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Physical fitness norm for form six sports science students in Kedah

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ABSTRACT

The aim of this study is to determine and develop health related physical fitness criterion reference norm for Form Six Sports Science students in Kedah. Health related physical fitness should be evaluated among these students to make sure potential candidates selected to study in form six. The purposive sampling method used to select 225 subjects, consists of 107 male and 118 female students. The Prudential FITNESSGRAM® was used to measure cardiovascular endurance, muscular endurance, muscular strength, flexibility and body mass index (BMI). Researchers used the mean, standard deviation, z scores and t scores to produce the overall health related fitness norm. Base on the norm produced the result for male and female students showed there were clear differences among both genders in each and every component of health related physical fitness level. The findings also proved that gender plays a major role in physical fitness and there should be separate norms by gender for all the fitness components accept Body Mass Index as recommended by the world Health Organization. The norm developed through this research can be used as a selection reference to recruit form six sports science students in the state of Kedah. The same criteria also followed by a higher education institution for student recruitment. In addition, this norm can also help students and teachers to maintain their level of health related physical fitness. Hopefully, this norm can be extended to other states in order to select potential students majoring in Sports Science and meet the needs of holistic human development according to our national education policy.

1. Introduction

Form Six education is one of the channels to pursue further education for Form Five leavers (SPM) by fulfilling certain conditions fixed by the Ministry of Education (MOE). The rebranding of Form Six aims to strengthen the education system by improving the quality and image of form six education equivalent to Matriculation studies (MOE, 2015). The Form Six students who choose to pursue their degree in sports science should have a good level of physical fitness and sports science knowledge. Based on the education syllabus, the combination of theory and practice should be given priority in order to strengthen students' knowledge and skills in this field. Therefore, the mastery of a good level of physical fitness is one of the main goals in the syllabus of sports science. Furthermore, students who have high fitness level will have good health by practicing a balanced meal and will be able to prevent themselves from the risk of hypokinetic disease and sedentary lifestyles (Beets and Pitetti, 2005). Geanina and Stefan (2015) pointed out that individuals who have a good level of physical fitness is able to live healthily.

Physical fitness includes physical fitness and health-based motor acting on the basis of physical fitness. Cardiovascular endurance, muscular endurance, muscular strength, flexibility and body composition are components of health related physical fitness. The components of physical fitness, acting motor, is defined as speed, agility, power, balance, reaction time and coordination (Corbin et al., 2016; Hashim, 2015; Ayers and Sariscsany, 2011; Lacy, 2011; Baumgartner et al., 2007).

According to MOE (2016), Form Four and Five students are required to undergo a physical fitness test namely, National Physical Fitness Standard,

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(SEGAK) twice a year, in March and August. This implementation is to get feedbacks on the effectiveness of physical education subjects and levels of physical fitness and health of students. The implementation of SEGAK test is based on the recommendations of the Ministry of Health (MOH), the increase in the percentage of people in this country who suffer from chronic diseases, non-infectious diseases and obesity. The main goal of the SEGAK exercise is that they have the knowledge, awareness and practice fitness activities in order to maintain an optimal level of physical fitness. This will motivate the students to adopt an active and healthy lifestyle similar to the National Education Philosophy.

However, the MOE's emphasis on the physical fitness level is only catered to Form Four and Five students. Form Six students were not involved in this assessment. What about the physical fitness of Form Six Students? They are also at the risk for infectious diseases. According to Ismail et al. (2008) and Shabeshan and Jilld (1998), the level of physical fitness of high school students are not satisfactory. They are not obliged to even follow subjects on Physical Education and involve themselves in extra-curricular activities at school. Meanwhile, the Form Six students engage in learning activities between 7.30 am to 3.00 pm and do not have the opportunity to engage themselves in physical activities. Form Six students should also have the opportunity to engage themselves in physical activities during school hours and must be measured and evaluated for physical fitness, especially students of sports science.

For time being, there are no specific studies conducted to produce a standard battery of tests to be applied to Form Six students in general and in particular to the sports science students. There are also researchers who are using a battery of tests and norms developed by researchers abroad and adapted to the students in the respective countries. The findings are less appropriate in view of the various factors that may vary from country to country. Hale (2014), Janssen and LeBlanc (2010), and Roberto et al. (2014) stated that physical fitness test scores that was conducted specifically for children and teens can be a great indicator of their fitness level at the school. According to the National Health Morbidity Survey (NHMS) issued by the MOH (2018), 55% of high school students are overweight and 14% are obese. Furthermore, the findings showed as much as 36.9% of the population consisting residents aged 18 to 59 years old are not practicing or performing physical activities. This shows that as many as 4 out of 10 people do not practice physical activity in the country.

