

Analysis of the fitness components based on a tests battery to evaluate the young categories in football

Field study on the first league U-19 clubs

Behat Leulmi¹ Univ Alger3, (Algeria) behat.leulmi@univ-alger3.dz Laboratory of the sciences, experiences, and technology of the physical and sport activity Code : C1671700	Toutah Mustapha Univ Alger3, (Algeria) mustasport10@gmail.com	Azzaz Yacine Univ Alger3, (Algeria) azzazyacine@yahoo.fr
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Abstract :

This study aims at extracting the variables of the fitness components using a tests battery that considers the age category and the Algerian environment in evaluating the footballers. In so doing, we used the correlational analytical method and carried out a set of physical tests on a random sample that included 132 U-19 footballers of the 1st league. After the statistical analysis using the central tendency, the dispersion, and the exploratory factorial analysis, based on the principal components method and the orthogonal rotation, we found out three factors for the fitness that express 12 physical tests to evaluate the footballers. These physical tests include the speed endurance, compatibility, power of speed, transitional speed, motor reaction time, general endurance, and agility, speed of movement, power endurance, explosive power, flexibility, and balance.

Keywords: components of the fitness; tests battery; evaluation.

Article info

¹ Corresponding author

1. Introduction

If the goal of sports is to develop various training aspects, the more challenging aim is to sustain and ideally enhance these achievements through mastery of the scientific aspects of training and evaluation. According to Gasmi Abd al Malik et al. (2016, p. 144), evaluating progress at predetermined intervals is crucial to understanding the development level attained. Hassan al Sayad emphasizes that physical abilities form the foundation for optimizing an athlete's overall training. The athlete's capacity to achieve peak performance correlates directly with their potentials and physical abilities (Hassan al Sayad Abu Abdu, 2008, p. 32).

Based on the requirements for a football player's preparation, physical conditioning stands as paramount. Fitness plays a crucial role, as training and competitive scenarios heavily rely on it. Football demands specific physical attributes such as strength, speed, balance, stability, flexibility, and endurance. Sustaining these qualities throughout the season is vital for achieving consistent performances and quality results (Michal Dragisky, 2017, p. 02). Therefore, monitoring training intensity is fundamental throughout the training process. Quantitative evaluation should accompany training across all phases to enhance competency and performance levels. Additionally, evaluation provides coaches and athletes with insights into the training progress and goal achievement, enabling them to adjust training programs as needed (Ryad Ali al Raoui, 2000, p. 17).

Physical tests play an important role in evaluating fitness levels and achieving set goals, necessitating the application of modern scientific principles and methods for a well informed decision-making. Scholars have extensively explored various physical tests for assessing footballers' physical performances, underscoring their significance. For instance, Yuanhua Li and Shishan Weng introduced a test battery that efficiently evaluates footballers' fitness levels within a short timeframe. This approach offers precise scientific control and yields results aligned with expert evaluations, highlighting its suitability for assessing performance indices (Yuanhua Li & Shishan Weng, 2021, p. 01).

Gasmi Abd al Malik et al emphasize that the coach's role extends beyond understanding training content; it includes mastering evaluation by selecting appropriate test batteries suitable for different age categories. Meanwhile, Kharroubi Mohamed Faysel and Boudaoud Farid emphasize the importance of periodic testing to assess footballers' abilities and ensure training programs align with objectives. They advocate for developing a standardized test battery that serves as a benchmark for coaches in evaluating fitness levels across the board.

Based on the discussion, there is a clear need to analyze fitness components using a tailored test battery that considers factors such as physical activity demands, age categories, the Algerian environment, and available club resources. This approach aims to effectively evaluate physical aspects influencing footballers' performance. Consequently, the question arises: "How can fitness components derived from physical tests be utilized to evaluate young footballers?" Our hypothesis suggests that the fitness components derived from these tests will vary between general and specific components when evaluating young footballers. This differentiation is crucial for accurately assessing and developing their physical capabilities.

2. Aims of the study:

The study aims at analyzing the fitness components extracted from the physical tests using the exploratory factorial analysis EFA to reach a scientific tests battery to evaluate the young footballers.

