Android System Based for Measuring Standing Broad Jump Test Among Reserve Officers Training Unit (ROTU)

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ABSTRACT

Android system with information technology elements designed to facilitate learning outcomes of a learning process more quickly, and effectively including in physical fitness test. **PURPOSE:** The main aim of this study is to develop an android system for a standing broad jump test to be used among Reserve Officers Training Unit (ROTU) and then to measure the reliability of the test. **METHODS**: Thirty (N=30) participants from ROTU Cadet Officers of National Defence University of Malaysia (NDUM) volunteered to participate in this study. The participants performed a standing broad jump test in two different occasions. All data recorded in the android system develop purposely for the test. The test-retest method was used to measure the reliability value of the android system. Pearson's product movement correlation was used to investigate the reproducibility of the android system. **RESULT**: The findings showed the correlation coefficient between the trials is significant ($r = 0.92$, $n = 30$, $p < 0.001$). The results of the study found that the value of the Pearson correlation coefficient for both tests was $r = 0.92$. The reliability testing showed a strong positive correlation of the use of an android system for measuring standing broad jump test **CONCLUSION**: It can be concluded that the android system is reliable an may facilitate the physical fitness test data to be obtained easily especially when assessing NDUM ROTU cadet officers.

Keywords: *Android system, Test-Retest, Standing Broad Jump, Physical Fitness, ROTU*

INTRODUCTION

Android is an operating system (OS) for mobile devices such as smartphones, tablets, and smart watches. It is based on the Linux kernel and was developed by Google. The Android OS is designed to be open-source, which means that anyone can access and modify the source code of the OS (Chinetha et al. 2015). This has led to the development of various custom ROMs (modified versions of the Android OS) that offer additional features and customization options. Android also includes a vast ecosystem of apps that can be downloaded and installed from the Google Play Store or other third-party app stores. These apps are written in the Java programming language and are designed to run on the Android platform. Android is designed to be highly customizable, allowing users to choose from a wide range of hardware and software options. This includes different types of devices, screen sizes, and hardware configurations, as well as a variety of user interfaces and customizations offered by device manufacturers (Chinetha et al. 2015).

Android has a wide range of fitness apps that cater to the needs of users who want to stay fit and healthy. These apps can track various aspects of fitness, such as exercise, nutrition, sleep, and overall wellness. In addition to that, this apps also helps individuals to identify their physical fitness levels (Dute et al. 2016). Today, the used of these apps are very common in those individuals who practice a healthy lifestyle and want to monitor constantly their level of physical fitness. Besides athletes and fitness enthusiasm, military personnel are the common individual that need to be physically fit and constantly being tested in physical fitness.

Physical fitness tests play a crucial role in the military for assessing the physical readiness and capabilities of personnel. These tests serve several purposes and are typically designed to evaluate strength, endurance, agility, and overall fitness levels. Physical fitness tests provide a standardized measure to establish and maintain fitness standards across the military. These tests help motivate personnel to maintain an appropriate level of physical fitness, which is vital for performing demanding tasks and ensuring mission success. They also guide training programs, allowing commanders to design targeted workouts and monitor progress (Kassim, et al. 2018). It's important to note that different military branches and countries may have their own specific physical fitness test protocols and requirements. These tests are periodically reviewed and updated to ensure they align with the evolving operational needs and fitness standards. In Malaysia, these assessments typically include a variety of exercises, such as cardiovascular fitness test, push-ups, sit-ups, and pull-ups, standing broad jump as well as the measurement of body composition.

