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Physical Activity, Sleep Quality, and Motor Ability Among Tenth-Grade Vocational High School Students

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Abstract

Objectives: This study aimed to examine the relationship between physical activity, sleep quality, and motor ability among tenth-grade students at SMK Negeri 1 Sikur in 2025.
Materials and Methods: This study used a quantitative correlational design. The population consisted of 502 tenth-grade students, with 83 students selected using proportionate stratified random sampling. Motor ability was measured using the Barrow Motor Ability Test, physical activity was assessed using the Physical Activity Questionnaire for Adolescents, and sleep quality was measured using the Pittsburgh Sleep Quality Index. Data were analyzed using descriptive statistics, normality tests, linearity tests, multicollinearity tests, partial correlation, and multiple correlation analysis with IBM SPSS version 25.
Results: Most students were classified as physically inactive (81%) and had poor sleep quality (70%). Motor ability was mostly in the moderate and low categories. Partial correlation analysis showed a significant positive relationship between physical activity and motor ability ($r = 0.372$; $p < 0.001$), and between sleep quality score and motor ability ($r = 0.444$; $p < 0.001$). Simultaneous analysis showed that physical activity and sleep quality significantly explained motor ability, $F(2,80) = 9.819$; $p = 0.001$, with $R^2 = 0.197$.
Conclusions: Physical activity and sleep quality were significantly related to students' motor ability. However, in the simultaneous model, sleep quality was the stronger predictor. These findings highlight the importance of promoting active lifestyles and healthy sleep habits among vocational high school students.

Keywords: physical activity; sleep quality; motor ability; vocational students; physical education

Introduction

Physical education is an integral part of the educational process because it supports students' physical, mental, emotional, and social development through selected movement activities(Kuswoyo, 2017; Renshaw et al., 2010; Renshaw & Chow, 2019). One important aspect of physical education is the development of motor ability. Motor ability does not only support students' performance in physical activities but is also related to cognitive, social, and emotional development (David J. Smith, 2003; Stamatelopoulou et al., 2018; Wang et al., 2022). Gallahue and Ozmun (2012) (Akbari & Sahibzada, 2020; Kuswoyo et al., 2017; Saban & Saban, 2022)explained that optimal motor development helps students improve learning readiness, self-confidence, and long-term health.

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Motor ability refers to an individual's capacity to control and coordinate body movements effectively(Apriyani et al., 2018; Luo et al., 2022; Roth et al., 2021). It involves the coordination of large muscle groups, including the hands, feet, and whole-body movements (Laby et al., 2018; Rahman et al., 2021)(Iswahyudi & Fajar, 2019). In adolescents, motor ability plays an important role in learning performance, participation in physical activity, and readiness to face daily physical demands. Students who are physically active tend to have better coordination, stronger muscles, better balance, and faster motor responses.

Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure (World Health Organization, 2020). It includes sports, games, walking, cycling, and other daily activities. The World Health Organization recommends that adolescents aged 15–17 years engage in at least 60 minutes of moderate-to-vigorous physical activity per day. However, Riskesdas data reported that many Indonesian adolescents remain physically inactive. Previous research also found that students with low physical activity tend to have poorer balance and motor coordination than students who regularly participate in physical exercise

In addition to physical activity, sleep quality is another factor that may influence motor ability. Sleep is a basic physiological need that supports body recovery, memory consolidation, emotional regulation, and neuromuscular function Poor sleep quality, such as short sleep duration, frequent awakenings, and irregular sleep patterns, may cause fatigue, reduced concentration, slower reaction time, and impaired motor coordination(Purnomo & Yendrizal, 2020; Young, 2006).

SMK Negeri 1 Sikur is a vocational high school with students from diverse social, physical, and daily activity backgrounds. Based on preliminary observations and informal interviews with physical education teachers, many tenth-grade students showed suboptimal motor ability, such as weak coordination, low agility, and slow reaction speed. This condition is important because vocational students have fewer opportunities for structured physical education in higher grades due to industrial practice and curriculum demands.

Therefore, tenth grade is a crucial period for developing active lifestyle habits and improving students' sleep behavior. However, scientific evidence regarding the relationship between physical activity, sleep quality, and motor ability among vocational high school students remains limited. Based on this background, this study aimed to examine the relationship between physical activity, sleep quality, and motor ability among tenth-grade students at SMK Negeri 1 Sikur.

Materials and Methods

Study Design

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(Sugiyono, 2012)This study used a quantitative correlational design. The design was selected because the study aimed to examine the relationship between two independent variables, namely physical activity and sleep quality, and one dependent variable, namely motor ability, without providing any intervention or treatment.

Study Participants

The population consisted of all tenth-grade students at SMK Negeri 1 Sikur in 2025, totaling 502 students. A total of 83 students were selected as the research sample using proportionate stratified random sampling. This sampling technique was used to ensure that students from different class groups were proportionally represented.

Study Organization

Motor ability was measured using the Barrow Motor Ability Test, which consisted of six test items: standing broad jump, softball throw, wall pass, medicine ball put, zig-zag run, and 60-yard dash. Physical activity was assessed using the Physical Activity Questionnaire for Adolescents. Sleep quality was measured using the Pittsburgh Sleep Quality Index.