The methodological procedures:

The pilot study:

Based on the field observation, literature review, and the pilot study, where we distributed a questionnaire about the physical tests to expert teachers and coaches specialized in training to recommend tests that suit the physical activity, the age category, the potential of the Algerian clubs, and the easy application, we found out a set of tests that measure the fitness components, as shown in table 01:

Battery	Order	Tests	Measured physical feature	Recommendation rate
Set 01	1	Long jump	The feet explosive power	74%
	2	30m and 10m speed running test	Transitional speed	85%
	3	Sprint 30 m	Speed of movement	81%
	4	05 jumps test	Power speed	69%
	5	Speed endurance 30s/30*5	Speed endurance	59%
Set 02	1	Akramov test	Agility	89%
	2	Nelson test	Motor reaction	64%
	3	Repetitive high jumps	Power endurance	76%
Set 03	1	Stand and reach test	Flexibility	92%
	2	Numbered circles test	Compatibility between eyes and legs	65%
	3	Briksi test	Endurance	71%
	4	Flamingo test	Balance	83%

Source: By the authors based on SPSS 27

From the 56 tests mentioned in the questionnaire, we notice that the high recommendation rates were between 59% and 92% regarding 12 physical tests (each one measures an element of the general or composed fitness). They were built on the informants' agreements. Then, we divided the chosen tests into 03 sets; each set is made in a day, taking into account the scientific sequencing of the tests of each set. To determine the optimal method, time, and organization of the workshops, and to know the obstacles, regulate the variables that affect the study, and make sure of the psychometric properties, we made a 2nd pilot study by applying the recommended tests on 10 footballers from Amal al Eulma Club, which is part of the regional league of Constantine (it won the winter championship in the 1st season for U-19 clubs).

Consistency and validity of the questionnaire:**Table 02: the consistency and validity values of the questionnaire:**

Tests	Sample	Correlation coefficient	Significance value	validity
Long jump	10	0.693	0.026	0.832
30m and 10m speed running test		0.784	0.007	0.885
Sprint 30 m		0.704	0.023	0.839
05 jumps test		0.816	0.004	0.903
Speed endurance 30s/30*5		0.886	0.001	0.941
Akramov test		0.841	0.002	0.917
Nelson test		0.793	0.006	0.890
Repetitive high jumps		0.830	0.003	0.911
Stand and reach test		0.841	0.002	0.917
Numbered circles test		0.874	0.001	0.934
Briksi test		0.870	0.001	0.932
Flamingo test		0.841	0.008	0.917

Source: By the authors based on SPSS 27

Table 02 shows that the correlation values before and after the tests are 0.693 at minimum and 0.886 at maximum, with significance values between 0.001 and 0.026, which are less than 0.05. Thus, the questionnaire is consistent. As for the values of the validity, they are between 0.941 and 0.831, which are high and confirm the validity and reliability of the study tool.

Method of the study:

We used the correlational analytical method because it suits the study nature.

Population of the study:

footballers.

Sample of the study:

We chose a random sample that represents 27.5% of the population, i.e., 132 footballers, as follows:

Clubs	Footballers	total
Biskra United	23	132
Khenchla United	24	
Magra Star	23	
Setif FC	22	
Constantine Youth	21	
Saoura Youth	19	

The study tools:

To collect data, we used the literature review, questionnaire for the coaches, physical tests battery, and measurement tools.

The statistical methods:

We used SPSS for the statistical analysis of the data, namely the arithmetic mean, the standard deviation, the correlation coefficient, the validity coefficient, the kurtosis coefficient, the skewness coefficient, Shapiro Wilk test, Smirnov, test, and the exploratory factor analysis.

