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Norms standardization of track and field talent scouting test for girls aged 11-14 years old

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Abstract

This study aims to develop a model of talent scouting athletic sports for kids with an age range of 11-14 years. The research method used is research and development. The results of validity test tell that the data obtained from the test and measurement results in two places, namely the State University of Solo (UNS), and the State University of Surabaya (UNESA), have good validity value on the anthropometry test items that are athlete height, Arm span and leg length. Biomotor component, while the girls athlete is found that the specified test item, vertical jump, speed, and beep test, Valid, the rest is valid. It states that the data accuracy level is good.

Integration of reference of journal result of research got that is the percentage value of percentage of athletic talent of kids aged 11-14 years that is girls obtained values for height, arm, and leg length is 26.25%, while weight is 21.25%.

The data test mention some data is normal distribution, spread value of data some test item also normal, but from result of reliability test obtained that component of test item is reliable. Thus, the test component is considered reliable to be used as an identification item of athletic talent of kids aged 11-14 years, it needs a review of the factors that affect the quality of data.

From the results of this study guidelines and identification norms of athletic talent of kids aged 11-14 years. The norms and weight of this giftedness apply only to kids of that age range and cannot be used for kids over the age range, this is related to differences in development and growth of kids before 14 years and after 14 different years.

Keywords: Talent Scouting; 11-14 years old; Track and field; Norm standaritation; Talent scouting

1. Introduction

Talent scouting can be a bridge to accelerate achievement improvement. The hope is that improving performance will no longer require a long time and require significant costs and materials. Currently, many talent scouting models have been implemented by many countries, such as Australia's Sport Search program, the Iranian TID Model, Germany's TID, the Sporting Giant program in England, and other talent scouting models. These talent scouting models are certainly instruments that have been adapted to the situations and conditions of each country and certainly have differences. For example, as stated by Rutten and Zei Mainz in their study entitled "Looking to the Future: Analysis of Talent Identification and Development Systems in Different Countries," they stated that Australia focuses more on athlete quality, while Germany focuses more on the process of improving athlete abilities. This certainly illustrates that the needs of each country are adjusted to the situation and conditions of human resources in sports in each country.

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Indonesia's talent scouting system currently adopts the same model as other countries, such as the popular Australian model, Sport Search. While this talent scouting system is effective, the problem arises from the differences in conditions and situations in Indonesia and Australia.

Talent identification is a process of scouting individuals through various physical, physiological, psychological, and social tests and measurements. The stages, as outlined in the diagram above, demonstrate that these steps are not easily implemented. However, if implemented, they will be able to identify and develop potential athletes capable of improving performance. Therefore, Indonesia, specifically in athletics, hopes to have a talent identification system capable of addressing performance improvement issues and helping accelerate national achievement. Athletics is a promising sport for contributing numerous medals.

This research and development will limit the scope of the study to ensure it is focused and systematic. The scope of the research includes the creation of a valid and reliable athletic talent scouting model instrument, encompassing anthropometric measurement components consisting of weight, height, arm span, sitting height, and leg length. The bio motor test components include flexibility (sit and reach), 40M sprint, vertical jump, hop jump (right and left), shocken throw, and beep test (VO2max).

The general objective of this research is to produce a valid and reliable instrument for scouting talented athletics, both in terms of anthropometric components and motor qualities. Specifically, this research aims to produce a guideline for a talent scouting model for young athletic athletes related to valid and reliable anthropometric measurement norms, bio motor test norms, and giftedness category norms.

2. Methods

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The developed instrument was then consulted with subject matter experts in a focus group discussion (FGD) to validate and evaluate the product's strengths and weaknesses. This involved appointing experts in the field of athletics. The correlation between the data results and expert judgment was then evaluated, assessing the instrument's strengths and weaknesses. The resulting data were then analyzed to determine its validity and reliability. The Kolmogorov-Smirnov test for normality was used to determine whether the data was normally distributed. The data analysis used to percentage the athletic talent of athletes used Exploratory Factor Analysis (EFA). After all data had been validated and reliable, norms were created using categorization with standard deviation and mean. For each norm level, a value of 1 (one) for the lowest scale, namely "Very Poor" and a value of 5 for the highest scale, namely "Very High". Next, the percentage of each anthropometric and bio motor component was carried out using SPSS calculation results.

3. Results

3.1 Validity Test Results

The results of the validity test of anthropometric measurements in the large group are presented in the following table.