Whereas, according to McWhorter et al. (2002), students who participate in fitness activities and exercise can reduce the percentage of fat and increase physical fitness and mental awareness. As such a study should be undertaken to build a set of tests and physical fitness norms that guide the Form Six students majoring in sports science, especially, in order to always be able to adopt a healthy and active lifestyle. Form Six students need to have a good level of physical fitness which will be of great help in the learning processes that will be encountered during their Form Six sports science studies. Mastery of basic skills and knowledge based on physical fitness or cognitive theory in sports science will allow students to set their own direction or their future career while continuing their studies at the tertiary level.

Some past studies showed the connection between physical activity and the level of individual functions. Ruiz et al. (2009) proved that there is a relationship between fitness and health through studies conducted in children and teenagers. A study conducted by Cvejic et al. (2013), shows that measurement and evaluation of physical fitness needs to be done as a predictor of general health and is the best indicator of the health of children and teenagers.

There are many test batteries used to measure the level of physical fitness of students. Among those, the test that is often used by researchers to date is Prudential FITNESSGRAM® (CIAR, 1992). Harun et al. (2014) stated that Prudential FITNESSGRAM® is suitable for the Asian community to test its health-based fitness. Based on past studies, researchers selected the Prudential FITNESSGRAM® to determine the level of physical fitness and produce norms criterion reference for Form Six students majoring in Sports Science by gender in the state of Kedah.

2. Methodology

The study is an experimental "ex post facto", which has a high internal validity (Piaw, 2006). Researchers just need to run the test once through the post-test and this way simplify the process of collecting data from a large number of samples and the corresponding samples tested on a variety of ages (Cicciarella, 1997). The data collected in the existing situation without any interventional training or treatment (Thomas et al., 2011). The study sample consisted of Form Six students at a total of 225 people (107 males and 118 females) who are studying in the Department of Sports Science in Kedah. The sample was selected using purposive sampling method in which all Sport Science students in Kedah were chosen as a subject of study except for students who have permanent health problems. Data was collected by researchers with the help of the 5 other researchers in all the schools which offers Sports Science course. Researchers used the Prudential FITNESSGRAM® containing five types of tests as shown in Table 1.

Table 1: Prudential FITNESSGRAM® test battery

No.	Tests	Fitness Components
1	Pacer test	Cardiovascular endurance
2	Curl up test	Muscle endurance
3	90^0 push- ups test	Strengthen muscles
4	Trunk lift test	Flexibility
5	Body Mass Index (BMI) test	Body composition

3. Findings

The researchers used descriptive analysis for the determination of grades based on physical fitness level of health for each component consisting of cardiovascular endurance, muscular endurance, muscular strength, flexibility and body composition. The analysis on level of achievement is based on the mean and standard deviation. The method of giving grades is a process used to categorize the results in the form of a reference norm that can be used to compare students to other students in groups according to their respective capabilities (Hashim, 2015).

Researchers have conducted an analysis of mean and standard deviation for each component in this study as the basis of the overall findings. Based on the analysis in Table 2, it shows the mean (M) and standard deviation (SD) for BMI for men M=22.80, SD=5.24, for female M=21:56, SD=3.75. Mean score Trunk Lift male M=25.47, SD=5.80, female M=25.71, SD=5.72, Curl Up male component M=32.93, SD=6.84; female M=25.17, SD=7:53. For the mean and standard deviation of 90 Push Up, Men M=22.64, SD=9:50; female M=6.89, SD=3.88. Mean and standard deviation for male PACER test M=34.98, SD=5.38; female M=24.82, SD=2.38. The mean and standard deviation score component of overall physical fitness male M=220.70, SD=20:26; female M=181.21, SD=14.73 (Table 2).

Table 2: Descriptive statistics mean and standard deviation of all components

Components	Gender	N	Mean	Standard Deviation
BMI	Male	107	22.80	5.24
	Female	118	21.56	3.75
Trunk Lift	Male	107	25.47	5.80
	Female	118	25.71	5.72
Curl Up	Male	107	32.93	6.84
	Female	118	25.17	7.53
Push Up	Male	107	22.64	9.50
	Female	118	6.89	3.88
PACER	Male	107	34.98	5.38
	Female	118	24.82	2.38
Overall Physical Fitness	Male	107	220.70	20.26
	Female	118	181.21	14.73

3.1. Norm for health-based physical fitness components among male and female students

The physical fitness level was tested using the Progressive Aerobic Cardiovascular Endurance Run (PACER), curl ups test, push-ups 90º test, trunk lift test and BMI test. Researchers have established the norm by using the mean and standard deviation score for all components of physical fitness for male and female students as showed in Table 3 and Table 4.