Presentation and analysis of the results:

To test the 1st condition of the EFA, which is the normality of distribution (it is hard to derive common factors in the abnormal distributions), and the validity of the study variables, we made these tests:

Table 03: the results of the statistical analysis of the physical tests and the normal distribution

Test	Mean	Deviation	Skewness	Kurtosis	Shapiro	Smirnov
Long jump	2.247	0.144	0.181	-0.165	0.60	0.200
30m and 10m speed running test	2.490	0.111	0.028	-0.584	0.48	0.200
Sprint 30 m	4.174	0.114	-0.043	-0.624	0.31	0.200
05 jumps test	11.36	0.815	0.129	-0.526	0.34	0.200
Speed endurance 30s/30*5	4.891	0.238	-0.034	-0.576	0.30	0.200
Akramov test	12.46	0.223	-0.058	-0.586	0.47	0.200
Nelson test	1.843	0.113	-0.115	-0.382	0.34	0.200
Repetitive high jumps	28.36	4.355	0.170	-0.260	0.25	0.200
Stand and reach test	8.651	4.156	0.067	-0.160	0.45	0.200

Numbered circles test	6.514	1.233	0.073	-0.573	0.31	0.200
Briksi test	1611.8	125.7	0.125	-0.535	0.26	0.200
Flamingo test	8.825	3.716	-0.065	-0.420	0.18	0.083

Source: By the authors based on SPSS 27

Table 03 shows that the values of the standard deviation are small and that the dispersion of the results of the physical tests is moderate. Besides, the skewness values are between +1 and -1 while of the kurtosis are between +3 and -3. As for Shapiro Wilk and Smirnov values, they are more than 0.05, what indicates the normality of the distribution. After testing the normality of the distribution, we can use EFA and make sure of its validity to check the values of the correlation and the determinant of the matrix.

Table 04: the correlation matrix and the values of the significance level of the physical tests

	Long jump	30m and 10m speed running test	Sprint 30 m	05 jumps test	Speed endurance 30s/30*5	Akramov test	Nelson test	Repetitive high jumps	Standard and reach test	Numbered circles test	Briksi test	Flimflam test
Long jump		,050	,282	,086	,036	,307	,094	,314	,000	,042	,393	,008
30m and 10m speed running test	,050		,000	,000	,000	,000	,000	,145	,500	,000	,000	,344
Sprint 30 m	,282	,000		,000	,000	,000	,000	,006	,317	,000	,000	,079
05 jumps test	,086	,000	,000		,000	,000	,000	,071	,444	,000	,000	,267
Speed endurance 30s/30*5	,036	,000	,000	,000		,000	,000	,084	,483	,000	,000	,424
Akramov test	,307	,000	,000	,000	,000		,000	,001	,037	,000	,000	,095
Nelson test	,094	,000	,000	,000	,000	,000		,026	,288	,000	,000	,499
Repetitive high jumps	,314	,145	,006	,071	,084	,001	,026		,395	,092	,003	,083

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Stand and reach test	,000	,500	,317	,444	,483	,037	,288	,395		,481	,478	,028
Numbered circles test	,042	,000	,000	,000	,000	,000	,000	,092	,481		,000	,433
Briksi test	,393	,000	,000	,000	,000	,000	,000	,003	,478	,000		,036
Flamingo test	,008	,344	,079	,267	,424	,095	,499	,083	,028	,433	,036	
Determinant = 2,850E-6 _a												

Source: By the authors based on SPSS 27

Table 04 shows the values of the 66 correlation coefficients between the physical tests. The total statistically significant coefficients less than 0.05 are 40 coefficients while the insignificant coefficients are 26. Besides, the value of the determinant of the matrix is 2.85 and is more than 0.00001. Therefore, there is no problem of multicollinearity between the variables. Furthermore, we can find the inverse of the matrix and carry on making the following exploratory steps, namely examining the values of correlation matrix using KMO-test to measure the competency of the sample, and Bartlett test to measure the minimum bound of the relations between the matrix values to know if they are analyzable, as shown in table 05:

Table 05: the results of Bartlett and KMO tests

The results of Bartlett and KMO tests		
Kaiser-Meyer-Elkin index for measuring the quality of the sample		,840
Bartlett sphericity test	Approx. Chi-square	1610,920
	DDI	66
	Significance	,000

Source: By the authors based on SPSS 27

Kaiser points that the value of the criteria is between 0 and 1. When the value is close to 01, the correlation values are strong and valid for factor analysis, and vice versa. Table 05 shows that the value of KMO is 0.840 and is more than 0.5. This means that the index of the sample sufficiency is high and strong. In addition, Bartlett test, with Chi-square, shows that the significance value is 0.000 and is less than 0.05. Thus, there is no multicollinearity in the matrix, and the correlation matrix is not similar to the unit matrix. Therefore, the results support the suitability of the correlation matrix to make EFA to reveal the competency of each study variable using MSA test, as shown in table 06.