Tabel 1 Anthropometry Validity Test Result

No	Item Test	Girls		
		Corrected Item-Total Correlation		Category
		p. value	r-tabel	
1	Body Height	0.738	0,282	Valid
2	Body Weight	0.290		Valid
3	Arm Span	0.719		Valid
4	Leg Length	0.543		Valid

*) =Item valid, if p. value. > r-Tabel

From the results of the validity test of the anthropometric measurements, all indicators for measuring anthropometry were declared valid (p.value> r-Table).

3.1.1 Validitas Tes Biomotor

The results of the validity of the biomotor test in girls in the large group are presented in the following table.

Tabel 2 Biomotor Validity Test

No	Item Test	Girls		
		Corrected Item-Total Correlation		Category
		p. value	r-tabel	
1	Flexibility	0,382	0,282	Valid
2	Vertival Jump	0,494		Valid
3	Sprint 40m	0,672		Valid
4	3Hops Jump Right	0,370		Valid
5	Hop Jump Left	0,413		Valid
6	Shocken Throw	0,344		Valid
7	Beep Test	0,490		Valid

*) =Item valid, if p. value. > r-Tabel

The table above shows the validity measurements of the bimotor test in girls subjects. All test results indicate that the test items are valid.

3.1.2 Reliability Test

Reliability testing in this study used the Cronbach Alpha coefficient, the results are summarized in the following table.

Tabel 3 Reliability Test

Test	Cronbach's Alpha Based on Standardized Items		Category
	p. value	r - Tabel	
Anthropometry	0.768	0.282	Reliabel
Biomotor	0.713	0.282	Reliabel

The table above shows that the anthropometric measurement instruments and biomotor tests are all declared reliable with a p.value > r-Table.

3.1.3 Normality Test

The normality test for data distribution uses the Shapiro Wilk test analysis technique and the results of the normality test for distribution are presented in the following table.

Tabel 4 Normality Test Result

	Item	**Sig.**
Antropometri	Body Height	0,304
	Body Weight	0,161
	Arm Span	0,707
	Leg Length	0,265
Biomotor	Flexibility	0,126
	Vertival Jump	0,150
	Sprint 40m	0,806
	3Hops Jump Right	0,232
	Hop Jump Left	0,764
	Shocken Throw	0,076
	Beep Test	0,321

The normality test results table above shows that all variables are normally distributed. Therefore, all items are interrelated and were included in the study.

3.2 Factor Analysis (EFA)

3.2.1 KMO Test

Model feasibility was assessed using the Keiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity. The KMO is used to measure sample suitability, while the Bartlett's Test of Sphericity is used to determine whether factors within a variable are significantly correlated. The resulting KMO value must be above 0.5 for the factor to be suitable for use in the study. If the Bartlett's Test of Sphericity and significance values are very small (<0.05), a significant relationship between the variables is expected.The analysis results are presented in the following table:

Tabel 5 KMO dan Bartlett's Test of Sphericity KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.770
Bartlett's Test of Sphericity	356.453
Approx.hi-Square df sig.	66.000

Based on the table above, the Bartlett's Test of Sphericity value was 356.453 with p<0.05, which means that there is a very significant correlation between the factors; while the KMO result of 0.770 indicates that the sample suitability is high (>0.5).

3.2.2 Anti-Images

Tabel 6 MSA (Measure of Sampling Adequacy

No.	Items	MSA	Note
1.	Body Height	0,860	Include
2.	Body Weight	0,769	Include
3.	Arm Span	0,814	Include
4.	Leg Length	0,684	Include
5.	Flexibility	0,718	Include
6.	Vertival Jump	0,855	Include
7.	Sprint 40m	0,736	Include
8.	3Hops Jump Right	0,714	Include
9.	Hop Jump Left	0,742	Include
10.	Shocken Throw	0,797	Include
11.	Beep Test	0,810	Include

The Anti-Image Matrix is essentially used to identify variables/factors that should not be included in factor analysis due to their low significance level. This matrix displays the diagonal values marked "a," indicating the MSA (Measure of Sampling Adequacy) of the factor/variable. If an MSA value is less than 0.5, the indicator should be removed (not included in the test). The results of the MSA (Measure of Sampling Adequacy) analysis are presented in the following table.

Referring to the analysis results above, all MSA values were above 0.5 (>0.5). Therefore, all indicators were included in the analysis and none were excluded.

3.2.3 Communalities

The communalities value is the variance explained by the factors formed for each research variable. The communalities values are presented in the following table.

