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A Study of the Relationshıp Between Agility, Speed, Flexibility and Explosive Power of Lower Limbs to Detection of Young Talents in Athletics for Middle School Students

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Abstract

The aim of this study was to determine whether there is a relationship Between Agility, Speed, Flexibility and Explosive Power of Lower Limbs to Detection of Young Talents in Athletics for Middle School Students. 245 students studying at the fourth intermediate level in some averages of the state of Laghouat. The data were analyzed in SPSS. Pearson Correlation test was used to determine the relationship between strength, Agility, Speed, Flexibility and Explosive Power of Lower Limbs. The results were interpreted as significance level. We were found positive and significant relationships between Agility and Explosive Power of Lower Limbs, between Agility and Speed, between Agility and Flexibility for this reason, we recommend that the trainings cover all motoric characteristics

I. Introduction

The identification of individuals talented for sport and their timely inclusion in the sports training process is one of the most demanding procedures in sports science. success in sport depends on many factors which originate from the athlete himself or his environment. The genetic potential of the athlete and his development, the adequate and systematic training process, it is a factor which in the end enable success in sport. Detection is one of the basic characteristics of sport, Initial selection is closely bound to talent the talent of an individual. Gifted students are those who show exceptional success in numerous fields of activity, and exceptional success in one field of activity (Milan Zvan et al., 2018).

for the beginning of the training of the basic qualities, between the age of 10-14 years, in particular speed, flexibility, coordination and aerobic endurance, consolidation of the interest in the sport practice in general, and for the organization of the corresponding structures, consolidate Sport in primary and middle schools. ensure a good pedagogue and technician, and motivation knowledge on the psychomotor characteristics of preadolescents and adolescents. (Georges Cazorla, 2010)

Athletics is considered among the most important sports, due to the integration of its activities that contain the basic movements that a person performs in his natural life, and which are performed by athletes in various sports disciplines, as it requires many physical qualities such as Agility, Speed, Flexibility and Explosive Power of Lower Limbs and other physical qualities.., According to the SUKAMTI study of the activities in athletics, we need speed and muscle power. That is why coaches and athletes need to develop all physical qualities such as speed, muscular power, strength, agility, muscular and cardiovascular endurance to obtain high performance. (Endang Rini Sukamti et al., 2020)

“Janih” defined talent when it is linked to abilities that develop naturally and unintentionally, which we call aptitudes, which is it: “above average ability in one or more areas of human aptitude (innate aptitude). (Joseph S. Renzulli, 1985)

Contemporary performance demands are so high in Track and Field that athletes with average ability are not going to succeed, even if the best training methods are employed. This emphasizes the importance of correct Detection procedures.

Proper identification of athletic talent has many benefits. From an economic standpoint, the success of the multi-billion-dollar professional sport

industry relies heavily on successful identification and devel-opment of athletic talent. (H. Joey Gray, et al., 2010) So must there should be tests and searching for talent in all Middle schools. That some of the less talented young athletes, sometimes win at their school trials, because they are developed properly. Sometimes the really talented children have to do all the sports and activities at Middle school and they are not developed properly. These talented children go from one sport to the other and no proper development of for example speed, pure speed, proper technique and jumping development etc.

The genetic factors have a very big influence on the development of physical qualities. (Table 1) So we were born champions and it's up to the coach to guide us and help us achieve high performance. Inheritance plays a major role in sports, and that is why you meet some very talented athletes in endurance events and others in speed events. But the main thing in detection is to make the right choice and the right investment in subjects who have the aptitude and the chance to become future champions, that is the role of selection tests. (Nacer Eddine Bendahmane, 2010)

Table 1. Influence of heredity on the physiological and physical parameters of humans

Settings	Percentage of heritability
maximum heart rate	85.9%
VO2 max	93.4%
Flexibility	81%
Strength	70%

Source: Nacer Eddine Bendahmane, 2010

Therefore, the process of discovering sports talents is based on identifying basic motoric features grouped as strength, speed, endurance, flexibility and skill are "the features, one or several of which are used to make a movement happen, that can be improved and vary from one person to another" (Bulent Tatlisu et al., 2019).

Strength is one of the motoric features that play a role in the formation of sportive skills (Bulent Tatlisu et al., 2019).

Speed is the ability of an athlete to move from one place to another in the fastest way or to perform the movement as fast as possible (Bulent Tatlisu et al., 2019).

Flexibility is the ability to perform the movements of different body parts and the muscular system with maximum conformity (Bulent Tatlisu et al.,

2019). It is the ability to deliberately make a movement at a maximum wide angle (Weineck. J, 1990).