Table 06: the partial correlation matrix

Long jump	,563 ^a	-,045	,051	,108	-,076	,118	,006	,039	-,330	,031	-,012	-,210
30m and 10m speed running test	-,045	,886 ^a	,192	-,083	-,167	-,179	-,443	,067	,110	,138	,022	-,061
Sprint 30 m	,051	,192	,800 ^a	,030	,030	-,740	-,157	,076	,133	-,058	-,288	-,082
05 jumps test	,108	-,083	,030	,964 ^a	-,218	-,008	-,016	,040	-,049	,027	-,271	-,085
Speed endurance 30s/30*5	-,076	-,167	,030	-,218	,796 ^a	-,068	-,088	-,056	-,046	-,973	,115	,016
Akramov test	,118	-,179	-,740	-,008	-,068	,791 ^a	,101	-,154	-,273	,067	-,004	,022
Nelson test	,006	-,443	-,157	-,016	-,088	,101	,908 ^a	-,130	-,090	,058	,042	,075
Repetitive high jumps	,039	,067	,076	,040	-,056	-,154	-,130	,745 ^a	,033	,062	-,149	-,094
Stand and reach test	-,330	,110	,133	-,049	-,046	-,273	-,090	,033	,595 ^a	,067	,053	-,091
Numbered circles test	,031	,138	-,058	,027	-,973	,067	,058	,062	,067	,804 ^a	-,107	,018
Briksi test	-,012	,022	-,288	-,271	,115	-,004	,042	-,149	,053	-,107	,925 ^a	-,109
Flamingo test	-,210	-,061	-,082	-,085	,016	,022	,075	-,094	-,091	,018	-,109	,595 ^a

Source: By the authors based on SPSS 27

The partial correlation matrix shows that the values of MSA are between 0.563 and 0.964. Thus, all the variables are more than 0.5, and each variable is sufficient for the sample.

Table 07: the values of the variables communality and variance

Qualities of representation		
	Initials	Extraction
Long jump	1,000	,715
30m and 10m speed running test	1,000	,696
Sprint 30 m	1,000	,793
05 jumps test	1,000	,896
Speed endurance 30s/30*5	1,000	,931
Akramov test	1,000	,761
Nelson test	1,000	,658
Repetitive high jumps	1,000	,398
Stand and reach test	1,000	,549
Numbered circles test	1,000	,924
Briksi test	1,000	,685
Flamingo test	1,000	,489
Method of extraction : principal components analysis		

Source: By the authors based on SPSS 27

The table shows the distribution of the communality coefficients of each variable that explain the variance in the common factors. The biggest variance that explains the variance with 39.1% is the test of the speed endurance while the minimum variable that explains the variance is the power endurance test whose value is 39.8%. To know the total variance and the self-values, and to extract the factors, we carried out Kaiser test as shown in the table:

