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Measurement of Anthropometry, Biomotor and Fundamental Skills for Identification of Future Athletes' Talents at the Age of 11-15 Years

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Abstract This study aims to identify the talents of prospective athletes aged 11-15 years through anthropometric, fundamental skills, and biomotor. Researchers conducted an assessment of these three factors to decide whether the candidate was a gifted athlete. The method used is survey and percentage analysis. The participants who took part in this study were 408 (242 males and 166 females) aged 11-15 years. The results of the assessment from the city of Salatiga showed that there were no very talented participants, 2% of participants were declared talented, 12% quite talented, 44% less talented, and 42% not talented. The percentage analysis showed that there were no very talented participants; less than 1% were talented; 3% were moderately talented; 22% were less talented, and 75% were not talented. There is a difference in catch indicators for male and female participants with a percentage of 30.11%. Talent identification that can be decided in this study, based on the results of anthropometry, fundamental skills, and biomotor measurements is in the javelin throw, sprint 100 meters, 200 meters and long jump. The results of this study conclude that the assessment of anthropometry, fundamental skills, and bimotor can be used to identify the talent of athletes at a young age. It could be concluded that biomotor and anthropometry aspects are more dominantly used to identify athletes but need to be added to other skills performance assessments to support this decision. Future research should focus on identifying the determinants of talent and developing assessment instruments.

Keywords Anthropometry, Fundamental Skills, Biomotor, Talent Identification

1. Introduction

Identification of sports talent can be one way to regenerate the achievements of future athletes. Selecting a suitable candidate for this talent development program often includes objective measurements of anthropometric, physiological, or sport-specific skills. Talent identification will have an advantage in determining one of the sports skills. The advantages of performance analysis as a preferred measure of game specific skills in the talent identification process [1]. Measures for fundamental skill assessment development are likely to assist with the junior-to-senior transition of talented players [2]. The most talented young athletes can be identified by a ranking based on the estimates of age-independent ability [3]. Earlier onset and a higher volume of discipline-specific training and competition, and an extended involvement in institutional talent promotion programmes [4]. Using a deliberate programming model a guide to the minimum exposure for a novice athlete to reach Olympic representative standard following intensified sport-specific training [5].

Scouts such as coaches will usually see several aspects through their experience. Combinations of training and match involvement affect overall player load [6]. The coach's instincts can also take into account that the athlete being coached can achieve the highest performance when competing. So that short or long term physical, technical, tactical and mental training programs will be related to athlete performance. A shorter training duration would allow the training to be integrated more easily into the daily programme of the athletes [7]. Collaborative efforts among training, nutrition, and mental health professionals to best support triathletes [8]. Around puberty, physical fitness attributes of elite basketball players of both sexes are associated with game performance parameters [9] the training of young soccer players be supplemented with the bilateral balance exercises and games [10]. The control and capacity functions of working-memory interact to predict performance [11]. High intensity interval training improved cardiorespiratory fitness [12]. The important role of service in the modern game, more efforts are necessary to develop training prescription for both performance enhancement and prevention strategies [13].

In addition to the exercise program, anthropometry related to the dimensions of the human body includes weight, height, standing position, arm length, leg length and walking movements etc. Trainers should also be aware that anthropometry also produces different physical performances based on age and gender. Anthropometric data is used for various purposes, such as product design in order to obtain appropriate and appropriate sizes with the dimensions of the human limbs that will use it and can also be used to identify athletes' talents. The talent identification of surfers and also help with anthropometric monitoring [14] anthropometric and physical fitness characteristics are highly associated with performance-related parameters [15]. Potential magnitude of change in body composition, lower body force-time characteristics and swim start performance in high performance swimmers within a season [16]. Differences in physical performance characteristics were present between age groups, thus suggesting improvements in lower limb power and aerobic endurance in adulthood as players physically mature [17] [18]. Structure strength and conditioning training to improve sprint and agility [19] an appropriate stimulus based on the training age and technical competency of the athlete [20].

