

Evaluation for Reliability of the Standing Broad Jump (SBJ) Fitness Test among Army Cadet Officers

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Abstract. Standing Broad Jump (SBJ) is a field test to evaluate the leg power. **AIMS:** The aims of this study is to evaluate the reliability of Standing Broad Jump Fitness Test among Army Cadet Officers. **METHODS:** Fifty (N=50) subject from Army Cadet Officers of National Defense University of Malaysia (NDUM) volunteered to take part in this study. The subject performed a standing broad jump fitness test in two different time. All data collected when performing a standing broad jump test is recorded. The standing broad jump fitness test's reliability value was calculated using the test-retest approach. In order to look at the reproducibility of the standing broad jump fitness test, Pearson's product movement correlation was used. **RESULT:** The findings showed the correlation coefficient between the trials is significant ($r = 0.81$, $n = 50$, $p < 0.001$). The results of the study found that the value of the Pearson correlation coefficient for both tests was $r = 0.81$. The reliability testing showed a strong positive correlation of the fitness test for the standing broad jump. **CONCLUSION:** In the field, reliability of the standing broad jump can be tested according to the population of the Malaysian Military. It can be used as a trustworthy indicator to assess lower limb power, monitor power output rises following training, find new Army Cadet talent, and carry out pre-recruitment tests in various places.

Keywords: Standing Broad Jump Test, Reliability, Fitness Activity

1 Introduction

Jumping is a basic human movement involving the motor coordination of both upper and lower body part. It requires a powerful form of power to perform the movement. Energy is supplied via the immediate energy system (ATP and the creatine phosphate system) without a significant input from the glycolytic route. In order to determine a person's ability to generate power over a short amount of time or a relatively small distance, evaluations that entail muscular power tests are utilised in both field and clinical settings [1]. When examining how to accurately assess (test or measure), for example, lower body power, validity and reliability are the two key factors. Before performing a test to evaluate a physical attribute, its dependability must be investigated and established. Sport-specific assessments are preferable for certain athletic groups because they provide a more accurate picture of the application in that particular sport. In order for coaches to make efficient use of their time and to have the assurance that the physical features being tested are accurate indicators of the athletes' training status, it is also vital to determine how many trials of a test are required for a reliable assessment[2].

For military troops, the strength of the legs is essential to perform their daily tasks. Most of their day-to-day tasks involve the lower limbs especially in the leg part. 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 [3]. Military soldiers must be able to execute physically demanding duties for lengthy periods of time, including running, jumping, climbing, carrying heavy weights, and more. Regular fitness evaluations and training are often required for military personnel to ensure they achieve the necessary physical fitness standards.

Muscle Power is sometimes defined as the ability to express high rates of force improvement as well as the capability of a rival to express high power yields [4, 6]. Additionally, he suggested that the ability to deliver rapid power development and large force yields are essential performance characteristics that are essential to winning most games [1]. This assertion is supported by previous study [5], who stated that these abilities are thought to be among the most important game performance traits, particularly in activities that depend on bouncing, course changing, and run execution. Muscle power is the after effect of strong solid quality as a fitting motivator in the midst of a given improvement. The result of a strong, solid quality acting as a transient motivator during a particular improvement is power [7]. The last mentioned, which is frequently referred to as peak power (PP), is frequently linked to sensitive developments like running and hopping and might be a crucial variable related with success in a certain preparation.

The Standing Broad Jump (SBJ), also known the Standing Long Jump, is a test that is frequently used to gauge the lower limb's explosive strength and power. The Standing broad jump (SBJ), is a common and easy to administer test of explosive leg power. By that, the SBJ tests are frequently used to measure lower body for individual mostly for athletes in order to get crucial data on their anaerobic performance in a particular activity. The SBJ test depend on the energy system's capabilities that ATP/PC,

which help to produce the most anaerobic power. SBJ test is a commonly used field test to assess explosive leg power [8]. Due to its simple and time-efficient implementation that does not require any equipment, [9] it is routinely used by coaches of several sports for talent selection, measurement and prediction of anaerobic power.

The previous study has divided SBJ performance (distance) into three parts: (a) the take-off distance, which is defined as the horizontal distance between the take-off line and the jumper's center of mass at the instant of take-off, (b) the flight distance, which is the horizontal distance travelled by the center of mass while airborne and (c) the landing distance, which is defined as the distance between the center of mass and the heels of the feet at the instant of landing [10]. Not only that, SBJ performance is highly correlated with physical characteristics, such as lean leg volume [11]. The distance that is achieved has a direct correlation with the amount of force that is produced by muscle fibers [12].

