adolescence, with clear benefits on quality of life aspects such as mental and physical health of the practitioners. In 2019, The World Health Organization recommends engaging in physical (sport) activities to achieve and maintain these physical and mental benefits [21].

There are studies that scientifically demonstrate how involvement in leisure-time physical activity or performance sport is associated with other domains such as academic performance [16] or positive ageing [13].

Research in the specialized literature shows that for children and adolescents, practicing sports has positive links with cognitive abilities such as: perception,

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attention, visuospatial abilities, intelligence [14], [17-18].

The cognitive skills allow the athlete to perceive the environment and to use this perception to generate an ideal decision for the subsequent action, which has a direct impact on the results in sport [12].

The quantity of information, the dynamics and openness of the sports along with the time-pressure require rigorous high-performance of athletes' brains and their cognitive functions [1].

2. Material and Methods

In this research Level of Intelligence: A Comparative Study of Individual vs. Team Sports Athletes we compared the level of intelligence of individual sports (swimming) versus team sports (soccer).

2.1. Research subjects

The research subjects are child athletes (swimmers and soccer players) aged between 6.0 and 9.11 (M = 7.08; SD = ±0.63) years who practice these sports at sports clubs in the Municipality of Iasi. The group of swimmers (see Tabel 1) consists of 60 children (40 boys and 20 girls) and the group of soccer players (see Tabel 2) consists of 64 subjects (50 boys and 14 girls).

The research subjects were randomly selected and prior to the start of the study, consent was obtained from the parents or legal guardian for the minors to be part of this research sample.

Swimmers Group Table 1

	Frequency	Percent	Cumulative Percent
Male	40	66.7	66.7
Female	20	33.3	100.0
Total	60	100.0	

Football Players Group Table 2

	Frequency	Percent	Cumulative Percent
Male	50	78.1	78.1
Female	14	21.9	100.0
Total	64	100.0	

2.2. Measurement of variables

The variable intelligence level was measured using the Raven Standard Progressive Matrices (RSPM). The RSPM (see Figure 1) is a non-verbal test commonly used to measure general human intelligence and abstract reasoning and is regarded as a test for estimating fluid intelligence [2], [10].

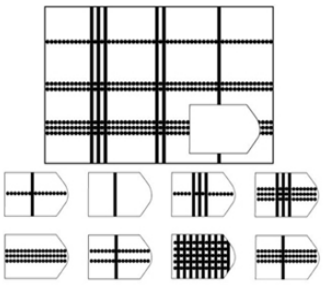

Fig. 1. *Raven Standard Progressive Matrices* [10]

All actions aimed at determining the level of cognitive abilities -the intelligence quotient- stem from the desire to observe the association between intelligence and educational activities such as school results, success in various exams, etc. [4], artistic activities such as theater, music, visual arts, etc. [8], jobs [11] and, last but not least, sports activities, especially athletic performance [9, [15].

The RSPM tests were administered in groups of 10 children, before training, without disturbing factors. Before the test, the children received the necessary information and all aspects related to the

testing methodology (requirements, time, completion method, etc.) were explained to them.

2.3. Research hypotheses

Hypothesis No. 1 There is no statistically significant difference in the level of intelligence of girls compared to boys in the two research groups.

Hypothesis No. 2. There is no statistically significant difference in the level of intelligence that swimmers have compared to footballers.

3. Results and discussion

3.1. Results

The results from this research were stored and processed using IBM SPSS 20 software. Specifically, the SPSS 20 software used in this research provides data analysis for descriptive statistics and hypothesis validation.

Distribution analysis

The first statistical indicators calculated at this stage were those that verify whether a data series meets the normality condition. The method of verifying whether a distribution meets the normality condition is to analyze whether it differs statistically significantly from the normal curve. The test used was Kolmogorov-Smirnov (K-S).

The variable invoked and measured in this research (fluid intelligence level) has a distribution of values that meets the normality condition in both research groups (swimmers and footballers).