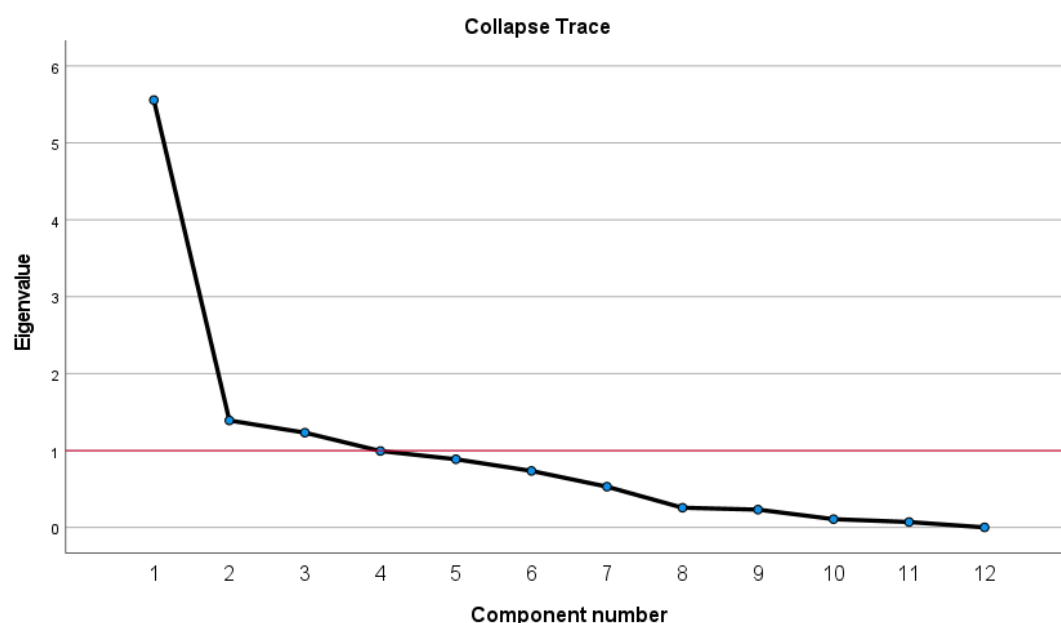
Table 08: the self-values and the explanation values before the rotation

Component	Initial self-values			Values extracted of the change square		
	Total	% of the variance	% cumulated	Total	% of the variance	% cumulated
1	5,727	47,726	47,726	5,727	47,726	47,726
2	1,453	12,112	59,838	1,453	12,112	59,838
3	1,315	10,958	70,796	1,315	10,958	70,796
4	,865	7,204	78,000			
5	,830	6,920	84,920			
6	,599	4,989	89,909			
7	,445	3,706	93,615			
8	,322	2,679	96,295			
9	,270	2,250	98,545			
10	,111	,928	99,473			
11	,061	,507	99,981			
12	,002	,019	100,000			

Source: By the authors based on SPSS 27

Table 08 shows that the factors are 03 and have Eigen values that are more than 01. Their values are respectively 2.727, 1.453, and 1.315 with variance values of 47.726%, 12.112%, and 10.958%, which represent 70.796% of the total variance of the factors. In this regard, they are more than 50%. The remaining 29.204% is for the remaining factors whose latent variables are less than 01. To better explain the extracted variables, we used the scree plot criteria as shown in this figure:

Figure 01: the scree plot test



The graph shows the factors extracted by the Eigen values according to Cattell criterion. In this context, we see only 03 factors whose Eigen values are more than 01, and that each factor has loadings for each set of variables, as shown in table 09:

Table 09: the variables loadings on the factors before the rotation

	Component		
	1	2	3
Speed endurance 30s/30*5	,9390		
Numbered circles test	,9360		
05 jumps test	,9320		
Sprint 30	,7940		,3990
Briksi test	,7810		
Nelson test	,7780		
30m and 10m speed running test	,7690		,323-0
Akramov test	,7620		,425
Long jump		,7410	,389-0
Stand and reach test		,7370	
Flamingo test		,5910	,3600
Repetitive high jumps			,5830

Source: By the authors based on SPSS 27

Table 09 shows that before the rotation, 08 factors are loaded with high values on the 1st factor, 03 on the 2nd factor, and 01 on the 3rd. Therefore, we must make the rotation to distribute the variance and loadings on the factors to get a simple form that can be explained. Therefore, we used the orthogonal rotation suggested by Kaiser to get independent factors, as shown in the table below:

Table 10: the self-values and the explaining values after rotation

Values of the rotation of the changes

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Total	% of the variance	% cumulated
5,065	42,210	42,210
1,962	16,352	58,562
1,468	12,234	70,796

