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# The Influence of Cooperation and Skills on Extracurricular Volleyball Performance at High School

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**ABSTRACT**

Optimal performance in school sports relies on individual capabilities and team dynamics, yet the empirical balance between technical skills and teamwork remains unclear. This study examines the independent and simultaneous effects of volleyball technical skills and teamwork on extracurricular performance at High School 2 Maros. Using a quantitative approach with an explanatory and correlational design, this study applied total sampling to all program members (N = 30). Data gathered via Likert-scale questionnaires, observations, and documentation were analyzed using descriptive statistics, assumption tests, Spearman correlation, and multiple linear regressions in SPSS. The results indicate that technical skills (X1) have a positive and significant effect on performance (Y), with a regression coefficient of 0.873 ($t = 3.554$; $p = 0.001 < 0.05$) and a moderate correlation ($r = 0.462$). Conversely, teamwork (X2) shows a positive but non-significant independent effect (coefficient = 0.153; $p = 0.578 > 0.05$; $r = 0.191$). However, simultaneously, both variables exert a significant joint effect on performance ($F = 6.942$; $p = 0.004 < 0.05$). This study contributes to sports pedagogy by demonstrating that extracurricular volleyball success is predominantly driven by individual technical skill mastery. It provides actionable insights for coaches to prioritize rigorous technical training while maintaining teamwork as a complementary predictive factor to optimize student athletic outcomes.



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## 1. INTRODUCTION

Physical education and health (Penjasorkes) in schools plays a crucial role in developing a healthy, disciplined, and character-driven young generation (Aksir et al., 2024; Hasmyati et al., 2024). Through structured physical activity, students are not only trained to achieve optimal physical fitness but also internalize fundamental social values such as hard work, responsibility, and sportsmanship (Jadwiszczak et al., 2025). Among the various sports developed, volleyball is one of the most popular extracurricular programs due to its complex movements and dynamic gameplay (Akhir et al., 2025; Usman et al., 2026). This sport not only demands high motor coordination but also

serves as an effective medium for fostering discipline and adaptability within a group (Azizin et al., 2024).

Theoretically, peak performance in volleyball is determined by two main pillars: mastery of individual technical skills and quality teamwork. A solid mastery of basic techniques such as serving, passing, spiking, blocking, and setting is an absolute foundation for every athlete to contribute tactically on the field (Hasmuddin et al., 2026; Hudain et al., 2026). However, volleyball is a collective sport, where team success is not solely the sum of individual abilities, but rather the result of synergy, interpersonal communication, and trust between players (Cevahircioğlu et al., 2022; Lualhati, 2025). However, empirical evidence at High School 2 Maros shows fluctuating performance variations between teams, indicating a gap between individual technical mastery and the implementation of teamwork on the field.

Several previous studies have consistently emphasized that a balance between technical aspects and socio-psychological dimensions is key to team success in extracurricular sports (Heredia-León et al., 2023; Lualhati, 2025; Zarazaga-Peláez et al., 2024). Although extensive literature on the performance of professional athletes has been published, studies specifically examining the interaction between teamwork and technical skills at the extracurricular level in high school remain very limited. Most previous research tends to examine these two variables separately or place them within the context of professional clubs, leaving a gap in understanding the dynamics of high-performance sports at the formal school level (D'Isanto et al., 2022; Precillas, 2025).

The uniqueness of this study lies in its simultaneous analytical approach and the specification of an unexplored sociogeographic context, particularly within the sports development ecosystem in Maros Regency. Unlike conventional research, this study goes beyond mapping individual linear influences but instead explores how a limited sample size (a micropopulation of $\leq 30$ respondents) at the school level can produce a valid performance prediction model when technical and social variables are integrated. Furthermore, this study offers originality in identifying the dominant influence weight between pure motor skills and group psychological dynamics in late adolescence, an aspect often overlooked in standard extracurricular training curriculum design.

