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Correlation of Leg Length and Leg Muscle Strength with Kicking Ability in Pencak Silat Sports

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A. *Conception and design of the study;* ***B.*** *Acquisition of data;* ***C.*** *Analysis and interpretation of data;* ***D.*** *Manuscript preparation;* ***E.*** *Obtaining funding*

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ABSTRACT

This research is descriptive research with a correlational design. This study aims to determine: the relationship between leg length and muscle strength with Kicksing ability in Pencak Silat sports. The population used was SMA Negeri 7 Makassar. The sample chosen in this research is representative and can represent the students of SMA Negeri 7 Makassar as a whole. The sample chosen was male students who actively participated in daily learning at school. Determination of the sample in this research was carried out in two stages, namely; (1) the first sample is to determine the class levels (cluster sampling) from previously determined schools, namely class X and class XI; and (2) the second stage of the sample is random sampling of male students at grade levels, by determining the number of students that will be used to obtain empirical data. The number of samples used in this research, with details that; (1) for class X students as many as 30 students; and (2) for class XI students as many as 30 students. So the total sample is 60 people. The sampling technique was carried out randomly (random sampling) so that a representative sample could be obtained that could represent the students of SMA Negeri 7 Makassar as a whole. The analysis technique used is regression and correlation analysis using the SPSS application program version 22.00 with a significance level of 0.05 α. The results of the research show that: (1) There is a significant relationship between leg length and Kicksing ability in Pencak Silat sports, with a value of r0 = 0.710; (2) There is a significant relationship between leg muscle strength and Kicksing ability in Pencak Silat sports, with a value of r0 = 0.854; and (3) There is a significant relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, with a value of r0 = 0.859.

Keyword: Leg Length; Muscle Strength; Kicks; Pencak Silat

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INTRODUCTION

Pencak Silat is a work that has been passed down from generation to generation in Indonesian culture. Pencak Silat is often displayed in various competitions from junior level,

national and international competitions. "Pencak Silat is a sport resulting from Indonesian human culture to defend/maintain its existence and integrity towards the surrounding environment/nature to achieve harmony in life to increase faith and devotion to God Almighty" (Iskandar, 1992). Pencak Silat has begun to spread to almost all countries in the world and can be seen in regional and international competitions (Nizam Shafie, 2014), so competition to achieve peak performance is very tight. This situation inspires Pencak Silat experts and trainers to search for and formulate effective training concepts to improve athlete performance.

Pencak Silat is a branch of martial arts that requires proficiency in mastering basic techniques. The basic techniques that must be mastered are kicking, punching, dodging and parrying. To achieve optimal performance, these basic techniques must be performed with strong, fast, precise and coordinated movements (Haqiyah et al., 2017). The technique most often used in Pencak Silat is kicks when compared to other techniques such as punches. Legitimate attacks using kicks have a higher value compared to attacks using punches, so martial artists need to master kicking techniques (Arsyad et al., 2018).

The kicking technique in Pencak Silat always uses the tip of the foot where the toe is bent upwards (Pomatahu, 2018). The target for a straightforward kick is aimed at the target areas of the front of the body, namely the chest and stomach. To achieve good results in kicking straight forward, kicking ability and kicking range are needed so that you can easily reach the target of the opponent's body (Samsudin & Ooi, 2018). Kicking ability greatly determines success in achieving the kick target. The ability to kick can make it difficult for the opponent to anticipate such as blocks and dodges. A fighter who has agile kicks will be able to attack his opponent more quickly (Sudirman et al., 2019).

Kicking ability in Pencak Silat can be achieved through programmed and intensive training. Training techniques must be able to develop leg muscle strength and speed of the muscles that play a role in the kicking process (Syamsudin et al., 2020). The muscles that need to be developed are the front thigh muscles, namely the sartorius, tensor fasciae latae, adductor longus, rectus femoris, vastus lateralis, and vastus medialis, as well as the back thigh muscles, namely the semitendinosus, semimembranosus, bicep femoris, adductor magnus and adductor brevis. These thigh muscles are what move the lower limbs, especially for kicking in the sport of Pencak Silat (Ihsan et al., 2020).

