

# Talent Indentification Model for Sprinter Using Discriminant Factor

*by* Nining Widyah Kusnanik

---

**Submission date:** 05-Jun-2020 08:43PM (UTC+0700)

**Submission ID:** 1338371508

**File name:** tion\_model\_for\_sprinter\_using\_discriminant\_factor\_-\_CAPEU\_2.pdf (1.24M)

**Word count:** 3153

**Character count:** 17415

**PAPER** · OPEN ACCESS

## The Consortium of Asia-Pacific Education Universities (CAPEU)

To cite this article: 2018 *IOP Conf. Ser.: Mater. Sci. Eng.* **296** 011001

View the [article online](#) for updates and enhancements.

### Related content

20

- [Justice and adaptation to climate change in the Asia-Pacific Region: A cosmopolitan perspective](#)  
Paul Harris and J Symons

- [Plasmas](#)  
Ian Spalding

16

- [PPCF Dendy Europe-Asia Pacific prize for outstanding research collaboration in plasma physics](#)  
R O Dendy, M Koepke, Y McGlashan et al.

5

## Preface of The 4<sup>th</sup> CAPEU Conference 2017

27

The 4<sup>th</sup> Consortium Asia-Pacific Education Universities (CAPEU) 2017 is one of a series of international conferences held by Universitas Negeri Surabaya (Unesa), Indonesia, in collaboration with some universities in Asia, South East Asia, and Pacific as well as with other institutions. Unesa held this event as its commitment to research activities and collaborations to strengthen the academic climate in Asia and beyond. This event is a perfect platform for senior and junior researchers in the fields of sciences, technology, engineering, and mathematics to exchange experiences and ideas and to build a network. In addition, this conference will certainly help improve scientific publication of researchers and lecturers.

The theme of this year event is “Innovations for Human Talents”. This two-day conference aims to bring together educators, graduate students, researchers, and faculty members of the CAPEU and of other countries to contribute to the concept of the STEM in education and to formulate goals on how this can be applied and implemented in their respective countries. The researchers can do their bit with their research findings in promoting better achievement of research innovation for the betterment of human life.

This conference has attracted much attention from scientific communities from diverse background of research interests. There are 130 research-based papers submitted and presented at the conference. Out of the submitted papers, the selected ones, around 56 papers, will be published by IOP Publishing. The papers have a wide range of topics, namely education, teaching and learning, assessment, community engagement, job opportunities related to STEM, and parents’ involvement in enhancing STEM. The topics are not limited to, but mostly of the above-mentioned areas of interest.

### Editors:

1. Abadi (Universitas Negeri Surabaya)  
abadi@unesa.ac.id
2. Ali Mustofa (Universitas Negeri Surabaya)  
alimustofa@unesa.ac.id
3. Setya Chendra Wibawa (Universitas Negeri Surabaya)  
setyachendra@unesa.ac.id

### Organize Committee:

Abadi (Universitas Negeri Surabaya)  
Ali Mustofa (Universitas Negeri Surabaya)  
Setya Chendra Wibawa (Universitas Negeri Surabaya)  
Raya Sulistyowati (Universitas Negeri Surabaya)  
Noviyanti (Universitas Negeri Surabaya)  
Yuni Lestari (Universitas Negeri Surabaya)  
Dimas Avian Maulana (Universitas Negeri Surabaya)  
Muhamad Ro'is Abidin (Universitas Negeri Surabaya)



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

PAPER • OPEN ACCESS

1

## Peer review statement

To cite this article: 2018 *IOP Conf. Ser.: Mater. Sci. Eng.* **296** 011002

View the [article online](#) for updates and enhancements.

## Related content

- [Peer review statement](#)

- [Peer review statement](#)

- [Peer review statement](#)

## <sup>2</sup> Peer review statement

All papers published in this volume of *IOP Conference Series: Materials Science and Engineering* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.



PAPER • OPEN ACCESS

## Talent identification model for sprinter using discriminant factor

<sup>23</sup>  
To cite this article: N W Kusnanik *et al* 2018 *IOP Conf. Ser.: Mater. Sci. Eng.* **296** 012055

<sup>5</sup>  
View the [article online](#) for updates and enhancements.

