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SPECIAL ISSUE ARTICLE

Designing a Model of Essential Motor and Physical Abilities as an Indicator for Selecting Track and Field Athletes Specialized in Jumping (Ages 13–15)

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Abstract

The significance of this study lies in designing a model for evaluating motor and physical determinants as a scientific tool to assist coaches and experts in selecting young athletes aged 13–15 years according to precise criteria aligned with the demands of jumping and leaping events. The current research aims to develop an evaluative model that contributes to establishing quantitative and qualitative standards that can be relied upon in guiding selection and training processes, thereby enhancing the early development of athletic talent. The study specifically sought to design a model targeting the most critical motor and physical abilities as indicators for selecting athletes in selected jumping events within the 13–15 age group. The researcher employed the descriptive method using a survey approach, as it was deemed appropriate for addressing the research problem. The study population consisted of track and field athletes specializing in jumping and leaping events. The sample included 35 athletes selected from the National Centre for Sports Talent (specialized athletics schools in the provinces), including Baghdad, Diyala, Karbala, and Najaf. Research procedures involved conducting tests to assess physical and motor determinants. The researcher concluded that the sample's performance levels were distributed primarily at the "average" level, followed by "good" and then "acceptable." The proposed evaluative model allows for predicting the future performance level of young athletes, making it a reliable tool for early athletic talent identification. The researcher recommends adopting the developed standards and model in objective evaluation processes and applying them in athletics centres and academies to support talent selection in jumping events, and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Quality Education).

Keywords: Adolescent athletes, Motor abilities, Jumping events, Talent identification

1. Introduction

Each athletic event or sport has specific requirements or ideal characteristics that must be present in the athlete to enable them to achieve advanced levels of performance. Consequently, the need for selection has emerged due to the variation in these characteristics. Accordingly, talent selection has become one of the fundamental pillars in the field of sports for reaching elite performance levels. "It has become widely accepted that the likelihood of an athlete reaching elite levels in the field of sports is significantly enhanced when the athlete is selected from the outset and directed toward the type of sport activity that aligns with their predispositions and various capabilities. Moreover, the ability to predict the extent to which training processes will impact the growth and development of these predispositions and capabilities in an effective manner enables the athlete to achieve continuous progress in their athletic performance. This, in essence, constitutes the core of the selection process" (Ismail, 2005, p. 15).

Moreover, sports talent identification pertains to selecting athletes who possess distinctive physical, physiological, functional, motor, psychological, and cognitive characteristics—qualities that represent the abilities, talents, and predispositions necessary for practicing a particular sport in alignment with the athlete's interests and capacities across age stages proposed by specialists. "The concept of athletic compatibility—which refers to the possibility of

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discovering the athlete's capabilities that are suitable for practicing a given sport—represents a high probability indicating that the athlete's potential is aligned with the successful continuation and completion of training. For this concept to succeed, it is essential to accurately identify all factors that determine access to elite levels, as well as the ideal requirements that an athlete must possess to achieve high-level performance" (Al-Kashef, 1987, p. 57).

The selection of sports talents is thus a fundamental element in building champions and securing athletic success. This process must rely on scientific foundations involving precise assessments of motor, physical, and physiological capacities. Athletics—particularly jumping events—require a sophisticated interplay of strength, speed, flexibility, and other motor determinants that directly influence athletic performance.

Children aged 13 to 15 represent a critical phase in their athletic pathways, marked by notable physical and motor development. This developmental stage necessitates rigorous selection systems based on scientific standards that assess the most relevant performance indicators. The significance of designing an evaluative model based on key physical and motor determinants linked to jumping events thus emerges. Such a model would enable coaches and specialists to identify the most promising athletes early and guide them toward suitable specialization.

Jumping sports demand high levels of physical fitness and motor proficiency, relying on a complex integration of strength, speed, balance, and coordination. Amidst the rapid advancements in sports science, there is growing emphasis on selecting talented athletes at early ages, particularly between 13 and 15 years—a decisive period for physical and motor development. Identifying the core determinants that affect performance in these disciplines is essential for developing effective training programs and guiding talent development through rigorous, evidence-based methods.

Selecting young athletes is a cornerstone of preparing champions capable of competing at high levels. In light of ongoing developments in sport sciences and training methodologies, the adoption of scientifically grounded assessment methods is vital for early talent identification. Jumping events, in particular, demand a fusion of motor and physical attributes, such as explosive power, speed, coordination, and flexibility. Therefore, establishing clear, measurable criteria is necessary to identify those best suited for these events.

Nevertheless, a knowledge and application gap persists regarding the identification of the most reliable physical and motor indicators for talent selection in jumping disciplines, especially within the 13–15 age group. This phase represents a critical period in a child's physical and motor growth. Current selection practices often rely on subjective or imprecise criteria, leading to suboptimal talent channeling. Despite challenges—such as difficulties in accurately measuring these capacities in youth or the need for specialized equipment—the expected outcome is the development of a practical, field-applicable evaluation model for identifying talented athletes. Such a model would enhance selection efficiency and support the objectives of physical education in cultivating motor and physical capacities among young athletes.

Based on the foregoing, the research problem can be articulated as follows: *What are the most influential motor and physical determinants in selecting athletes for jumping events within the 13–15 age group? And how can an evaluative model be designed based on these determinants to assist coaches in identifying the most talented athletes using precise scientific criteria?*

This research derives its significance from its pioneering role in enhancing early-stage talent identification. The proposed model aims to enable coaches and physical education professionals to recognize children with the requisite capacities to excel in jumping sports. The study also addresses a knowledge gap by establishing precise selection criteria for this age group, drawing upon existing literature and scientific theories in kinesiology and physical education.

In sum, this study represents a critical advancement toward developing a scientifically sound methodology for identifying potential in jumping sports at an early age. It contributes to the pursuit of athletic excellence and reinforces academic and practical efforts to nurture talent based on objective, evidence-driven foundations.