The military places a high emphasis on physical fitness because it is essential for soldiers to be able to perform their duties effectively, especially in combat situations. (Rustam and Kassim, 2018). Military personnel must be able to run, jump, climb, carry heavy loads, and perform other physically demanding tasks for extended periods. To ensure that military personnel meet the required physical fitness standards, they are typically required to undergo regular fitness assessments and training. Nevertheless, the traditional method of collecting physical fitness data are intricate especially when working with big pools of data (ref). It's important to note that these traditional methods may still be in use,

but advancements in technology have introduced more sophisticated and efficient ways of collecting fitness data, such as wearable devices, smartphone applications, and digital tracking systems. These modern tools provide real-time data, enable easier data management and analysis, and offer more comprehensive insights into an individual's fitness levels and progress. Therefore, in this study the main aim is to develop a standing broad jump fitness test app that can help storing and retrieving data more easily involving ROTU cadet officers at NDUM. The standing broad jump is a common exercise used in military training to assess lower body explosive power and anaerobic fitness. The test involves jumping as far as possible from a standing position, with both feet leaving the ground at the same time. The standing broad jump is used to assess the lower body power of military personnel because it requires a combination of strength, explosiveness, and coordination. Then, the second aim of this study is to measure the reliability of the android system. Reliability refers to the consistency and stability of the measurements taken by the apps (Atan & Kassim 2020). No previous studies has been developed an apps to be specifically used by military officer.

METHOD

Participants

Thirty (N = 30) NDUM ROTU Cadet Officers between the ages of 19 and 21 volunteered to participate in this study. Written consent form was obtained from the participant's after being thoroughly informed the benefits and potential risks of the study.

Test Procedure

To determine the reliability of the standing broad jump test with android system based, this study used test-retest methodology. The subject is provided with a description of the standing broad jump test along with a demonstration method at the beginning of the study. The standing broad jump test process is described in the test's description. Before taking the scoring test, the individual is given the chance to try the standing broad jump exercise after the explanation and demonstration are completed. A score test was administered using an Android app created to evaluate the sample's degree of physical fitness.

Standing Broad Jump Procedure

The standing broad jump, also known as the standing long jump, is a test used to assess an individual's lower body power and explosiveness. This are general procedure for conducting the standing broad jump:

a. Set Up: Prepare a flat and non-slip surface for the test. Place the standing broad jump mat

b. Warm-up: Prior to the test, participants performed a standardised warmed up with light aerobic activities and dynamic stretching.

c. Positioning: Instruct the participant to stand behind the starting line with their feet shoulder-width apart. Their toes should be just behind the line, and they should be in a relaxed standing position.

d. Jump Technique: Explain and demonstrate the proper jump technique to the participant. The technique typically involves the following steps:
    - Bend the knees, lowering the body into a partial squat position.
    - Swing the arms backward for momentum.
    - Explosively extend the hips, knees, and ankles, propelling the body forward.
    - Simultaneously swing the arms forward and upward for additional momentum.
    - Aim to achieve maximum distance horizontally while landing with both feet simultaneously.

e. Execution: Instruct them to perform the jump. They should perform a single explosive jump, pushing off the ground with both feet and propelling themselves forward as far as possible.

f. Measurement: Measure the distance from the starting line to the nearest heel or body part that touches the landing surface. Ensure the measurement is taken perpendicular to the starting line. Repeat the test for each participant, allowing for sufficient rest between attempts.

g. Recording: Record the distance achieved by each participant for subsequent analysis and comparison.

Android system based.

All data from the standing broad jump test were recorded in the android based system. The score was analysed in the mobile application to provide an instant measurement of the user's level of physical fitness.

In order to gauge the sample's degree of consent to using the Android system to acquire information on their level of physical fitness and muscle power, questionnaires were employed as research instruments. After the first and second tests are completed, questionnaires are given.

Data analysis

All data were presented as mean ± standard deviation. The Pearson product-moment correlation coefficient (or Pearson correlation coefficient, for short) is a measure of the strength of a linear association between two variables and is denoted by r. It is used to investigate the reliability of the android system (Atan & Kassim, 2020). All statistical analyses were performed with SPSS software (version 21.0, SPSS Inc, Chicago, IL) with the level of significance set at $p \leq 0.01$.

RESULT

The mean ± SD of the scored in standing broad jump are presented in Table 1. The results showed that for the first test the mean ± SD were 7.50 ± 1.72 m, and for the second test was 7.62 ± 1.43 m. The results indicated that the second test higher scored than the first test. However, no significant differences noted between the tests.