The strength of leg muscle contractions can provide powerful movement capabilities when kicking in the sport of Pencak Silat (Aldani et al., 2021). The main muscles that contract when kicking in Pencak Silat are the rectus femoris, vastus lateralis, and vastus medialis muscles. When the kicker's leg is withdrawn quickly after kicking, the muscles involved are the biceps femoris, semimembranosus, semitendinosus, and gastrocnemius muscles. Other supporting muscles that contract during a kick apart from the muscles mentioned above are the iliopsoas, pectineus, tensor fasciae latae, adductor longus, and soleus. The joints that play the most role in kicking straight forward are knee extension and hip flexion. Leg muscle strength can be used to support the movement of contracting muscles and joints that work when kicking in Pencak Silat (Suwirman & Sasmitha, 2020). If the leg muscles are strong enough, it will support the effectiveness of kicking movements in the sport of Pencak Silat.

Leg length also helps in the kicking process in Pencak Silat, especially when the legs are straightened to reach the target of the opponent's body. Long legs can provide the ability to reach the kick target quickly even if the opponent is quite far away. A fighter who has long legs can make it difficult for the opponent to carry out attacks, especially if the opponent's legs are shorter (Syaifullah & Doewes, 2020). The target in the sport of Pencak Silat is an opponent who always moves to avoid so that the opponent's position is sometimes quite far from our reach to carry out an attack. When your opponent is always avoiding you,

you need the ability to maximize the length of your legs to reach your opponent's target. A fighter who has shorter legs certainly has difficulty reaching the target (his opponent) and always keeps his distance when attacking with kicks (Panjiantariksa et al., 2020).

The movement process in kicking in the sport of Pencak Silat is carried out in an uninterrupted movement pattern, namely starting from a stance, lifting the kicking leg to knee height, and straightening the leg with a fast movement to reach the target of the opponent's body (Regency & Sinurat, 2020). These technical movement elements require integrated movement automation accompanied by the ability to optimize leg length and leg muscle strength (Dei, 2020). If the Pencak Silat kick movement is carried out haltingly or the movement stops, it will reduce the agility of the movement so that it is easily parried or dodged by the opponent and it is likely that the opponent will counterattack (Sarwita & Is, 2020).

Many beginner martial artists always practice Pencak Silat kicks at one of the Pencak Silat schools, but the results achieved are not optimal. Some beginner martial artists who do the training are not able to show optimal performance. Many martial artists have less-than-perfect physical and technical abilities, such as very poor leg strength in carrying out attacks with kicks, parrying techniques, dodging and the ability to exploit the opponent's weaknesses to attack back because they do not have adequate kicking abilities (Doewes et al., 2022). When martial artists develop their abilities, such as kicking abilities, they often do technical training by doing kicks repeatedly without training to develop the contraction strength of the leg muscles. It is realized that this training technique is less effective in improving kicking ability in the sport of Pencak Silat (Ihsan et al., 2022). What needs to be considered is that to perform a kick in the sport of Pencak Silat, the strength of the movement of the legs or the whole body is needed to help with the agility of the leg movements when executing the kick (Rahmat et al., 2022). For fighters who have not yet developed the strength and speed of contraction of their leg muscles optimally, and the technical ability to perform kicks in Pencak Silat, such as the technique of lifting the kicking leg accurately, quickly and strongly, has not been mastered with the right timing, it is necessary to be given training that can improve this ability (Saputra & Muzaffar, 2022).

The problem that arises is can leg length and leg muscle strength be utilized to achieve kicking ability in the sport of Pencak Silat. For beginner martial artists, there are still many technical mistakes in kicking movements that are often made when kicking because the technical movements have not been mastered properly. This will make it difficult for martial artists to develop the agility to contract their leg muscles when kicking in the sport of Pencak Silat. If a martial artist has adequate leg strength along with sufficient leg length, but errors in kicking techniques are still very dominant, then kicking ability in Pencak Silat will be difficult to achieve (Efendi & Welis, 2022). For beginner martial artists, it is still very difficult to ensure that they can achieve kicking abilities in Pencak Silat after they have better leg strength and leg length because beginner fighters have not yet mastered kicking techniques in Pencak Silat. The opposite can also happen, in that it is very difficult for beginner martial artists to develop their kicking abilities if they are not supported by leg muscle strength. The length of your legs also helps you reach the target, thus supporting your kicking ability in the sport of Pencak Silat (Didik Cahyono & Muhammad Abdurrochim, 2022). Even though martial artists have good kick technique skills, not being supported by leg strength will make it difficult to perform kick movements optimally.

