

Talent identification model for sprinter using discriminant factor

by Agus Hariyanto

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Talent identification model for sprinter using discriminant factor

N W Kusnanik¹, A Hariyanto¹, Y Herdyanto¹, A Satia²

¹Faculty of Sports Science, Universitas Negeri Surabaya, Indonesia

²Faculty of Sports Science, Universitas Negeri Jogjakarta, Indonesia

niningwidyah@unesa.ac.id

Abstract. The main purpose of this study was to identify young talented sprinter using discriminant factor. The research was conducted in 3 steps including item pool, screening of item pool, and trial of instruments at the small and big size of samples. 315 male elementary school students participated in this study with mean age of 11-13 years old. Data were collected by measuring anthropometry (standing height, sitting height, body mass, and leg length); testing physical fitness (40m sprint for speed, shuttle run for agility, standing broad jump for power, multistage fitness test for endurance). Data were analyzed using discriminant factor.

The result of this study found that there were 5 items that selected as an instrument to identify young talented sprinter: sitting height, body mass, leg length, sprint 40m, and multistage fitness test. Model of Discriminant for talent identification in sprinter was $D = -24,497 + (0,155 \text{ sitting height}) + (0,080 \text{ body mass}) + (0,148 \text{ leg length}) + (-1,225 \text{ Sprint 40m}) + (0,563 \text{ MFT})$. The conclusion of this study: instrument tests that have been selected and discriminant model that have been found can be applied to identify young talented as a sprinter.

1. Introduction

Science and technology in sports are the important things that can be used to develop sports achievement. One of the goals of doing sports is to achieve the excellent performance. Achievements can be obtained by conducting structured and systematic in sports coaching. Sports coaching should be based on scientific concepts that supported by sports science and technology. Through science and technology can carry out the training process, identifying, selecting, and predicting young talented athlete effectively and efficiently. The aim of talent identification is for identifying and selecting young talented athlete that valid and reliable. This is necessary to obtain accurate results in predicting young talented athlete for future. It is hoped that young talented athlete who is identified and selected can compete at the international level.

There are some talent identification models that have been developed by some countries including Germany, Japan, China, Scotland, and Australia [1–5]. Some literature report that there is some talent identification which specifies for sport such as volleyball [6–14]. Talent identification in Indonesia needs to be developed systematically and continuously, especially for a sprinter. Therefore, the purpose of this study is to identify young talented sprinter using discriminant factor in order to identify young talented sprinter effectively and efficiently.



2. Methods

This study was conducted at 315 elementary school students with an aged range of 11-13 years old. The research developed talent identification model based on Aussie Sport's talent search instruments. The product of this study was a model of talent identification using discriminant factor that can identify young talented sprinter. Data were collected by measuring anthropometric including standing height, sitting height, body mass, leg length; testing physical fitness (40m sprint for speed, shuttle run for agility, standing broad jump for power, multistage fitness test for endurance). Data were analyzed using discriminant factor.

3. Results and Discussion

The result of talent identification based on collecting the item pool, screening of item pool by consulting with the sprinter coaches and sports scientists and test measurements expert for sports. Then produced Selected Test Item Design (STID) as follows: anthropometric measurements include standing height, body weight, sitting height, and leg length; physical fitness tests include sprint 40m, vertical jump, standing broad jump, sit up, push up, flexibility and multistage fitness test.

The object identification was to determine whether the research variables can be used to test the differences of a group against other groups. The variables are standing height, sitting height, body mass, leg length, sit up, push up, flexibility, vertical jump, sprint 40 m, standing broad jump and Multi Fitness Test (MFT). Based on the identification using the test of Equality of Group Means shown in Table 1:

1
Table 1. Tests of Equality of Group Means

	2 Wilks' Lambda	F	df1	df2	Sig.
Standing Height	.704	131.810	1	313	.000
Sitting Height	.718	123.181	1	313	.000
Body Mass	.767	95.290	1	313	.000
Leg Length	.703	132.048	1	313	.000
Sit Up	.983	5.313	1	313	.022
Push Up	.992	2.532	1	313	.113
Flexibility	.988	3.765	1	313	.053
Vertical Jump	.799	78.762	1	313	.000
Sprint 40m	.725	118.843	1	313	.000
Standing Broad Jump	.893	37.670	1	313	.000
Multistage Fitness Test	.686	143.157	1	313	.000

As clearly shown in Table 1 that observed from F-test, therefore variable standing height, sitting height, body mass, leg length, sit up, vertical jump, sprint 40m, standing broad jump, and MFT has P-value (Sig) 0.000 < 0, 05 level of significant so H1 accepted and Ho rejected. This means that the variable can be used to identify the talent category of the sprinter athlete. The push-up and flexibility arm has P-value (Sig) 0.113 < 0.05 level of significant so H1 is accepted and Ho is rejected. This means both of these variables cannot be used to identify the talent category of sprinter athletes.