The research examines the principal motor and physical determinants that influence performance in jumping events, focusing on measurable indicators that can effectively determine young athletes' potential. It also aims to develop precise assessment tools that support coaches in making evidence-based decisions in selecting suitable athletes for these disciplines.

1.1. Research objective

1. To identify the level of motor and physical abilities as an indicator for selecting track and field athletes specializing in jumping events aged 13–15 years.
2. To establish normative levels for selected motor and physical abilities as a basis for selecting track and field athletes in jumping events aged 13–15 years.

Table 1. Illustrates the description of the research population and sample.

Seq	School	Main Application Sample	Pilot Study Sample
1.	The Specialized School for Athletics / Baghdad	12	2
2.	The Specialized Athletics School in Diyala	8	2
3.	The Specialized Athletics School in Karbala	7	2
4	The Specialized Athletics School in Najaf	8	2
	Total	35	8

3. To design a model based on key motor and physical abilities as an indicator for selecting track and field athletes specializing in jumping events within the 13–15 age group.

1.2. Research domains

- **Human Domain**: The research sample consisted of 35 athletes from the National Center for Sports Talent Development, specifically enrolled in the specialized athletics schools located in Baghdad, Diyala, Karbala, and Al-Najaf Al-Ashraf.
- **Temporal Domain:** The study was conducted from January 6, 2025, to January 18, 2025.
- **Spatial Domain:** The research was carried out at the specialized athletics schools in Baghdad, Diyala, Karbala, and Al-Najaf Al-Ashraf.

2. Research methodology and field procedures

Research Methodology: The researcher adopted the descriptive approach using the survey method, as it is deemed suitable for addressing the research problem effectively.

Research Sample: The research population included athletes in track and field specializing in jumping events. A sample of 35 athletes was randomly selected from the National Center for Sports Talent Development, representing the specialized athletics schools in Baghdad, Diyala, Karbala, and Al-Najaf Al-Ashraf. The selected participants belonged to a single age group (13–15 years), as detailed in Table 1.

2.1. Research equipment and tools

- Digital Medical Scale — Chinese-made, quantity: 1
- Electronic Stopwatches — Japanese-made, 1/100 second precision, quantity: 4
- Medicine Ball — 3 kg weight
- Whistles — quantity: 3
- Measuring Tapes — lengths of 10 meters and 50 meters, Chinese-made
- Colored Signal Flags — quantity: 6
- Rope, Cones, Colored Chalk, Colored Adhesive Tape vfill
- Measuring Ruler
- Digital Video Camera — SONY brand

2.2. Research procedures

2.2.1. Identification of key physical and motor abilities

To identify the relevant physical and motor abilities, the researcher referred to a range of Arabic and international scientific sources. Based on these references, a set of physical and motor abilities was determined and included in a questionnaire form (Appendix 1 and 1(a)). This form was then presented to experts and specialists in testing, sports training science, and track and field for the purpose of gathering their opinions and identifying the abilities most fundamental to jumping events—those that contribute significantly to evaluating the performance of athletes at the National Center for Sports Talent Development aged 13–15 years.

The selection of these abilities was based on the values of the Chi-square test (χ^2), where values equal to or greater than 5 were considered statistically significant, exceeding the critical value of 3.84 at a degree of freedom (df = 1) and a significance level of (0.05). As a result of this process, three physical abilities were found to be valid, as their Chi-square values surpassed the tabulated threshold. Table 2 presents these findings.

2.2.2. Selection of tests used in the research

Following an extensive review of various scientific sources, several physical and motor ability tests were selected, with attention to the variation in their use across prior studies. The researcher subsequently compiled a list of relevant tests and incorporated them into a questionnaire designed to gather expert evaluations. This questionnaire was distributed to eleven specialists in the domains of physical testing, sports training, and athletics. Based on expert responses, the researcher selected those tests that received an agreement rate of 80% or higher, as shown in Table 3. distributed to eleven specialists in the fields of testing, sports training, and athletics to determine the most appropriate tests for inclusion. The researcher then selected those tests that achieved a consensus agreement of 80% or more among the experts, as presented in Tables 3 and 4.

Table 2. Presents the experts' evaluations and the corresponding calculated and tabulated Chi-square (χ^2) values for five proposed physical ability determinants.

No.	Physical and Motor Abilities	Number of Experts	Agreed	Disagreed	Calculated Chi-Square (χ^2)	Tabulated Chi-Square (χ^2)	Significance Level
1	Transitional Speed	11	9	2	4.454	3.84	Significant
2	Speed-Strength	11	11	0	11		Significant
3	Explosive Strength	11	9	2	4.454		Significant
4	Flexibility	11	8	3	2.272		Not Significant
5	Muscular Endurance	11	7	4	0.818		Not Significant
6	Motor Speed	11	7	4	0.818		Not Significant
7	Coordination	11	11	0	11		Significant
8	Agility	11	11	0	11		Significant
9	Motor Balance	11	9	2	4.454		Significant
10	Motor Transfer	11	7	4	0.818		Not Significant

*The tabulated chi-square (χ^2) value is 3.84 at 1 degree of freedom (df = 2−1 = 1) and a significance level of 0.05.

Table 3. Expert agreement rates for special strength tests.

No.	Physical Determinant	No.	Test Description	Relative Importance	Accepted
1	Speed	1	30-meter sprint from a standing start	100%	✓
		2	40-meter sprint from a standing start	75%	
		3	50-meter sprint from a standing start	66.66%	
2	Leg Speed-Strength	1	Three consecutive bounding hops	91.66%	✓
		2	10-second speed bounding run	66.66%	
		3	Five-step power test	75%	
3	Arm Explosive Power	1	Overhead forward throw of a 3kg medicine ball from standing	83.33%	✓
		2	Forward throw of a 3kg medicine ball from seated position	66.66%	
		3	Forward push of a 3kg medicine ball in motion	58.33%	
4	Leg Explosive Power	1	Standing long jump	91.66%	✓
		2	Vertical jump from standing without arm swing	75%	
		3	Sargent vertical jump	83.33%	✓
5	Flexibility		Supine leg pull towards chest	66.66%	
			Dynamic flexibility test	75%	
			Seated forward trunk flexion	91.66%	✓

Table 4. Expert agreement on motor ability test.