Kicks in Pencak Silat must be done hard with the ability to reach the target so that it is difficult for the opponent to parry and dodge. Kicks that are executed weakly due to inadequate leg strength accompanied by short legs will be easily anticipated by the opponent by parrying, dodging, and even making it easier for the opponent to counterattack quickly and suddenly.

METHODS

This research is a type of descriptive research that will reveal the relationship between leg length muscle strength and kicking ability in Pencak Silat sports. The variables involved in this research consist of; (1) independent variables, namely leg length and leg muscle strength; and (2) the dependent variable, namely Kicksing ability in Pencak Silat sports. The research design used is adjusted to the type of research, so the research design used is correlational. The overall research population is students of SMA Negeri 7 Makassar. SMA Negeri 7 Makassar was chosen purposively as the research object with the consideration that; (1) SMA Negeri 7 Makassar can provide all the facilities needed during the research, namely the tools needed in the data collection process; and (2) there is support from the school principal and physical education teacher who are willing to provide personnel to assist in the data collection process. The population of this study is quite homogeneous because they have several similar characteristics, namely the same age, relatively the same level of Kicksing ability in Pencak Silat sports, and they received sports lessons at the same school and were taught by physical education teachers who had relatively the same level of education and sports experience. The sample chosen in this research is representative and can represent the students of SMA Negeri 7 Makassar as a whole. The sample chosen was male students who actively participated in daily learning at school. Determination of the sample in this research was carried out in two stages, namely; (1) the first sample is to determine the class levels (cluster sampling) from previously determined schools, namely class X and class XI; and (2) the second stage sample is a simple random sampling by drawing lots of male students at grade levels, by determining the number of students that will be used to obtain empirical data. The number of samples used in this research, with details that; (1) for class X students as many as 30 students; and (2) for class XI students as many as 30 students. So the total sample is 60 people. The sampling technique was carried out randomly (random sampling) so that a representative sample could be obtained that could represent the students of SMA Negeri 7 Makassar as a whole. To obtain reliable research results with a more accurate level of generalization, the samples selected from male students at SMA Negeri 7 Makassar had similar characteristics. Data collection is carried out systematically and in a planned manner according to the provisions of the measurement technique for the type of test used. The data that needs to be collected is data on leg length, leg muscle strength, and kicking ability in Pencak Silat sports.

The data obtained in the research were data on leg length, leg muscle strength and kicking ability in Pencak Silat sports. Data from these research variables are then analyzed using descriptive statistical techniques and inferential statistics to carry out hypothesis testing. The steps taken in analyzing this research data are as follows:

1. Descriptive statistical analysis.
2. Test data normality.
3. Hypothesis testing through multiple regression analysis of two predictors, analysis of the product-moment correlation coefficient (r), and analysis of the multiple correlation coefficient (R) at a significant level of $\alpha 0.05$.

The steps taken in research data analysis are described in detail, as follows:

Descriptive statistical analysis

Descriptive analysis is intended to obtain a general picture of the data on the variables involved, namely data on leg length, leg muscle strength, and kicking ability in Pencak Silat sports. Things you need to know in the descriptive analysis are the average value, standard deviation, total value, variance, maximum value, minimum value, and variance of research variable data.

Data normality testing

Research data that will be analyzed using parametric statistics such as regression analysis, product-moment correlation coefficient (r), and multiple correlations (R) must meet the analysis requirements. The analytical requirements test required in this research data analysis is the data normality test. Data normality testing is intended to determine whether the data for research variables is normally distributed or follows a normal distribution. The analysis technique used in testing data normality is the Lilliefors test at a significance level of $\alpha 0.05$.

Test criteria in testing data normality using the Lilliefors test, namely; (1) if the value of L0 > L is critical, then H0 is rejected and H1 is accepted, meaning that the research data obtained is not normally distributed; and (2) if the value of L0 < L is critical, then H0 is accepted and H1 is rejected, meaning that the research data obtained is normally distributed.