For the current study, special interest is placed on anthropometric assessment, agility, speed, strength and sport-specific skills to identify the talents of future athletes. Anthropometric measures from the age of 15 years are substantial improvements in speed, lower-body power, and aerobic capacity from U20 age group [21] physical performance characteristics than female, in relation to both the lower and upper body [22]. The anthropometric characteristics indicate a muscular with low adiposity and muscle power-related fitness and anthropometric factors are related to sprint performance [23]. Identification of desirable anthropometry, the 2000-m ergometer potential of juniors may be accounted for by upper-body strength and endurance [24]. That well-developed physical, anthropometry, and skill qualities are associated with effective playing performance [25]. The importance of strength and upper-body power; changes in female anthropometric data provide insight into the changing nature of the sport [26]. Performance times, chronological age and anthropometry (body mass, height, sitting height and maturity status), overhead medicine ball throw and sit and reach for all distances [27]. From the results of previous studies, anthropometry is related to the athlete's performance during the match. With the measurement of anthropometry and physical performance, it is expected to be able to identify the talent of athletes in certain sports.

2. Materials and Methods

2.1. Procedure

The research method used is quantitative through a survey approach [28]. Focus group survey, and direct observation of 408 participants investigating sports talent. Discriminant analysis was then applied to the 3 measured variables, including anthropometric parameters, biomotor, and sport-specific skills to be able to predict the sport that athletes participated in. These three variables were measured in all participants and only participants with complete data were retained in the analysis, and contributed to the different sample sizes from each region.

2.2. Measurements and Data Analysis

To measure the relative contribution of each parameter, the variables measured fall into three categories: anthropometric (high, weight, sitting high, leg high), biomotor (leg strength, agility run, speed, endurance), and fundamental skills (catch ball, basketball). ball throws, long jumps). To evaluate sprint performance, participants ran a straight sprint over a distance of 20 m and did an agility test [29]. Body mass (kg) was measured without shoes and wearing light clothing on the scales. Sitting height is obtained by participants sitting on chairs that can be adjusted in height at a seat height of 40 cm. Leg length is indirectly obtained by subtracting the value of sitting height from height. Time-trial protocols to assess endurance performance, where participants work at a self-selected intensity for either a set distance as quickly as possible or a set duration where they must cover maximum distance [30]. Analysis of the data used in this study by means of percentage, mean and standard deviation. This is enough to find out how big the 3 variables are to find out and determine the sports talent possessed by the participants in the future.

3. Results

The results of this study at least explain 3 variables that will identify sports talent in students aged 11-15 years. Of the 3 variables that are the focus of research, they can provide new knowledge in coaching young athletes. In general, the results obtained in this study aim to look at anthropometric, biomotor and specific runs in determining and identifying sports talent. The results of the research that has been done can be seen in table 1 and table 2 below.

Table 1. Results of Anthropometric, Biomotor and Fundamental Skills Measurements in Salatiga

Male (n = 120)	Mean	SD	Female (n = 73)	Mean	SD
Antropometri					
Age (years)	13,23	1,34	Age	13,04	1,25
Height (cm)	157,18	12,33	Height	151,1	7,99
Sitting High (cm)	82,22	6,57	Sitting High	80,12	5,08
Weight (kg)	46,16	12,12	Weight	43,18	7,85
Arm Span (cm)	159,90	13,10	Arm Span	153,5	8,20
Fundamental Skills					
Catch	6,18	4,17	Catch	1,69	2,24
Basket ball Throw	4,89	2,28	Basket ball Throw	3,94	0,64
Vertical Jump (cm)	34,97	7,72	Vertical Jump	29,55	4,98
Biomotor					
Agility Run (second)	20,28	1,30	Agility Run	22,45	1,23
40 m Sprint (second)	6,51	0,65	20 m Sprint	7,32	0,66
Endurance (Vo2max)	40,28	4,33	Endurance	39,35	2,09

