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MOTOR ABILITY LEVEL AND ITS RELATIONSHIP WITH FOOTBALL PLAYING SKILLS IN 16-17 YEAR OLDS

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ABSTRACT

Contemporary soccer performance relies heavily on a combination of basic physical abilities and mastery of proper technique. The purpose of this quantitative correlational study was to examine the relationship between motor skills and soccer playing ability and their impact on shooting ability in 40 adolescent athletes aged 16-17 years with N = 40. The descriptive statistics showed that the average motor skill was 150.45, and the average soccer skill was 100.12. The hypothesis was accepted because the correlation test showed a significant positive relationship with the observed r value (r_0) = 0.521 with a probability value of 0.001 smaller than the critical value $\alpha = 0.05$ (sig. 0.001 < 0.05). However, the regression test results showed that motor skills did not significantly influence shooting ability ($p = 0.157$). This study fills the research gap regarding the limitations of general motor skills in predicting complex specific techniques in late adolescence. According to recent research, motor skills only function as a basis for movement at the age of 16-17 years. However, accurate shooting requires functional technical skills and deeper maturity in movement mechanics. The results suggest that to optimize the performance of young athletes towards a professional level, coaches must combine fundamental physical strengthening with specific technical drills.

Keyword: Motor Ability, Football, Youth, Sport Science.

INTRODUCTION

Mastery of soccer skills at the secondary school level should be viewed as the result of complex neuromuscular integration, not just recreation. Students in the sixteen to seventeen age group are in the midst of late adolescence, which is biologically a very important time for developing specific athletic movement patterns (Bergmann et al., 2021). Theoretically, students' motor skills, which include coordination, reactive agility, and dynamic balance, are the basis for applying more complex soccer techniques. Physical fitness and motor skills are essential for the overall health and growth of children and adolescents. A person's level of ability to use various motor skills supported by coordination and control is called motor competence (Bardid et al., 2021). If students do not have sufficient motor skills, they tend to have difficulty performing basic techniques such as passing or dribbling. As a result, they often do not want to participate in physical activities at school (Ermış & Cindemir, 2024).

Motor Ability Level and its Relationship With Football Playing Skills in 16-17 Year Olds
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This study is based on the fact that the evaluation of physical education learning in schools is often subjective and focuses only on game results, without considering the basic motor skills of individuals. This is very important because the age of sixteen to seventeen is a transitional period towards adulthood where students' motor skills will affect their active lifestyle in the future (N. F. Santoso et al., 2023). High school students who do not have the motor skills required for soccer will find it difficult to achieve the competency standards set by the curriculum (Araujo et al., 2020; Hoppe et al., 2020). Identifying these correlations is also important for preventing sports injuries in schools, which often occur because students cannot control their body coordination when performing certain movements (Nikolić & Mraković, 2021).

From a sports psychology perspective in education, the relationship between soccer skills and motor skills also has a significant impact on students' self-efficacy at school. High school students who experience motor coordination problems tend to feel anxious when they have to demonstrate their technical skills in front of their classmates. This anxiety often causes students to abandon physical activity altogether (Trecroci et al., 2021). Therefore, this study not only looks at the physical-technical relationship briefly, but also seeks the important basis that allows students to feel confident and competent in an ever-changing sports learning environment. Students' negative perceptions of sports that carry over into adulthood can occur if this relationship is not found at the age of 16-17 years (Mateusz Wykocki et al., 2023).

The existence of research gaps in the field shows that there are differences between teaching theory and practice. Most research on motor skills and soccer only looks at academy athletes or professional club players (Roca & Ford, 2020). There is little research discussing how this relationship works in public school students from very different backgrounds who have different levels of physical activity and training. In addition, many physical education teachers in the field use technical training methods without conducting preliminary checks on students' motor profiles. Due to the lack of empirical data in secondary schools, this research is highly relevant and important as an effort to improve physical literacy in schools.

In addition, field results show that many high school students experience skill stagnation, even though they have attended soccer classes many times. Previous studies have shown that students' technical failures are often caused by limitations in basic coordination skills that have never been scientifically diagnosed, rather than a lack of tactical understanding (Leyhr et al., 2021). To address this issue, this study examines whether the lack of soccer skills among high school students is caused by low general motor skills or whether there are additional mediating factors, such as a lack of daily physical activity (Royo et al., 2023). During high school, improving physiological motor skills is very important for increasing movement efficiency. In ball games, students with better motor skills have higher energy efficiency, which correlates directly with their endurance on the field. However, periods of rapid growth, also known as growth spurts, in adolescents often interfere with motor coordination and stability (Gonaus et al., 2023). Based on this comprehensive explanation, the research question is: "How does motor ability relate to soccer skills in high school students aged 16-17 years?" The purpose of this study is to analyze in depth the degree of correlation between basic motor components and technical soccer skills in order to formulate recommendations for more inclusive teaching strategies for physical education teachers.