Through comprehensive empirical testing, the results of this study are expected to provide a strong scientific foundation for physical education teachers and sports coaches. The resulting data will serve not only as an evaluative report but also as a basis for designing integrative training intervention strategies. Tactical recommendations, such as the implementation of small-sided games or role rotation, can be precisely implemented to bridge the gap between technical and social aspects (González-Espinosa et al., 2021; Mancha-Triguero et al., 2021). Thus, the coaching process is no longer partial or based solely on intuition but rather driven by an evidence-based approach.

Specifically, this study aims to examine and analyze the independent and simultaneous effects of volleyball technical skills and teamwork on extracurricular performance at High School 2 Maros. Beyond practical contributions to partner schools, this research is expected to make significant theoretical contributions to the development of sports pedagogy and the management of early childhood athlete

development in Indonesia. The results of this study are projected to become a cutting-edge scientific reference for academics and sports practitioners to optimize students' non-academic potential, strengthen group solidarity, and produce young talents who are ready to compete in various comparative competitions at the regional and national levels.

## 2. METHOD

This study used a quantitative approach with an explanatory and correlational design, aiming to examine the causal relationship between volleyball technical skills ($X_1$) and teamwork ($X_2$) as independent variables and volleyball extracurricular performance (Y) as the dependent variable. The study was conducted at High School 2 Maros for three months, employing a quantitative explanatory design and a correlational approach.

The study population was all active volleyball extracurricular members in the even semester of the 2025/2026 academic year, using a total sampling technique to obtain 30 respondents. Data were collected through a Likert-scale questionnaire, structured observation, and documentation, with primary data sources from respondents and secondary data from supporting documents such as match statistics and training programs.

The operational definitions of the variables include: (1) volleyball technical skills ($X_1$), namely the ability to perform technical movements as measured by indicators of basic technique mastery, accuracy, and movement efficiency (Schmidt & Lee, 2020); (2) teamwork ($X_2$), namely the ability to interact and coordinate within a team as measured by indicators of communication, coordination, trust, and team cohesion; and (3) extracurricular performance (Y), namely the quality of student performance as measured by playing effectiveness, ability to maintain formation, performance under pressure, and integration of individual skills.

The research procedure was carried out in four stages: preparation (instrument development and validity-reliability testing), data collection (questionnaires, observation, documentation), data analysis, and reporting. Data analysis using SPSS version 22 through validity tests (r count > r table 0.374) and reliability (Cronbach's Alpha > 0.60), assumption tests (normality and linearity), and inferential analysis including Spearman correlation, simple linear regression for partial tests, and multiple linear regression with t-test and F-test at a significance level of 5%. Qualitative data from observations were analyzed using thematic analysis and triangulation to increase the validity of the findings.

## 3. RESULTS AND DISCUSSION

### Results

### Volleyball Playing Technical Skills on the Extracurricular Performance

#### *Validity Test*

In this study, the calculated r value was obtained at 0.374 with the degrees of freedom (Df) calculated using the formula n − 2, namely 30 − 2 = 28, so that Df = 28. The

calculated r value of 0.374 was then compared with the table r value at Df 28 to determine whether the relationship or correlation tested in the study was significant or not.

In the instrument validity test for the Engineering Skills variable, the testing criteria stipulate that an instrument item is valid if the calculated r value is greater than the table r (0.374). The data in Table 5 shows that the majority of statement items, starting from X1.1 (0.477), X1.3 (0.584), X1.4 (0.690), and up to X1.12 (0.775), have calculated r values that exceed this standard threshold and are therefore declared valid. Conversely, item X1.2 has a calculated r value of 0.232, which is less than the table r value, so it is declared statistically invalid.

Meanwhile, the test results for the extracurricular performance variable indicate excellent fulfillment of validity criteria. Using the same benchmark, namely that the calculated r value must be greater than the table r value (0.374), all instrument items in this variable are declared valid. The calculated r value obtained moved in the range of 0.665 to 0.928, where item Y.4 recorded the highest value of 0.928 and item Y.6 recorded the lowest value of 0.665.