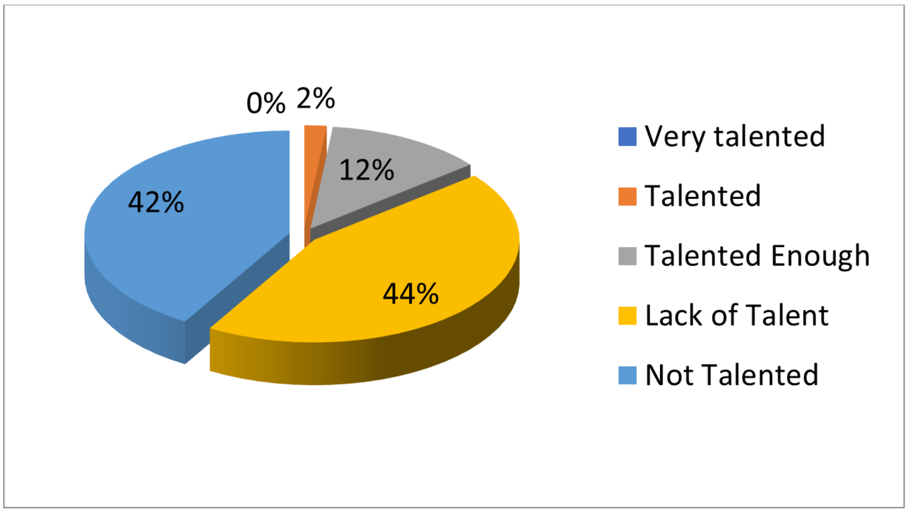

Figure 1. Athlete Talent Percentage Chart

Table 2. Results of Anthropometric, Biomotor and Fundamental Skills Measurements in Kendari

Male (n = 122)	Mean	SD	Female (n = 93)	Mean	SD
Antropometri					
Age	13,19	1,05	**Age**	13,1	0,97
Height	153,4	9,58	**Height**	150	8,10
Sitting High	80,04	5,79	**Sitting High**	77	16,97
Weight	41,35	13,4	**Weight**	42,8	9,82
Arm Span	153,5	12,66	**Arm Span**	150	10,19
Fundamental Skill					
Catch	6,04	4,26	**Catch**	2,8	3,06
Basket ball Throw	4,91	1,14	**Basket ball Throw**	3,99	0,92
Vertical Jump	41,14	15,96	**Vertical Jump**	29,8	7,32
Biomotor					
Agility Run	21,55	2,77	**Agility Run**	22,5	2,98
40 m Sprint	7,06	1,76	20 m Sprint	8,29	2,70
Endurance	37,44	2,48	Endurance	35,5	2,49

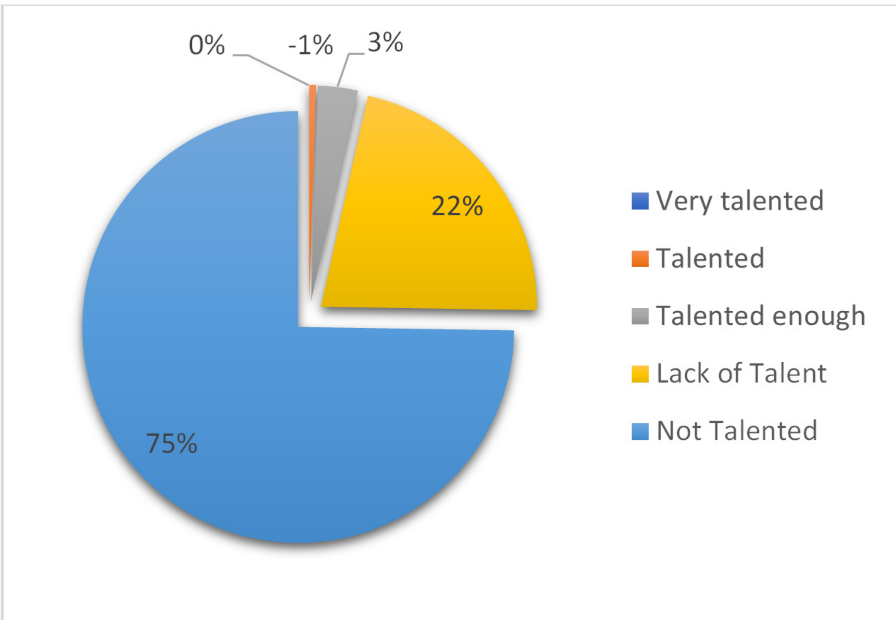

Figure 2. Athlete Talent Percentage Chart

Based on the results of the study in **Table 1** which was conducted in Salatiga and was attended by 193 participants, anthropometry results obtained male and female average age 13.23 ± 13.04 years, height 157.18 ± 151.1 cm, sitting high 82.22 ± 80.12 cm, weight 46.16 ± 43.18 kg, arm span 159.90 ± 153.5 cm. While the specific skills average catch 6.18 ± 1.69, basketball ball throw 4.89 ± 3.94, vertical jump 34.97 ± 29.55. The average biomotor aspect is agility run 20.28, 40 m sprint 6.51 ± 7.32, endurance 40.28 ± 39.35. There is a significant difference in the results of specific skills for men and women, precisely on the catch indicator because of all participants who took the test 45.21% did not get a score. From these results, it can be seen that the percentage analysis in **Figure 1** shows that there are no very talented participants, 2% of participants are declared talented, 12% are quite talented, 44% are less talented, and 42% are not talented.