No.	Motor Ability	No.	Test Description	Relative Importance	Accepted
1	Agility	1	Zigzag run test	66.66%	
		2	Inclined prone-stand test	75%	
		3	Zigzag run between obstacles	91.66%	✓
		4	Fleishman's zigzag run test	58.33%	
		5	Shuttle run test	66.66%	
2	Coordination	1	Throw and catch test	58.33%	
		2	Rope skipping test	58.33%	
		3	Lunge movement test	66.66%	
		4	Numbered circles test	83.33%	✓
3	Balance	1	Modified Bass dynamic balance test	91.66%	✓
		2	Headstand test	66.66%	
		3	Seated balance test	75%	
		4	One-leg standing test	58.33%	
		5	Forward balance test	66.66%	

2.2.3. Tests for the physical and motor abilities proposed for jumping events

1. 30-meter sprint test from a standing start (Majeed, 1991)

Purpose of the Test: To measure transitional speed.

Equipment Used: A test field with marked start and finish lines 30 meters apart, two sprinting lanes (each 1.22 meters wide), two electronic stopwatches, two whistles, and two signal flags.

Performance Description: The participant stands behind the starting line in a high start position. Upon hearing the start signal, they sprint straight and as fast as possible within their lane until they cross the finish line.

Test Administration:

- One recorder is responsible for calling out the names of the students and documenting their test times.
- One starter oversees initiating the sprint and ensures the correctness of execution.
- Two timekeepers are assigned to measure the duration of the test.

Instructions:

- To foster a sense of competition among the participants, the test is conducted with two students running simultaneously.
- Each student must remain within the designated running lane throughout the test.
- Each participant is allowed only one attempt.

Scoring: Time is recorded to the nearest 1/100 of a second.

2. Overhead Forward Medicine Ball Throw (3 kg) from Standing (Hassanein, 2001)

Purpose of the Test: To measure the explosive strength of the arm muscles (upper limbs).

Required Equipment: Test area, measuring tape, 3kg medicine ball, whistle, and chalk.

Performance Description: The participant stands with feet apart behind a marked line, holding the medicine ball at chest level. On the signal, the ball is swung backward then thrown forward over the head for maximum distance with speed emphasized.

Instructions:

- The participant is not permitted to touch the marked line on the ground or the area beyond it.
- The feet must remain in contact with the ground throughout the performance.
- Each student is allowed two attempts, with the best result recorded.
- The score achieved by each student must be announced to the next participant to reinforce the element of competition.

The participant must not step on or over the line, and the feet must remain on the ground. Each participant has two attempts, with the better result recorded. The result is announced aloud to the next participant to enhance motivation.

Test Administration:

- One recorder logs names and results based on ball landing.
- One judge signals the start and observes proper form.

Scoring: Distance is measured in meters from the inner edge of the line to the nearest mark left by the ball.

3. Standing Long Jump (Hassanein, 2001)

Purpose of the Test: To measure the explosive strength of the leg muscles.

Required Equipment: Flat, non-slippery surface, measuring tape, marked starting line.

Performance Description: The participant stands behind the line with feet slightly apart, arms raised. They swing their arms while bending the knees and torso, then jump forward using both legs simultaneously to cover maximum distance.

Instructions:

- Each participant is allowed two attempts, with the better result being recorded.
- If the participant loses balance and any part of the body other than the feet touches the ground, the attempt is considered invalid and must be repeated.
- Both feet must remain in contact with the ground until the moment of takeoff.

Test Administration:

- One recorder logs names and distances.
- One judge observes performance and measures the jump.

Scoring: Distance is measured from the inner edge of the start line to the closest mark left by the participant.

4. The Vertical Standing Jump Test (Sargent) (Alawi, 2001)

Purpose of the Test: To measure the explosive power of the leg muscles.

Required equipment: A smooth vertical wall of appropriate height, a measuring tape, and chalk.

Performance Description:

- The student stands facing a smooth wall, stretches both arms upward as far as possible, and marks the wall with chalk without lifting the heels off the ground. The number aligned with the mark is recorded.
- The student then stands sideways to the wall. From a standing position, they swing both arms downward and backward, bend the trunk forward and downward, and flex the knees to form a right angle.
- The student then extends the knees and pushes upward with both feet simultaneously, vigorously swinging the arms forward and upward to reach the highest possible point, where another chalk mark is placed on the wall.

Instructions:

- The jump must be executed using both feet.
- Before jumping upward, the participant should swing the arms forward and downward to synchronize movement timing in order to reach maximum height.
- Measurements should be recorded to the nearest 1 cm.

Test Administration:

- One recorder is responsible for calling out participants' names and documenting results.
- One judge calculates the scores and monitors the accuracy of performance.

Scoring: The participant's score is the number of centimeters between the mark reached from a standing position and the highest point reached as a result of the vertical jump, rounded to the nearest 1 cm.

5. The Triple Hop for Maximum Distance Test (Alou, 2008)

Purpose of the Test: To measure leg speed-strength (explosive strength with speed) from a ready position.

Required Equipment: Stopwatch, alignment cone, whistle, measuring tape, and recording sheet.

Performance Description:

- The athlete stands behind the starting line. Upon hearing the signal, they perform a series of three consecutive bounding hops in a straight line at maximum speed.
- The athlete places one foot just behind the starting line.
- Using powerful leg extension, the athlete pushes off the ground to execute three consecutive bounds, aiming to cover the greatest distance possible while maintaining readiness throughout the movement.

Scoring: The distance is measured from the inner edge of the starting line to the furthest mark left by the athlete's body upon ground contact. Each athlete is allowed two attempts, with the better distance recorded.

6. The Forward Trunk Flexion Test from a Long Sitting Position (Hassanein, 2001)

Purpose of the Test: To measure the flexibility of the back and hamstrings through forward trunk flexion from a long sitting position.