***Reliability Test***

The reliability of the instrument was tested using the Cronbach's Alpha method with the help of SPSS version 22. A variable is declared reliable if the Cronbach's Alpha value is > 0.60.

**Table 1.** Reliability Test

| Variabel | Cronbachs Alpha | N of Items | Reliabilitas |
|---|---|---|---|
| Volleyball Technical Skills (X1) | .810 | 12 | Reliable |
| Extracurricular Appearance (Y) | .942 | 12 | Reliable |

Table 1, all research instruments are declared reliable because they have a Cronbach's Alpha value > 0.60. The Volleyball Technical Skills variable (X1) obtained a value of 0.810 (12 items), while the Extracurricular Performance variable (Y) obtained a value of 0.942 (12 items), indicating a very high level of consistency.

**Analysis Assumption Test**

***Normality Test***

The normality test in this study was conducted using the One-Sample Kolmogorov-Smirnov Test on the Unstandardized Residual value to determine whether the data was normally distributed. Based on data analysis with a sample of 30 respondents, the results of the normality test show an Asymp. Sig. (2-tailed) of 0.004 (<0.05) and an Exact Sig. (2-tailed) of 0.166 (>0.05). Because this study used a small sample (N <50), the Exact Sig. value is more recommended as a reference, so that the data is declared normally distributed and meets the assumptions of the regression/correlation analysis.

***Linearity Test***

The linearity test aims to determine whether there is a linear relationship between the Volleyball Technical Skills variable (X1) and Extracurricular Performance (Y). This test was conducted using ANOVA analysis using the SPSS version 22 program.

**Table 2.** Linearity Test

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|---|
| Extracurricular Appearance (Y) * Volleyball Technical Skills (X1) | Between Groups | (Combined) | 1970.611 | 11 | 179.146 | 1.696 | .154 |
| | | Linearity | 1284.891 | 1 | 1284.891 | 12.165 | .003 |
| | | Deviation from Linearity | 685.720 | 10 | 68.572 | .649 | .755 |
| | Within Groups | | 1901.256 | 18 | 105.625 | | |
| | Total | | 3871.867 | 29 | | | |

Table 2, the significance value for Linearity is 0.003 (<0.05), indicating a linear relationship between the variables Volleyball Technical Skills (X1) and Extracurricular Performance (Y). Furthermore, the significance value for Deviation from Linearity is 0.755 (>0.05), indicating no deviation from linearity. Thus, it can be concluded that the relationship between Volleyball Technical Skills (X1) and Extracurricular Performance (Y) is linear, thus fulfilling one of the assumptions in the regression analysis and allowing for the hypothesis testing stage. Additionally, the linearity test shows a significance value of 0.003 (<0.05), indicating a linear relationship between Volleyball Technical Skills (X1) and Extracurricular Performance (Y). The Deviation from Linearity value of 0.755 (>0.05) also indicates no deviation from linearity. Thus, the linearity assumption is met, allowing the regression analysis to proceed to the hypothesis testing stage.

**Simple Inferential Analysis**

***Correlation Analysis***

The correlation analysis in this study used the Spearman's rho method to determine the level of relationship between Volleyball Technical Skills (X1) and Extracurricular Performance (Y), because the data was analyzed based on ranking or did not meet parametric assumptions.

**Table 3.** Correlation Analysis

| | | | Volleyball Technical Skills (X1) | Extracurricular Performance (Y) |
|---|---|---|---|---|
| Spearman's rho | Volleyball Technical Skills (X1) | Correlation Coefficient | 1.000 | .462* |
| | | Sig. (2-tailed) | | .010 |
| | | N | 30 | 30 |
| | Extracurricular Appearance (Y) | Correlation Coefficient | .462* | 1.000 |
| | | Sig. (2-tailed) | .010 | |
| | | N | 30 | 30 |

Table 3, the Spearman's rho correlation coefficient value of 0.462 with a significance of 0.010 (<0.05) indicates a significant relationship between Volleyball Technical Skills (X1) and Extracurricular Performance (Y). This positive correlation value in the sufficient/moderate category indicates that the higher a student's volleyball technical skills, the better their extracurricular performance.