Source: By the authors based on SPSS 27

Table 10 shows that after redistributing the variance between the factors using the orthogonal rotation, the variance rates that explain the factors differ than the previous values before rotation. Despite this, the big rate is for the 1st factor (42.21%), the rate of the second factor is 16.352%, and of the 3rd is 12.234%. As for the rate of explaining the variance in the factors together, it reached 70.796%, which equals the rate of explaining the variance of the factors before rotation. In order to know the correlation between the variables and each factor, we shall use the variables loadings on the factors after rotation, as shown below:

Component			
	1	2	3
Speed endurance 30s/30*5	0,951		
Numbered circles test	0,947		
05 jumps test	0,924		
30m and 10m speed running test	0,833		
Nelson test	0,806		
Briksi test	0,618	0,550	
Akramov test	0,539	0,685	
Sprint 30	0,583	0,672	
Repetitive high jumps		0,629	
Long jump		-0,311	0,757
Stand and reach test			0,737
Flamingo test		0,373	0,586

Source: By the authors based on SPSS 27

Based on Guilford standard that accepts the loaded variables from 0.3 and more, table 11 shows the loadings of 06 variables on the 1st factor with values between 0.951 and 0.618, the loadings of 06 variables on the 2nd factor with values between 0.685 and 0.629, and the loadings of 03 variables on the 3rd factor with values between 0.757 and 0.586. Thus, the condition of 03 factors loadings is achieved after the rotation. Hence, they are accepted. To explain the variables loadings on each factor, we use the tables 12, 13, and 14, as shown in table 12:

Table 12: the values of the variables loadings on the 1st factor

Order	Variable	Loading value
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1	Speed endurance 30s/30*	,9510
2	Numbered circles test	,9470
3	05 jumps test	,9240
4	30m and 10m speed running test	,8330
5	Nelson test	,8060
6	Briksi test	,6180

Source: By the authors based on SPSS 27

Table 12 shows that the 06 variables show loading on the 1st factor with a value of 50% of the 12 variables. Therefore, based on the order of the loading values and the diversity of the variables, this factor is specific. Because of the absence of negative loadings with the positive values achieved, the orientation of the factor is non-polar. This is explained by the results of the athletes in the physical tests, i.e., the footballer who achieves high results in the speed endurance achieves high results in other 05 tests. In addition, the loadings of the first 05 variables of this factor in the rest of the variables equal 00. Besides, the 06th variable shows loading on the 2nd factor with a value of 0.550, and on the 3rd factor with a value of 00. Therefore, the 1st factor is characterized with purity.

Explanation of the variables loadings on the 2nd factor:

Table 13: the loading of the variables on the 2nd factor

Order	Variable	Loading value
1	Akramov test	,6850
2	Sprint 30	,6720
3	Repetitive high jumps	,6290

Source: By the authors based on SPSS 27

Table 13 shows the loadings of 03 variables on the 2nd factor with a value of 25% of the total. These variables are diverse and do not measure the same physical element; therefore, the factor is specific. In addition, the accepted values of the variables loadings are positive and show no negative values. Hence, the factor is non-polar. Besides, the loadings of the factor show values close to 00 on the rest of the factors; hence, the factor is characterized with purity.

Explanation of the variables loadings on the 3rd factor:

Table 14: the loading of the variables on the 3rd factor

Order	Variable	Loading value
1	Long jump	,7570
2	Stand and reach test	,7370
3	Flamingo test	,5860

Source: By the authors based on SPSS 27

Table 14 shows the loading of 03 variables on the 3rd factor with a value of 25% of the total. These variables are diverse and do not measure the same physical element; therefore, the factor is specific. In addition, the accepted values of the variables loadings are positive and show no negative values. Hence, the factor is non-polar. Besides, the loadings of the factor show values close to 00 on the rest of the factors; hence, the factor is characterized with purity. To know the type of relation between the variables, we shall rely on the components matrix, as shown in table 16:

Table 16: the components matrix that shows the relation between the variables before and after the rotation

Matrix of the components transformation			
Component	1	2	3
1	0,922	0,683	0,590
2	-0,065	0,003	0,998
3	-0,382	0,224	-0,027
Method of extraction: principal components analysis Method of rotation : Vari max with Kaiser normalization.			

