A preliminary study on the recommended fitness test on students with visually-impaired: An alternative to SEGAK ?

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Abstract

SEGAK Test (Standard Kecergasan Penilaian Kebangsaan) known as the fitness test for students in Malaysia, but the test relevancy with students with disabilities can be questioned. For that, an effort been taking to design a test battery specifically for students with visually-impaired. Purpose of the study was to investigate the differences of fitness level on fitness test protocols on students with visual impairments. For the preliminary study, a total of thirty students (N=30) were selected where 14 were females and 16 were male students aged between 13 to 19 years old and all the participants currently are studying at Sekolah Menengah Pendidikan Khas (cacat penglihatan) Setapak, Kuala Lumpur. The participants were divided into three (3) groups based on the visual impairments classes which are B1, B2 and B3. Therefore, B1 had 12 participants, B2 had 15 participants and B3 had three (3) participants. All the participants were tested with the fitness tests that are a) one-mile run/walk test, b) curl up test, c) isometric push up test and d) sit and reach test. The results revealed that there was no significant difference in BMI, isometric push up, curl up, one-mile run/walk and sit and reach ($p > 0.05$). In a conclusion, a test battery needs to be designed for students with disabilities especially students with visually-impaired.

Keywords: visually-impaired; health related fitness; fitness test; curl-up test; sit and reach test

INTRODUCTION

Physical fitness can be defined as the subject able to perform physical effort and also divides into health-related physical fitness and skill related physical fitness. (Coledam, Batista, and Glaner, (2015) stated that the components of health-related physical fitness are flexibility, muscular strength and endurance, body composition and cardiorespiratory fitness. Meanwhile Morrow et al., (2013) mentioned that health related fitness is an important health marker shown to be predictive of morbidities, mortality and cardiovascular diseases especially during adolescents.
However Chen, Mason, Hammond-Bennett and Zalmout (2016) revealed students who demonstrated healthy level of had a lower level of overall adiposity, abdominal adiposity and low metabolic risk as stated. Cattuzzo et al. (2016) stated healthy level of health-related fitness allow to promote resistance to fatigue and to perform physical activities with vigour. When creating and designing a test battery for the school children, there must be a guideline to be adherence with some reference from the establish test battery example EUROFIT, FITNESSGRAM, ALPHA study,AVENA study, HALENA study(to name a few).Klavina et. al., (2017) mentioned that the comprehensive understanding of physical activity and appropriate measurement instruments forhealth and activity experience. There are many test batteries available, but not all of them are suit to children with disabilities. EUROFIT test battery (ETB) specifically designed for children with disabilities was established.

Table 1: Comparison between EUROFIT and ETB

Test component	EUROFIT	ETB
Endurance	Endurance shuttle run or ergometer Bicycle test PWC (170)	
Strength	Hand grip Long jump	Long jump Pushing a 2 kg ball
Local muscle endurance	Bent arm hang	Sit ups (30 sec)
Speed	Shuttle run 10x5m Plate taping	25 Meter run
Flexibility	Sit and reach	Sit and reach
Balance	Flamingo Balance Test	Balance walk

Another test battery for children is Adolescents Surveillance System and Obesity prevention study or also known as ASSO Fitness Test Battery.

Table 2: ASSO Fitness Test Battery

Test component	ASSO battery test
Grip and forearm strength	Hand grip strength test
Lower body explosive power	Standing broad jump test
Abdominal muscular endurance	Sit up test to exhaustion
Agility	4 x 10m shuttle run test
speed	20m sprint test

Another test battery that was establish and widely use for children with disabilities are Brockport Physical Fitness Test battery that use similar test protocols with ETB.Brockport physical fitness test battery is considered valid and reliable for ID (Winnick & Short, 2014).

To our wide scope of discovery, there is no/limited study has investigated on physical fitness skills.In Malaysia, The National Physical Fitness Standard Test (SEGAK) designated for Malaysian students in order to evaluate their level of fitness. However, SEGAK tests practically used to test level of fitness of able students. There are few of test in SEGAK that requires adjustment for student with visual impaired since there are limitations occurs. Therefore, there is a need for testing battery fitness tests to come up with an assessment of physical activity that is more standardized, rigorous and comprehensive for visual impairment students.

The current study will try to establish a test battery for children with visually-impaired and it is considered as a pilot study or preliminary study to give more options to design a test battery for children with disabilities especially children with visually-impaired. The aim of the study is to identify the fitness level and to recommended and proper fitness test for children with visually-impaired.

METHODOLOGY

A non-experimental causal comparative design study because the independent variable under study cannot be directly manipulated. As such, the study also determine whether the suggested fitness tests were reliable to be applied to the students with visually-impaired without any obstacles or require modifications.