***Simple Linear Regression Analysis***

**Table 4.** Simple Linear Regression Analysis

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 2.529 | 8.113 | | .312 | .758 |
| | Volleyball Technical Skills (X1) | .894 | .240 | .576 | 3.729 | .001 |

Table 4, the simple linear regression equation obtained is Y = 2.529 + 0.894X, where the constant 2.529 means without technical skills (X = 0), extracurricular performance is worth 2.529, and the regression coefficient 0.894 indicates that every increase of one unit of technical skills will increase performance by 0.894 units. The t-test results show a calculated t value = 3.729 with a significance of 0.001 (<0.05), so it is concluded that volleyball technical skills have a positive and significant effect on extracurricular performance.

**Skills and Cooperation Simultaneously on the Extracurricular Performance of Volleyball Sports**

***Analysis Assumption Test***

The normality test was conducted using the One-Sample Kolmogorov-Smirnov method on the Unstandardized Residual value with SPSS 22 to determine the normal distribution of the research data. Based on data analysis with a sample of 30 respondents (N=30), the Exact Sig. (2-tailed) value was obtained at 0.212 in the normality test. Since the Exact Sig. value is > 0.05, the data is declared normally distributed. Thus, the assumption of normality in the regression analysis has been met.

***Linearity Test***

**Table 5.** Linearity Test

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|---|
| Extracurricular Appearance (Y) * Volleyball | Between Groups | (Combined) | 1970.611 | 11 | 179.146 | 1.696 | .154 |
| | | Linearity | 1284.891 | 1 | 1284.891 | 12.165 | .003 |
| | | Deviation from Linearity | 685.720 | 10 | 68.572 | .649 | .755 |

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|---|
| Technical Skills (X1) | Within Groups | | 1901.256 | 18 | 105.625 | | |
| | Total | | 3871.867 | 29 | | | |
| Extracurricular Appearance (Y) * Teamwork (X2) | Between Groups | (Combined) | 1556.450 | 15 | 103.763 | .627 | .810 |
| | | Linearity | 118.967 | 1 | 118.967 | .719 | .411 |
| | | Deviation from Linearity | 1437.483 | 14 | 102.677 | .621 | .808 |
| | Within Groups | | 2315.417 | 14 | 165.387 | | |
| | Total | | 3871.867 | 29 | | | |

The results of the linearity test show that the relationship between Volleyball Technical Skills (X1) and Extracurricular Performance (Y) is linear and significant, with a Linearity value of 0.003 (<0.05) and Deviation from Linearity of 0.755 (>0.05). On the other hand, the relationship between Teamwork (X2) and Extracurricular Performance (Y) does not show significant linearity, with a Linearity value of 0.411 (>0.05) and Deviation from Linearity of 0.808 (>0.05).

**Multiple Inferential Analysis**

***Correlation Analysis***

Correlation analysis was conducted to determine the relationship between the variables of Volleyball Technical Skills (X1) and Teamwork (X2) on Extracurricular Performance (Y). The test used the Spearman's rho method with a sample size (N) of 30 respondents.

**Table 6.** Correlation Analysis

| | | | Extracurricular Appearance (Y) | Volleyball Technical Skills (X1) | Teamwork (X2) |
|---|---|---|---|---|---|
| Spearman's rho | Extracurricular Appearance (Y) | Correlation Coefficient | 1.000 | .462* | .191 |
| | | Sig. (2-tailed) | | .010 | .312 |
| | | N | 30 | 30 | 30 |
| | Volleyball Technical Skills (X1) | Correlation Coefficient | .462* | 1.000 | -.046 |
| | | Sig. (2-tailed) | .010 | | .811 |
| | | N | 30 | 30 | 30 |
| | Teamwork (X2) | Correlation Coefficient | .191 | -.046 | 1.000 |
| | | Sig. (2-tailed) | .312 | .811 | |
| | | N | 30 | 30 | 30 |

Table 6, the results of the correlation analysis show: (1) Volleyball Technical Skills (X1) are significantly related to Extracurricular Performance (Y) (r = 0.462; p = 0.010)

with a moderate and positive relationship strength; (2) Teamwork (X2) is not significantly related to Y (r = 0.191; p = 0.312) with a very weak relationship; (3) There is no significant relationship between X1 and X2 (r = -0.046; p = 0.811) with a very weak and negative relationship.