Tabel 7 Nilai Communalities Item tes Antropometri

No	Item Tes	Communalities
1.	Body Height	0,851
2.	Body Weight	0,818
3.	Arm Span	0,803
4.	Leg Length	0,568

Tabel 8 Nilai Communalities Item tes Biomotor

No	Item Tes	Nilai
1.	Flexibility	0,860
2.	Vertival Jump	0,845
3.	Sprint 40m	0,844
4.	3Hops Jump Right	0,826

5.	Hop Jump Left	0,707
6.	Shocken Throw	0,510
7.	Beep Test	0,389

From the table above, for example, it can be seen that in the variables of this athletic talent scouting model, the first indicator (height) has a value of 0.818, meaning that 81.8% of height can explain the athletic talent scouting model; the second indicator (weight) is 56.8%; arm span is 85.1% and so on.

3.3 Norms

Norms are compiled using a categorization process based on value intervals. The classification process is carried out using standard deviation and mean. Classification is done by dividing into five levels: the highest category: Very Good, Good, Moderate, Low, and Very Low. The range between these categories is determined by utilizing the data mean and standard deviation. The following table provides guidelines for determining norm categories:

Tabel 9 Pedoman Klasifikasi Norma

Klasifikasi	Interval
Very Good	X > M+1,5 SD
Good	M + 0,5 SD < X ≤ M + 1,5 SD
Medium	M – 0,5 SD ≤ X ≤ M + 0,5 SD
Low	M – 1,5 SD ≤ X ≤ M – 0,5 SD
Very Low	X < M – 1,5 SD

3.3.1 Anthropometry Norms

Body Height Norms

The norms results for body height measurements for girls are presented in the following table:

Tabel 10 Body Height Norms

No	Height(Cm)	Category
1	>163	Very Good
2	157-162	Good
3	150-156	Medium
4	144-149	Low
5	<143	Very Low

Body Weight Norms

The normal results for body weight measurements in girlsare presented in the following table.

Tabel 11 Body Weight Norms

No	Weight (Kg)	Category
1	>56	Very Good
2	47-55	Good
3	38-46	Medium

4	28-37	Low
5	<27	Very Low

Arm Span

The normal results for arm span measurements in girlsare presented in the following table.

Tabel 12 Arm Span Norms

No	Length(Cm)	Category
1	>166	Very Good
2	158-165	Good
3	150-157	Medium
4	143-149	Low
5	<142	Very Low

3.3.2 Leg Length Norms

The standard results for measuring leg length in girlsare presented in the following table.

Tabel 13 Leg Length Norms

No	Length(Cm)	Category
1	>98	Very Good
2	93-97	Good
3	88-92	Medium
4	83-87	Low
5	<82	Very Low

3.4 Biomotor Norms

3.4.1 Sit and Reach (Flexibility)

The norms for the sit and reach measurement results for girlsare presented in the following table.

Tabel 14 Sit and Reach (Flexibility**)**

No	Flexibility (Cm)	Category
1	>39	Very Good
2	31-38	Good
3	23-30	Medium
4	16-22	Low
5	<15	Very Low

3.4.2 Vertical Jump

The results of the vertical jump measurement norms for girlsare presented in the following table.

Tabel 15 Vertical Jump Norms

No	Vertical Jump (Cm)	Category
1	>49	Very Good
2	38-48	Good
3	27-37	Medium
4	16-26	Low
5	<15	Very Low

3.4.3 Hop Jump Norms

The standard results for Hop Jump measurements in girlsare presented in the following table.

Tabel 16 Hop Jump Norms

No	Right Foot (m)	Left Foot (m)	Category
1	>4,95	>4,85	Very Good
2	4,20-4,94	4,16-4,84	Good
3	3,46-4,19	3,46-4,15	Medium
4	2,71-3,45	2,76-3,45	Low
5	<2,70	<2,75	Very Low

3.4.4 Shocken Throw

The results of the shocken throw measurement norms for girlsare presented in the following table.

Tabel 17 Shocken Throw Norms

No	Distance(m)	Category
1	>7,23	Very Good
2	5,54-7,22	Good
3	3,68-85,53	Medium
4	2,18-3,85	Low
5	<2,17	Very Low

3.4.5 Sprint 40M (Speed)

The measurement results for the 40M sprint for girls are presented in the following table.