Sample

Total of 30 (n=30; 16 males;14 females) students participated in the study. They were divided into three categories based on their severity of the impairment (B1, B2, B3). B1 consists of 12 students (6 males;6 females), B2 (15; 8 males;7 females) and B3 (3; 2 males; 1 female). The classification system is a) B1-Totally blind; those who may possess light perception but are unable to recognize hand shapes at any distance; B2- Those perceiving hand shapes but with visual acuity of not better than 20/600 and/or those with less than 5 degree through 20 degree; B3-Those with visual acuity from 20/599 through 20/200 and/or those with 5 degree through 20 degree in visual field (IBSA 2018).
All participants are currently studying at Sekolah Menengah Pendidikan Khas (cacat penglihatan), Setapak, Kuala Lumpur. The purposive sampling was applied to the study. The inclusion criterions are i) all the subjects must be visual impaired that diagnosed by eyes expert, ii) they have no other disabilities, iii) the age of the subjects will be between 13 – 19 years old.

Instrumentation

For the study, four fitness tests were applied based on five components of health-related fitness. The following paragraph explain subtests used in the study. One-mile walk/run test was perform in order to evaluate the aerobic functioning of the participants. Upon receive the signal Go, the participants were asked to walk/run at a fast pace possible on a distance 1609 meters. The participants are required to complete the task. Participants can run or walk alone without any help or with the guide rope. One trial was given. Curl-up was used to evaluate abdominal endurance. Participant need to complete as many curl ups as possible up to maximum 75 repetitions of curl up with a cadence of one curl up every 3 seconds. The participant starts with supine position. The knees are bent at approximately 140 degrees with the feet flat on the floor and legs are slightly apart.The arms are held straight, parallel to the trunk and palms facing down toward the mat.

The participant is positioned so that top of the tape markers (11.4 cm) can be touched by the outstretched fingers. From starting position, the participant curls upslowly, sliding the fingers across and to the opposite site of the tape markers. The important factor is the participant moves the fingertips 11.4cm as part of curl up. The participant continues to do curl upswithout pausing until the pace cannot be maintained or until 75 repetitions have been completed. One trial was administered. Curl up is not counted if the participant do not reach the required distance, do not return to the start position or feet completely leave the floor at any time during movement or performing curl up in incorrect manner.Testing assistance will guide the participants by placetheir hand on the mat to make sure that participant's head back to the appropriate down position on the mat.
Isometric push up test was use to evaluate muscular strength.

The participant attempts to hold a raised push-up position for up to 40 seconds. Participant will form a push up position with a front leaning rest position with the hands directly below the shoulders, arms extended, the whole body in a straight line and toes touching the floor. One trial been given. Times is stop when the correct position for push up is no longer held. For test modification, it is permissible to provide tactual assistance to help place and keep the body in the proper position during the test but no assistance to hold the body upright.

Data collection procedures

Participants were brief and introduce all the tests, with demonstrations. The study was approved by the Ethical Committee of the Universiti Teknologi MARA, Malaysia. All participants and/or their parents/guardians provided written consent prior to the study.

Statistical Analysis

Statistical calculations were performed with SPSS 23.0. Descriptive statistics were used to calculate the mean age, anthropometric data, fitness tests scores.The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of the participants.

RESULT

The mean age of participants is as seen in Table 3. The mean age of female participants for B1 was 16.17 ± 2.04, B2 was 14.43 ± 1.40 and B3 was 14.00 ± 00.0. Meanwhile, the mean age of male participants of B1 was 16.00 ± 0.89, B2 was 16.25 ± 1.91, B3 was 53.00 ± 7.07. Next, the mean weight of female participants for B1 was 42.83 ± 6.97, for B2 was 49.43 ± 12.04 and for B3 was 48.00 ± 00.0. Meanwhile, the mean weight of male participants for B1 was 64.67 ± 24.45, B2 was 54.50 ± 18.43 and for B3 was 53.00 ± 7.07. Then, highest mean height of female participants for B1 was 148.00 ± 4.15, for B2 was 148.71 ± 6.07 and for B3 was 166.00 ± 00.0.