Source: By the authors based on SPSS 27

Table 16 shows an average positive correlation between the 1st, 2nd, and 3rd factors before rotation. The values were respectively 0.683 and 0.590. Besides, the correlation between the 2nd and 3rd factors is 0.998, which shows a strong correlation between the two factors. After rotation, the value of correlation changed, as the correlation between the 1st, 2nd, and 3rd factors is 0.065 and 0.382, respectively. This shows a very weak inverse correlation. On the other hand, the correlation between the 2nd and 3rd variables is 0.224, which shows a weak direct correlation. Therefore, we conclude from the components matrix after rotation that the correlation between the factors is weak, and confirm the independence relation between them. Hence, EFA using the principal components and the orthogonal rotation is valid and correct.

Discussion of the study results in the light of the hypothesis:

The objective of this hypothesis is to extract the latent factors of fitness components through physical tests using Exploratory Factor Analysis (EFA). This method helps to analyze the factors and create a battery of tests for evaluating football players. After conducting statistical analyses, we identified three factors that explain 12 variables (physical tests), each distinct from the other. Specifically, six physical tests showed loadings on the first factor based on the order of the variable loadings. These tests measure speed endurance, compatibility, movement speed, transitional speed, reaction time, and endurance. According to Abu Abdu, speed endurance comprises speed and endurance, as players run long distances at high speeds during a match. Therefore, it reflects a footballer's ability to maintain high levels of rapid movements over long distances and extended periods, with minimal breaks. Practical examples include planning and skill performance at various speeds, such as running with or without the ball, taking appropriate positions, and repetitive running (Abu Abdu, 2008, p. 40).

Additionally, Dellal Alexandre emphasizes that the coordination between body parts during skill execution is crucial for precise performance and is fundamental to mastering the skill. Without coordination between the athlete's vision, the ball, and their body parts; controlling the ball becomes impossible (Dellal Alexandre, 2008, p. 50). According to Fleishman, coordination is the athlete's ability to perform a series of complex movements simultaneously. Furthermore, Assim Hilmi (1999) adds that

coordination involves accurately and flexibly synchronizing different movements. He explains that it requires significant co-operation between the muscular and nervous systems to execute the movement optimally (Amira Hassan Mahmoud & Maher Hassan Mahmoud, 2008, pp. 219-220).

Moreover, Schroder asserts that the capability of the muscular and neural systems to confront resistance with high-speed contractions is essential for executing the skills and physical efforts required in the game. This means displaying power in the shortest time possible due to the constant changes in the intensity and level of effort (Fadel Daham Mansor al Mayahi, 2018, p. 33). Analyzing the game reveals that match conditions demand rapid movement for transitions, performance, or responses. Increased playtime, sudden attacks by opponents, a striker attempting to break through the defense, a defender trying to block a strike, or moving quickly to pass or receive the ball all necessitates high transitional speed and quick reactions.

Furthermore, Roggie Loumir states that general endurance enables sustained moderate-intensity efforts over extended periods (Jacque le Gyader, 2005, p. 67). This endurance is evident in an athlete's ability to perform average or high-intensity movements consistently from the first minute to the last minute of a match with the same efficiency (Jean-Paul Ancian, 2008, p. 31). Its significance lies in its positive preventive effects on the heart and blood circulation, as well as its impact on performances during competitions and training loads. For instance, it allows seamless transitions from defense to attack (and vice versa) with a high level of control and motor efficiency. Overall, this extends the duration an athlete can maintain dynamic or static activities, enhances physical capacity, and increases the body's resistance to fatigue and external environmental stimuli (Ahmed Attia Fetehe, 2017, p. 31).