Regression analysis

This regression analysis is used to predict the dependent variable, if two independent variables are determined, in other words, the individual in the dependent variable can be predicted if the individual in the independent variable is determined. From the results of the multiple regression analysis of these two predictors, it can be seen that there is a causal relationship between leg length, leg muscle strength, and Kicksing ability in Pencak Silat sports.

The multiple regression equation for the two predictors used is as follows:

$$Y = a + b_1X_1 + b_2X_2$$

Correlation analysis

Correlation analysis is a continuation of regression analysis because regression analysis is always followed by correlation analysis. Correlation analysis is used to determine the r-value of the relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports. Correlation analysis can also provide information about the percentage contribution that leg length and leg muscle strength can provide to Kicksing ability in Pencak Silat sports.

The correlation analysis used is the analysis of the product-moment correlation coefficient (r) and the multiple correlation coefficient (R) at a significant level of $\alpha 0.05$. Product moment correlation coefficient analysis (r) was used to determine the relationship between leg length and Kicksing ability in Pencak Silat sports and to determine the relationship between leg muscle strength and Kicksing ability in Pencak Silat sports. Analysis of the product-moment correlation coefficient (r) uses the Spearman-Brown formula as follows:

$$r_{xy} = \frac{n\Sigma X_iY_i - (\Sigma X_i)(\Sigma Y_i)}{\sqrt{\{n\Sigma X_i^2 - (\Sigma X_i)^2\}\{n\Sigma Y_i^2 - (\Sigma Y_i)^2\}}}$$

The test criteria for rejecting H0 and accepting H1 in the analysis of the product-moment correlation coefficient (r), are; (1) if the value of r0 > rt $\alpha 0.05$, then H0 is rejected and H1 is accepted, meaning there is a significant relationship between the independent variable and the dependent variable; and (2) if the value of r0 < rt $\alpha 0.05$, then H0 is accepted and H1 is rejected, meaning there is no significant relationship between the independent variable and the dependent variable.

Multiple correlation coefficient (R) analysis was used to determine the relationship between leg length and leg muscle strength together with Kicksing ability in Pencak Silat sports. Analysis of the multiple correlation coefficient of two predictors (R) uses the following formula:

$$R_{y.\,x1x2} = \sqrt{\frac{r^2_{yx1} + r^2_{yx2} - 2r_{yx1}r_{yx2}r_{x1x2}}{1 - r^2_{x1x2}}}$$

The test criteria for rejecting H0 and accepting H1 in the analysis of the multiple correlation coefficient (R) at the significance level α0.05, are; (1) if the R0 value > R0 α0.05, then there is a significant relationship between the two independent variables and the dependent variable; and (2) if the value of R0 < R0 α0.05, then there is no significant relationship between the two independent variables and the dependent variable.

RESULTS AND DISCUSSION

Result

The results of the descriptive analysis described in the following tables include; variable data on leg length, leg muscle strength, and kicking ability in Pencak Silat sports. The complete results of the descriptive analysis, while a summary of the analysis results is listed in **Table 1**.

Table 1.
Results of descriptive analysis of data on research variables

Nilai Statistik	N	Mean	STDEV	Maks	Min	ΣX	Variants
Leg length data (cm)	60	93,067	3,931	98	78	5584	15,453
Leg muscle strength data (kg)	60	21,891	1,756	26,07	18,88	1313,47	3,083
Pencak Silat Kicks ability data (points)	60	18,25	3,568	24	10	1095	12,733

The data in **Table 1** is a summary of the results of descriptive analysis of data on leg length, leg muscle strength, and Kicksing ability in Pencak Silat sports, it is explained that:

1. For leg length data using anthropometric measurements, an average value of 93.067 centimetres was obtained and a standard deviation of 3.931 centimetres. The maximum leg length that students have is 98 centimeters and the minimum is 78 centimeters. The total value of leg length obtained from 60 students was 5584 centimetres and the variance was 15.453 centimetres.
2. For leg muscle strength data using the leg dynamometer test, an average value of 21.891 kilograms was obtained and a standard deviation of 1.756 kilograms. The maximum leg muscle strength achieved by students was 26.07 kilograms and the minimum was 18.88 kilograms. The total value of leg muscle strength obtained from 60 students was 1313.47 kilograms and the variance was 3.083 kilograms.
3. For Kicksing ability data in Pencak Silat sports using a 15-second Pencak Silat Kicks ability test, an average value of 18.25 points was obtained and a standard deviation of 3.568 points. The maximum Kicksing ability achieved by students in Pencak Silat sports is 24 points and the minimum is 10 points. The total value of Kicksing ability in Pencak Silat sports obtained from 60 students was 1095 points and the variance was 12,733 points.

Data normality testing

Data normality testing is intended to determine that the research variables data, namely data on leg length, leg muscle strength, and Kicksing ability in Pencak Silat sports, are normally distributed or follow a normal distribution. The data normality testing technique used is the Lilliefors test at a significance level of $\alpha 0.05$.

Table 2.
Data normality test results

	L_0	L_t	Information
Leg length data.	0,1056	0,1144	Normal
Leg muscle strength data.	0,1088	0,1144	Normal
Pencak Silat Kicks ability data	0,0663	0,1144	Normal

Based on **Table 2**, which is a summary of the results of data normality testing for research variables, it turns out that:

a. In testing the normality of leg length data, the observed Lilliefors value was 0.1056, which was smaller than the table Lilliefors value = 0.1144 at a significant level of $\alpha 0.05$. This shows that the leg length data obtained from samples of SMA Negeri 7 Makassar students are normally distributed so that it meets the requirements for analysis using parametric statistical techniques.
b. In testing the normality of leg muscle strength data, the observed Lilliefors value was 0.1088, which was smaller than the table Lilliefors value = 0.1144 at a significant level of $\alpha 0.05$. This shows that the data on leg muscle strength obtained from samples of SMA Negeri 7 Makassar students is normally distributed so that it meets the requirements for analysis using parametric statistical techniques.
c. In testing the normality of Kicksing ability data in Pencak Silat sports, the observed Lilliefors value was 0.0663, which was smaller than the table Lilliefors value = 0.1144 at a significant level of $\alpha 0.05$. This shows that the data on Kicksing ability in Pencak Silat sports obtained from samples of Makassar 7 State High School students is normally distributed so that it meets the requirements for analysis using parametric statistical techniques.

Regression analysis

The regression analysis used is multiple regression analysis with two predictors. Multiple regression analysis with two predictors is used because this research variable consists of two independent variables and one dependent variable. Regression analysis is needed to determine the causal relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports. The results of the regression analysis show that leg length and leg muscle strength can determine the level of Kicksing ability in Pencak Silat sports.

Table 3.
Results of multiple regression analysis of two predictors

	N	Konstan	Koef.Reg	F_0	F_t	Information
The relationship between leg length (X1) and leg muscle strength (X2) with Pencak Silat Kicks ability (Y).	60	-27,145	b_1 = 0,133 b_2 = 1,509	80,330	3,17	Sig.

The data in **Table 3** is a summary of the results of multiple regression analysis of two predictors of data on leg length and leg muscle strength with Kicksing ability in Pencak Silat

sports. It turns out that a constant value or coefficient a = -27.145 was obtained, while the regression coefficient obtained was b1 = 0.133 and the regression coefficient b2 = 1.509. The regression coefficient determines the regression equation for leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, namely $\hat{Y}$ = -27.145 + 0.133X1 + 1.509X2. Based on the regression coefficient values, it can be stated that:

a. In the regression analysis of data on leg length and kicking ability in Pencak Silat sports, the regression coefficient b1 = 0.133 was obtained. The regression coefficient of 0.133 is positive. which shows that there is a positive relationship achieved from the relationship between leg length and kicking ability in Pencak Silat sports. The regression coefficient value was 0.133 after being tested for significance with the F-test, it turned out that the observation F value (F0) = 80.330 was greater than the table F value = 3.17 at the significant level α0.05, meaning there was a significant positive relationship between leg length and Kicksing ability in Pencak Silat sports. This shows that leg length can determine the level of Kicksing ability in Pencak Silat sports.
b. In the regression analysis of data on leg muscle strength and kicking ability in Pencak Silat sports, the regression coefficient b2 = 1.509 was obtained. The regression coefficient of 1.509 is positive. which shows that there is a positive relationship achieved from the relationship between leg muscle strength and kicking ability in Pencak Silat sports. The regression coefficient value was 1.509 after being tested for significance using the F-test, it turned out that the observation F value (F0) = 80.330 was greater than the table F value= 3.17 at the significant level of α0.05, meaning there was a significant positive relationship between leg muscle strength with Kicksing abilities in Pencak Silat sports. This shows that leg muscle strength can determine the level of Kicksing ability in Pencak Silat sports.
c. In the multiple regression analysis of two predictors of data on leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, the regression coefficient b1 = 0.133 was obtained after being tested for significance with the F-test, the observation F value (F0) = 80.330 was obtained which was greater than the table F value = 3.17 insignificant level α0.05, while the regression coefficient b2 = 1.509 after testing significance with the F-test, the observed F value (F0) = 80.330 is greater than the table F value = 3.17 at the significant level α0.05. This proves that there is a significant positive relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports. Thus, leg length and leg muscle strength together can determine the level of Kicksing ability in Pencak Silat sports.

Correlation analysis

The correlation analysis used to test this research hypothesis is product-moment correlation coefficient analysis (r) and multiple correlation coefficient analysis (R) at a significant level of α0.05. Product moment correlation coefficient analysis (r) is used to find out; (1) the relationship between leg length and Kicksing ability in Pencak Silat sports; and (2) the relationship between leg muscle strength and Kicksing ability in Pencak Silat sports. Multiple correlation coefficient (R) analysis was used to determine the relationship between leg length and leg muscle strength together with Kicksing ability in Pencak Silat sports. From the results of the correlation analysis, it can be seen that the r value can determine the relationship between leg length leg muscle strength, and kicking ability in Pencak Silat sports.

Table 4.
Correlation analysis results

Hypothesis	N	r_0	r_t	Information
1. The relationship between leg length and kicking ability in Pencak Silat sports.	60	0,710	0,254	Significance
2. The relationship between leg muscle strength and kicking ability in Pencak Silat sports.	60	0,854	0,254	Significance
3. The relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports.	60	0,859	0,254	Significance

The data in **Table 4** is a summary of the results of product-moment correlation coefficient analysis (r) and multiple correlation coefficient analysis (R) data on leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, described as follows:

a. In the analysis of the product-moment correlation coefficient (r) of leg length data with Kicksing ability in Pencak Silat sports, it turns out that the observed r value (r0) = 0.710 is greater than the table r-value = 0.254 at the significance level α0.05. This shows that H0 which states there is no relationship between leg length and Kicksing ability in Pencak Silat sports is rejected and H1 is accepted, meaning there is a significant relationship. From the correlation coefficient value of 0.710, the coefficient of determination r2 = 0.7102 is obtained = 0.5048, meaning that leg length can make a significant positive contribution of 50.48 percent to Kicksing ability in Pencak Silat sports and the remaining 49.52 percent is determined by other factors.
b. In the analysis of the product-moment correlation coefficient (r) data on leg muscle strength and Kicksing ability in Pencak Silat sports, it turns out that the observed r value (r0) = 0.854 is greater than the table r-value = 0.254 at the significance level α0.05. This shows that H0 which states there is no relationship between leg muscle strength and Kicksing ability in Pencak Silat sports is rejected and H1 is accepted, meaning there is a significant relationship. From the correlation coefficient value of 0.854, the coefficient of determination r2 = 0.8542 is obtained = 0.7291, meaning that leg muscle strength can make a significant positive contribution of 72.91 percent to Kicksing ability in Pencak Silat sports and the remaining 27.09 percent is determined by other factors.
c. In the analysis of the multiple correlation coefficient (R) data on leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, it turns out that the observed R-value (R0) = 0.859 is greater than the table r value = 0.254 at the significance level α0.05. This shows that H0 which states there is no relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports is rejected and H1 is accepted, meaning there is a significant relationship. From the correlation coefficient value of 0.859, the coefficient of determination R2 = 0.8592 is obtained = 0.7382, meaning that leg length and leg muscle strength together can make a significant positive contribution of 73.82 percent to Kicksing ability in Pencak Silat and sports. the remaining 26.18 percent is determined by other factors.