Table 3: Descriptive characteristics of the sample

BI	Female (n=6) M±SD	Male (n=6) M±SD
Age	16.17±2.04	16.00±0.89
Weight (kg)	42.83±6.97	64.67±24.45
Height (cm)	148.00±4.15	164.17±8.84
BMI	19.50±2.17	23.33±6.15
B2	Female (n=7) M±SD	Male (n=8) M±SD
Age	14.43±1.40	16.25±1.91
Weight (kg)	49.43±12.04	54.50±18.43
Height (cm)	148.71±6.07	159.50±5.24
BMI	22.00±3.92	21.38±6.84
B3	Female (n=1) M±SD	Male (n=2) M±SD
Age	14.00±00.0	14.50±2.12
Weight (kg)	48.00±00.0	53.00±7.07
Height (cm)	166.00±00.0	168.50±3.53
BMI	17.00±00.0	18.50±2.12

The mean height of male participants for B1 was 164.17 ± 8.84, for B2 was 159.50 ± 5.24 and B3 was 168.50 ± 3.53. Lastly, the BMI of female participants was B1 19.50 ± 2.17, B2 was 22.00 ± 3.92 and B3 was 17.00 ± 00.0.The BMI of male participant for B1 was 23.33 ± 6.15, B2 was 21.38 ± 6.84 and B3 was 18.50 ± 2.12. Meanwhile the BMI of male participant for B1 was 23.33 ± 6.15, B2 was 21.38 ± 6.84 and B3 was 18.50 ± 2.12.

Table 4: Descriptive statistics of the physical fitness

Male	**B1**(n=6) Mean±SD	**B2**(n=8) Mean±SD	**B3**(n=2) Mean±SD
One mile run/walk (min)	15.00±6.42	10.23±5.16	8.72±3.23
Curl Up (no)	26.33±22.18	37.37±14.78	55.00±14.14
Isometric push up (sec)	38.08±4.69	40.00±00.00	40.00±00.00
Sit and reach (cm)	25.08±6.41	22.84±7.62	26.87±1.24

Female	B1(n=6) Mean±SD	B2(n=7) Mean±SD	B3(n=1) Mean±SD
One mile run/walk (min)	26.00±7.69	25.00±3.32	28.00±00.00
Curl Up (no)	17.75±11.45	30.50±20.21	47.50±00.00
Isometric push up (sec)	37.08±7.14	37.21±6.15	40.00±00.00
Sit and reach (cm)	26.13±3.71	19.66±7.90	32.00±00.00

Table 4 showed the mean statistics of four (4) health related fitness tests result according to different classes of visual impairment; B1, B2 and B3. It also been divided into gender; male and female. Firstly, the highest mean result for one-mile run/walk for male participants was 15.00 ± 6.42 and the lowest mean was B3, 8.72 ± 3.23. We can say that B1 males able to finish the laps earlier than the others because of they have advantages of better sightedness. Next, the highest mean for curl up for male participants was B3, 55.00 ± 14.14. Meanwhile, the lowest mean 26.33 ± 22.18 stated for B1. Therefore, it showed that B3 have a better muscular endurance than the other participants. Then, the highest mean for isometric push up for male participants was B2 and B3 where it stated 40.00 ± 00.00. From the result we can say that B2 and B3 male's participant have a good muscular strength since they all can finished the duration during the test held. That was why the result stated same value of mean. The highest mean value for sit and reach test for male participants was B3 where it stated 26.87 ± 1.24. Moreover, for females, they also experienced the same test like males. The highest mean for one-mile run/walk for female participant was 28.00 ± 00.00 for B3 and the lowest mean was B2, 25.00 ± 3.32. Next, the highest mean for curl up test for female participant was B3 at 47.50 ± 00.00 while, the lowest mean was B1 at 17.75 ± 11.45. The highest mean for isometric push-up test for female participants was B3, 40.00 ± 00.00 and the lowest mean was B1, 37.08 ± 7.14. Lastly, sit and reach highest mean for female participants wasB3 where it recorded at 32.00 ± 00.00. Meanwhile, the lowest mean recorded at B2, 19.66 ± 7.90. From the result, we can see that the standard deviation value for B3 females was 00.00 because only one participant involved in this study. Therefore, no standard deviation value occurred.

As seen in Table 5 showed the result of male participants based on visual impairments classification group in health-related fitness tests. All the tests showed no significant different between group (p>0.05). Firstly, for one-mile run/walk test, an analysis of variance showed that there is no significant different between groups, F (2,13) = 50.10, p=0.24). Curl up test results showed there is no significant different between B1, B2 and B3 males where F (2,13) = 646.36, p = 0.17. Also, isometric push up stated no significance different between groups, F (2,13) = 6.88, p = 0.46. Sit and reach analysis showed that there is no significant different between groups, F (2,13), p = 0.70.