METHOD

This study uses a quantitative descriptive approach with a correlation approach. Based on the correlation coefficient, the purpose of the correlation method is to determine the relationship between variables. In this situation, the focus of the study is how the independent variable of motor skills, which includes agility and speed, is related to the dependent variable of soccer skills, which includes passing, dribbling, and shooting skills. This study was conducted on high school students aged 16-17 years with the criteria of soccer players registered at a soccer school (SSB) in Palu City. The location was chosen deliberately (purposively) because of the adequate field facilities and testing equipment. The research began with administrative

preparations, informing the subjects about the test protocol, and collecting field data, which was conducted in two sessions to prevent the sample from becoming too tired.

This study involved all soccer players aged 16-17 years who were registered at SSB schools in Palu City. Based on the established inclusion criteria, a total or saturation sample was used, resulting in 40 samples. This sample size of forty was considered representative for parametric statistical analysis and met the minimum requirements for normal distribution for multiple correlation testing. The instrument used to measure motor variable ability consisted of two validated standard tests. The agility test used a 4x10 shuttle run with a validity score of 0.998 (Castro-piñero et al., 2023) and a speed test involving a 50-meter sprint with a validity score of 0.904 (Bariya et al., 2019).

The instruments used in soccer consist of three main technical components. Passing skills are measured by a short passing test to a wall target with a validity score of 0.64 (N. Santoso, 2014). Dribbling skills are measured using a slalom dribbling test, which involves passing through cones with the fastest recorded time and a validity score of 0.843 (Aziz & Anam, 2022). In addition, shooting ability is measured through a test of kicking a ball at a goal target that is given a score with a validation value of 0.876 (Efendi & Widodo, 2019). Motor skill tests were conducted prior to data collection. Before the tests began, forty samples had to perform a standard warm-up for fifteen minutes. This was done to reduce the risk of injury and ensure that their muscles were ready to explode. The assessment team, which had been trained in perception to ensure that the data they produced was objective, recorded the results manually.

This study analyzes data using descriptive and inferential statistical analysis. Descriptive analysis displays the minimum, maximum, mean, and standard deviation values (Analysis, 2023). Before beginning hypothesis testing, data prerequisites are tested for normality and linearity using Kolmogorov-Smirnov to ensure that the relationship model between variables is linear (Kuranga, 2016). To determine the partial relationship between each component of motor skills and each soccer skill, Pearson's Moment Product correlation technique was used. Furthermore, a multiple correlation test, also known as multiple correlation, was conducted to determine the extent of the simultaneous contribution of strength, agility, and speed to the total performance of soccer skills.

RESULTS

The data obtained from the research variables, namely motor ability data and soccer playing skills, obtained the following descriptive analysis results:

Statistical Value	N	Average	Max	Min	Sum	Range
Motor ability	40	150,45	186	106	6018	80
Football playing skills	40	100,12	129	71	4005	58

Table 1. Summary of the results of the descriptive analysis of the total data scores of the research variables

The results of the descriptive statistical analysis conducted on forty respondents for the Motor Ability variable showed an average value of 150.45. The highest score (Max) received by respondents for this variable was 186, while the lowest score (Min) was 106, resulting in a score range of 80 and a total accumulated value of 6,018. However, the Football Playing Skills variable had a lower average value of 100.12. The distribution of data for this variable showed a highest score of 129 and a lowest score of 71, indicating a difference or range of scores of 58 points. Overall, all respondents received a score of 4,005 for football playing skills. Comparatively, these data indicate that, compared to respondents' technical skills in playing football, respondents' motor skills showed greater variation and achievement.