***Multiple Regression Analysis***

**Table 7.** Multiple Regression Analysis

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -2.665 | 12.352 | | -.216 | .831 |
| | Volleyball Technical Skills (X1) | .873 | .246 | .562 | 3.554 | .001 |
| | Teamwork (X2) | .153 | .272 | .089 | .563 | .578 |

Table 7, the multiple regression equation obtained is Y = –2.665 + 0.873X1 + 0.153X2. The regression coefficient of X1 of 0.873 (Sig. = 0.001 < 0.05) indicates that volleyball technical skills have a positive and significant effect on extracurricular performance, where each increase of one unit of X1 increases Y by 0.873 units. Meanwhile, the regression coefficient of X2 of 0.153 (Sig. = 0.578 > 0.05) indicates that teamwork has a positive but insignificant effect on extracurricular performance. Thus, the increase in extracurricular performance is more influenced by volleyball technical skills than teamwork.

***Simultaneous Test***

**Table 8.** Simultaneous Test

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1314.901 | 2 | 657.450 | 6.942 | .004[b] |
| | Residual | 2556.966 | 27 | 94.702 | | |
| | Total | 3871.867 | 29 | | | |

Table 8, the simultaneous test (F) shows a calculated F value of 6.942 with a significance of 0.004 (<0.05). This means that Volleyball Technical Skills (X1) and Teamwork (X2) together (simultaneously) have a significant effect on Extracurricular Performance (Y).

## Discussion

This study aims to determine the contribution of volleyball technical skills (X1) and teamwork (X2), both partially and simultaneously, to the extracurricular performance (Y) of students at High School 2 Maros. Based on the data analysis, several essential

findings were identified that illustrate how individual technical factors and social group factors interact to determine volleyball performance in the school environment.

**The Influence of Volleyball Technical Skills on Extracurricular Performance**

The results of simple and partial linear regression analyses indicate that volleyball technical skills (X1) have a positive and significant influence on extracurricular performance (Y). This is evidenced by a regression coefficient of 0.873 with a significance level of 0.001 (<0.05) and a calculated t-value of 3.554. A Spearman's rho correlation of 0.462 also confirms that the relationship between the two variables is moderate/sufficient and unidirectional. This means that the higher a student's mastery of basic volleyball techniques (such as passing, serving, smashing, and blocking), the more optimal their performance will be during competitions or extracurricular activities.

Theoretically, performance in complex structured sports like volleyball relies heavily on motor efficiency and the automation of basic techniques. Mature technical skills provide players with the confidence to make appropriate tactical decisions on the field. This finding aligns with research by Challoumas et al. (2017), which states that biomechanical mastery of basic techniques is the primary foundation for determining an athlete's effectiveness in actual match situations. Furthermore, Bisagno et al. (2019) emphasized that in the adolescent or school age group, on-field performance is predominantly influenced by individual technical skills (such as passing accuracy and attack success) rather than complex strategic maturity. Therefore, the efficiency of basic technique execution is a strong predictor of a student athlete's overall performance.

**The Effect of Teamwork on Extracurricular Performance**

An interesting finding in this study is that the teamwork variable (X2) did not have a significant effect on extracurricular performance (Y) partially. A regression test yielded a regression coefficient of 0.153, with a significant significance value of 0.578 (>0.05) and a very weak correlation ($r = 0.191$; $p = 0.312$). These results indicate that an increase or decrease in teamwork scores does not significantly impact students' extracurricular performance on the field.

