



Development of Physical Fitness Measurement on Senior High School Students

Ishak Aziz* 

Faculty of Sports Science, Universitas Negeri Padang, West Sumatera, Indonesia

Abstract

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***Correspondence:** Ishak Aziz, Faculty of Sports Science, Universitas Negeri Padang, West Sumatera, Indonesia. E-mail: ishakazizup@gmail.com

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AIM: This study aims to provide another alternative for physical education teachers in measuring the physical fitness of high school students by measuring the tests of jumping, push-ups, and sit-ups and determining the correlation between the three activities as a condition for determining physical fitness.

MATERIALS AND METHODS: The random sampling method used to select respondents, and as a result, as many as fifty-two students chose as respondents. The device included a leaping test, push-ups, sit-ups, and a 2400 m run test.

RESULTS: The results showed that the validity coefficient between X1 and Y is $r = -0.352$. The push-up meets the requirement to measure the endurance of blood circulation and breathing with the acquisition of $r = -0.007$. Sit-ups measured the endurance of blood circulation and respiration with the acquisition of $r = -0.164$. The relationship between the combined degree of ability X1, X2, and X3 with a run of 2400 m obtained $r = 0.47$. The reliability coefficient for X1 was $r = 0.82$, X2 was $r = 0.83$, and X3 was $r = 0.85$.

CONCLUSION: It concluded that the jump test, push-ups, and sit-ups together could be used as another alternative to measure high school students' physical fitness through facilities and infrastructure compared to the 2400 m running test.

Introduction

Sporting activities endeavor to improve one's health and physical fitness and develop a quality Indonesian society. Physical activity is a vital requirement for every human being to preserve their physical condition and health (Mubarok *et al.*, 2014) [1]. It is not only the government's responsibility but also the community's.

Physical fitness is a person's ability to carry out daily activities with optimal results without fatigue and still has energy reserves to carry out other activities. Muscle strength, endurance, flexibility, explosive power, balance, strength, coordination, and accuracy are all components of fitness. The body will surely be more comfortable carrying out an activity if these elements fulfilled in every human being's physique (Mukhlis *et al.*, 2020) [2]. Physical fitness affects one's cognitive abilities, such as cognitive flexibility, working memory, and decision-making, advantageous to daily activities, motor development, and social connections (Bile and Suharharjana, 2019) [3].

At present, sports knowledge and skills included in the education curriculum, even in school activities. Sport, physical, and medical education (*Penjasorkes*) provide the senior high school students with the knowledge about physical movement in

sports and health factors that influence it, skills in carrying out physical movements in exercising, and maintaining their health. *Penjasorkes* referred to the aspect of an overall educational process that uses activity encouragement to develop fitness, organic, neuromuscular, strength, intellectual, and emotional control (Depdiknas, 2003) [4]. It functioned to educate through physical movement (Prayoga *et al.*, 2020) [5] and assist students in improving their freshness and health by introducing inculcating positive attitudes and health and basic movement abilities from physical activity (Radifan and Aziz, 2019) [6]. *Penjasorkes* has an essential role in students' daily activities, because good physical fitness needed in the learning process at school and to accomplish achievements outside of school (Sari, 2020) [7]. Physical education is needed to develop students' potential by doing physical activities that impact the development of student's critical thinking and knowledge.

Measurement of physical fitness is one of the efforts to increase stamina and health status by doing physical activity and physical exercise or sports (Ervina *et al.* (2020) [8]. This measurement aims to make it easier for a coach, teacher, and all sports players to classify someone in making a program made when they want to determine the achievements obtained by each coach and teacher (Gumantan, 2020) [9]. It is a science and technology developed in sports to

evaluate the performance of athletes then be treated with specific treatments to develop sports performance. In the educational process, tests defined as a data-gathering instrument and a basis for evaluation in the form of tasks that students must complete providing values regarding behaviour. Strength tests, speed tests, balance tests, VO2 max testing, flexibility tests, hand and foot-eye coordination tests, endurance tests, power tests, response tests, and agility tests are some of the physical condition tests or assessments done through sports (Gumantan, 2020) [9]. Through tests, teachers can obtain accurate information about the condition of their students, if they are at low, medium, or high physical abilities. Teachers can use tests to get reliable information about their student's physical abilities, whether low, medium, or high level. As a result, tests and measurements used as an entire discussion unit. In physical education and sports, the term measuring has a variety of meanings and applications.

The development of sports science begins from the sciences that study humans. This scientific development aims to develop physical education teaching materials for physical fitness using skipping movement tests, push-ups, and sit-ups with a 2400 m run. The steps of development are the actions taken to tackle a research challenge so that the problem may be solved and a product created (Mukhlis *et al.*, 2020) [2]. The aim of this study to examine if skipping, push-ups, and sit-ups use to predict the level of physical fitness for a 2400 m run. Furthermore, this research aims to learn more about the relationship between physical education tests and a 2400 m running test by employing skipping, push-ups, and sit-ups as the foundation for producing test material.