Hypothesis test

There is a significant relationship between leg length and kicking ability in Pencak Silat sports.

Based on the results of regression analysis and product-moment correlation coefficient analysis (r) of leg length data with Kicksing ability in Pencak Silat sports, the regression coefficient b1 = 0.133 was obtained. After testing significance with the F-test, the observation F value (F0) was 80.330, which was greater than the F value = 3.17. table at a significant level of = 0.254 and is reinforced by the correlation coefficient value r0 = 0.710 which is greater than the value = 3.17 of r table = 0.254 at a significant level of α0.05. Thus, H0 is rejected and H1 is accepted, meaning that there is a significant relationship between leg length and Kicksing ability in Pencak Silat sports. The coefficient of determination is 0.5048, meaning that leg length can make a significant positive contribution of 50.48 percent to Kicksing ability in Pencak Silat sports, and the remaining 49.52 percent is determined by other factors.

There is a significant relationship between leg muscle strength and kicking ability in Pencak Silat sports.

Based on the results of regression analysis and product-moment correlation coefficient analysis (r) data on leg muscle strength and kicking ability in Pencak Silat sports, the regression coefficient b2 = 1.509 was obtained. After testing significance with the F-test, the observed F value (F0) was 80.330 which was greater than the value The F table = 3.17 at the significant level is = 0.254 and is reinforced by the correlation coefficient value r0 = 0.854 which is greater than the r table value = 0.254 at the significant level α0.05. Thus, H0 is rejected and H1 is accepted, meaning that there is a significant relationship between leg muscle strength and Kicksing ability in Pencak Silat sports. The coefficient of determination is 0.7291, meaning that leg muscle strength can make a significant positive contribution of 72.91 percent to Kicksing ability in Pencak Silat sports, and the remaining 27.09 percent is determined by other factors.

There is a significant relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports.

Based on the results of multiple regression analysis of two predictors and analysis of the multiple correlation coefficient (R) data on leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, the regression coefficient b1 = 0.133 was obtained. After testing significance with the F-test, the observation F value (F0) was obtained.) of 80.330 is greater than the table F value = 3.17 at the significance level α0.05, and the regression coefficient b2 = 1.509, after testing significance with the F-test, the observed F value (F0) of 80.330 is greater than the value The F table at the significant level is α0.05 = 3.17 and is reinforced by the multiple correlation coefficient value R0 = 0.859 which is greater than the r table value = 0.254 at the significant level α0.05. Thus, H0 is rejected and H1 is accepted, meaning that there is a significant positive relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports. The coefficient of determination is 0.7382, meaning that leg length and leg muscle strength together can make a significant positive contribution of 73.82 percent to Kicksing ability in Pencak Silat sports and the remaining 26.18 percent is determined by other factors.

Discussion

There is a significant relationship between leg length and kicking ability in Pencak Silat sports. The results of the regression analysis and product-moment correlation coefficient (r)

data on leg length and Kicksing ability in Pencak Silat sports, obtained a regression coefficient as a determinant of the linear relationship between leg length and Kicksing ability in Pencak Silat sports and after testing the significance with the F-test, it turned out that the observational F value was obtained greater than the F table value at the significance level α0.05. The observation r value which determines the closeness of the relationship between leg length and Kicksing ability in Pencak Silat sports is greater than the table r value at a significance level of α0.05. This proves that the first hypothesis proposed is accepted at a significant level of α0.05. A prediction that can be made is that the length of a person's legs can determine the level of Kicksing ability in Pencak Silat sports. Leg length can make a positive contribution to Kicksing ability in Pencak Silat sports or the better the condition of a person's leg length, the better the Kicksing ability in Pencak Silat sports. A fighter who has longer legs will have better reach to Kick at the target (opponent) in the sport of Pencak Silat. To be able to reach the target of the Kicks, namely the opponent who is always changing, moving to avoid, and always maintaining distance, a longer reach is needed from the leg when Kicksing in the sport of Pencak Silat. A fighter who has long legs can make it difficult for the opponent to attack, especially if the opponent's legs are shorter. The target in the sport of Pencak Silat is an opponent who always moves to avoid the opponent's position, which is sometimes quite far from our reach to carry out an attack. When your opponent is always avoiding you, you need the ability to maximize the length of your legs to reach your opponent's target. A fighter who has shorter legs certainly has difficulty reaching the target (his opponent) and always keeps his distance when attacking with kicks. Fighters who have longer legs naturally have taller bodies so they tend to have more power to support their Kicksing abilities in the sport of Pencak Silat.