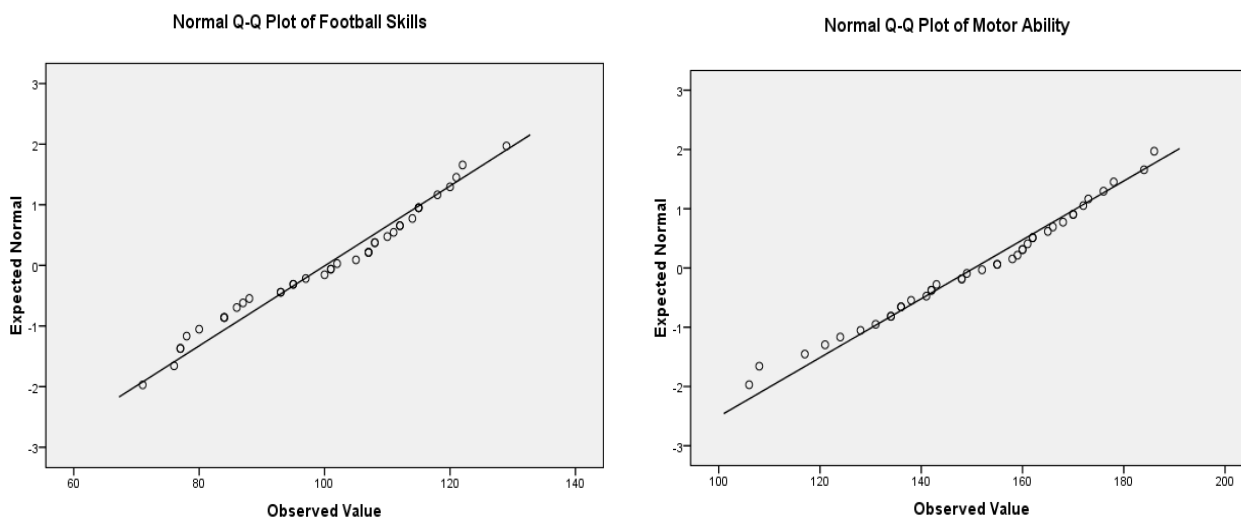
The product moment correlation coefficient (r) was measured at a significance level of $\alpha = 0.05$ through simple linear regression analysis before conducting parametric statistical analysis

to test the validity of the hypothesis. Next, the analysis requirements needed for data analysis of each research variable were tested through data normality testing (Schober et al., 2018).

	Sig	Critical Value	Information
Data motor ability	0,200	0,05	Normal
Football playing skills data	0,117	0,05	Normal

Table 2. Summary of data normality test results.

The statistical test results are presented in the summary table. Since their significance values are greater than the critical value of 0.05, the soccer playing skill variable obtained a significance value (Sig) of 0.117 and the motor skill variable obtained a significance value of 0.200. This indicates that both data groups have a normal distribution. Therefore, your research data is eligible for analysis. The statistical test results in the summary table support the visual findings of normality in the Q-Q Plot.



Picture 1. Q-Q Normality Test Plot of Soccer Skills and Motor Ability Data

The data are distributed according to the assumption of a normal distribution, as demonstrated by the normal Q-Q plots for the motor skills and football skills variables. This can be seen from the scattered data points that consistently follow the diagonal line. Without any significant curvature or deviation, most of the data points appear to adhere to or closely follow a straight line.

Furthermore, one of the analytical requirements for regression analysis and product moment correlation coefficient (r) is the linearity test. The results of the linearity test of motor ability data on soccer playing skills show that the significant linearity value $F = 17.595$ with a significance of $0.003 < 0.05$, meaning that H_0 is rejected and H_1 is accepted, meaning that the linearity of motor ability on soccer playing skills is fulfilled. The following is a table displaying the linearity test of soccer skills with motor ability:

ANOVA Table							
		Sum of Squares	df	Mean Square	F	Sig.	
Football Skill * Motor Ability	Between Groups	(Combined)	7859.875	31	253.544	1.830	.188
		Linearity	2438.059	1	2438.059	17.595	.003
		Deviation from Linearity	5421.816	30	180.727	1.304	.366
	Within Groups		1108.500	8	138.563		
Total			8968.375	39			

Table 3. Summary of linearity test results

The conclusion is that motor skills and soccer skills are positively correlated. Once the assumptions of normality and linearity are met, there is a strong basis for further analysis using parametric statistics, such as the Pearson correlation test or regression analysis. Because this study consists of one independent variable, motor ability, and one dependent variable, linear regression analysis was used to determine the causal relationship between motor ability and soccer skills. Based on the analysis, it can be concluded that motor ability can determine soccer skills.

	N	Konstan	Koef.Reg	Prob.	Critical Value	Information
The relationship between motor ability (X) and soccer playing skills (Y)	40	32,933	0,113	0,157	0,05	H ₁ rejected

Table 4. Summary of linear regression analysis results.

The coefficient table shows a constant value of 32.933 and a regression coefficient of motor ability of 0.113. However, the significance value of the t-test is 0.157, greater than the significance level of 0.05. This indicates that the partial effect of motor ability on shooting ability in this study is not statistically significant, although there is a linear relationship. Analysis of the product moment correlation coefficient (r) at a significance level of $\alpha = 0.05$ is used to test the hypothesis of this study. The purpose of the correlation analysis is to determine the relationship between motor ability and soccer playing skills. The results of the correlation analysis show a large r value that can indicate the closeness of the relationship between motor ability and soccer playing skills.