Tabel 18 Sprint 40M Norms

No	Time (s)	Category
1	<6,40	Very Good
2	7,23-6,41	Good
3	8,06-7,24	Medium

4	8,89-8,07	Low
5	>8,90	Very Low

3.4.6 Beep Test (VO2Max)

The normal of the beep test (VO2Max) in girls are presented in the following table.

Tabel 19 Beep Test (VO2Max) Norms

No	**VO2Max (mlHg)**	**Category**
1	>29,51	Very Good
2	25,39-29,50	Good
3	21,28-25,38	Medium
4	17,17-21,27	Low
5	<17,16	Very Low

4. Discussion

Anthropometry consists of height, weight, arm span, and leg length. We already know, based on references, that height and leg length play a crucial role in achieving the best performance. The results of the variance analysis show that height (0.839), arm span (0.838), weight (0.614), and leg length (0.586) are significant.

"Humans run faster by increasing of combination of stride length and stride frequency. In slow and medium-paced running, stride length is increased by exerting greater support forces during ground contact, whereas in fast running and sprinting, stride frequency is increased by swinging the legs more rapidly through the air. Dorn, Schache dan Pandi, 2012, p 215 [4,19,22].

Athletics consists of two types of events: track and field. Track events include short, middle, and long-distance running, as well as race walking. Field events include throwing and jumping. Jumping events are divided into vertical and horizontal jumps.

Based on these event groupings, it's easy to categorize the dominant elements in each event. Track events include short, middle, and long-distance running, and race walking. These events tend to be predominantly based on running and walking movements. From the mechanics of these movements, you can determine which body parts are frequently used, which muscles are dominant in the movement, and what physical and motor conditions contribute to the movement.

Sprint combines the movement capabilities of all the body's muscles and the best biomotor system, which is used to deliver maximum force while running. Pandi and Sultana stated that sprinters and jumpers achieve the best efficiency from their running technique when they maximize the capabilities of all the muscles in their body. When running, athletes must exert all their energy to achieve maximum power. All available strength plays a significant role in providing propulsion while running. Furthermore, athletes must understand how to efficiently manage their speed while running so they can run at or near peak performance(Pandi, Sultana, 2013) [4]

In general, runners utilize all the muscles in their body. However, there are certain dominant muscles that play a major role in providing propulsion while running. This is inseparable from the athlete's running technique and motor skills. These muscles, particularly the lower body and arm muscles, tend to be more dominant than the others.

Sprinting is performed by increasing the combination of stride length and stride frequency. This stride frequency can be increased by increasing the speed of the leg swing while in the air, or by rapidly alternating steps between the left and right legs. We know that running is a complex combination of strength, speed, balance, and biomotor skills. Strength and speed in short-distance runners tend to focus on the muscles of the lower body. However, to achieve good balance, the arm muscles, which provide stabilizing movement, and the core muscles must also be strengthened to prevent inefficient movements while running. The muscles of the lower extremities generally consist of the thighs, calves, and feet.

According to Wang et al., in their study of lower extremity muscles used when running on treadmills and other surfaces, the rectus femoris, tibialis anterior, biceps femoris, and gastrocnemius are the dominant muscles used in running. (Wang, He & Li Xian, 2019[11]

“A muscle group which is very important for jumping and running is the calf muscle (triceps surae). This mucle have three parts: (a) the “twin” calf muscle (gastocnemius) with its two heads of origin (one from each of the condyles of the thigh bone) and (b) the “flounder” muscle (soleus) (a flat muscle originating from the back of the lower leg). Together the three parts form the heel tendon (tend achilles) wich is inserted into the heel bone (calcaneum).” (Wirhed, n.d., p.57)[25]

Kusnanik, Hariyanto, Herdiyanto, & Satia (2017, n.d.)[15] in their research stated that there are five items used in the process of determining the talent of young athletes: sitting height, body weight, leg length, 40m sprint, and MFT (VO2Max).

Furthermore, several dominant factors can influence running speed. Research indicates that pelvic movement is more influential on speed increases than knee movement (Simpson & Bates, 1990[20]; Belli et al. 2001[1]; Kuitunen et al. 2002[10]; Schache et al. 2014)[19].

Later research confirmed this, as the percentage increases in hip extension net joint moments with increasing running speed were greater than the percentage increases in knee extension net joint moments”(S&C Reasearch, n.d.)[18]. So, running is a complex process, a combination of muscle, joint, and biomotor capabilities. It's not just physical ability, but also the ability to coordinate and balance the body's energy efficiently to achieve peak speed.