Table 1. Test retest of Android system based

	Mean	Standard Deviation	N
First test Android system based for Standing Broad Jump	7.50	1.72	30
Second test Android system based for Standing Broad Jump	7.62	1.43	30

Table 2. Reliability of Android system based

		First test Android system based for Standing Broad Jump	Second test Android system based for Standing Broad Jump
First test Android system based for Standing Broad Jump	Pearson Correlation	1	.927**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	86.146	66.462
	Covariance	2.971	2.292
	N	30	30
Second test Android system based for Standing Broad Jump	Pearson Correlation	.927**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	66.462	59.688
	Covariance	2.292	2.058
	N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 presented the correlation coefficient between tests that used Android system based to measure standing broad jump tests performed by the NDUM ROTU Cadet Officers. The output below shows the correlation coefficient between the first test score of the use of Android system based for standing broad jump and the second test score of the use of mobile application for standing broad jump was significant ($r = 0.92$, $n = 30$, $p < 0.001$). The results of the study found that the value of Pearson correlation coefficient for both tests was $r = 0.92$. This shows the reliability of the use of mobile applications for standing broad jump test is high and acceptable.

DISCUSSION

The main objective of this study is to evaluate the importance of test reliability when NDUM ROTU Cadet Officers between the ages of 19 and 21 are tested for muscular strength using an Android-based system. Physical fitness tests provide a standardized measure to establish and maintain fitness standards across the military. These tests help motivate personnel to maintain an appropriate level of physical fitness, which is vital for performing demanding tasks and ensuring mission success. They also guide training programs, allowing commanders to design targeted workouts and monitor progress. Previously, all the data were recorded manually, however with an advancement of technology, the use of apps may help to store and retrieving a big pool of data without any hassle. The result showed the Android system build to measure the standing broad jump is reliable and valid to record the data. The correlation coefficient obtained in this investigation showed positive correlation ($r = 0.92$), The value found in this study is consistent with Whelan's (2014) recommendations, that described value greater than 0.90 indicates a high dependability coefficient. Furthermore, Portney (2000) also strongly suggested that correlation value of 0.90 or above is ideal when testing new instrument. Therefore, mobile applications to evaluate the muscular strength of NDUM ROTU Cadet Officers is very reliable to be used in determining the level of physical fitness in military physical testing.

When it comes to test instruments, validity and reliability are essential characteristics that ensure the accuracy and consistency of the measurements obtained. Reliability refers to the consistency and stability of the measurements and validity refers to the accuracy of the measurements (Wheelan, 2014). It's important to note that the validity and reliability of a test instrument can vary depending on the specific context and population being assessed. Researchers and practitioners should select instruments that have been validated and demonstrated consistent results for the specific purpose and target population of interest. Consequently, this current study intends to develop and validate a system that can be use when perform a military physical testing. Before examining a test's validity, Ahmad (2015) suggested to test the reliability of the instrument first. The reliability and validity of a test are strongly related. Unreliable measurement cannot be valid. However, a measurement can be reliable without being valid. It is often required for measurements to be both valid and reliable.

The most common techniques for determining the correlation between two tests is to use the correlation coefficient for two data sets. Wheelan (2014) lists the reliability coefficient values, i.e., value 1 has perfect reliability, value over 0.9 has excellent reliability, value 0.8 to 0.9 has good reliability, value 0.7 to 0.8 has acceptable reliability, value 0.6 to 0.7 has doubtful reliability, value 0.5 to 0.6 has weak reliability, and value less than 0.5 has unreliable reliability coefficients accepted as a standard (Wheelan, 2014). Portney (2000) also provided some principles for categorising correlation coefficients, including the following: a correlation coefficient of less than 0.50 is considered weak; one of 0.50 to 0.75 is considered moderate; one of 0.75 to 0.90 is considered good; and one of more than 0.90 is considered ideal.

CONCLUSION

It can be concluded that the android system builds to investigate the standing broad jump is reliable. The apps can be installed in a mobile phone, and can be accessed at anywhere and anytime.

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