Materials and Methods

The development research design utilized in *Penjasorkes* to answer challenges in the education and learning process. The inferential approach applied in this research, which resulted in a correlation. The research conducted on first-grade senior high school (SMA) students in Bukittinggi City, West Sumatra Province, Indonesia. In this study, 469 people separated into 18 groups and came from three senior high schools. Purposive random sampling used to select a sample of up to 10% from each class. The instruments used to 2400 m running test, skipping, push-ups, and sit-ups test. The 2400 m run test was held in the Lapangan Ateh Bukittinggi, while the skipping, push-up, and sit-up tests carried out at their respective schools in each *Penjasorkes* lesson. The data analyzed with regression.

Furthermore, the data analyzed using both simple and multiple regression with a significance level

of 0.05. To determine the validity of the test, concurrent validity used by correlating the results of the skipping, push-ups, and sit-ups tests with the results of the 2400 m run test. Meanwhile, reliability carried out using the test re-test technique, where the calculation uses the product-moment correlation formula.

Results and Discussion

Results

Based on the data obtained for each variable:

- 2400 m run test, the highest score 1,419 s, and the lowest score 851 s. It also showed that the average value 1084.37, with a standard deviation of 131.242. The median obtained 946.96, and the modus 1016.
- Skipping test measured in units of the number of successes with the highest score 83.83 and the lowest score 33.33. The average value 58.46 with a standard deviation of 16.66, for the median of 64.44, and the modus 49.17.
- Push-Up test measured in units of the number of successes with the highest score 28.16 and the lowest score 11.16. The average value is 18.74 with a standard deviation of 4.68, with a median of 17.80, and the modus 16.5 and 16.67.
- Sit-Up test measured in units of the number of successes with the highest score 22 and the lowest score 7.16. The average value 14.76 with a standard deviation of 3.79, with a median of 15.69, and the modus 13.83 and 20.67.

Normality test (*lilliefors test*)

The analyse showed that the data distributed normally. It showed in Table 1.

Table 1: The result of lilliefors test

Variables	L_0	L_1	Distribution
X1	0.0520	0.123	Normal
X2	0.0728	0.123	Normal
X3	0.0841	0.123	Normal
Y	0.1123	0.123	Normal

Homoscedasticity test (*bartlett's test*)

The result showed, all variables homogeneous. It showed in Table 2.

Table 2: The result of Barlett's test

Variables	X^2 Result	X^2 Table	Population variance
X1	0.75	5.59	Homogeneous
X2	1.06	5.59	Homogeneous
X3	0.75	5.59	Homogeneous
Y	2.77	5.59	Homogeneous

Statistical hypothesis testing

- a. Correlation and regression skipping test (X1) with 2400 m run test. The result of correlation is shown in Table 3, and the result of regression is shown in Table 4.

Table 3: The result of correlation skipping test (X1) with 2400 m run test

df = n-3	r	r ²	t _{ratio}	Sig (0.05)
49	-0.352	0.1225	2.63*	1.675

- b. Correlation and regression push-up test (X2) with 2400 m run test. The result of correlation for the push-up test (X2) with 2400 m run test is shown in Table 5 and result of regression is shown in Table 6.

Table 4: The result of regression skipping test (X1) with 2400 m run test

Varian	Degree of Freedom (df)	Sum square	Mean square	F-ratio	
				F ₀	F ₁
Total	52			0.003	1.03
Regression ^(a)	1	61133267.77			
Regression ^(ab)	1	127907.31	127907.03		
Residual	50	903499.02	18069.98		
Non-Sig.	42	732827.02	17448.26238	0.82	3.33
Square error	8	170672	21334		

- c. Correlation and regression sit-up (X3) with 2400 m run test. The result of correlation for sit-up test (X3) with 2400 m run test is shown in Table 7 and result of regression is shown in Table 8: Correlation of each variables skipping test (X1), push-up (X2), sit-up (X3), and with 2400 m run test. A multiple regression correlation analysis conducted to determine the relationship between the skipping, push-up, sit-up, and the 2400 m run, which gives the following description (Table 9).

Table 5: The result of correlation push-up (X2) with 2400 m run test

df = n-3	r	r ²	t _{ratio}	Sig (0.05)
49	-0.007	0.00049	0.343	1.675

Discussion

Product development has an element of interactivity so that the delivery of material can be appropriately conveyed and effectively and can achieve the maximum learning objectives (Arief *et al.*, 2021) [10]. Development of physical fitness measurement using skipping, push-up, and sit-up by running 2400 m.