Middle and long-distance running is no different from sprint. However, middle and long-distance running requires good stamina and endurance. “This is not too much of a guess for elite athletes, but it does vary considerably with training – an elite athlete is usually able to sustain running speeds that require about 85% – 90% of VO2max for about one hour. Marathons are usually run at an intensity corresponding to approximately 80% of VO2max, while 10,000m is run at around 95% of VO2max” (Ross, 2010. 3 Pebruari 2017)[17].

In athletics, besides track events, there are field events. Field events consist of throwing and jumping events. The throwing events include the javelin throw, discus throw, hammer throw, and shot put. The jumping events include the vertical and horizontal jumps. The vertical jump includes the high jump (hi-jump) and pole vault, while the horizontal jump consists of the long jump and triple jump.Pada nomor lempar, terdapat beberapa perbedaan gerakan pada saat melakukan trial. Lempar lembing, diawali dengan awalan berlari (run approach), Lontar martil dan cakram, diawali dengan gerakan berputar (rotation), dan tolak peluru saat ini berkembang, jika dulu hanya menggunakan gaya Obrain dan Ortodox, sekarang tolak peluru juga mulai menggunakan rotasi pada saat melakukan tolakan.

The javelin throw begins with a running motion on a 30m starting track. The minimum length of the javelin throwing starting track is 30m. After doing the running start, it is continue with the javelin release process, namely throwing. Fattahilah and Mintarto (2016)[13] stated that, "The javelin throw begins with a running start process, this is to provide a thrust in the same direction as the javelin (Newton's First Law), and when throwing the greatest force that occurs comes from the swinging movement of the arm when throwing." Fattahilah and Mintarto (2016)[13] also mentioned in their research entitled "Contribution of Arm Muscle Strength, Back Muscle Strength, and 30M Sprint to Javelin Throwing Achievement", namely that the largest contribution to the distance of javelin throwing achievement is respectively arm muscle strength contributing 35.05%, then back muscle strength 21.34%, 30M sprint 8.43% and the rest are other factors that support javelin throwing achievement.

Additionally, the muscles involved in throwing are the abdomen, shoulder, arm (elbow), and wrist. "When throwing an object, the muscle groups are activated in the following order: abdomen, shoulder, elbow, wrist." (Wirhed, n.d., p. 105)[25]. Wirhed also states that in the javelin throw, a straight arm, opposite the body's rotation, is more effective than an arm bent toward the body during the throw.

When the javelin is thrown, the arm functions as a propulsion system with angular and linear motion. The arm functions as the swing arm, and the shoulder as the pivot. In physics, with the same angular angle, a longer swing arm with the same angular velocity will produce a higher linear velocity than an object with a shorter swing arm radius (Linear and

Angular Velocity, n.d.). This results in a greater momentum force.The release speed of the javelin is the most important factors affecting the distance of the javelin flying, as much as 70% of the speed is developed in the last 0.1 second（Morriss & Bartlett, 1996). In the last phase of throwing, the arm movements play an important role in raising the speed, and also play an irreplaceable role in the factors' control such as release angle, angle of attack and rotation.(Wang, He&He, n.d. p. 1)[27]

So, in all throwing events, including the javelin, discus, and hammer, which employ a rotational system, the longer the arm swing, the greater the momentum of the object and the greater the chance of achieving maximum performance.

This further emphasizes that in addition to the arm's primary role as a swinging force, it must also be strong as the primary driving force in the throwing process. Arm strength is paramount in the throwing process (Peng, Huang & Peng, 2005[8]; Young & Li, 2005[26]; Terziz, Kyriasiz, Karampatsos & Georgiadis, 2012)[21].

The discus and hammer throw share similar throwing characteristics. The discus begins with a rotational start, similar to the hammer throw. However, there are several differences between the two. Equipment specifications indicate that the heaviest equipment used in discus throw competitions weighs only 2 kg (senior men), the lightest 1 kg (junior women), and the hammer throw uses the heaviest equipment, weighing 7.26 kg (senior men) and the lightest 3 kg (junior women). This comparison of equipment certainly provides a glimpse into the fact that, despite their similar movement characteristics, there are other differences.

The discus and hammer throw employ different throwing techniques than the javelin and shot put. However, their starting motion system utilizes a rotational motion, with the feet serving as the pivot and pivot, and the arms serving as the swing arm.Gerakan pada lempar cakram dan lontar martil mengkombinasikan keseimbangan berputar, kekuatan togok, dan lengan. Wirhed n.d. menyatakan bahwa pada saat persiapan melempar, lengan yang tidak memegang cakram juga berperan dalam proses transisi tubuh dan ayunan lengan sebelum melepaskan cakram dan ini berperan juga di setiap proses melempar lainnya.