Agility is the ability to quickly change direction while maintaining balance without loss of speed (K. Lemmink et al., 2004). Agility consists of two main components: decision-making mechanisms and speed of changing direction. They change the performance of the entire body's movements, rapidly, in multiple directions, in response to a specific stimulus and at full speed (Sheppard JM et al., 2006).

When the literature is examined, it becomes clear to us that in this study it is necessary to identify the relationship between Agility, Speed, Flexibility and Explosive Power of Lower Limbs to Detection the anaerobic abilities of young talents in athletics , for Middle School Students

More specifically, experimental studies indicate that The Relationshıp Between Strength, Speed, Flexibility, Agility, and Anaerobic Power in Elite Athletes (Bulent Tatlisu, Sercan Karakurt, Ozturk Agirbas, and Izzet Ucan, 2019);

Where he was the aim of this study was to determine whether there is a relationship between strength, speed, flexibility, agility, and anaerobic power in elite athletes. In various sport branches 29 active male athletes participated in this study with an average age of 21.14±1.98 years who without any health problems. Back and leg strength were measured by dynamometer (Takei), speed was measured by 20 meters test, agility was measured by T test, flexibility was measured by sit and reach test, vertical jump sit-reach test by Jumpmeter (Takei) anaerobic power was calculated by the Lewis formula. The data were analyzed in SPSS 22.0 for Windows package program. Bivariate - Pearson Correlation test was used to determine the relationship between strength, speed, flexibility, agility, and anaerobic power. The results were interpreted as .05 significance level. We were found positive and significant relationships between the back and leg force, between anaerobic power and vertical jumping, between anaerobic power and back force, between anaerobic power and leg strength, and between flexibility and vertical jumping. And also, there was a negative and significant relationship between flexibility and agility, between speed and vertical jump, and between agility and vertical jump. In this study, it was concluded that strength, vertical jump and anaerobic power was related both each other and the other.

There is another experimental study The Relationship between body composition and physical capacities in junior soccer players,

(Daniela Zanini, Augusto Kuipers, Indianara Vicini Somensi, Jonathan Filipe Pasqualotto, Julia de Góis Quevedo, Jucielly Carla Teo, Danielle Ledur Antes, 2020);

The purpose of this study was to verify the relationship between body composition and physical capacities in young soccer players. Study participants were athletes from junior categories (under-12 and under-13) belonging to the Soccer Association of Chapecó, Brazil.. Athletes were submitted to agility, (Illinois), vertical jump (Sargent Jump), aerobic condition (TCAR), flexibility and sit-and-reach (Wells Bench) tests, as well as anthropometric assessment. All procedures were performed at UNOESC campus, Chapecó. Statistical analysis consisted of the Spearman's Rô test, measuring the correlation among variables, additionally, significance level of $p<0.05$ was adopted. Results showed significantly correlation in agility ($p=0.000$; $\rho=0.530$) and vertical jump tests ($p=0.003$; $\rho=-0.437$) with body fat percentage. It was concluded that there is relationship between body fat percentage and agility and explosive power of lower limbs.

Through this literature review, it became clear to us that the main objective of this study is to determine the relationship between agility, speed, flexibility and explosive power of lower limbs to detection the anaerobic abilities of young talents in athletics, for middle school students. based on all the foregoing, we present the central question of our research as follows;

- Is there a statistically significant correlation between agility, speed, flexibility and explosive power of lower limbs which allows us to detection young talents in Athletics for Middle School Students?

Where he was the aim of this study was to revealing the relationship between agility and explosive power of lower limbs of young talents in athletics, for middle school students. As well as revealing the relationship between agility and speed of young talents in athletics, for middle school students, in addition to shedding light on the relationship between agility and flexibility of young talents in athletics, for middle school students.

II. Method and Materials

The descriptive method was followed because it is in line with the requirements and characteristics of the study

2.1. Participants

- The study population was represented by all middle school students in the wilaya of Laghouat.
- The sample of the study was 245 male students, studying at the fourth intermediate level in some averages of the state of Laghouat, the schools were chosen intentionally according to the ease of dealing with their managers.

2.2. Materials

- Matériels et outils utilisés dans la recherche :
Craie, ruban à mesurer, sifflet, planche en bois de 40 cm de long et 20 cm de large, règle à mesurer, sans cour ni sol, cônes (50), ruban à mesurer, horloges électroniques.
- The tests applied in the study
Sprint test: 70 meters sprint run
Endurance test: BRIKCI and DEKKAR **5'** Test
Explosion test lower limbs: Sargent test.
agility test: Explosion test lower limbs
Test Flexibilité: Stand and Reach Flexibility Test. The subject stands on a raised surface and bends forward with straight legs.