The values of the K-S statistical indicator in the swimmers group were: K-S = 0.77; p = 0.20, and in the soccer players group K-S = 0.98; p = 0.29). If the significance threshold is greater than 0.05 (the limit accepted by the academic community), the distribution meets the normality condition.

Hypothesis testing

To verify the hypotheses of this research, we used the T-test for independent samples.

The research results show that hypothesis No. 1 *there is no statistically significant difference in the level of intelligence of girls compared to boys in the two research groups* is confirmed (see Table No 3 and Table No. 4).

In this research the difference in the intelligence level of boys (M = 100.73; SD = ±12.03) is not statistically significantly greater (t = 0.73; p = 0.46) compared to the intelligence level of girls (M = 99.03; SD = ±10.43).

The literature shows similarities between girls and boys up to 11 years of age in terms of cognitive test scores [4]. However, girls score slightly higher on verbal ability and boys perform better on deductive reasoning [3].

The research results show that hypothesis No. 2 *there is no statistically significant difference in the level of intelligence that swimmers have compared to footballers* is not confirmed (see Table No 5 and Table No. 6).

The results obtained in this research show that the hypothesis H2 is disproved, and the difference in the intelligence level that footballers have (M = 103.25; SD = ±12.86) is statistically significantly higher (t = 3.05; p = 0.003) compared to the intelligence level of swimmers (M = 97.08; SD = ±9.15).

Descriptive analysis by gender Table 3

	Gender	N	Mean	Std. Deviation	Std. Error Mean
IQ	Male	90	100.73	12.033	1.268
	Female	34	99.03	10.437	1.790

Verification of hypothesis No. 1 by Independent Samples T-Test Table 4

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
IQ	2.48	.118	.73	122	.468	1.704	2.340	-2.928	6.336
			.78	68.09	.440	1.704	2.194	-2.674	6.082

Descriptive analysis by sports Table 5

	Sports	N	Mean	Std. Deviation	Std. Error Mean
IQ	Swimming	60	97.08	9.153	1.182
	Football	64	103.25	12.869	1.609

Verification of hypothesis No. 2 by Independent Samples T-Test Table 6

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
IQ	7.25	.008	3.05	122	.003	6.167	2.017	10.16	2.17
			3.09	113.91	.003	6.167	1.996	10.12	2.21

3.2. Discussion

The results obtained in this study did not show a statistically significant difference between the intelligence level of girls and the intelligence level of boys who play soccer and swimming.

The literature shows similarities between girls and boys up to the age of 11 in terms of cognitive test scores [4]. Studies conducted on a large number of children in the United Kingdom have shown that boys and girls up to the age of 11 do not show significant differences in terms of average general cognitive ability [3].

In the context of comparing intelligence levels based on the sport practiced (soccer and swimming), the results obtained in this study show that soccer players have a higher level of intelligence than swimmers.

In the context of comparing intelligence levels according to the sport practiced

(soccer and swimming), the results obtained in this study show that soccer players have a higher level of intelligence than swimmers, the difference being statistically significant.

The literature does not present such studies comparing intelligence levels according to the sport practiced.

However, studies have been found [7-19] showing that soccer is a sport in which cognitive (brain) demands are much higher due to the fact that it is a team sport and many variables must be taken into account in order to perform well (technical elements, tactical aspects, teammates, opponents, etc.).

4. Conclusions

The difference in intelligence levels based on gender is not statistically significant among the subjects included in this study (124 children aged between 6 and 10 who play soccer or swimming in the city of Iasi).

The difference in intelligence levels based on the sport practiced (soccer or swimming) is statistically significant in favor of children who play soccer. This difference may be due to genetic inheritance, but also to the fact that soccer is a team sport that requires more psychomotor processing due to aspects such as:

- the technical elements are more complex in soccer due to the presence of the "game object"—the ball;
- there are more and more diverse tactical aspects (individual tactics, collective tactics, attacking tactics, defensive tactics);
- soccer requires synchronization with teammates and countering opponents.

The demands placed on the brain in sports are just as important as the demands placed on the brain in school.

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