"When preparing to throw, (the discus, or whatever), the skilful athlete pulls his "non-throwing arm" well back as shown in figure 262 (f). Before actually hurling the object this movement is blocked. The arm is thrust in the opposite direction in order to increase rotation of the trunk which in turn increases the velocity of throwing arm." (Wirhed n. d. p. 100)[25]

As explained by Peng, Huang & Peng, 2005[8]; Young & Li, 200526]; Terziz, et al., 2012[21], the most important factor in throwing is arm strength. Therefore, in the hammer and discus throws, the arms remain the primary driving force.

Mechanically, the force generated comes from the arm swing and the rotational movement of the body. Therefore, maximum performance can be achieved by accelerating the object's linear velocity and increasing the height of the release point at an optimal angle. Fattahilah and Mintarto (2016)[13] state that with the same speed, release angle, and force acting on an object, the higher the release point, the farther the object will fall. Therefore, taller athletes have a greater chance of achieving maximum performance.

Shot put is a throwing event, but the movement itself is not done by throwing. As the name suggests, the movement is pushing the shot put. In the pushing process, the force generated comes from a series of initial movements, positional power, and push. As explained by Peng, Huang & Peng, 2005[8]; Young & Li, 200526]; Terziz, et al., 2012[21], the most important factor in throwing is arm strength.

Terzis et al. (2012)[21] also stated that the velocity of the shot put at the end of its release is the accumulation of a series of forces from the initial process, positional power, and push-off velocity. Therefore, to generate maximum force, the push-off process cannot be separated into a separate sequence, but rather performed in rapid succession to generate momentum on the body and the shot put. This increases the force acting on the shot put.

Furthermore, Terzis et al. (2012)[21] stated that the optimal release angle in the shot put is 31-36 degrees. As Fattahilah and Mintarto (2016)[13] noted, the higher the release point, the farther the object will fall, with the same force and speed. Therefore, height is also a crucial factor for shot put athletes to achieve maximum performance.

The triple jump is a competition in athletics that uses complex movements. The movements are performed sequentially, accurately, and quickly. The triple jump consists of three phases: the running start, the takeoff (hop, step, jump), and the airborne phase. "The result is defined primarily by the speed of the run-up and the optimal proportion between the distances of the three flight phases" (Hay, 1992). Similarly, the triple jump achievement is a combination of the force obtained during acceleration and the run-up, as well as the strength and thrust applied during the last three phases of the triple jump (hop, step, jump). (Hay & Miller, 1985[6]; Graham,Smith & Lees, 1994)[5].

The force acting on the jump originates from the running start, which is in accordance with Newton's first law, which states that the force acting in the same direction as the force is applied. The next movement provides the propulsive force from the takeoff phase, hop, step, and jump. In this phase, the propulsive force is the accumulated force derived from the initial velocity and the propulsive force during the hop, step, and jump transitions. This transition phase is the core movement of the triple jump. The transition from the hop to the step and jump requires precise accuracy in the takeoff angle, height, and speed. The right change in velocity angle will produce maximum speed and force, resulting in a maximum jump result. "preservation of optimal horizontal velocity in the hop, step and jump phases is a crucial factor for achieving maximal distance in the triple jump. A critical moment in the triple jump is a transition from hop into step phase"(Coh&Kugovnik, 2011, p1)[12].

After the takeoff phase, comes the airborne phase. This phase is the final phase of the triple jump movement sequence before landing. In this phase, the athlete aims to achieve their maximum jump distance. The airborne phase is the result of a series of forces acting on the two phases of the triple jump. The more optimal the forces generated in the first two phases, the more optimal the takeoff speed and the optimal time in the air.

To achieve maximum results, the athlete must be able to utilize each phase effectively. "Each of the structural units represents a specific motor task with certain characteristics and tasks, which an athlete has to complete in order to execute a successful triple jump. According to some of previous studies" (Panoutsakopoulos & Kollias, 2008)[23].

Each movement in the triple jump is a combination of complex motor movements and has its own characteristics. These movements must be supported by muscles that are capable of working optimally. If you look closely, the movements consist of running and jumping. Anatomically, running and jumping are supported by the lower extremity muscles, namely the gluteus maximus, quadriceps, hamstrings, gastrocnemius, Achilles, and tibialis anterior.