Table 3: Health related physical fitness norm for male students

Level Test	Excellent	Very Good	Good	Moderate	Poor
PACER	44.67 above	38.22-44.66	31.75-38.21	25.30-31.76	25.29 below
Curl Up	45.25 above	37.04-45.24	28.83-37.03	20.62-28.82	20.61 below
Push Up 90º	39.75 above	28.35-39.74	16.94-28.34	5.54-16.93	5.53 below
Trunk Lift	35.92 above	28.96-35.91	21.99-28.95	15.03-21.98	15.02 below

Table 4: Health related physical fitness norm for female students

Level Test	Excellent	Very Good	Good	Moderate	Poor
PACER	29.11 above	26.26–29.10	23.39–26.25	20.54–23.38	20.53 below
Curl Up	38.73 above	29.70–38.72	20.65–29.69	11.62–20.64	11.61 below
Push Up 90º	13.88 above	9.23–13.87	4.56-9.22	1.00–4.55	0.99 below
Trunk Lift	36.02 above	29.15–36.01	22.28–29.14	15.41–22.27	15.40 below

3.2. Overall physical fitness level for form six male students

The overall physical fitness levels for grading were analyzed using the z score and t score. Referring to Table 5, the result showed for male students, 257.18 and above an excellent level, 232.87 to 257.17 level of very good, 207.84 to 232.86 good achievement, 184.23 to 207.83 moderate level, meanwhile 184.22 and below were poor.

Table 5: Overall physical fitness level for the male students

Norm	Level
257.18 and above	Excellent
232.87–257.17	Very Good
207.84–232.86	Good
184.23–207.83	Moderate
184.22 and below	Poor

3.3. Overall physical fitness level for form six female students

According to Table 6, the overall physical fitness level for form six female students is 207.73 and above an excellent level, 190.06 to 207.72 level of very good. 172.37 to 190.05 good level While 154.70 to 172.36 moderate level and 154.69 and below poor.

Table 6: Overall physical fitness level of the female students

Norm	Level
207.73 and above	Excellent
190.06–207.72	Very Good
172.37–190.05	Good
154.70–172.36	Moderate
154.69 and below	Poor

3.4. Body composition level for form six male and female students

Body composition using BMI test was conducted and evaluated using the norms set by WHO (2004). 18.5 and below less weight, 18.5 to 24.9 normal

level, 25.0 to 29.9 overweight, 30.0 to 34.9 obese class i, 35.0 to 39.9 obese class ii and 40 and above obese class iii (Table 7).

Table 7: Body Mass Index for male and female students

Norma	Level
18.5 and below	Less weight
18.5–24.9	Normal
25.0–29.9	Overweight
30.0–34.9	Obese class i
35.0–39.9	Obese class ii
40 and above	Obese class iii

4. Discussions

The main objective of this study is to produce health related physical fitness norms for Form Six students majoring in sports science in Kedah. Researchers collected the data in all the schools that offer sports science in Kedah. In the construction of norms, researchers used a descriptive analysis, the mean and standard deviation for determining grades. The health related physical fitness norms has certain value that able to help students improve their fitness level. This norm will be a motivation for them to continue to adopt a healthy lifestyle through physical activity. Given the retention level of physical fitness is good not only for athletes or adults but have to be prioritized to everyone, including students who are growing up. This view is supported by Hashim (2015), who states that all individuals require a degree of physical fitness and not only individuals who play sports. Health is not evaluated in terms of the absence of disease, but also determined by the individual's level of physical fitness.

Based on this study, the norm of physical fitness was built according to each health-based component of physical fitness. The test battery used to measure the level of physical fitness in line with the assessment of the past studies such as Hashim et al. (2017), Csányi et al. (2015), Bass et al. (2013), Morrow et al. (2013), Pillsbury et al. (2012), Siegel (2006), and Grissom (2005). Hence, the norm being built is expected to be fully utilized by the state education department and schools. The evaluation also will be a motivation to students and guidance to improve the physical fitness level of each component to be healthy and fit lifelong.

5. Conclusion

These study build physical fitness component reference norm which can be used in selection of the Form Six students for Sports Science in Kedah. Based on this reference norm as well, it can help students to identify their fitness levels in cardiovascular endurance, muscular endurance, muscular strength, flexibility and body composition. In addition, through this measure, it makes easier for the school teachers to make the right choice during the selection process of students. Testing, measurement and evaluation in sports science is not only important in the world of sports, but it is also very important in daily life so that form six students are always healthy as they have a long journey in life. The implementation and use of this battery and norm should be extended to other states in order to select potential students majoring in Sports Science and meet the needs of holistic human development according to our national education policy.

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

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