Required Equipment: The test can be performed directly on the floor. Markings can be made using chalk, a graded Justin ruler, or the Wells and Dillon flexometer.

Performance Description: The participant sits in a long sitting position with the back straight and hands resting on the floor beside the body. The participant then extends the arms forward and upward in alignment with the trunk, bending the torso forward to reach as far as possible.

Instructions:

- Each participant is allowed two attempts, with the best score recorded.
- The test must be performed with knees fully extended (bending the knees is not allowed).
- Two warm-up trials are permitted for familiarization.
- To record a valid score, the participant must hold the final position for 2 to 3 seconds.

Test Administration:

- **Judge:** Observes the execution, calculates the score, and ensures that participants do not bend their knees.
- **Recorder:** Calls the participants and documents the results.

Scoring: The participant's score is the distance from the starting point at the heels to the furthest point reached with the fingertips.

2.2.4. Motor ability tests used in the study

1. The numbered circles test (Hassanein, 2001)

Purpose of the Test: To measure eye–foot coordination.

Required Equipment: A stopwatch, a measuring tape, and eight circles drawn on the ground, each with a diameter of 60 cm.

Performance Description: The participant stands inside Circle No. 1. Upon hearing the start signal, they jump with both feet simultaneously to Circle No. 2, then to Circle No. 3, and continue in sequence until reaching Circle No. 8, performing the task at maximum speed.

Test Instructions:

- The participant must jump using both feet simultaneously.
- The jumps must follow the numerical order of the circles.
- Each participant is given two attempts, and the better time is recorded.

Scoring: The participant's score is the total time (in seconds) taken to move through all eight circles as shown in Fig. 1.

2. Zigzag Running Test Between Hurdles (Alawi, 2001)

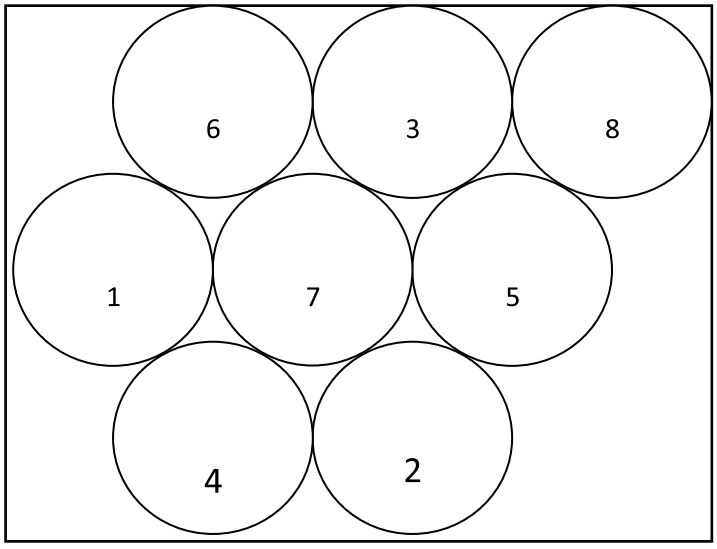

Fig. 1. Numbered circles test.

Purpose of the test: To measure the ability to change direction during running (agility assessment).

Required equipment:

- Measuring tape, stopwatch, and four track and field hurdles, along with a whistle.
- A solid-surface running field with a length of 9 meters and a width of 2 meters.
- A starting line should be drawn with a length of 1.80 meters and a thickness of 5 cm.
- Four track and field hurdles are placed facing the starting line, with the first hurdle positioned 3.60 meters from the start and a spacing of 1.80 meters between each hurdle.
- Two points, labelled (A) and (B), should be designated at both ends of the starting line to mark the start and finish.

Performance Description:

- The participant assumes a ready position behind the starting line at the right end of the line at point (A).
- Upon receiving the start signal, the participant begins running between the four hurdles in a figure-eight pattern, circles around the last hurdle, and continues running back through the hurdles, crossing the finish line at the opposite end at point (B).

Instructions:

- The participant starts running from a standing position at point (A).
- The running direction must pass through the four hurdles.
- The test concludes when the participant crosses the finish line at point (B) at maximum speed.
- Each participant is allowed only one attempt.
- One-tenth of a second is added to the total time if the participant touches any of the four hurdles.

Test Administration:

- **Timekeeper**: Responsible for signalling the start and recording the time.
- **Recorder**: Responsible for noting any errors and recording the time.

Scoring: The participant's score is the total time taken from the moment the start signal is given until the participant crosses the finish line as declared in Fig. 2.

3. Bass Modified Test for Motor Balance (Alawi, 2001)

Purpose of the test: To measure the ability to jump accurately and maintain balance during and after the movement.

Required equipment:

- Stopwatch and measuring tape.
- Eleven markers, each measuring 1 inch × ¾ inch, fixed to the ground with measurements on the ground indicated in inches.

Performance description: The participant stands with the right foot on the starting point and then begins to jump to the first marker with the left foot, attempting to maintain balance on the ball of the left foot for as long as possible, up to a maximum of five seconds. Subsequently, the participant jumps to the second marker with the right foot, and so forth until reaching the last marker.

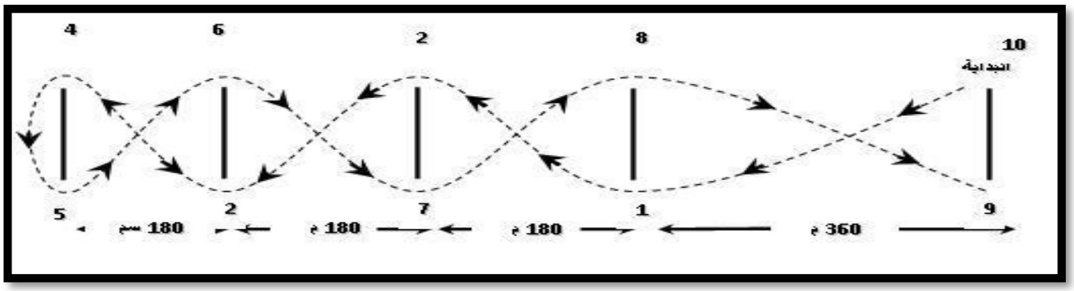

Fig. 2. Cone sprint test.