### <sup>10</sup> Related content

- [Innovation: Banks SPRINT for technology](#)  
Sally Croft  
<sup>10</sup>
- [Predicting Player Position for Talent Identification in Association Football](#)  
Nazim Razali, Aida Mustapha, Faiz Ahmad Yatim *et al.*
- [Detecting meaningful body composition changes in athletes using dual-energy x-ray absorptiometry](#)  
Steffi L Colyer, Simon P Roberts, Jonathan B Robinson *et al.*

## 10 Talent identification model for sprinter using discriminant factor

N W Kusnanik<sup>1</sup>, A Hariyanto<sup>1</sup>, Y Herdyanto<sup>1</sup>, A Satia<sup>2</sup>

<sup>1</sup>Faculty of Sports Science, Universitas Negeri Surabaya, Indonesia

<sup>2</sup>Faculty of Sports Science, Universitas Negeri Jogjakarta, Indonesia

[niningwidyah@unesa.ac.id](mailto: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  $D = -24,497 + (0,155 \text{ sitting height}) + (0,080 \text{ body mass}) + (0,148 \text{ leg length}) + (-1,225 \text{ Sprint } 40\text{m}) + (0,563 \text{ MFT})$ . 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:

Table 1. *Tests of Equality of Group Means*

	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. *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  $D = -24,497 + (0,155 \text{ sitting height}) + (0,080 \text{ body mass}) + (0,148 \text{ leg length}) + (-1,225 \text{ Sprint } 40\text{m}) + (0,563 \text{ MFT})$ .

#### Acknowledgement

The authors would like to thanks to Director of Post Graduate Universitas Negeri Surabaya for supporting the research grant. In addition, many appreciate Dr. Sri Rahayu Vice Rector for Academic for giving the opportunity to present the article at the CAPEU 2017.

#### References

- [1] JISS 2005 *Annual Report 2004* (Tokyo)
- [2] Cooke C, Cogley S, Till K and Wattle N 2010 Searching for Sporting Excellence: Talent Identification and Development *Br. J. Sports Med.* **44**
- [3] Yuan W 2004 Yuan Weimin's Speech on the Press Conference in Athens
- [4] Abbott A and Collins D A Theoretical and Empirical Analysis of a "State of the Art" Talent Identification Model, *High Ability Studies* **13** 157-78
- [5] Sport A 1993 *The Search Is Over* (Australian Sport Commission)
- [6] Kusnanik N 2013 Anthropometrical Measurement, Physiological and Biometrical Testing in Identifying Young Talented Volleyball Athletes *Assiut J. Sport. Sci. Arts* 692-8
- [7] Aouadi R, Jlid M, Khalifah R, Hermassi S, Chelly M, Van Den Tilaar R and Gabbett T 2012 Association of Anthropometric Qualities with Vertical Jump Performance in Elite Male Volleyball Players *J. Sports Med.* **52** 11-7
- [8] Thakur V 2010 Talent Identification in Kabaddi *Br. J. Sports Med.* **44**
- [9] Ballard R 2010 *Tennis Indonesia Youth Talent Identification Program* (Jakarta: PELTI)
- [10] Reilly T, Bangsbo J and Franks A 2000 Anthropometric and Physiological Predispositions for Elite Soccer *J. Sports Sci.* **18** 669-83
- [11] Reilly T, Williams A, Nevill A and Franks A 2000 2000b: A Multidisciplinary Approach to Talent Identification in Soccer *J. Sports Sci.* **18** 695
- [12] William A and Reilly T 2000 Talent Identification and Development in Soccer *J. Sports Sci.* **18** 657-67
- [13] Hoare D and Warr C 2000, 2000: Talent Identification and Women's Soccer: An Australian