After knowing that the variables can be used as discriminant variables, it is necessary to know how big the differences of each discriminant variable in two categories can be seen from the equation of discriminant function. To know the discriminant function equation can be seen in Canonical Discriminant Function Coefficients as seen in Table 2:

Table 2. ² *Canonical Discriminant Function Coefficients*

	Function
	1
Sitting Height	.155
Body Mass	.080
Leg Length	.148
Sprint 40m	-1.225
Multistage Fitness Test	.563
(Constant)	-24.497
Unstandardized coefficients	

Another crucial finding as clearly depicted in Table 2 that the coefficients of each variable can be formed in a discriminant function, as the following discriminant functions: $D = -24.497 + (0.155 \text{ Sitting Height}) + (0.080 \text{ Body Mas}) + (0.148 \text{ Leg Length}) + (-1.225 \text{ 40m Sprint}) + (0.555 \text{ Multistage Fitness Test})$. Based on the equation it is seen that the average value of 40 m sprint is the most dominant to predict the difference of talent category (Sprinter and non Sprinter) because it has the highest coefficient that is 1.225 and the lowest in predicting sprinter talent category is body mass with coefficient 0,080.

In Phase 1, a Selected Test Instrument Design (RITT) was prepared based on the results of some literature reviews and consultation with a team of sports experts. The selected instrument was found 11 items. For anthropometric measurements consisting of body height, body mass, sitting height, and leg length; for physical fitness tests such as 40 m sprints, vertical jumps, standing broad jumps, arm muscle strength (push up), abdominal muscle strength (sit up), flexibility and multistage fitness tests (MFT).

The selection of the RITT refers to a sports search model that has been modified by [11]. The number of instruments based of Aussie Sport [5] model was 10 items instrument consisting of 4 anthropometric measurements of body height, sitting height, body mass, spam arm, and 5 physical fitness tests including 40m sprint, vertical jump, shuttle run 5m, basketball throw, throw and catch tennis ball, and multistage fitness test. The instrument of the modified sports search model has been tested for its validity and reliability [15].

Based on the trial results and discriminant analysis showed that there were 5 items of measurement tests consisting of anthropometric measurements (body mass, leg length, and sitting height); and physical tests (40m sprints) and Multistage Fitness Test (MFT), later referred to as Selected Instruments Test (SIT). Based on the discriminant equation it seems that 40m sprint was the most dominant value in predicting young talented for sprinters. 40m sprint is one form of test to determine the level of one's physical fitness in the component speed. Sprinters require components of physical fitness, especially acceleration and speed in supporting their performance. Furthermore, sprinter also requires cardiovascular endurance as one component of physical fitness that must be owned. This is because the endurance capability is needed by a sprinter in doing various exercise activities. The Sprinter needs a repetition of a short sprint that must be done many times each day. Therefore good cardiovascular endurance can certainly support these activities.

To determine young potential athletes including young talented sprinter or non sprinter, simply by including the results of anthropometric measurements, and physical fitness tests in the model of discriminant equations that have been designed. Therefore, trainers, teachers of Physical Education, and parents will be able to know whether their students are talented in sprinters or non sprinters. The discriminant analysis model that has been produced can be used as an instrument to classify the sprinter talent category or non sprinter for children aged 11-13 years.

Creating a discriminant analysis model requires special knowledge, therefore a program that facilitates trainers, teachers of physical education, parents, and coaches can be used easily and precisely. This model was created to identify young talented children aged 11-13 years. This is done to avoid measurement tests that are "too difficult" for children younger than 11 years old and "too easy" for children over 13 years old. If the child under the age of 11 years old is still in the stage of multilateral development. But if it is above 13 years old then it is in the stage of talent development. Furthermore, McComas says that the development of muscle and skeletal children aged 1 - 5 years will increase by 45%, aged 5-18 years increased by 60%, after the age of 18 years increased 20% [16]. Therefore, children aged 11-13 years in this study is the right age for growth and development of muscle and skeletal because of its relatively high increase.

The results of this research can be used to identify talent identification for children aged 11-13 years for sprinter using discriminant equation. Of course, these results can be helpful for coaches, coaches, parents, teachers of Physical Education in identifying young talented athlete for sprinters. Not every child has a talent in sprinters, therefore only certain children have potential in anthropometric and physical fitness to be nurtured and further developed. It is expected that the child can practice optimally so as to provide greater opportunities for the child to succeed as sprinters. Therefore, this talent identification model is a practical, effective and efficient to identify young talented sprinters.

4. Conclusion

Instrument tests that have been selected and a discriminant factor model that have been found can be applied to identify young talented sprinter. Model of Discriminant factor for identifying young talented sprinter was $D = -24,497 + (0,155 \text{ sitting height}) + (0,080 \text{ body mass}) + (0,148 \text{ leg length}) + (-1,225 \text{ Sprint } 40\text{m}) + (0,563 \text{ MFT})$.

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