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THE CONTRIBUTION OF SPEED AND LEG MUSCLE STRENGTH TO PASSING PERFORMANCE IN UNIVERSITY FOOTBALL STUDENTS

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Abstract
Background and Study. Passing is a fundamental skill in football that requires not only technical proficiency but also adequate physical conditioning. This study aimed to examine the contribution of speed and leg muscle strength to passing performance among university students. Methods. A quantitative correlational design with multiple regression analysis was employed in this study. The participants were 100 male students from the Physical Education, Sport, and Recreation program. Data were collected using a 30-m sprint test to measure speed, a standing broad jump test to assess leg muscle strength, and a short passing test to evaluate passing performance. The data were analyzed using correlation and multiple regression techniques. Results. The results showed that speed was significantly correlated with passing performance ($r = 0.62$, $p < 0.05$), as was leg muscle strength ($r = 0.58$, $p < 0.05$). Both variables had significant partial and simultaneous effects on passing performance, accounting for 42% of the total variance. Discussion and Conlusions. These findings indicate that improving speed and leg muscle strength plays an important role in enhancing passing quality and effectiveness; therefore, these components should be prioritized in university football training programs.
Keywords: *Speed; Leg Muscle Strength; Passing Performance; Football; Physical Conditioning*

INTRODUCTION

Soccer is a team sport played by two groups, with each team consisting of eleven players (Rajkumar et al. 2024) (Putra 2022). The main objective in soccer is to score goals in the opponent's goal using the feet as the primary tool (Singh, Singh, and Mola 2025) (Alex et al. 2024). In soccer, physical abilities such as speed, strength, endurance, and coordination are required. This game also requires mastery of basic techniques, tactical intelligence, and good teamwork (Furman 2025) (Atradinal et al. 2023). As a sport that is very popular among various groups of people, soccer plays an important role in the physical, mental, social, and emotional development of players (Sannicandro, Trotta, and D'onofrio 2025) (Saputra et al. 2024). Soccer is often used

as an educational tool in physical education and sports, particularly to improve basic motor skills and build character in students.

Passing in soccer is a basic technique of passing the ball from one player to another on the same team with the aim of maintaining possession, building attacks, and creating scoring opportunities (Perepelytsia, Mulyk, and Perevoznyk 2025) (Xie et al. 2021). Passing is one of the most important basic skills in soccer, as it serves to connect the ball between players (Carlsson, Broman, Isberg, et al. 2025) (Cord et al. 2020). Analysis of research data from various leagues and major tournaments confirms that passing dominates match statistics, both in terms of quantity and its influence on the final result (Anzer and Bauer 2022) (Zeng and Zhang 2022). Passing consists of various types such as short passes, long passes, through balls, and cross passes, depending on the game situation. Effective passing is highly correlated with a team's chances of winning (Tertuliano 2021) (García-aliaga and Refoyo 2023).

For beginner players at the undergraduate level taking soccer courses, passing accuracy is often a major problem observed on the field. Many students are able to pass the ball, but they do not always hit the target, resulting in less effective gameplay during lectures. This phenomenon is influenced by various factors, one of which is the physical condition of the students. In addition, students come from different sports backgrounds.

Discussing physical condition components, speed and leg muscle strength are among the most important physical condition components used in passing (Saputra et al. 2025) (Schache et al. 2014). Speed affects how players move toward their ideal position before passing, while leg muscle strength plays a role in generating sufficient thrust to control the direction and distance of the ball's bounce. When these two components are not optimal, passing accuracy tends to decline, both in fast-paced game situations and structured training.

Speed in the context of soccer is a player's ability to move or run as fast as possible in various game situations (Mc and Alistair, J Dos 2022) (Id et al. 2025). Speed includes sprinting, acceleration, and the ability to maintain high speeds for short

periods of time (Kadhim, Husain, and Hamzah 2024) (Beato 2023). Speed in soccer is not limited to running in a straight line, but also includes the ability to accelerate, decelerate, and change direction effectively according to the demands of the game situation.

Therefore, in this case, the researcher examined how the speed and strength of the leg muscles contribute to passing ability. In this case, the researcher scientifically examined how the muscles work in passing. This will serve as a guideline for researchers and others in scientifically examining passing ability.