"A muscle group which is very important for jumping and running is the calf muscle (triceps surae). This mucle have three parts: (a) the "twin" calf muscle (gastocnemius) with its two heads of origin (one from each of the condyles of the thigh bone) and (b) the "flounder" muscle (soleus) (a flat muscle originating from the back of the lower leg). Together the three parts form the heel tendon (tend achilles) wich is inserted into the heel bone (calcaneum)."The long jump is not much different from the triple jump. The long jump also consists of three phases, but the second phase, the takeoff phase, involves only the "jump." Therefore, the forces involved are almost identical to those in the triple jump, and the muscles involved are similar. Because the run-up is the same, starting with a sprint, speed efficiency still involves stride length and frequency, supported by the advantages of leg length and height.

Vertical jumps consist of the high jump and the pole vault. The high jump differs from the pole vault.

The high jump consists of three phases: the run-up, the take-off, and the aerial phase. In the run-up phase, the movement is running. The running motion in the high jump differs from the running motion in the long jump and triple jump. The high jump run-up area is a minimum of 15-25 meters long.

The high jump involves a variety of styles. However, to date, the highest achievement ever achieved was using the flop style. This style begins with a semi-arc run-up, followed by a push-off and a mid-air phase with the back facing the bar.

During the run-up, the semi-circular running motion is intended to provide centripetal thrust to the body immediately after the run-up and push-off. This is intended to optimize the force acting during the push-off, ensuring the body's optimal force to clear the bar.

The forces acting in the flop high jump are the speed of the run-up process plus the centripetal force from the half-circle run-up, followed by the vertical thrust from the push-off during the jump. The most important thing in the process of executing this jump is the athlete's ability to position the body's center of mass at the optimum height during the jump. Comparatively, the higher the center of mass, the greater the opportunity to achieve maximum results from the jump. Therefore, athletes with a taller body and a higher center of mass have a greater opportunity to achieve maximum performance outside of other factors that influence the jump result. Therefore, the higher the center of mass, the easier it is for the athlete to lift their body to greater heights. This positive center of mass is obtained from longer legs and a taller body. "The single most important factor and es-sential contributor to the height cleared, is the height of the flight of the body's centre of mass (BCM), which is a result of the vertical impulse produced during the take-off phase(Panoutsakopoulos & Kollias, 2008)[24].

Additionally, several other factors contribute to optimal force during takeoff and in the air. The knee angle during takeoff, the thigh lift angle, and body position during the takeoff are crucial for achieving maximum results. "Key biomechanical factors that describe the take-off are the knee angle of the take-off leg, the angle of the lead leg thigh, the angle of the trunk position and the angles of forward/back-ward and inward lean 4,5"(Panoutsakopoulos & Kollias, 2012, p. 32)[23].

The movements in the pole vault differ from those in the long jump. In the pole vault, the movements are performed using a combination of the athlete's physical strength and the ability to control the apparatus (pole). The start phase in the pole vault involves running with the pole. The main aim of the run-up is to arrive at the take-off with the maximum amount of controlled speed. At take-off, the vaulter plants the pole into the take-off box and executes an upwards running jump.

The running start is intended to generate maximum speed and force before the pole is placed on the pole takeoff box. When placing the pole on the takeoff box, the athlete grips the pole and pushes hard. Because the pole is made of flexible material, the momentum generated after running and the push on the pole causes the athlete to be lifted upward. Furthermore, it is important to note that the angle before takeoff towards the support block must be perfectly aligned with the running direction, so that the resulting momentum is optimal for the pole's push and rebound. Like the angle of contact, angle of departure uses the perpendicular line to the runway as the zero point for reference measurement of the body angle just prior to the take off foot leaving the ground.

Before the pole reaches its equilibrium point at the vertical peak of the polestand, the athlete quickly shifts their body, initially suspended from the pole, into a vertical position by pushing upward. This positional change requires upper body muscle strength to achieve maximum thrust and the change in body position.

According to existing reference studies, height and leg length are the components with the highest coefficients in this weighting.

In addition, Fattahilah and Mintarto (2016, n.d.)[13] stated that the higher the height of the javelin release point, the further the javelin's fall point will be with the same strength and thrust conditions acting on the javelin. This states that the taller the athlete's body, the greater the advantage in the javelin release point and the added length of the arm as the swing arm. They also stated that javelin throwing works by force, namely that obtained from the throwing process with angular movements and the arm as the swing arm.