Table 6: The result of regression push-up (X2) with 2400 m run test

Varian	Degree of Freedom (df)	Sum Square	Mean Square	F-ratio	
				F ₀	F ₁
Total	52			0.003	1.03
Regression ^(a)	1	61133267.77			
Regression ^(ab)	1	60.56	60.56		
Residual	50	1031345.67	20626.91		
Non-Sig.	33	689601.66	20897.02	1.04	2.15
Square Error	17	341744.01	20102.58		

The results showed that the skipping test (X1) obtained a negative value of -0.352 or the correlation between X1 and Y is an inverse correlation. The results contradicted, but the hypothesis can be accepted due to the skipping movement score data taken by number of successes. In contrast, the 2400 m running score data taken by the time it takes.

Table 7: The result of correlation sit-up (X3) with 2400 m run test

df = n-3	r	r ²	t _{ratio}	Sig (0.05)
49	-0.164	0.027	8.255	1.675

Furthermore, the sit-up movement (X3) score obtained a negative value of -0.164 which means that the correlation between the sit-up movement and the 2400 m run is also inverse correlation. The result showed the push-up movement relatively lower, namely, $r = -0.007$. It showed a non-significant correlation between X2 and Y.

Table 8: The result of regression sit-up (X3) with 2400 m run test

Varian	Degree of Freedom (df)	Sum Square	Mean Square	F-ratio	
				F ₀	F ₁
Total	52			1.14	1.03
Regression ^(a)	1	61133267.77			
Regression ^(ab)	1	22913.32	22913.32		
Residual	50	1008492.92	20169.86		
Non-Sig.	33	761354.58	23071.351	1.59	3.33
Square Error	17	247138.34	14537.55		

The relationship between skipping test, push-up, and sit-up with a 2400 m run obtained an $r = 0.47$. It means a significant correlation between X1, X2, and X3 with Y (Table 10).

Table 9: The result of correlation multivariate

df = n-3	r	r ²	t _{ratio}	Sig (0.05)
49	0.47	0.22	12.58	0.273

It means that the 2400 m run could be the standard measure of endurance, blood circulation and breathing, predicted through skipping, push-ups, and sit-ups. These three movements can be used as a test to measure circulatory and respiratory endurance.

Table 10: The result of correlation between each variable

Variable	X1	X2	X3	Y
X1		0.256	0.288	-0.352
X2	0.256		0.422	-0.007
X3	0.288	0.422		-0.164
X ₁ , X ₂ , X ₃				0.47

However, one form of this test cannot measure endurance, and further, research needs to be conducted practically.

Conclusion

Based on the facts above, it is concluded that the skipping test, push-up test, and sit-up test could be utilized as an alternative to the 2400 m running test to assess high school students' physical fitness through the utilization of facilities and infrastructure.

References

1. Mubarok H, Rahayu S, Hidayah T. Analisis profil tingkat kesegaran jasmani pemain futsal anker FC tahun 2014. *J Sport Sci Fitness*. 2015;4(3):2516.
2. Mukhlis NA, Kurniawan AW, Kurniawan R. Pengembangan media kebugaran jasmani unsur kekuatan berbasis multimedia interaktif. *Sport Sci Health*. 2020;2(11):566-81.
3. Bile RL, Suharharjana S. Efektivitas penggunaan model latihan kebugaran "Bbc Exercise" untuk pemeliharaan kebugaran jasmani mahasiswa. *SPORTIVE J Phys Educ Sport Recreat*. 2019;3(1):30-7.
4. Depdiknas RI. Pendidikan Jasmani Untuk Meningkatkan Individu. Jakarta: Departemen Pendidikan Nasional; 2003.
5. Prayoga GA, Heynoek FP, Yudasamara DS. Pengembangan model pembelajaran kebugaran jasmani dengan modifikasi permainan pada siswa kelas VIII. *Sport Sci Health*. 2020;2(10):500-10.
6. Radifan M, Aziz I. Perbandingan Tingkat Kesegaran Jasmani Siswa Sekolah Menengah Atas Negeri 1 Sungai Beremas Kabupaten Pasaman Barat Dengan Siswa Sekolah Menengah Atas Negeri 11 Padang, Doctoral Dissertation. Indonesia: Universitas Negeri Padang; 2019.
7. Sari DN. Tinjauan Kebugaran Jasmani Siswa Sekolah Dasar. *J Sporta Sainika*. 2020;5(2):149. <https://doi.org/10.24036/sporta.v5i2.149>
8. Ervina RS, Eryando T, Prabawa A. Perancangan sistem informasi pengukuran kebugaran jasmani (E-Bugar) kementerian kesehatan RI. *J Manajemen Inform Kesehatan Indones*. 2020;8(1):14.
9. Gumantan A. Pengembangan aplikasi pengukuran tes kebugaran jasmani berbasis android. *J Ilmu Keolahragaan*. 2020;19(2):196-205.
10. Arief MG, Kurniawan AW, Kurniawan R. Pengembangan pembelajaran kebugaran jasmani unsur kelincahan berbasis multimedia interaktif. *Sport Sci Health*. 2021;3(2):40-53.