METHOD

This study uses a quantitative research design with a correlational approach. This design aims to determine the extent of the contribution of leg speed and strength to soccer passing ability in physical education students who are taking soccer classes. The independent variables in this study are speed (X_1) and leg strength (X_2), while the dependent variable is soccer passing ability (Y). The subjects of this study were 100 students from the Department of Physical Education who were enrolled in soccer classes.

The research instruments used consisted of three types of tests, namely a 50-meter sprint test for speed, a standing broad jump test for leg muscle strength, and a short pass test for passing ability.

Data collection was conducted at the Padang State University soccer field, with the order of implementation being warm-up before the test, speed test, leg muscle strength test, and passing ability test. All tests were conducted on the same day with sufficient rest between tests to avoid excessive fatigue.

The data obtained was analyzed using descriptive statistics to determine the mean, standard deviation, minimum and maximum values. Next, prerequisite tests were conducted, including normality and linearity tests. To test the contribution of independent variables to dependent variables, multiple regression analysis was used, while the contribution of each variable was analyzed using Pearson's correlation. All data analysis was performed using statistical software at a significant level $\alpha = 0,05$.

RESULTS

Descriptive Statistics

Table 1. Description of Strength, Speed, and Passing Ability Data of Sports Education Department Students

Research Variables	N	Mean ± SD	Minimum Value	Maximum Value
Leg Muscle Strength	100	54,94 ± 5,99	40,25	68,10
Speed	100	54,30 ± 5,83	35,9	65,8
Passing	100	131,12 ± 10,10	97	145

Based on the descriptive analysis of 100 participants, the passing ability showed a mean score of 131.12 ± 10.10, with scores ranging from 97 to 145. The speed variable had a mean value of 54.30 ± 5.83, with a minimum score of 35.9 and a maximum of 65.8. Meanwhile, leg muscle strength obtained a mean score of 54.94 ± 5.99, with values ranging from 40.25 to 68.10.

Assumption Testing

Table 2. Data Normality Test

Research Variables	Shapiro-Wilk (Sig.)	Kolmogorov-Smirnov (Sig.)	Conclusion
Passing	0.421	0.200*	Normally Distributed
Speed	0.082	0.154	Normally Distributed
Leg Muscle Strength	0.115	0.200*	Normally Distributed

Based of the table, the results of the normality test showed that all variables were normally distributed ($p > 0.05$). Therefore, parametric statistical analyses were considered appropriate for further analysis.

Correlation between Strength, Speed, and Passing Ability

Table 3. Pearson correlation coefficients between variables

Variables	r	p-value
Strength – Passing ability	0.521	0.05
Speed – Passing ability	0.563	0.05

The correlation analysis revealed a significant positive relationship between leg muscle strength and passing ability ($r = 0.62$, $p < 0.05$). In contrast, sprint speed showed

a significant negative correlation with passing ability ($r = -0.58$, $p < 0.05$), indicating that faster sprint performance was associated with better passing ability.

Contribution of Strength and Speed to Passing Ability

Table 4. Multiple regression analysis of strength and speed on passing ability

Model	R	R Square (R2)	Adjusted R Square
1	0.648	0.420	0.403

The R Square (R2) value of 0.420 indicates that Strength and Speed together contribute 42% to Passing ability. The remaining 58% is influenced by other factors not examined in this model (such as technique, mentality, or concentration).

Table 5. F Test (Simultaneous)

Model	F	Sig.	Conclusion
Regresi	24.981	0.000	Significant

Since the Sig. value (0.000) < 0.05, it can be concluded that, taken together, Strength and Speed have a significant effect on Passing ability.

Contribusi Of Each Variable

Table 6. Regression equation (Uji T)

Variables	Coefficient (B)	Sig.	Description
(Constant)	13.245	0.008	Initial Constant
Speed (X1)	0.452	0.000	Significantly Influential
Leg Muscle Strength (X2)	0.384	0.002	Significantly Influential

Based on the results of data analysis and statistical testing that has been carried out, it can be concluded that there is a significant partial influence between Speed and Passing ability. This is evidenced by a p-value (0.000) < 0.05. The higher the athlete's speed, the more optimal the coordination in passing, and there is also a significant partial influence between strength and passing ability, as evidenced by a p-value (0.002) < 0.05. Muscle strength plays an important role in providing stable power and control when passing. Additionally, simultaneously (together), speed and strength significantly influence passing ability. The combination of these two physical

components contributes 42% to passing success, while the remaining 58% is determined by other variables not studied (such as basic technique, mental calmness, or playing vision).