There is a significant relationship between leg muscle strength and kicking ability in Pencak Silat sports. The results of the regression analysis and the product-moment correlation coefficient (r) data on leg muscle strength and Kicksing ability in Pencak Silat sports, the regression coefficient was obtained as a determinant of the linear relationship between leg muscle strength and Kicksing ability in Pencak Silat sports and after testing significance with the F-test, the value was obtained. The F observation is greater than the F table value at the significance level α0.05. The observation r value which determines the closeness of the relationship between leg muscle strength and Kicksing ability in Pencak Silat sports is greater than the table r value at a significance level of α0.05. This proves that the second hypothesis proposed is accepted at a significant level of α0.05. Predictions that can be made are that leg muscle strength can determine the level of Kicksing ability in Pencak Silat sports. Leg muscle strength can make a positive contribution to Kicksing ability in Pencak Silat sports. To achieve the level of Kicksing ability in the sport of Pencak Silat, the fighter is required to be able to exert the strength and speed of the leg muscles with maximum contraction. Leg muscle strength can be used to support the movement of the contracting muscles and joints that work when Kicking in Pencak Silat sports. If the leg muscles are strong enough, they will support the effectiveness of Kicksing movements in Pencak Silat sports. To perform a Kick in the sport of Pencak Silat requires strong movement of the legs or the whole body to help with the agility of the leg movements when executing the Kicks.

There is a significant relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports. The results of the multiple regression analysis of two predictors and the multiple correlation coefficient (R) data on leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, obtained the regression coefficient as a determinant of the linear relationship between leg length and leg muscle strength and Kicksing ability in Pencak Silat sports and after being tested significance with the F-test, it

turns out that the observation F value is greater than the table F value at the significance level α0.05. The observational r value which determines the close relationship between leg length and leg muscle strength and Kicksing ability in Pencak Silat sports is greater than the table R value at a significance level of α0.05. This proves that the third hypothesis proposed is accepted at a significant level of α0.05. Predictions that can be made are that leg length and leg muscle strength can together determine the level of Kicksing ability in Pencak Silat sports. Leg length and leg muscle strength are very important to support Kicksing ability in Pencak Silat sports, namely the ability to utilize longer leg length and stronger leg movement ability to Kick at a target or opponent so that the Kicks can reach the target hard for the opponent to parry or dodge. To be able to reach the target of the Kicks, namely the opponent who is always changing, moving to avoid, and always maintaining distance, a longer reach is needed from the leg when Kicksing in the sport of Pencak Silat. A fighter who has long legs can make it difficult for the opponent to attack, especially if the opponent's legs are shorter. To perform fast and hard Kicks, the fighter is required to exert the strength of the leg muscles with maximum contraction. Leg muscle strength can provide the ability to move the contracting muscles to support Kick's strength in Pencak Silat sports. The leg muscles are strong enough and will support the effectiveness of Kicksing movements in Pencak Silat sports. Leg muscle strength must be combined with whole-body strength and other physical conditions to support the speed and power of kicks in Pencak Silat sports.

CONCLUSION

Based on the results of multiple regression analysis, product-moment correlation coefficient (r), and multiple correlation coefficient analysis (R) at a significant level of α0.05, the results of this research are concluded as follows:

1. There is a significant relationship between leg length and kicking ability in Pencak Silat sports, with a value of r0 = 0.710.
2. There is a significant relationship between leg muscle strength and kicking ability in Pencak Silat sports, with a value of r0 = 0.854.
3. There is a significant relationship between leg length and leg muscle strength with Kicksing ability in Pencak Silat sports, with a value of r0 = 0.859.

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