

Study of physical fitness of weight training students: Motoric skills and motivation

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Abstract

The purpose of this study was to determine the physical fitness of students who focused on leg muscle strength of students who used weight training on different motoric skills in terms of motivation. This study uses a survey research design using a quantitative approach with a comparative descriptive design. Where, the sample in this study amounted to 145 students obtained based on random sampling technique. The instrument used is the ACSPTT test for students and a questionnaire. The data analysis used included descriptive statistics and inferential statistics using ANOVA followed by independent sample t-test and multiple regression. The overall weight training system without considering the level of motoric skills is better to use when compared to the weight training system which is regulated on the student's leg muscle strength. And there is an interaction between weight training and motoric skills on the student's leg muscle strength in terms of motivation. Motoric skills possessed greatly affect the results to be achieved in this case is the leg muscle strength of the students, because with good motoric skills and supported by good motivation, these students can exercise correctly and maximally, compared to students who have low motoric skills and low motivation.

Keywords: ACSPTT; Motoric Skills; Motivation; Weight Training;

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1. Introduction

1.1 Conceptual and Theoretical Framework

Sport is a systematic process in the form of all activities or businesses that can encourage, develop, and foster a person's physical and spiritual potential in the form of games, competitions or competitions. According to the purpose of sport is physical development such as increasing physical fitness and the components contained such as the development of strength, speed, flexibility, endurance, and agility, but the purpose of sport is not only physical development but also mental and spiritual formation (Wallhead., & Ntoumanis, 2007; Wallhead., & O'sullivan, 2005). Sport also brings many functions to human life. The basic function of sport is to bring people to changes in physical aspects for the better, such as increasing respiratory function, movement function and increasing physical fitness. Physiological changes from the results of exercise or exercise together will cause an increase in the functional ability of the body's organs (movement ability), with increased movement ability meaning an increase in the person's quality of life (MacPhail., Kirk., & Kinchin, 2004; Giriwijoyo, 2010; Harvey., Kirk., & O'Donovan, 2014; Padli et al, 2022).

At this time, athletes really need strong leg muscles, because with strong leg muscles the athletes are able to support the body for the better. According to Janiver, it shows that leg muscles are the ability to work well which is needed in sports that have elements of jumping, starting and sprinting (Cristea et al, 2008; Karabulut et al, 2010; Basirun, 2015). Therefore we need an exercise to strengthen or increase the leg muscles, one of which is using weight training.

Dreger (2006) states that weight training is a physical activity that is carried out systematically using weights as a tool to improve the physical condition of athletes. O'Shea (1976); ladreev (2015) argues that the purpose of the principle of weight training for athletes is to develop muscle strength, muscle power and muscle endurance. For this reason, in increasing the explosive power of Taekwondo kicks, a taekwondoin must have good motoric skills. According to Kirkendal (1980) motoric ability is a person's general quality that can make it easier to perform movement skills. Oxendine (1968); Bjelica., & Petković, (2011); Hornigova et al (2017), defines motoric skills as a description of one of the skills in performing various basic skills and physical activities as a whole.

The so-called weight training is distinguished from another training called weightlifting. According to Mazzili et al (2019); Hartmann et al (2018), weightlifting is an exercise that emphasizes heavy weights and is useful for the sport itself, where athletes compete to carry as much weight as possible in their own class, while it is a systematic exercise in which weights are only used as a means to increase muscle strength to achieve certain goals such as: improving physical condition, health, strength, achievement in one sport and so on. Weight training was developed to train primarily to increase muscle strength and endurance and muscle hypertrophy. In the expansion of weight training can be designed to increase cardiorespiratory endurance and improve body composition (Gokulkrishnan, 2018; Padli et al, 2022).

For the weight training method, the low motoric ability group did not encounter significant obstacles, because weight training with regular lifting or fighting movements and increasing the training load gradually progressively stimulated the leg muscles to contract rapidly, resulting in great strength and speed. accompanied by explosive power (Pan et al, 2018; Podrigolo et al, 2019; Kuldoshovich, 2021). In achieving the optimal course must go through training and coaching tiered and continuous, and in practice, the sport itself requires good physical condition in order to produce maximum training. Physical conditions that an athlete must have to achieve these achievements

include: strength, endurance, speed, strength, agility, flexibility, balance, coordination, and reaction speed (Hanief., & Puspodari, 2017; Yulianti, 2017).