From a sports psychology and group sociometric perspective, this phenomenon may be due to several factors during adolescence. At the school extracurricular level, students often focus on individual performance or play egocentrism, where they tend to prioritize their personal abilities. Durdubas and Koruc (2023) explain that at the beginner or adolescent level, collective tactical coordination (teamwork) cannot be effective if individual technical skills have not reached minimum standards. In other words, even if students have social cohesion or a strong desire to work together, this cooperation will not result in good match performance if unforced errors (unforced errors) due to failure of basic techniques (such as incorrect passing or failed service) still occur frequently. Research from Ramos et al. (2020) also supports this by stating that tactical interactions between new players will contribute positively to team performance if each individual's basic motor skills have reached the associative or automatic phase.

**The Simultaneous Influence of Technical Skills and Teamwork**

Although teamwork was not partially significant, the results of the simultaneous test (F-test) revealed a different perspective. Together, volleyball technical skills (X1) and teamwork (X2) significantly influenced extracurricular performance (Y). This is indicated by the calculated F-value of 6.942 with a significance level of 0.004 (<0.05).

These results confirm the essential nature of volleyball as a team sport. While technical skills are the primary driving force behind individual performance, their existence cannot be completely separated from the aspect of teamwork in macro-competitive situations. Each player's mastery of basic techniques acts as the "initial capital," while teamwork serves as the "binding vessel" that unites these individual skills into a solid team performance (Wicaksono et al., 2022). Farley et al. (2020), in their study of youth volleyball performance, emphasized that the integration of physical-technical skill quality and interpersonal group dynamics (team cohesion) is a duality that determines achievement. When individual technical ability is harmoniously combined with positional awareness and communication on the pitch (Tafuri et al., 2024), the team's tactical efficiency increases exponentially, ultimately minimizing errors and optimizing overall playing performance.

**Practical Implications and Recommendations**

The results of this study provide practical implications for physical education teachers and volleyball extracurricular coaches at High School 2 Maros. Given the dominant and significant contribution of technical skills, the training portion of the extracurricular program should be more focused on consistently strengthening, refining, and automating basic techniques (skill drills). However, coaches should not neglect the teamwork aspect; this aspect should be gradually integrated through a games-centered approach (or Small-Sided Games). This approach is considered effective for honing technical skills while building tactical communication among students in situations that mimic real matches, allowing both components to develop in balance to improve their playing performance.

## 4. CONCLUSION

This study concluded that volleyball technical skills (X1) partially had a positive and significant influence on the extracurricular performance (Y) of students at SMA Negeri 2 Maros ($t = 3.554$; $p = 0.001$), which indicates that the more mature the individual's mastery of basic techniques, the more optimal the performance displayed on the field. On the other hand, the teamwork variable (X2) partially did not show a significant influence on extracurricular performance ($p = 0.578$), indicating that strengthening the teamwork aspect independently has not been able to provide a real impact for beginner level students if it is not balanced by adequate individual technical capacity. However, when tested simultaneously through the F test, both variables (X1 and X2) together were proven to have a significant influence on students' extracurricular performance ($F = 6.942$; $p = 0.004$). Thus, it can be concluded that although technical skills are the most dominant determinant, the harmonious interaction between individual technical

readiness and teamwork remains a coherent whole that is necessary for optimal collective volleyball performance.

As a recommendation, physical education teachers and extracurricular coaches at SMA Negeri 2 Maros are advised to develop a more structured training program with intensive reinforcement of basic technical skills (drill skills) in the initial phase, then gradually integrate them into a tactical-based playing approach such as Small-Sided Games to foster communication and teamwork in real-life match situations. Furthermore, future researchers are expected to expand the scope of their research by including other moderating or mediating variables relevant to student athletes, such as physical fitness level, achievement motivation, or duration of training experience, and to use a broader sample size to generalize the research results related to volleyball performance more comprehensively.

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