	N	r ₀	Prob.	Critical Value	Information
The relationship between motor ability and soccer playing skills	40	0,521	0,001	0,05	H ₁ rejected

Table 5. Summary of correlation analysis results

After the assumptions were met, the relationship between variables was tested using the Pearson Product Moment correlation. The correlation coefficient was 0.521, with a significance value (Sig. 2-tailed) of 0.001. With a significance value less than 0.05, it can be concluded that there is a positive and significant relationship between Motor Ability and Soccer Skills at a 99% confidence level. On the other hand, in a simple linear regression test to evaluate the effect of Motor Ability on a specific dependent variable, Shooting, a significance value of 0.157 was found, meaning the p-value is greater than 0.05. This regression result indicates that soccer skills and motor skills are not statistically significant, although there is a strong correlation in general.

DISCUSSION

The results of the study for soccer in 16-17 year olds indicate that motor skills and technical skills are related. The results of a descriptive analysis conducted on forty participants showed that motor skills received an average score of 150.45, while soccer playing skills received an average score of 100.12. Overall, these findings indicate that the study subjects have a fairly good motor foundation. This is crucial for mastering complex basic soccer techniques. Before hypothesis testing, the data met the assumptions of parametric statistics requirements. Motor skills had a significance value of 0.200, and soccer skills had a significance value of 0.117. Furthermore, the linearity test showed a significant linear relationship between the two variables, with a deviation from linearity of 0.366.

Soccer skills rely heavily on good muscle and nerve coordination (Afshar, 2019), with a positive correlation of 0.521 between motor skills and soccer playing ability. To perform rapid movement transitions, such as changing dribbling direction or controlling the ball in unstable positions, players must possess motor skills that include elements of agility and balance (Sariati et al., 2020). This finding is particularly important for the 16-17 year age group as this is the final period of adolescence where biological growth reaches peak maturity (peak motor performance) (Parr et al., 2020). Respondents' motor capacity is very helpful for coaches in providing tactical instructions because the central nervous system is able to handle more complex motor information at this age.

However, the insignificant result regarding the influence of motor skills on shooting ability (Sig. value 0.157) indicates that there are different motor specializations. This is due to the fact that soccer skills are the result of a combination of basic motor skills, but also leg muscle strength, accuracy of foot contact with the ball, and composure of mind (Mujezinovi et al., 2022). Although athletes generally have good motor coordination, their soccer skills depend more on hours of specific drills and proper technique. This is why someone with great agility doesn't necessarily have a killer shot if they haven't trained their core strength and ball contact technique (Rivaldi et al., 2023).

Therefore, this study suggests that at the late adolescent developmental stage, there is a limit to the effectiveness of motor skills to predict certain technical abilities (Humaedi et al., 2023). While motor skills can have a comprehensive impact on every technique, the relationship begins to be selective at the age of 16-17. The results suggest that the training model used to train young athletes in Indonesia must change, shifting from a generalist approach to a more functionally focused approach (Kokstejn et al., 2019). The correlation result of 0.521 shows that the players' ability to control the ball is often caused by their limited motor skills to adapt to dynamic match conditions rather than a lack of tactical understanding.

In conclusion, although motor ability is an important part of the collective skill of playing soccer, it is not the only component that influences certain techniques, such as shooting (Preljević et al., 2020; Rivaldi et al., 2023). Untuk To ensure players have the best movement efficiency, coaches are advised to include motor skill strengthening exercises in every technique training session. However, for the latter part, extensive motor function training is required to develop precise kicking mechanics. Adolescent athletes' more complex performance on the pitch will result from a combination of repetitive technical training and a strong physical foundation (Lee & Joo, 2020; Mema & Lleshi, 2023).

CONCLUSION

This study revealed a positive correlation between motor skills and soccer playing ability in adolescent athletes aged 16-17 years, with a correlation coefficient of 0.521. The results confirmed that basic motor skills such as agility, coordination, and balance are most important when players learn to play soccer better collectively. With an average motor skill score of 150.45, respondents indicated that they were physically ready to perform technical tasks on the field.

However, the regression significance value of 0.157 ($P > 0.05$) indicated that motor skills did not have a significant partial effect on shooting ability. This is a new finding in this study, indicating that in the late stages of adolescence (ages 16-17 years), certain technical skills such as shooting accuracy no longer depend on general motor skills, but are more dominated by technical specialization, functional movement mechanics, and hours of specific training.

Coaches should continue to integrate motor skills as primary reinforcement, but they should begin developing specific training curricula for specialized techniques such as archery. To ensure that sixteen- to seventeen-year-old athletes' motor potential is maximized into tangible technical performance in competitions, their training must shift from a generalist approach to a functional-specific approach.

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