Test administration: A judge records landing errors and balance errors, providing audible countdown for the five seconds to the participant.

Scoring:

- The participant is awarded 5 points for each marker landed on correctly.
- The participant receives 1 point for each second they maintain balance on the marker, up to a maximum of 5 seconds, making the total possible score 100 points.
- The 5 points for a correct landing on a marker are not awarded if the participant fails to come to a stop after jumping onto the marker, touches the ground with any part of the body other than the ball of the foot, or fails to cover the marker with the ball of the foot. In such cases, the participant is allowed up to 5 seconds to regain balance on the ball of the supporting foot.
- If the participant commits any of the following balance errors before the end of the 5-second period, one point is deducted for each second of instability.

Pilot Study:

The pilot tests for the research were conducted as follows: The first pilot was held on Saturday, January 4, 2025, at 10:00 AM at the National Athletics Center in Baghdad. The second took place at Diyala Sports Club stadium on Monday, January 6, 2025, at 10:00 AM. The third was conducted at Karbala Sports Club stadium on Saturday, January 11, 2025, at 10:00 AM, and the fourth at Najaf International Stadium on Friday, January 17, 2025, at 10:00 AM. The objectives of these pilot studies were:

1. To determine the time required to conduct the tests and their sequence.
2. To assess the responsiveness of the sample and the ease of performing the tests.
3. To verify the validity and suitability of the equipment and tools used.
4. To evaluate the research team's ability to perform tasks accurately and familiarize themselves with the proper completion of the research forms.
5. To identify potential difficulties and obstacles that might hinder the execution of the tests.

2.3. Psychometric properties of the tests

2.3.1. First: Test validity

Validity is one of the most fundamental qualities of a good test, serving as the foundation for building tests due to the benefits it provides in evaluating various tests and understanding test components and individual capabilities. According to Lindquist's definition cited by Al-Nimr (2008), validity is defined as the degree to which a test accurately measures what it intends to measure. In other words, a valid test measures only the intended function and does not measure anything else or include additional constructs. After reviewing relevant literature and prior studies employing skill tests standardized for the same age group, the researcher applied face validity and construct validity by presenting the test to experts in the relevant field.

2.3.2. Second: Test reliability

A good test is defined as one that yields consistent or similar results when administered multiple times under the same conditions (Obaidat, 1998). To verify the reliability of the test, the researcher employed the test-retest method. Results were collected from pilot samples during the first pilot study over one week. The tests were repeated one week after the initial administration. The sample consisted of twelve athletes, and the correlation coefficient was calculated using Pearson's simple correlation formula between the two test administrations as an indicator of reliability and stability.

2.3.3. Third: Test objectivity

The tests used in this research rely on numerical results that are not subject to subjective judgment by evaluators. Therefore, these tests minimize bias and self-assessment, providing high objectivity in measurement, as in Table 5.

Table 5. Presents the reliability (stability) coefficient and internal consistency of the physical and motor ability tests.

No.	Tests	Reliability Coefficient (r)	Internal Consistency (α)	Significance Level
1	Transitional Speed	0.84	0.916	Significant
2	Explosive Strength of the Arms	0.92	0.959	Significant
3	Explosive Strength of the Legs (Standing Long Jump)	0.87	0.932	Significant
4	Explosive Strength of the Legs (Sargent Jump)	0.814	0.902	Significant
5	Speed-Strength of the Legs	0.805	0.897	Significant
6	Flexibility	0.902	0.948	Significant
7	Coordination	0.896	0.946	Significant
8	Agility	0.884	0.940	Significant
9	Balance	0.902	0.948	Significant

2.4. Main experiment

After selecting the tests and completing the pilot study, and following the preparation of the necessary equipment, tools, testing venue, and the standardization of the timing and conditions for conducting the tests in accordance with the pilot study sequence, the researcher applied the tests to the main sample consisting of 35 athletes. Testing commenced on Sunday, January 5, 2025, and concluded on Saturday, January 18, 2025. The tests were conducted on the research sample with the researcher undertaking appropriate organizational measures to ensure the smooth implementation of the tests and the achievement of the following objectives:

- Preparing the testing site.
- Explaining and presenting the test components, scoring rules, and performance procedures before the commencement of the application.
- Allowing the participants a 15-minute warm-up period prior to the start of the tests.

2.5. Statistical methods

The Statistical Package for the Social Sciences (SPSS) was employed to analyze the data obtained by the researcher, relying on established scientific sources and utilizing the following statistical methods:

- Arithmetic mean
- Standard deviation
- Pearson's simple correlation coefficient
- Skewness coefficient
- Adjusted T-score
- Z-score

3. Presentation, analysis, and discussion of results

3.1. Presentation and analysis of test results

To establish normative standards, it is essential to convert raw scores—measured in diverse units—into standardized scores with unified measurement units. This transformation facilitates the determination of the relative status of raw scores and enables the interpretation and evaluation of their outcomes. Given that standardized scores may include negative values, the researcher utilized adjusted T-scores. These scores represent a standardized method for assessing individual values based on the arithmetic mean and standard deviation, allowing for the establishment of normative levels against which all other cases can be evaluated (Ahmed, 1996).

The statistical processing of test results involved the calculation of means and standard deviations to derive the adjusted T-scores, which have a mean of 50 and a standard deviation of 10 (Abu Al-Ala, 1986).

The T-score typically ranges from 20 to 80. It is worth noting that the T-score increases when the raw score surpasses the arithmetic mean, particularly in tests measured in meters and their fractions or using numerical scores. Conversely, the T-score decreases when the raw score falls below the arithmetic mean.