Based on the pre-survey conducted through observations, interviews, and body types to prospective students at UNP in anthropometric tests, it is known that most of them lack muscle strength, because the muscles of the body are relatively small which are useful for body sturdiness and balance. In addition, there is a diversity of motoric skill levels for those taking the other tests. Then, the students in physical fitness training at the UNP laboratory, both active and beginners practiced in the next survey. For today's workout, mostly just work the muscles of the shoulder and arm muscles apart from the others and for beginners just dabble according to his wishes. Instructors whose job is not to respond to this situation, because there are still many who have not mastered the basic concepts of weight training.

Achievement motivation requires individuals to improve their abilities in order to produce what the individual's goals are (Sagita, Daharnis, & Syahniar, 2017). Achievement motivation also makes individuals have plans to achieve goals, make individuals work efficiently, and individuals will be able to solve problems or obstacles they face easily (McClelland, 2009). According to Mulya and Indrawati (2017) achievement motivation can reduce academic stress. Achievement motivation is a physical condition that exists in students where it can encourage them to carry out certain activities so that the desired goals can be achieved. Another opinion says that achievement motivation is an individual's need to meet the desired goals, these goals are realistic or can also be called the need for success (Singh & Jain, 2017). From some of these opinions it can be concluded that achievement motivation is a person's encouragement or effort to achieve success. The strength of motivation can affect academic stress, according to McClelland (2009) the existence of achievement motivation can make students more aware of what will be achieved so that these students have a plan or strategy in dealing with the risks that will be faced, students can also think more positively that all academic assignments will be useful for the future.

Motoric skills are divided into two items; Coarse motoric and fine motoric. Gross motoric activity uses large muscles that cover basic locomotoric, non-locomotoric, and manipulative movements, while the meaning of fine motoric skills is the ability of preschoolers who are busy using smooth muscles such as writing, drawing, and others (Muratović., & Bojanić, 2016). ; Rakita et al, 2018; Yaprak, 2018). Gross motoric skills that are closely related to basic movements in observing and evaluating basic movements are: (1) Run which has a statement above the motion components include: leg movements seen from the side, arms and leg movements seen from behind. (2) Jumps that have basic movement components including arms, trunk, and leg muscles. (3) Throws that have basic components include: arms, togok, and leg muscles. (4) Catching has basic movement components including: head, arms, and hands. (5) Kicking has basic motion components including arm, togok, and leg muscles (Setiawan et al, 2020; Kamaludin et al, 2020). To measure motoric skills, several types of tests that have these standards can be used; 1) Scott Motoric Ability Test, 2) Barrow Motoric Ability Test, 3) Cozen's Test of General Athletic Ability, 4) Larson Motoric Ability Test (Chatzipanteli., & Digelidis, 2011). A further test that can be used for students and a rather quick implementation is a motoric skill test with the Barrow Motoric Ability Test (Fraser, 1966; da Rosa Orssatto et al, 2018; Kamarudin, 2020; Yudanto & Alfian, 2020).

1.2 Related Research

There are several studies that prove that there is a relationship between learning motivation and students' motoric skills, Budiawan (2013); Ryska, T. A., & Vestal, S. (2004); Subarjah (2016) which

explains that there is a significant positive relationship between achievement motivation and one's motoric skills. Other studies were conducted by Tamara and Chris (2018); You, J. W. (2018) found that the level of motoric ability has a relationship with one's achievement. Based on several studies that have been mentioned, there is a gap, namely the existence of research that discusses learning motivation with motoric skills that affect pre-service teacher achievement, especially in gymnastics courses. Choosing a good system in weight training must pay attention to the level of motoric skills, those who have high level motoric skills are able to carry out the exercise well, but on the other hand those who have poor motoric skill levels tend to be unable. Carry out the training properly and successfully.

1.3 Purpose of The Study

Therefore, the aim of the researcher was to find out whether there was a significant difference in students' physical fitness focusing on the leg muscle strength of students who used weight training on different motoric skills.

2. Method and Material

2.1 Research Model

This research is a survey research. According to Cohen, Manion, and Morrison (2007), the survey is a descriptive part that aims to find out the status (status), phenomena (symptoms) and determine status similarity by comparing it with predetermined standards. This research design uses a quantitative approach with a comparative descriptive design. According to Creswell (2012) comparative research is research that compares two or more symptoms. Comparative descriptive compares the same variable for different samples.