1.1 Objective

Therefore, the objective of this study is to evaluate the reliability of standing broad jump fitness test among army cadet officers at National Defense University of Malaysia (NDUM). The standing broad jump is a typical exercise used in military training to evaluate anaerobic fitness and lower body explosive strength. Therefore, this study was to assess the reliability of the standing broad jump fitness test according to the demographic suitability of military forces in Malaysia. Although there have been a few validation studies for SBJ, the population's differences in terms of age, gender, and experience necessitate a new study of the pertinent population [13,14,15]. This allows the standing broad jump test battery valid and reliable to use in Malaysian military forces.

2. Material and Method

This study employed test-retest methods to ascertain the reliability of the standing broad jump test. At the start of the study, the subject is given a description of the standing broad jump test and a demonstration technique. The procedure for the standing broad jump test is outlined in the test description. After the explanation and demonstration, the person is given the opportunity to try the standing broad jump exercise before taking the scoring test. This study involved fifty (N=50) NDUM Army Cadet Officers between ages 21 to 23 years old 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.

2.1 Testing Procedure

Participants attended three sessions. One to familiarise them with the protocols and then will perform the test protocol in full (Trial 1 and Trial 2 in full separated by 1 day) 1-day interval were given in order to allow enough time for recovery between trials. Test-retest reliability was used to measure the reliability of the application by administering the same test twice over a period of time to a group of Army Cadet Officers.

SBJ test

Participants were encouraged to avoid strenuous exercise the day before the performance testing. On the days of the performance tests, participants completed a prescribed warm-up that consisted of 5 minutes of jogging and 5 minutes of dynamic stretching. Each participant took a starting position on the line with their feet shoulder-width apart and their legs straight. Participants were told to bring their arms behind their bodies and flex their knees to a depth they chose. They then jumped as high as they could by extending their legs and propelling their arms ahead. Centimeters were used to measure the distance leapt.

2.2 Statistical Analysis

Data were presented as mean and standard deviation (SD). Pearson's correlation was used to evaluate correlation of SBJ (cm) test-re-test. 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 [16]. It is used to investigate the reliability of the standing broad jump fitness test. All statistical analyses were performed with SPSS software (version 27.0, SPSS Inc, Chicago, IL) with the level of significance set at $p \leq 0.01$.

2.3 Result

The aforementioned study procedures were carried out by each participant exactly as stated. All $N=50$ subjects are analyzed in descriptive form and data are analyzed in mean \pm SD. Table 1 displays the mean \pm SD of the standing broad jump scores. The findings revealed that the mean and standard deviation (SD) for the first test were 200.6 ± 20.3 cm and for the second test were 216.6 ± 21.3 cm. According to the results, the second test had higher scores than the first test. There were no appreciable variations between the tests.

Table 1. Descriptive for Test-retest Standing Broad Jump Fitness Test

	Mean	Standard Deviation	N
First test for Standing broad jump fitness test	200.66	20.310	50
Second test for Standing broad jump fitness test	216.66	21.383	50

Table 2. Reliability of Standing Broad Jump Fitness Test

		First test for Standing broad jump fitness test	Second test for Standing broad jump fitness test
First test for Stand- ing broad jump fitness test	Pearson Correlation	1	.810**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	20213.220	17238.220
	Covariance	412.515	351.800
	N	50	50
Second test for Standing broad jump fitness test	Pearson Correlation	.810**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	17238.220	22405.220
	Covariance	351.800	457.249
	N	50	50

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

Result of the SBJ scores obtained from the test and retest measurements made by the NDUM Army Cadet Officers are shown in table 2 as a correlation coefficient. The output below demonstrates that there was a substantial correlation between the first test result obtained using the SBJ fitness test and the second test result obtained using a SBJ fitness test ($r = 0.81$, $n = 50$, $p < 0.001$). According to the study's findings, both tests had a Pearson correlation coefficient of $r = 0.81$. This demonstrates the good and acceptable dependability of SBJ fitness tests.

3. Discussion

The main purpose of this study's is to evaluate the reliability of the SBJ test among the NDUM Army Cadet Officers between the ages of 21 to 23 years old through a leg power fitness test. Physical fitness assessments offer a consistent way to develop and uphold fitness standards throughout the military. These tests encourage personnel to keep up a healthy level of physical fitness, which is essential for carrying out difficult jobs and guaranteeing mission accomplishment.