The researcher adopted the Gaussian distribution (normal distribution), which is among the most widely used in the field of physical education, as many traits and characteristics measured in this discipline tend to approximate a normal curve (Al-Kashef, 1987). This method is considered one of the most objective approaches for evaluating scores. It is based on the premise that approximately 99.73% of all cases fall within three standard deviations on either side of the mean. In other words, the total range spans six standard deviation units. By dividing this range into six standard levels, the researcher assigned each standard level a range of one unit of standard scores, equivalent to 10 units in the percentile score scale for adjusted scores. This can be seen clearly Fig. 3.

The results presented in (Tables 6 to 8) reveal the ranges of raw scores, standardized scores, defined performance levels, and frequencies for the physical and motor tests. These levels ranged from poor, acceptable, average, to good, with the highest frequencies recorded in the acceptable and average categories. This distribution is attributable to the fact

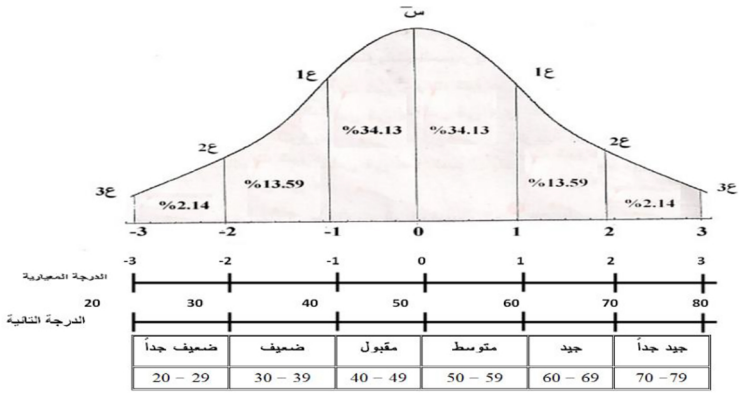

Fig. 3. Illustrates the standard-score (T-score) levels and their boundary values.

Table 6. Presents the median, mean, standard deviation, and skewness for the study sample across the investigated skills.

No.	Test	Unit of Measurement	Mean	Median	Standard Deviation (SD)	Skewness
1	Transitional Speed	S	5.6797	5.6700	0.04349	0.562
2	Explosive Strength of the Arms	M	3.6017	3.6500	0.09037	–0.664
3	Explosive Strength of the Legs (Standing Long Jump)	M	2.1100	2.1000	0.11619	0.847
4	Explosive Strength of the Legs (Sargent Jump)	Cm	29.600	29.0000	2.59184	0.147
5	Speed-Strength of the Legs	M	5.2037	5.1800	0.20395	0.440
6	Flexibility	Cm	3.5680	3.5500	0.19876	–0.968
7	Coordination	Score	7.5377	7.5500	0.09912	–0.211
8	Agility	S	9.3317	9.3200	0.05721	0.939
9	Balance	Score	76.542	77.0000	1.52128	–0.060

Table 7. Displays the raw scores, Z-scores, and T-scores for the physical and motor tests.

Translational Speed				Explosive Arm Power				Explosive Leg Power (Long Jump)			
Raw Score	Rank (K)	Z-score	T-score	Raw Score	Rank (K)	Z-score	T-score	Raw Score	Rank (K)	Z-score	T-score
5.59	2	–2.06303	68.46	3.45	5	–1.67873	33.21	1.95	5	–1.37706	36.23
5.65	5	–0.6833	66.16	3.5	6	–1.12547	38.75	2.0	6	–0.94673	40.53
5.66	6	–0.45334	50.07	3.61	5	0.09168	50.92	2.1	7	–0.08607	49.14
5.67	9	–0.22339	47.77	3.65	8	0.53428	55.34	2.15	9	0.34427	53.44
5.68	6	0.00657	45.47	3.68	7	0.86624	58.66	2.2	4	0.7746	57.75
5.75	3	1.61626	43.17	3.7	4	1.08754	60.88	2.25	3	1.20493	62.05
5.76	4	1.84621	29.37					2.5	1	3.35659	83.57
Explosive Leg Power (Sargent Jump)				Leg Speed-Strength				Flexibility			
Raw Score	Rank (K)	Z-score	T-score	Raw Score	Rank (K)	Z-score	T-score	Raw Score	Rank (K)	Z-score	T-score
25.0	4	–1.7748	32.25	4.95	6	–1.24402	37.56	3.0	2	-2.85775	21.42
28.0	6	–0.61732	43.83	5.0	5	–0.99886	40.01	3.44	3	–0.644	43.56
29.0	10	–0.2315	47.69	5.13	3	–0.36144	46.39	3.45	6	–0.59369	44.06
30.0	7	0.15433	51.54	5.18	7	–0.11628	48.84	3.55	7	–0.09056	49.09
33.0	4	1.31181	63.12	5.3	6	0.47211	54.72	3.57	7	0.01006	50.1
34.0	4	1.69763	66.98	5.45	6	1.20759	62.08	3.77	6	1.01631	60.16
				5.64	2	2.1392	71.39	3.85	4	1.41881	64.19
Coordination				Agility				Balance			
Raw Score	Rank (K)	Z-score	T-score	Raw Score	Rank (K)	Z-score	T-score	Raw Score	Rank (K)	Z-score	T-score
7.35	5	–1.89388	31.06	9.25	4	–1.42822	35.72	74.0	4	–1.67153	33.28
7.5	5	–0.38051	46.19	9.28	3	–0.90387	40.96	75.0	5	–1.01419	39.86
7.54	5	0.02306	50.23	9.31	7	–0.37953	46.2	76.0	8	–0.35684	46.43
7.55	12	0.12395	51.24	9.32	7	–0.20474	47.95	77.0	8	0.3005	53.0
7.61	5	0.7293	57.29	9.33	2	–0.02996	49.7	78.0	6	0.95784	59.58
7.74	3	2.04089	70.41	9.35	7	0.3196	53.2	79.0	4	1.61518	66.15
				9.45	5	2.06742	70.67				

Table 8. Presents the normative levels, observed frequencies, and percentages for the physical and motor tests.