2.2 Participants

The population in this study were all male students in the 2016-2017 academic year who took the Development course at the Department of Physical Condition Development. One way to get a representative sample is to use a random sampling technique. The first sample was taken by determining a random sample of 145 male students from the total population. The selected sample underwent a motor skills test. Furthermore, the motor skills test scores are sorted from the highest score to the lowest score. Verducci said that 27% of the top scores were categorized as good and 27% of the lower scores were categorized as low. In accordance with this theory, 38 samples from number 1 to number 18 include those with a high level of motoric ability and numbers 102 to 145 include those with a low level of motoric ability.

2.3 Data Collection

All samples did weight training exercises. Weight training is done for 15-25 minutes with a load of 30%-75% of 1 RM (Maximum Repetition or Best Performance) and repetitions 10-15 times performed 2-3 sets with the same load. Weight training which is intended to exercise the leg muscles using the leg press. Set the load first. Sit on the machine and immediately place your feet on the platform in front of you with your feet shoulder-width apart. Grasp and lower the safety bar on the leg press while holding the platform with both feet, push the platform until your legs are straight, but remember not to lock your feet when they are in a straight position. The torso and legs should form a 90 degree angle. This position is the starting position of the leg press. Inhale, slowly lower the platform until the top and bottom legs form a 90-degree angle. Push back using your heels, and engage/use your Quadriceps muscles to return to the starting position. Exhale. When finished using the machine, don't forget to lock the safety pin on the machine. Make sure it is locked so you don't order the platform.

The research treatment was given as many as 16 meetings for 1 month which must be followed by the sample.

The data collection procedure to refer to Creswell (2012), is described in the figure below:



Figure 1. Data Collection

Based on Figure 1, it can be seen that the first activity carried out was to apply weight training, especially for the leg muscles using a leg press machine. Based on A.C.S.P.F.T. (Asian Committee for the Standardization of Fitness Tests) the measurement results are poured into the following categories:

Table 1. Physical fitness norms, especially leg muscle strength for male students

Interval	Classification
431 – Up	Very Good
376 – 430	Good
311 – 375	Enough
251 – 310	Not Good
0 – 250	Very Not Good

Source: A.C.S.P.F.T. 1977

Table 2. Motivation and Motoric Skills pre-service teacher

Category	Interval	
	Motoric Skills	Motivation
Very Good	78.3 – 92.0	18.0 – 31.5
Good	64.5 – 78.2	31.6 – 45.0
Not Good	36.9 – 50.6	45.1 – 58.5
Very Not Good	23.0 – 36.8	58.6 – 72.0

2.4 Data Analysis

After the weight training activities were carried out, measurements were made using the A.C.S.P.F.T test instrument for the waiting subject. ACSPT is a branch of an international organization whose target is to develop and standardize various forms of physical fitness tests called ICSPFT (International Committee on the Standardization of Physical Tests). In Asia, on the initiative of Asian countries, the same organization has been formed and is a subsidiary of I.C.S.P.F.T, whose activities are aimed at Asian countries and nations. The organization is named: ACSPT (Asia Committee on the Standardization of Physical Test). A.C.S.P.F.T Physical Fitness Test for Junior/Senior High School Students includes; 1) 50m sprint; 2) Long jump without a prefix; 3) hanging lifts for boys and hanging elbows for girls; 4) Running back and forth 4x10 m; 5) Lie down and sit for 30 seconds; 6) Bend the stick to the front; 7) Long run, 1000 m for men. 800 m for women. The use of the A.C.S.P.F.T test instrument is intended to determine the physical fitness of students which includes strength. Why is strength only the main topic in this study, because strength is the main basis for students' physical fitness. Strength factors (maximum strength) including muscle power or explosive power (a combination of strength and speed), and muscle endurance and cardiorespiratory both anaerobic and

aerobic, are elements of physical fitness (biomotor abilities) that need to be considered by an athlete. (Vaara et al, 2014; Kyröläinen et al, 2018; Gomer & Reineke, 2020). As well as a motor skills and motivation questionnaire. After the data is collected then the data is compiled, then data processing is carried out with descriptive statistics which include mean, min, max, and categories as well as inferential statistics using ANOVA analysis with Tukey's poshoc follow-up test and multiple regression to see whether student motivation and motor skills affect physical fitness. .