2.3. Design and Procedure

This study was carried out at the level of 10 averages of the wilaya of Laghouat - This study extended for 45 days, starting from 25/02/2018 until 10/04/2018.

2.4. Statistical Analysis

- Arithmetic mean, standard deviation.
- alpha cronbach method for calculating stability coefficient
- Pearson's linear correlation coefficient, simple linear regression and multiple linear regression
- ANOVA for regression coefficients.
- We used the SPSS statistical program to calculate the statistical relationships and laws used in the study.

III. Results

Table 2. Regression coefficients between the independent variables of (explosive power, speed, flexibility) and the dependent variable (agility) among the study sample members.

	non-standard transactions		Standard coefficients	Calculated T	probability value	correlation coefficient (r)	coefficient of determination	Adjusted coefficient of determination
	B	standard error	Beta					
segmented linear regression B_0	-1,42	0,28		-5,01	0,00	,962a	0,93	0,92
explosive power degrees	0,31	0,09	0,31	3,56	0,00			
sprint degrees	0,58	0,07	0,48	8,89	0,00			
flexibility degrees	0,30	0,06	0,29	5,36	0,00			

Source: Authors, 2021

- theoretical conditions:

It is noted here that the variables of the phenomenon under study fall within the competitive sport of the field of physical education and sports.

By referring to the simple linear regression model obtained in the study, which shows the significant relationship between the research variables after the quantization process, we find

$$Y = 0{,}30X_1 + 2{,}04X_2 + 2{,}04X_3 3{,}51$$

and through this model we conclude the following:

- The constant of B_0 has a positive value not equal to zero (1,42).

- The slope of the regression line B_1 has a positive value ranging from (0,31).

- The slope of the regression line B_2 has a positive value ranging from (0,58).

- The slope of the regression line B_3 has a positive value ranging from (0,30).

There is no conflict between the theoretical conditions of the phenomenon under study and the results of the regression model explaining the moral effect relationship between the independent variable are physical traits (explosive power, speed, flexibility) and the dependent variable is physical trait (agility).

The explanatory ability of the regression model is judged by the adjusted coefficient of determination found in the above, which shows the significant effect relationship between the independent variables (explosive power,

speed, flexibility) and the dependent variable (agility) among the study sample, where the value of the estimated modified coefficient of determination (0.92), this means that the variables of the study selected for the model have explained its value (92%) of the effect of the independent variables of (explosive power, speed, flexibility) on the dependent variable (agility) among the estimated study sample members, meaning that (55%) of the changes that occur in the dependent variable physical attribute (agility) are attributed to the independent variables physical attributes (explosive power, speed, flexibility), and (08%) are due to other factors, and these results reflect the validity of the variables selected for the study and their ability to interpret the results of the regression model , As for the statistical significance of this model, it was justified by the estimated significance level (0.00), which is less than the value (0.05), which is statistically significant and in line with the hypothesis of the study.

Table 3. Analysis of variance and correlation coefficients between the independent variables of (explosive power, speed, flexibility) and the dependent variable (agility) among the study sample.

	sum of squares	degree of freedom	mean square	F. value	Signifi cance level	Correlation coefficient R	r squared coefficient of determination	Adjusted coefficient of determination
regression	4 765,47	4	1 191,37	740,26	,000b	,962a	0,93	0,92
error	386,25	240	1,61					
Total	5 151,72	244						

Source: Authors, 2021

The purpose of calculating the ANOVA table is to analyze the sum of squares of the total deviations of the dependent variable SST, the sum of squares of the deviations of the SSR, and the sum of squares of the SSE error.

The most important indicator of the quality of the regression model is extracted, the coefficient of determination R^2.

$$0{,}56 = \frac{682}{1204.88} = \frac{SSR}{SST} = R^2$$

The square root of the value of the coefficient of determination is equal to the coefficient of correlation.

$\sqrt{R^2} = r$ Substituting the values, we find $0,75 = \sqrt{0,56} = r$
These results are in line with the results obtained in Table (3).
These results show that (75%) of the variances of the total deviations in the values of the variable dependent on the trait (agility) among the study sample members are explained by the linear relationship of the regression model with the independent variables of the traits (explosive power, speed, flexibility), and this result justifies the value of the modified coefficient of determination obtained in Table (3).

The overall significance of the model :
It is clear from Table (3) ANOVA that the calculated F value is (43.69) and the P.VALUE value is (0.00) which is less than the level of significance (0.05) This means that there is at least one of the regression coefficients It is different from zero and has a significant value. It is also consistent with the hypothesis of the study where the results obtained are justified.