Test	Raw Score Range	T-Score Range	Normative Level	Observed Frequency	Percentage
Translational Speed	5.55–5.58	70.00–79.99	Very Good	0	0 %
	5.59–5.62	60.00–69.99	Good	2	5.71 %
	5.63–5.66	50.00–59.99	Average	6	17.14 %
	5.67–5.70	40.00–49.99	Acceptable	15	42.85 %
	5.71–5.74	30.00–39.99	Weak	0	0 %
	5.75 and above	20.00–29.99	Very Weak	7	20 %
			Total	35	100 %
Explosive Arm Power	3.41–3.33	20.00–29.99	Very Weak	0	0 %
	3.50–3.42	30.00–39.99	Weak	11	31.42 %
	3.59–3.51	40.00–49.99	Acceptable	0	0 %
	3.69–3.60	50.00–59.99	Average	20	14.28 %
	3.78–3.70	60.00–69.99	Good	4	42.85 %
	3.87–3.79	70.00–79.99	Very Good	0	0 %
			Total	35	100 %
Explosive Leg Power (Long Jump)	1.86–1.76	20.00–29.99	Very Weak	0	0 %
	1.98–1.87	30.00–39.99	Weak	5	14.28 %
	2.10–1.99	40.00–49.99	Acceptable	13	20 %
	2.22–2.11	50.00–59.99	Average	13	25.71 %
	2.34–2.23	60.00–69.99	Good	3	11.42 %
	2.35 and above	70.00–79.99	Very Good	1	11.42 %
			Total	35	100 %
Explosive Leg Power (Sargent Jump)	24.09 and below	20.00–29.99	Very Weak	0	0 %
	27.40–25.00	30.00–39.99	Weak	4	11.42 %
	29.59–27.41	40.00–49.99	Acceptable	16	17.14 %
	32.19–29.60	50.00–59.99	Average	7	20 %
	34.78–32.20	60.00–69.99	Good	8	22.85 %
	34.79 and above	70.00–79.99	Very Good	0	0 %
			Total	35	100 %
Leg Speed-Strength	4.95–5.98	20.00–29.99	Very Weak	0	0 %
	5.00–5.12	30.00–39.99	Weak	6	17.14 %
	5.13–5.17	40.00–49.99	Acceptable	5	14.28 %
	5.18–5.29	50.00–59.99	Average	13	37.14 %
	5.30–5.29	60.00–69.99	Good	11	31.42 %
	5.45 and above	70.00–79.99	Very Good	0	0 %
			Total	35	100 %
Flexibility	3.17–2.99	20.00–29.99	Very Weak	2	5.71 %
	3.36–3.18	30.00–39.99	Weak	0	0 %
	3.55–3.37	40.00–49.99	Acceptable	16	45.71 %
	3.74–3.56	50.00–59.99	Average	7	20 %
	3.94–3.75	60.00–69.99	Good	10	28.57 %
	4.13–3.95	70.00–79.99	Very Good	0	0 %
			Total	35	100 %
Coordination	7.32 and below	20.00–29.99	Very Weak	0	0 %
	7.42–7.33	30.00–39.99	Weak	5	14.28 %
	7.52–7.43	40.00–49.99	Acceptable	5	14.28 %
	7.64–7.53	50.00–59.99	Average	22	62.85 %
	7.74–7.65	60.00–69.99	Good	3	11.42 %
	7.84–7.75	70.00–79.99	Very Good	0	0 %
			Total	35	100 %
Agility	9.16–9.20	20.00–29.99	Very Weak	0	0 %
	9.21–9.26	30.00–39.99	Weak	4	11.42 %
	9.27–9.32	40.00–49.99	Acceptable	17	48.57 %
	9.33–9.38	50.00–59.99	Average	9	37.14 %
	9.39–9.44	60.00–69.99	Good	11	31.42 %
	9.45 and above	70.00–79.99	Very Good	0	0 %
			Total	35	100 %
Balance	71.97–73.48	20.00–29.99	Very Weak	0	0 %
	73.49–75.10	30.00–39.99	Weak	9	0 %
	75.02–76.53	40.00–49.99	Acceptable	8	22.85 %
	76.54–78.06	50.00–59.99	Average	14	40 %
	78.07–79.58	60.00–69.99	Good	4	11.42 %
	79.60–80.10	70.00–79.99	Very Good	0	0 %
			Total	35	100 %

Variables	Standard Scores Achieved	Normative Levels					
		30 Very Weak	40 Weak	50 Acceptable	60 Average	70 Good	80 Very Good
Translational Speed	5.66						
Explosive Arm Power	3.68						
Explosive Leg Power (Long Jump)	2.20						
Explosive Leg Power (Sargent Jump)	33.00						
Leg Speed-Strength	5.64						
Flexibility	3.77						

Fig. 4. Illustrates an evaluation model of one of the research participants' physical abilities.

Variables	Standard Scores Achieved	Normative Levels					
		30 Very Weak	40 Weak	50 Acceptable	60 Average	70 Good	80 Very Good
Coordination	7.54						
Agility	9.45						
Balance	76.00						

Fig. 5. Illustrates an evaluation model of one of the research participants' motor abilities.

that the sample comprised youth players rather than advanced-level athletes.

To assess and estimate the actual performance status of the sample across all physical and motor indicators, the researcher employed the profile model (also known as the personal profile method) or the side profile graph. This technique was used to visualize the achieved performance levels for the individuals in the sample across the investigated variables related to physical and motor attributes. The conceptual foundation of designing a specific model for each sport or athletic event has demonstrated clear value in the early identification of talented athletes and in establishing the appropriate training requirements for them.

This method offers several advantages, notably its ability to provide researchers and coaches with a comprehensive understanding of individual performance levels. It generates a clear graphical representation of all examined variables, both individually and collectively, thereby facilitating real-time assessment. Furthermore, it enables the determination of athletes' ability levels and supports the development of appropriate training programs, in addition to allowing for ongoing comparisons aligned with the various stages of training as shown vividly in Fig. 4.