3. Result

The research findings are described in this section. The results of the A.C.S.P.F.T test to see students' physical fitness can be seen (table 3) and motor skills and motivation can be seen in tables 4 and 5 below

Table 3. Results of students' physical fitness

Category	Classification			Mean	Min	Max
	Interval	F	%			
Very Good	431 – to the top	24	16.5	396.7	305	433
Good	376 – 430	79	54.5			
Enough	311 – 375	32	22.1			
Not Good	251 – 310	8	5.5			
Very Not Good	0 – 250	2	1.4			
Total		145	100			

From table 3, which came from 145 respondents from students after they were obtained and the results using the SPSS 23 application program, the students' physical fitness was in the dominant good category with a percentage of 54.5% (79 out of 145 students) and had a mean value of 396.7, minimum score 305, and maximum score 433.

Table 4. Results of students' motor skills

Category	Classification			Mean	Min	Max
	Interval	F	%			
Very Good	74.9 – 92.0	35	24.1	45.5	25	87
Good	57.6 – 74.8	98	67.6			
Not Good	40.3 – 57.5	7	4.9			
Very Not Good	23.0 – 40.2	5	3.4			
Total		145	100			

From table 4, which came from 145 respondents from the students after they were obtained and the results using the SPSS 23 application program, for the results of students' motor skills, they were in the good dominant category with a percentage of 67.6% (98 out of 145 students) and had the mean value is 45.5, the minimum score is 25, and the maximum score is 87.

The results of the questions given and the results obtained using the SPSS 21 application can be seen in the table 5.

Table 5. The results of the student motivation questionnaire

Classification			Mean	Min	Max	%
Interval	Category	Total				
18.0 – 31.5	Not very good	3	52.5	27	68	2.1
31.6 – 45.0	Not good	8				

45.1 – 58.5	Good	99	68.3
58.6 – 72.0	Very good	35	24.1
TOTAL		145	100

From table 5, which came from 145 respondents from the students after they were obtained and the results using the SPSS 23 application program, the students' motivation results were in the good dominant category with a percentage of 68.3% (99 out of 145 students) and had a score of 68.3% (99 of 145 students) the mean is 52.5, the minimum score is 27, and the maximum score is 68.

From the table 3-5, it can be seen that the use of weight training exercises using leg press on physical fitness and motor skills got different results, good results were obtained on motor skills, motivation and physical fitness of students. However, this has not been able to strengthen the difference between the use of weight training exercises, so inferential testing was carried out using ANOVA (table 6) and independent sample t-test in table 7.

Table 6. Results of leg muscle strength using leg press exercises

ANOVA					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	358.847	2	179.423	14.237	.000
Within Groups	18009.426	1429	12.603		
Total	18368.273	1431			

The ANOVA test was used to see the difference in the results of physical fitness which focused on the leg muscle strength of students in the city of Padang. The results of data analysis in table 6 on weight training exercises obtained a significance value of 0.00 or less than 0.05 with a significant level of 0.05. So the data is concluded that there is a significant average difference.

Table 7. Results of Independent sample t-test for weight loss of participants

	T	Df	Sig	Std. Deviation	95% confidence interval	
					Lower	Upper
Physical fitness focused on Leg Muscle	14.163	140	0.012	2.51	12.236	.4120
	14.163	76.321	0.012	1.83	11.935	.5615

From table 7 it can be seen that the value obtained (t count). The t-table value can be seen in the t-table with a significance value of 0.025 (2-sided test) with 140 degrees of freedom (df). In this study, the results of the t table were 1.98177. While the t value can be seen in table 5. (Column t) is 14,163 for physical fitness which focuses on Leg Muscle. The criteria for testing the hypothesis in this study are if the t table value is smaller than t arithmetic or the sig value obtained is smaller than specified (0.025), then there is a difference (Cremer, 2003). Therefore, based on the results obtained that t arithmetic is greater than t table, there is a comparison between students who have high motor skills and students who have low motor skills in the weight training exercises used. And reinforced by a significance value which is below 0.025, which is 0.012. So it can be concluded that there is a significant difference between students who have high motor skills and students who have low motor skills in weight training exercises that are used for physical fitness which are focused on students' leg muscles.

For the results of the influence of motoric skills, and motivation for student physical fitness can be seen in table 8.

Table 8. Results of Regression

Variabel	Unstandardized Coefficients		Standardized Coefficients	T	sig.
	B	Std. Error	Beta		
1 (Constant)	14.521	3.151		4.584	.000
Motoric Skills	.257				
Motivation	.246	.174	.143	1.378	.021

From table 8, it can be seen the results of a simple regression test found that the regression equation is $Y = 14.521 + 0.257X_1 + 0.246X_2$, for the number of contributions to pre-service teacher academic stress on motivation can be seen in table 9 below.