Partial significance of the model :
In the previous step, we concluded that there is at least one of the regression coefficients that differ from zero, and to determine which of these coefficients are significant, we conduct a partial significance test of the model through the T-test.
The constant part of B_0= (1,00) at the probabilistic value (0,32) which is greater than the value (0.05) from it. We conclude that the constant amount in the regression model is not significant.
The slope of the regression line B_1 for the degree of the independent variable, explosive power, is equal to (0.93) at the probability value (0.36), which is greater than the probability value (0.05), and from it we conclude that the magnitude of the slope of the degree of the independent variable, explosive power, on the values of the dependent variable The agility characteristic of the study sample members, and this indicates that the regression model is significant and statistically significant.
The slope of the regression line $B_2$for the degree of the independent variable, the attribute of speed, is equal to (0.93) at the probability value (0.36), which is greater than the probability value (0.05), and from it we conclude that the magnitude of the slope of the degree of the independent

variable, the attribute of speed, on the values of the dependent variable, the attribute of agility. This indicates that the regression model is significant and statistically significant.

The slope of the regression line B_3 for the degree of the independent variable, the elasticity trait, is equal to (0.93) at the probabilistic value (0.36), which is greater than the probabilistic value (0.05), and from it we conclude that the magnitude of the slope of the degree of the independent variable, the elasticity trait, on the values of the dependent variable, the agility trait. This indicates that the regression model is significant and statistically significant.

Table 4. Correlation coefficients between the independent variables of (explosive power, speed, flexibility) and the dependent variable of (agility) among the study sample

agility	explosive power	speed	flexibility
Pearson correlation coefficient	0,922**	0,948**	0,935**
p-value signification	0,000	0,000	0,000
sample	245	245	245

Source: Authors, 2021

IV. Discussion

Through the results obtained in this study, where we studied the relationship between Agility, explosive power of lower limbs, speed and flexibility, to detection of young talents in athletics for middle school students, it was found that there was a statistically significant and positive relationship between agility and explosive power of lower limbs. In the literature, results showed the relationship between body composition and physical capacities in young soccer players. (under-12 and under-13) significantly correlation in agility and vertical jump tests with body fat percentage. It was concluded that there is relationship between body fat percentage and agility and explosive power of lower limbs. (Daniela Zanini, 2020). Contrary to the results of our study, it was found, there was a negative relationship a significant relationship between agility and vertical jump, which is an indicator of muscle strength (Taskin, C., 2015; Mayhew, J.L., 1989; Pauole, K., 2000). while Zorba et al. (2010) stated that leg volume and leg masses of wrestlers play an important role in anaerobic performance (Bulent Tatlisu et al., 2019). Also, the results of our study do not agree with "Bulent Tatlisu"

study. Which found that statistically significant and positive relationship between vertical jump and agility (Bulent Tatlisu, 2019). The results of his study also found that, have no significant relationship between agility and vertical jump, speed and agility, and also between anaerobic power and speed and agility. (Bulent Tatlisu, 2019). We also found that there was a statistically significant and positive relationship between agility and speed, it is seen that speed and agility are improved along with anaerobic performances of those with improved vertical jump. The results of researches on different branches in the literature are in line with our results. (Bulent Tatlisu, 2019). Also, the results of our study do not agree with the study Young et al. (2001) examined the effects of flat sprint exercises on agility, and as a result of the study they found that flat sprint exercises did not improve the speed of changing direction (Young W. B., 2001), Ozdemir (2013) stated that there was no significant relationship between speed and agility in young players (Bulent Tatlisu et al., 2019). We also found that there was a statistically significant and positive relationship between agility and flexibility, Also, the results of our study do not agree with Hazar. study, it is seen that there is a statistically significant and negative relationship between flexibility and agility. Hazar and Tasmektepligil (2008) could not find a statistically significant relationship between agility test and flexibility in children before puberty, which differs from our study (Hazar, F., & Tasmektepligil, 2008). The difference between this result and our study is thought to be due to age and consequent body composition differences.

V. Conclusion

When the research results are evaluated in general, positive and significant the relationship between agility and explosive power of lower limbs. upon Detection the anaerobic abilities of young talents in athletics, and positive and significant the relationship between agility and speed upon Detection the anaerobic abilities, for Middle School Students, and positive and significant the relationship between agility and flexibility upon Detection the anaerobic abilities of young talents in athletics, for Middle School Students. Considering the relationship of motoric properties with each other, we recommend the trainings to be performed to be programmed in such a way to cover all motoric features.

As well training programme must be coordinated in schools and test results should be sent to provincial bodies.

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