This reliability test of standing broad jump among NDUM Army Cadet Officers are very necessary because, this test is carried out according to the demographics and suitability of the military community in Malaysia. This is because most reliability for the standing broad jump test is according to demography and suitability of the local community of the previous researcher. With the reliability of this test battery, the standing broad jump test carried out by the NDUM Army Cadet Officers is a reliable and valid test battery carried on for the purposes of physical fitness tests. Thus, the standing

broad jump test that has gained reliability and legitimacy was carried out to the Malaysian military.

The outcome demonstrated that the SBJ fitness test, which measures leg power, is valid and accurate for recording data. The SBJ scores collected during this study for Army Cadet Officers were 200.6 ± 20.3 centimeter for the first trial and the second trial were 216.6 ± 21.3 centimeter. It showed that, the second trial had higher score than the first trial. Which mean the second trial for the SBJ test is better than the first trial for the SBJ test among Army Cadet Officers. The correlation coefficient reported in this study was positive ($r = 0.81$), which is compatible with suggestions made in [17], which state that a value between 0.75 and 0.90 suggests a good reliability coefficient. Furthermore, it is strongly recommended by [18] that when testing a new instrument, a correlation value of 0.80 to 0.90 is a good reliability coefficient. Therefore, the SBJ fitness test is very trustworthy to be utilized in assessing the degree of physical fitness in military physical testing. It evaluates the leg power of NDUM Army Cadet Officers.

The validity and reliability of the instrument is very important to maintain the accuracy of the instrument from being exposed to defects. The higher the value and level of validity and reliability of the instrument the more accurate the data that will be obtained to produce a good and quality study [19]. Validity and reliability are crucial traits for test equipment that guarantee the precision and consistency of the measurements taken. There is no doubt that a measurement tool's usefulness and reliability are closely related. The tool cannot provide valuable data for the comparison of various responders if it is unreliable [20]. It's crucial to remember that a test instrument's validity and reliability can change based on the particular situation and target group. For the particular aim and interested target group, researchers and practitioners should choose instruments that have been validated and shown to produce consistent results. As a result, the goal of the current study is to create and validate a system that may be used to conduct military physical testing. The previous researcher [20] suggest, the development of a new measurement tool necessitates an analysis of its psychometric characteristics, which typically involve some degree of test-retest reliability. Unfortunately, this is rarely done in the case of test-retest agreement, and it would seem that the distinction between reliability and agreement is frequently just ignored.

Understanding and testing reliability is a relevant thing for military physical trainer, sports coaches, and sports practitioners also sports researchers when choosing a measurement. This is because it gives an overview of the environment, technical, factors that affect the score. For military physical trainer, the reliability of a test is important to determine the objective of a test being implemented when it starts with a military fitness program for cadets. It is also needed to evaluate performance as well as plan intervention programs within the training program. In fact, it is used to select valid tests and have high reliability. Such a thing requires high adherence to the procedures explained in the test administration in order to obtain reliable and valid results in a test performed.

In research, reliability is a useful tool for studying literature and helping to design studies. Knowledge of reliability will give an idea of the appropriateness of the results obtained in the literature. In fact, it is also necessary to calculate the measurement of a well-planned study sample and should obtain accuracy during the measurement. This

is because the less the measurement, the larger the sample size required to have sufficient statistical strength to see a significant effect.

4. Conclusion

The main conclusion that can be drawn is that the precise SBJ test battery in terms of reliability and construct validity will enhance the success of the evaluation and interpretation for all new Army Cadet Officers to be selected as a Military Officers in Malaysia. The proper selection process will ensure the Army Cadet Officers are healthy and fit to fulfil the requirements of the Military program throughout the study period. Only quality Army Cadet Officers can equip themselves with all the skills required throughout the study. Furthermore, these findings also will improve the Army Cadet Officers to serve better in their units and contribute significantly to the community to achieve the aims of military fitness education worldwide. Moreover, quality Army Cadet Officers should be balance of intellectual, spiritual, emotional, and physical, especially in order to the military aspect. This study also provides a new direction for other researchers to conduct future research, especially with different methodology and population.

Establishing reliability and validity evidence in fitness setting is very important in assessing and measuring the physical performance among Army Cadet Officers. The need for having valid and reliable testing instruments will enhance the success of the evaluation and the interpretation for all army cadets. The results of this study will also provide useful feedback to the military trainers to identify the Army Cadet Officers in terms of lower body power. This is by having the cadets to maintain as much of their horizontal velocity and maintain good posture allowed for further jumps. According to the findings, SBJ tests can be used to accurately evaluate anaerobic power in Malaysian Military in the field. It can be used as a reliable indicator to evaluate lower limb power, track power output increases after training, identify new Army Cadet Officer's talent, and conduct pre-recruitment tests in locations.

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