Table 5: Anova analysis for male participants in health-related fitness tests

		Df	Mean Square	Sig.
One-mile run/walk	Between Groups	2	50.106	.236
	Within Groups	13	30.990	
	Total	15		
Curl up	Between Groups	2	646.365	.174
	Within Groups	13	322.208	
	Total	15		
Isometric push up	Between Groups	2	6.888	.465
	Within Groups	13	8.478	

	Total	15			
Sit and reach	Between Groups	2	16.853	.706	
	Within Groups	13	47.201		
	Total	15			

Table 4 below showed the result of female participants based on visual impairments classification group in health-related fitness tests. All the tests showed no significant different between group (p>0.05). Firstly, for one mile run/walk test, an analysis of variance showed that there is no significant different between groups, $F(2,11) = 4.60$, p = 0.87). Curl up test results showed there is no significant different between B1, B2 and B3 females where $F(2,11)= 505.75$, p = 0.21. Also, isometric push up stated no significance different between groups, $F(2,11) = 3.79$, p = 0.92. Sit and reach analysis showed that there is no significant different between groups, $F(2,11)$, p = 0.11.

Table 6: ANOVA analysis for female participants in fitness tests

		Df	Mean Square	Sig.
One-mile run/walk	Between Groups	2	4.607	.871
	Within Groups	11	32.909	
	Total	13		
Curl up	Between Groups	2	505.750	.213
	Within Groups	11	282.807	
	Total	13		
Isometric push up	Between Groups	2	3.789	.918
	Within Groups	11	43.831	
	Total	13		
Sit and reach	Between Groups	2	108.373	.112
	Within Groups	11	40.330	
	Total	13		

DISCUSSION

The aim of the study was to investigate the differences of fitness level of health-related fitness protocol on students with visual impairment. There was a need to determine which alternative test can give more significant value to determine the fitness level of the participants based on the five elements of health-related fitness which are body composition, cardiovascular endurance, muscular endurance, muscular strength and flexibility. Total of 30 students were chosen based on the criterion and they were divided into three (3) groups based on their level of severity of the impairments that already verified by the expertise.

As the results is similar with previous the study, the current study discovers that sex differences in health-related fitness tests. Boys have a better cardiovascular endurance than girls because majority of the boys finished the laps faster than girls. Erwin and Castelli (2008) reported that in PACER tests, boys statistically outperformed girls. Meanwhile, similar studies stated during cardiovascular endurance test, boys ran more laps than girls (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2008; Chen et al., 2016).In contrast with the previous studies, in curl up test, male participants also have a better muscular endurance than female. However, Erwin and Castelli (2008) reported there was no statistically significant difference on the curl-ups by gender. Chen et al. (2016) also found that male and female participants have a same mean score in curl up test.

Moreover, in isometric push up test, boys are slightly better than girls because of the mean score between both are far apart. Only B1 group have a difficulty in this test since they are limited in vision cause them to take time longer to adapt with the test and extra attention needed. Similarreport byChen et al. (2016) found that the girls had slightly lower percentages than boys. Also, boys significantly done higher number of push ups than girls. Inconsistent with this finding, (Barnett et al., 2008; Erwin & Castelli, 2008; Nascimento et al., 2013) reported that no significant difference in the mean score of the push up test between boys and girls.

In sit and reach test, the current study reported that girls are slightly lower mean scores than boys. This may cause by lack of exercising. This look like similar with (Minatto et al., 2016), where it stated that girls have a lower physical fitness than boys. In other words, the proportion of those who do not meet health related criteria was higher for girl adolescents even though, they obtained higher mean values than boys in flexibility.

CONCLUSION

In conclusion, it seems that all the recommended fitness tests can be applied among the students with visually-impaired and they look like comfortable with the tests. It is easy to understand and administer at the same time. All of the tests in this study are field based, easy to perform, user friendly (Boer & Moss, 2016). in this study, there were no significant differences in physical fitness scores between boys and girls.

IMPLICATION OF FINDINGS

The physical fitness tests use in this study were selected according to some proof of measurement instruments been used to groups of children with visual impairment. Moreover, the inclusion criteria were that children are able to perform the fitness test independently while with little verbal or/and physical support (e.g., tactile cue to lift leg/ touching the markers in curl-up test for children with visually-impaired).

RECOMMENDATIONS

The recommendation for other scholar to embark in the same field of the study such as:

1. Teachers and Physical education teachers should be exposed in conducing and administering the field tests for visual impairment participants to avoid any biased results. They also need to have knowledge and better understanding on how to manage the participants with disabilities since they need more attention and care.

2. Government and school's authority should encourage and positively helps disabled community to engage in sports and physical activity so that they will keep engaging in healthy lifestyle to prevent serious diseases like heart attack, high blood pressure and diabetes.

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