The results of measurements carried out in Kendari **Table 2** show that the average age of male and female participants is 13.19 ± 13.1, height 153.4 150, sitting high 80.04 ± 77, weight 41.35 ± 42 ,8, arm span 153.5 ± 150. Fundamental variables catch skill 6.04 ± 2.8, basketball ball throw 4.91 ± 3.99, vertical jump 41.14 ± 29.8,. Biomotor agility run 21.55 ± 22.5, sprint 40 m 7.06 ± 8.29, endurance 37.44 ± 35.5. There are differences in catch indicators for 23 male and female participants with a percentage of 30.11%. Percentage analysis according to **Figure 2** showed that there were no very talented participants, less than 1% were talented, 3% were moderately talented, 22% were less talented, and 75% were not talented. However, **Tables 1 and 2** show different anthropometry, fundamental skills, and biomotor values between men and women, these three aspects can identify athlete talent. Talent identification that can be decided in this study, based on the results of anthropometry, fundamental skills, and biomotor measurements is in the javelin throw, sprint 100 meters, 200 meters and long jump.

4. Discussion

The purpose of this study was to identify the talent of the participants based on anthropometry, fundamental skills and biomotor. It turned out that after measuring 408 participants, the three variables could be used to identify the athlete's talent. Several anthropometric and physical fitness characteristics of women are strongly related to the performance of aspiring athletes. Measured parameters, such as age, and height, time in the T-Drill test, contracted arm perimeter, to select players with greater potential for better game performance values [31]. resistance training can have a significant effect on dynamic balance, maximum lower-body strength, and power [32]. Specific sporting requirements may incur slight differences in athletic movement skill among talent-identified juniors [33]. Physical, anthropometric, and athletic movement qualities discriminant of development level within a rugby league talent pathway [34]. Skill-based volleyball training improves spiking, setting, and passing accuracy and spiking and passing technique, but has little effect on the physiological and anthropometric characteristics of players [35].

In fact, after measuring the fundamental skills, there are results that state that they can consider talent identification. Biomotor components such as sprints, agility runs can be considered to find athletes' talents in sprint. While the vertical jump that identifies the strength of the legs can be a parameter to determine the long jump. Physical education doing so has allowed us to identify performance they drew on in everyday practice [36]. Physical variables can be used by sports coaches and support staff to influence talent identification, training, and nutrition programs [14]. Individual discriminant analysis identified the improvements in some novice players [37]. As for the bimotor variables that have been recorded, endurance, agility and sprints are a big consideration in this study to identify talent. Physical fitness data to demographic and anthropometric data improves the prediction accuracy of race times in young athletes [38]. After identifying the talent, the athlete will make an appropriate training program for the sport. Coaches must consider appropriate training so that athletes whose talents have been identified can reach peak performance.

Coaches at 11-15 years may consider implementing training oriented towards increasing lower body strength, repetitive sprints, and maximal aerobic capacity. This may increase the developmental transition to later ages, and the possibility of being identified as a talent at 17-20 years. Sports coaches and scientists should use boundary scores for tests in the talent identification and development process. By classifying the limit value for the test, the coach can also decide that the athlete will be placed in a particular sport. Youth soccer coaches and sports scientists should use the cut-off scores for the technical tests in the talent identification [39]. Limited assessments of talent potential based on current performance [40]. The most frequently identified skills were speed/agility [41]. Coach who implicitly and explicitly selects participants based on character and draws on his personal value set [42]. Motor skills assessment seems to be a reproducible, objective part of a talent development programme [43]. Assessing multi-dimensional performance qualities when identifying talented team sports [44]. The assessments of mental and goal management skills predict future performance [45].

5. Conclusions

It fact that the assessment of anthropometry, fundamental skills, and bimotor can be used to identify the talent of athletes at a young age. But the identification will also not be useful if the prospective athlete does not have the potential to become an elite player. It could be that biomotor and anthropometry aspects are more dominantly used to identify athletes but need to be added with other skills performance assessments to support this decision. Future research should focus on identifying the determinants of talent, developing assessment instruments. In particular, there is a relationship between assessment and identification as a determinant of talent in aspiring young athletes.

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