In angular motion, there are centripetal and centrifugal forces, namely with the same radian velocity, the length of the swing arm that has a longer radius will have a faster angular velocity. So a longer arm span provides more advantages. So on this basis, the percentage value of the two items is the same. In addition, that the length of the arm span in kids is 1cm shorter than the height and in adolescents is the same and in adults 5cm exceeds the height. Based on this statement, the next item classification level is that the arm span has the same coefficient as the height and leg length.

Regarding body weight, in athletics, it does significantly impact performance. However, not all athletic events are affected by weight. For example, long-distance running differs from throwing events, and the relationship tends to be inverse. Long-distance running requires a lightweight body to be able to run long distances at a consistent speed for extended periods. Meanwhile, throwing events, especially rotational throwing, require a strong (heavy) body as a pivot to provide balance and high momentum during the throwing process. Furthermore, during the growth period, body weight can become uncontrollable due to the growth period and unstable metabolic processes that accompany changes in body development (Wang et al. 2014)[11]. Therefore, body weight has the lowest coefficient value after height, leg length, and arm span.

The first percentage calculation that can be used is the ratio of height to leg length. To achieve ideal body weight, the weight ratio should be 15% less than height for women and 10% less than height for men. Therefore, if the coefficients for the three items are equal, the weight percentage coefficient should be 15% lower than the three items for girls athletes and 10% lower for male athletes.

Athletics involves running, walking, throwing, and jumping. Overall, these movements involve the biomotor skills of speed (40m sprint), power (vertical jump, forward jump), and flexibility. Furthermore, running, throwing, and jumping require a strong core, demonstrated by the shock throw. In childhood, one indicator suggests that active kids tend to have good biomotor skills because they are able to perform all activities well (Hans, 2009). To be active, kids must have a good fitness level. Therefore, measuring a child's maximum lung capacity can be an indicator that a better fitness level means a more active child, a measure of which can be demonstrated by the VO2Max test item. Furthermore, during this period or age, kids's biomotor skills are still natural and cannot yet be a very accurate guideline for specializing in competition numbers. Therefore, all of these biomotor skills are very important for kids at that age.

The anthropometric component has a balanced value with the biomotor at the same level of Good to obtain a high giftedness score in kids. However, at that age (11-14 years), biomotor cannot be a very accurate guideline because it is still natural and during the development and growth period, the biomotor can be improved to be further directed to specialization in competition numbers. This giftedness norm will later be used generally and not yet directed to specialization in sports branches, therefore the coefficient value in the biomotor component is the same as the percentage value. Moreover, kids's biomotor at that age have not been fully trained. Meanwhile, this age range is a period of rapid growth in the anthropometric component. Such as increased height, leg length, and arm span. Therefore, anthropometry is a better reference for predicting the needs of talented athletes, tailored to the needs of today's athletes, who tend to require tall and strong athletes. However, the hope is that the biomotor component will not be too far behind in the child's future development and growth. Therefore, the biomotor coefficient value should not be too far apart from the anthropometric component. This means that as the child's body grows and develops better, with good biomotor skills, the child's biomotor development will not be too far behind or too poor even though the anthropometric component has a greater advantage. Therefore, the weighting calculation, if the total coefficient percentage is 100%, to avoid too much of a difference, a ratio of 55% anthropometric and 45% biomotor can be set. This coefficient value is not a standard value and can be adjusted to suit the situation and conditions of the athlete's future needs.

5. Conclusion

After analyzing the data and integrating journal references, the research results revealed a weighted percentage value for athletic talent in kids aged 1-14 years. For girls, the values for height, arm span, and leg length were 26.25%, while for weight, the coefficient value for both boys and girls was 14.29%.

Data analysis it was concluded that the data accuracy level was good and the data distribution for several test items was also normal. However, the reliability test results showed that the test item components were reliable. Therefore, based on this, the test components were declared reliable for use as test items to identify athletic talent in kids aged 11-14 years. However, with low levels of accuracy and normality, a reassessment of factors influencing data quality is needed, including the data collection process, both from the tester and the athlete (testee) side. Differences in measuring instruments also affect the level of data accuracy.

The results of this study provide guidelines and norms for identifying athletic talent in kids aged 11-14. These norms and talent weightings apply only to kids within that age range and cannot be used for kids beyond that age range. This is related to the differences in development and growth of kids before and after 14 years of age.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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