Table 9. Contribution from Motoric Skills and learning motivation for Student physical Fitness

Model	R	R square	Adjust R Square	Std. Error of the Estimate
1	.730	.532	.561	2.503

4. Discussion

The results of multiple regression analysis show that the value of the determination coefficient is (R²) 0.532. This means that the contribution of motoric skills and motivation to student physical fitness is 53.2%, while the remaining 47.8% is influenced by other variables.

Based on the results obtained (see table 2-4), that there are differences in physical fitness that focuses on students' leg muscles from the implementation of weight training exercises using the leg press on students who have high and low motivation and motor skills.

Physical education and sports provide opportunities for students to be physically active while at school (Pühse et al, 2005; McEvoy, 2017; Cai et al, 2018). and has many benefits, including developing motor skills, increasing physical fitness and self-esteem, and reducing the level of risk factors for heart disease and obesity, as well as maintaining and or improving students' academic performance. Bevans writes that providing sufficient time in physical education and sports will increase students' maximum energy use, this is a key contributor to the maintenance of a healthy weight and physical fitness (Puhse et al, 2005). This is supported by Silverman who stated that in the design of learning designed by teachers, it is important to remember that each student needs a different amount of time and practice to acquire good skills and to be able to master movements at higher skills. Conceptually, the mission of physical education and sports programs is comprehensive education, so it is seen not only related to efforts to develop physical abilities, but is broader than that, covering intellectual, mental, social and emotional dimensions (O'Sullivan, 2004; Muros-Ruiz., & Fernandez-Balboa, 2005).

There are several studies that prove that there is a relationship between learning motivation and learning achievement, Budiawan (2013); Ryska, T. A., & Vestal, S. (2004); Subarjah (2016) which explains that there is a significant positive relationship between achievement motivation and one's achievement. Other studies were conducted by Tamara and Chris (2018); You, J. W. (2018) found that the level of academic stress has a relationship with a person's achievement. Thus, the primary purpose of the present study was to examine the relationship among academic stress, coping, motivation, and

performance in college students using an academic-specific measure of students' coping style (Struthers, et al, 2000). Based on several studies that have been mentioned, there is a gap, namely the body of research that discusses learning motivation with academic stress that affects pre-service teacher achievement, especially in gymnastics courses.

Based on the results obtained (see table 2-4), that there are differences in physical fitness that focuses on students' leg muscles from the implementation of weight training exercises using the leg press on students who have high and low motivation and motor skills.

Physical education and sports provide opportunities for students to be physically active while at school (Pühse et al, 2005; McEvoy, 2017; Cai et al, 2018). and has many benefits, including developing motor skills, increasing physical fitness and self-esteem, and reducing the level of risk factors for heart disease and obesity, as well as maintaining and or improving students' academic performance. Bevans writes that providing sufficient time in physical education and sports will increase students' maximum energy use, this is a key contributor to the maintenance of a healthy weight and physical fitness (Puhse et al, 2005). This is supported by Silverman who stated that in the design of learning designed by teachers, it is important to remember that each student needs a different amount of time and practice to acquire good skills and to be able to master movements at higher skills. Conceptually, the mission of physical education and sports programs is comprehensive education, so it is seen not only related to efforts to develop physical abilities, but is broader than that, covering intellectual, mental, social and emotional dimensions (O'Sullivan, 2004; Muros-Ruiz., & Fernandez-Balboa, 2005; Görner., & Reineke, 2020).

5. Conclusion

Weight training has been recognized as an excellent way to increase muscle strength in all branches of martial arts, but to obtain an optimal training effect it requires special consideration of the methodology and training system, both accompanied by weight training. weight, intensity and duration of exercise, frequency of exercise, and the method of execution of the exercise itself. The overall weight training system without considering the level of motor skills is better to use when compared to the weight training system which is regulated on the student's leg muscle strength. And there is an interaction between weight training and motor skills on the student's leg muscle strength in terms of motivation. And the motor skills possessed greatly affect the results to be achieved in this case is the leg muscle strength of the students, because with good motor skills and supported by good motivation, these students can exercise correctly and maximally, compared to students who have low motor skills and low motivation.

6. Recommendation

This research will be more complete if interview data is added to strengthen the findings, based on this it will be better if further research is added with qualitative data.

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