DISCUSSION

The results of this study indicate that leg muscle speed and strength have a significant effect on soccer players' passing ability, both partially and simultaneously. These findings are in line with theoretical studies that place physical condition as one of the main determinants of technical performance in sports. According to research conducted by Mishchenko et al., 2020, physical components such as speed and strength play an important role in the efficiency of complex game techniques (Farley et al. 2020).

The finding that speed has a significant partial effect on passing ability ($p < 0.05$) reinforces the theory that speed ability is a reflection of the efficiency of neuromuscular coordination in regulating rapid and coordinated body movements when facing challenges in the game. In the context of soccer, where the tempo of the game is fast and responsiveness to game situations is crucial, players with higher speed have the ability to adjust their position and timing of movement more effectively, resulting in passing with a higher level of accuracy (Fabio et al. 2025) (Filipe et al. 2023).

Several previous studies have shown a positive relationship between speed and technical skill quality in various team sports. Players with higher speed scores demonstrate better passing efficiency in competitive games (Id and Muehlbauer 2022) (Miguel et al. 2025). This is consistent with findings that increased speed correlates positively with passing ability.

In addition, leg muscle strength also has a significant effect on passing ability ($p < 0.05$). This is consistent with sports biomechanics literature, which explains that passing requires thrust from the leg muscles as well as postural control to maintain body balance when making contact with the ball (Yılmaz et al. 2024) (Zhang et al. 2025). Strong leg muscles enable players to generate the right amount of thrust while

maintaining body stability, thereby minimizing errors in passing technique execution (França et al. 2024) (Artikov n.d.). Leg muscle strength is positively correlated with kicking and passing skills in youth soccer players, confirming the role of strength as a predictor of technical performance (Duncan et al. 2024) (Teoldo 2014). Planned strength training improves passing accuracy in (small-sided games) (Carlsson, Broman, and Isberg 2025).

Furthermore, the results of simultaneous analysis show that speed and strength together have a significant effect on passing ability, with a contribution of 42%. This finding is consistent with the view that technical performance in soccer is not determined by a single factor, but is the result of the integration of various physical, technical, and cognitive components. This finding also supports the idea that training that focuses on only one physical component will not be sufficient to improve overall technical performance without the integration of speed and strength training simultaneously.

Although speed and strength contribute significantly to passing ability, the results of this study also show that there is still 58% variation in passing ability that cannot be explained by these two variables. This confirms that passing skills are a complex construct that is influenced by many other factors such as basic technique, decision making, mental calmness, and game vision. This aligns with other studies that emphasize that cognitive and tactical factors also play an important role in the technical performance of sports games (Plakias et al. 2024).

Overall, the results of this study confirm that physical components such as speed and leg muscle strength are important aspects in supporting the passing ability of soccer players, but they are not the only determining factors. These findings are in line with theoretical studies and empirical evidence and scientific literature in the field of sports, which consistently show a relationship between physical components, technical skills, and game performance.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that leg muscle speed and strength are physical determinants that significantly influence passing ability in soccer. Partially, both variables were found to contribute significantly to passing quality, and simultaneously, they explained 42% of the variation in passing performance. These findings confirm that passing ability does not only depend on technical mastery, but is also greatly influenced by underlying physical capacity.

However, there is still a 58% variation in passing ability that is influenced by factors outside the scope of this study, such as technical, cognitive, and psychological aspects. This shows that passing performance is a complex and multidimensional skill. Therefore, the development of passing skills in soccer learning and training needs to be done through an integrated approach, combining physical conditioning, technical mastery, and the development of players' tactical and cognitive aspects.

Practically speaking, the results of this study imply that soccer training programs, especially in college settings, should systematically integrate speed and leg muscle strength training as a fundamental part of efforts to improve the quality and effectiveness of passing. For future research, it is recommended that other variables such as biomechanical factors, decision making, and psychological aspects be included in order to gain a more comprehensive understanding of the determinants of passing performance in soccer.

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