According to Fig. 5, the motor abilities profile indicated variability across performance levels. The agility test achieved a *"very good"* standard level, while the coordination indicator reached a *"moderate"* level. In contrast, the balance indicator registered a *"weak"* standard level. Given the developmental stage of the sample and the characteristic rapid progression in motor learning at this age, it is possible—through targeted training and practice—to enhance and develop weaker motor abilities so they align with other physical capacities (Al-Yasiri, 2020).

4. Conclusions

Based on the results obtained and following an in-depth analysis and discussion of the findings, the researcher concluded the following:

1. There are varying standardized levels and scores for evaluating talented individuals at the National Center for Sports Talent in the disciplines of jumping and leaping.
2. The overall performance level of the sample predominantly fell within the *moderate* category, followed by *good*, and then *acceptable* levels.
3. A strong correlation exists between motor and physical determinants and the level of athletic performance in jumping and leaping events. The tests revealed that indicators such as explosive strength, speed, motor coordination, and flexibility play a crucial role in achieving distinguished athletic accomplishments.
4. The proposed evaluation model offers a reliable predictive tool for estimating the future performance levels of young athletes, thereby serving as an effective instrument in early sports talent identification.
5. Reliance on traditional selection methods that lack a rigorous scientific basis may result in the misidentification or underutilization of athletic potential in children.

6. It is essential to integrate motor determinants with physiological and psychological factors when selecting athletes. Psychological elements such as motivation and self-confidence were found to influence performance in jumping and leaping events.
7. There is a need to design specialized training programs informed by the outcomes of the evaluative tests, aimed at improving and developing the physical and motor aspects requiring enhancement among young athletes.

5. Recommendations

1. Adopt the standardized levels, scores, and the proposed model developed by the researcher for objective evaluation of athletes in sports talent centers.
2. Implement the proposed evaluation model in athletics centers and academies as a fundamental tool for selecting young athletes specializing in jumping and leaping events.
3. Integrate motor and physical tests into early sports talent identification programs to ensure the selection of the most competent children based on rigorous scientific standards.
4. Continuously update and refine sports selection criteria based on recent scientific research, while accounting for individual differences among athletes.
5. Organize specialized training programs for coaches and experts in the field of sports evaluation to raise awareness about the importance of applying scientific models in athlete selection and to provide instruction on how to accurately administer motor and physical tests.
6. Emphasize the psychological and educational aspects alongside physical factors during the selection process, recognizing the role of motivation and psychological readiness in achieving optimal athletic performance.

Conflicts of interest

The authors declare no conflicts of interest.

Ethical clearance

This study was approved by Prof. Dr. Hanan Adnan Aboub on May 7, 2025.

Author contributions

The entirety of this research—including conceptualization, manuscript drafting, and interpretation of results—was conducted by Marouj Tahseen Jaed. No additional contributors were involved in statistical analysis, peer review, or translation.

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Data availability

The data that support this findings of this study are available on request from the corresponding author.

References

Abu Al-Ala, A. (1986). *Selecting talented individuals in the field of sports*. Alam Al-Kutub.

Ahmed, M.-B. (1996). *Measurement in the field of sports*. Dar Al-Kitab Al-Hadith.

Alawi, M. (2001). *Motor performance tests*. Dar Al-Fikr Al-'Arabi.

Al-Kashef, E. (1987). *Foundations of mathematical choice*. Nahdet Misr Library.

Al-Nimr, I. (2008). *Measurement and evaluation in special education*. Dar Al-Yazouri.

Alou, A.-J. K. (2008). *Determining standard levels for some physical and motor abilities as an indicator for selecting cubs for jumping and vaulting activities in athletics in Diyala Governorate* (Master's thesis, University of Diyala, College of Physical Education and Sports Sciences).

Al-Yasiri, B. (2020). *Designing a model to evaluate the most important motor, mental, and skill determinants as an indicator for selecting players from football schools and academies aged 10–12 years* (Master's thesis, University of Karbala, College of Physical Education and Sports Sciences).

Hassanein, M. (2001). *Measurement and evaluation in physical education and sports*. Dar Al-Fikr Al-Arabi.

Ismail, S. (2005). *Predictive value of skill performance in light of some physical characteristics, motor abilities, and anthropology* [Self-published].

Majeed, R. (1991). Encyclopedia of measurements and tests in physical education and sports. University of Baghdad, College of Physical Education.

Obaidat, D. (1998). *Scientific research: Its concept, tools, and methods*. Dar Al-Fikr.

Appendix 1

Sample questionnaire form for identifying physical and motor tests

Respected Professor . . . . . .

Greetings,

The researcher intends to conduct a scientific study entitled: ***"Designing a Model for Assessing Key Physical and Motor Determinants as an Indicator for Selecting Athletes in Selected Jumping Events Aged 13–15 Years."***

Given your esteemed expertise and deep scientific knowledge in your field of specialization, we kindly request your opinion regarding the identification of appropriate tests. We also welcome any suggestions or additions of tests that you deem relevant.

Thank you for your cooperation and support.

Respectfully,

Signature: _____
Full Name: _____
Academic Title: _____
Area of Specialization: _____
Current Workplace: _____
Date: _____

The Researcher

No.	Physical Determinant	No.	Tests	Nomination Approval Yes	Nomination Approval No
1	Speed	1	30-m sprint from high start		
		2	40-m sprint from high start		
		3	50-m sprint from high start		
2	Leg Speed-Strength	1	Triple hop test		
		2	10-second jump run		
		3	Five-step test		
3	Explosive Arm Power	1	Standing overhead medicine ball throw (3 kg)		
		2	Seated medicine ball throw (3 kg) using both hands		
		3	Medicine ball push test (3 kg) from motion		
4	Explosive Leg Power	1	Standing long jump		
		2	Standing vertical jump without arm swing		
		3	Sargent jump test		
5	Flexibility		Supine hamstring pull toward chest		
			Dynamic flexibility test		
			Seated trunk flexion test		

Appendix 1 (a)

Name of experts

Name	Affiliation
Asst. Prof. Dr. Yasser Mahmoud Wahib	College of Education- Al-Muqdadiya, University of Diyala
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