Regarding the second factor, three variables exhibit loadings, which are diverse; as they measure fitness, motor speed, and power endurance—all essential in football. A footballer must be physically fit to change body positions, quickly change directions, master new movements, and select the appropriate method for performances (Abd al Khalek, 2005, p. 179). Additionally, the player needs the skill to swiftly alter a performance, link skills, change speed and direction, run to evade opponents, and receive the ball within short times (Ali Fateh Salman, 2018, p. 09). Speed of movement is also crucial for certain actions, such as kicking the ball, shooting, or running. Furthermore, power endurance is necessary for continuous engagements and physical confrontations with opponents to gain control of the ball, while they maintain physical commands for extended periods, utilize muscular strength, and execute powerful shots (Fatma Abd Maleh et al., 2009, p. 98).

Regarding the third factor, three physical tests show loadings. These tests measure the explosive power of the lower limbs, trunk flexibility, and overall body balance, which are highly efficient in performances. Struggles, heading the ball, quick starts, changing directions, shooting, and jumping all require muscular power (Turpin, 2002, p. 65), as these movements depend on how the body is moved. Additionally, muscles control these movements through contraction and stretching (Abu Abdu, 2007, p. 76).

Flexibility plays a vital role in enhancing efficiency and preventing injuries, strains, and muscle or ligament dislocations across all skills. It enables athletes to acquire and master technical motor performance, positively impacting muscular power levels. For instance, it facilitates raising the feet high to control the ball, bending the trunk backward to receive it, extending the arms to throw or pass, and executing various movements like shooting (Amr Allah al Bassati, 2001, p. 181). During matches, all movements—whether voluntary or involuntary—are performed by structural muscles, making balance a fundamental aspect of body positioning changes and physical activities. Improved balance enhances

overall performance (Kadri, 2018, p. 16) and significantly supports skill execution. Moreover, balance represents the neural and muscular compatibility between lower limbs, allowing precise body control during movements where external and internal forces on the body balance out (Kahli et al., 2016, p. 143).

Based on the three variables identified through Exploratory Factor Analysis (EFA), the findings align with Gasmi Abd al Malik's research, who identified four factors and recommended five physical tests to measure explosive power, speed power, transitional speed, endurance, and fitness. Additionally, they correspond with the findings of Yuanhua Li & Shishan Weng, who suggested tests to evaluate speed, endurance, power, flexibility, and agility in footballers' physical training. The evaluation process in sports holds significant importance as a cornerstone of education and training. It enables providing feedback, identifying areas needing improvement, and reinforcing strengths. Evaluation also assesses performances and reflects the changes achieved through training and learning, based on performance specifications (Mohamed Hassan Farhoud et al., 2023, p. 96).

The trainer should schedule specific dates for program evaluations using specialized tests to guide future actions (Mansor Jamil al Abki, 2013, p. 192). Physical tests serve as a fundamental resource for training, providing insights into an athlete's current physical state and abilities. Therefore, the three factors derived from explaining the 12 physical tests should be incorporated into the evaluation battery due to their relevance, reliability, consistency, and widespread acceptance in football. This battery aligns with internationally recognized standards such as NFTP-PRC, Eurofit, AAHPER, and Alpha. These tests measure diverse components, affirming the hypothesis that underscores the diversity of fitness components in football.

The results and future hypotheses:

The results:

After recommending the physical tests according to the views of the expert teachers and trainers, and after testing their properties, making the exploratory factor analysis, and extracting 03 factors, namely:

- Factor one is explained by the speed endurance, the compatibility, the speed power, the transitional speed, the response time, and the general endurance.
- Factor two is explained by the agility, the movement speed, and the power endurance.
- Factor three is explained by the explosive power, the flexibility, and the balance.

We can set a scientific battery of tests for U-19 footballers to evaluate their performance during the season, or diagnose it in the beginning of the season.

The future hypotheses:

1. Identifying the standard levels of the fitness components based on the battery of tests we made to reveal the physical level of U-19 footballers.
2. Using EFA to analyze the factors of the fitness of other age categories.
3. Building a diverse tests battery to measure more than one aspect (the physical, tactical, and skill sides) and evaluate the athletes.
4. Building a tests battery to select, monitor, and evaluate the talented children.

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