- Experience, , Vol.18, No.9; *J. Sports Sci.* **18** 751–8
- [14] Hoare D 2000 Predicting Success in Junior Elite Basketball Players – The Contribution of Anthropometric and Physiological Attributes *J. Sci. Med. Sport.* **3** 391–405
- [15] Menpora 2003 *Indonesian Directorate General of Sport, Pemanduan Bakat* (Jakarta: Ditjen Olahraga)
- [16] Belanger A and McComas A 1989 Contractile properties of human skeletal muscle in childhood and adolescence *Eur J Appl Physiol Occup Physiol* **58** 563

# Talent Identification Model for Sprinter Using Discriminant Factor

## ORIGINALITY REPORT

30%

SIMILARITY INDEX

24%

INTERNET SOURCES

23%

PUBLICATIONS

23%

STUDENT PAPERS

## PRIMARY SOURCES

1

Submitted to President University

Student Paper

4%

2

re.public.polimi.it

Internet Source

3%

3

conference.unesa.ac.id

Internet Source

2%

4

dspace5.zcu.cz

Internet Source

2%

5

digilib.unimed.ac.id

Internet Source

2%

6

K Ashadi, D N Mirza, G Siantoro. " Hydration status in adolescent runners: ", IOP Conference Series: Materials Science and Engineering, 2018

Publication

2%

7

www.scopus.com

Internet Source

2%

8	Internet Source	1%
9	<a href="http://www.frontiersin.org">www.frontiersin.org</a> Internet Source	1%
10	Nazim Razali, Aida Mustapha, Faiz Ahmad Yatim, Ruhaya Ab Aziz. "Predicting Player Position for Talent Identification in Association Football", IOP Conference Series: Materials Science and Engineering, 2017 Publication	1%
11	Submitted to Universiti Tenaga Nasional Student Paper	1%
12	<a href="http://www.tandfonline.com">www.tandfonline.com</a> Internet Source	1%
13	<a href="http://docplayer.net">docplayer.net</a> Internet Source	1%
14	<a href="http://www.gssiweb-de.com">www.gssiweb-de.com</a> Internet Source	1%
15	G Turner, A J Richardson, N S Maxwell, J S M Pringle. "Comparison of total haemoglobin mass measured with the optimized carbon monoxide rebreathing method across different Radiometer™ ABL-80 and OSM-3 hemoximeters", Physiological Measurement, 2014 Publication	1%

---

16	<a href="http://china.iopscience.iop.org">china.iopscience.iop.org</a> Internet Source	1%
17	Submitted to Liverpool John Moores University Student Paper	1%
18	<a href="http://www.journal.unitas-pdg.ac.id">www.journal.unitas-pdg.ac.id</a> Internet Source	1%
19	Submitted to Sunway College Student Paper	1%
20	R O Dendy, M Koepke, Y McGlashan, F A O White. "PPCF Dendy Europe-Asia Pacific prize for outstanding research collaboration in plasma physics", Plasma Physics and Controlled Fusion, 2017 Publication	1%
21	Submitted to University of Wales Swansea Student Paper	1%
22	Submitted to University of Birmingham Student Paper	<1%
23	<a href="http://vuir.vu.edu.au">vuir.vu.edu.au</a> Internet Source	<1%
24	Submitted to City University Student Paper	<1%
25	<a href="http://akademik.unsoed.ac.id">akademik.unsoed.ac.id</a> Internet Source	<1%

---

26 "Mathematics, Informatics, Science and Education International Conference (MISEIC)", Journal of Physics: Conference Series, 2018  
Publication <1%

---

27 journal.uny.ac.id  
Internet Source <1%

---

28 Submitted to Delhi University  
Student Paper <1%

---

Exclude quotes Off

Exclude matches Off

Exclude bibliography Off

# Talent Identification Model for Sprinter Using Discriminant Factor

---

GRADEMARK REPORT

---

FINAL GRADE

**/0**

GENERAL COMMENTS

**Instructor**

---

PAGE 1

---

PAGE 2

---

PAGE 3

---

PAGE 4

---

PAGE 5

---

PAGE 6

---

PAGE 7

---

PAGE 8

---

PAGE 9

---

PAGE 10

---