Statistical Analysis

Data were analyzed using IBM SPSS version 25. Descriptive statistics were used to describe the minimum score, maximum score, mean, standard deviation, frequency, and percentage. Before hypothesis testing, normality, linearity, and multicollinearity tests were conducted. The relationships between variables were analyzed using partial correlation and multiple correlation/regression analysis. The significance level was set at $p < 0.05$.

Results

Descriptive Statistics

Table 1. Descriptive Statistics of Research Variables

Variable		Minimum	Maximum	Mean	SD
Physical Activity	83	1.44	3.56	2.41	0.54
Sleep Quality	83	8.00	19.00	13.78	2.78
Motor Ability	83	35.49	68.39	50.71	9.95

The descriptive analysis showed that the mean physical activity score was 2.41, indicating that students generally had a low level of physical activity. The mean sleep quality score was 13.78, indicating poor sleep quality based on the PSQI scoring system. The mean motor ability score was 50.71, suggesting

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that students' motor ability was generally in the moderate range.

Distribution of Physical Activity

Table 2. Distribution of Physical Activity Levels

Interval	Category	Frequency	Percentage
1.00–2.99	Inactive	67	81%
3.00–5.00	Active	16	19%

Most students were categorized as physically inactive, with 67 students or 81% falling into this category.

Distribution of Sleep Quality

Table 3. Distribution of Sleep Quality

Interval	Category	Frequency	Percentage
≤ 5	Good	25	30%
> 5	Poor	58	70%

Most students had poor sleep quality. A total of 58 students or 70% were classified as having poor sleep quality.

Distribution of Motor Ability

Table 4. Distribution of Motor Ability

Category	Frequency	Percentage
Very High	7	8%
High	20	24%
Moderate	27	33%
Low	28	34%
Very Low	1	1%

The largest proportion of students was in the low category, followed by the moderate category. This finding indicates that students' motor ability was not yet optimal.

Assumption Testing

The Kolmogorov-Smirnov normality test showed that physical activity ($p = 0.165$), sleep quality ($p = 0.159$), and motor ability ($p = 0.165$) were normally distributed. The linearity test showed a significant linear relationship between physical activity and motor ability ($p < 0.001$; deviation from

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linearity = 0.650), and between sleep quality and motor ability ($p < 0.001$; deviation from linearity = 0.100). The multicollinearity test showed that both independent variables had tolerance values of 0.295 and VIF values of 3.388, indicating no multicollinearity problem.

Correlation Analysis

Table 5. Partial Correlation Results

Relationship			p-value
Physical Activity and Motor Ability	83	0.372	< 0.001
Sleep Quality and Motor Ability	83	0.444	< 0.001

The partial correlation test showed a significant positive relationship between physical activity and motor ability. The correlation coefficient was 0.372, indicating a weak relationship. Sleep quality also showed a significant positive relationship with motor ability, with a correlation coefficient of 0.444, indicating a moderate relationship.

Multiple Correlation Analysis

Table 6. Simultaneous Relationship Between Physical Activity, Sleep Quality, and Motor Ability

Predictor		Standard Error	p-value
Physical Activity	-0.053	3.425	0.988
Sleep Quality	1.597	0.660	0.018

The simultaneous test showed that physical activity and sleep quality were significantly related to motor ability, $F(2,80) = 9.819$; $p = 0.001$. The coefficient of determination was $R^2 = 0.197$, meaning that 19.7% of the variance in motor ability could be explained by physical activity and sleep quality. In the regression model, sleep quality was the only significant predictor of motor ability

Discussion

The findings showed that most tenth-grade students at SMK Negeri 1 Sikur had low physical activity, poor sleep quality, and motor ability that was generally in the moderate-to-low category. This condition indicates that students' lifestyle patterns may not yet fully support optimal motor development. Low physical activity may reduce opportunities for students to train coordination, agility, balance, strength, and reaction speed through repeated movement experiences.

The significant relationship between physical activity and motor ability supports the idea that regular movement participation contributes to better motor performance. Students who are more physically active have more opportunities to practice fundamental movement skills, improve

neuromuscular coordination, and develop movement efficiency. This finding is consistent with Mahfud et al. (2020), who reported that students with higher physical activity showed better balance and motor coordination. Similar findings were also reported by Yoga et al. (2023), who found that physical activity was associated with students' motor skills and physical fitness.

Sleep quality was also significantly related to motor ability. This result suggests that sleep may play an important role in supporting motor performance among adolescents. Adequate and good-quality sleep helps the body recover from fatigue, supports cognitive and motor memory consolidation, and maintains neuromuscular function. Chaput et al. (2018) stated that insufficient sleep is associated with poorer physical and mental health indicators among school-aged children and adolescents. In addition, Watson et al. (2015) emphasized that adolescent sleep is closely related to learning readiness and daytime performance.

The simultaneous analysis showed that physical activity and sleep quality together significantly explained motor ability. However, the contribution was relatively limited, with an R^2 value of 19.7%. This means that other factors, such as nutritional status, body composition, motivation, physical education participation, extracurricular involvement, and previous sport experience, may also influence students' motor ability. Therefore, motor ability should be understood as a multidimensional outcome influenced by lifestyle, physical condition, and learning environment.

An important finding was that sleep quality became the stronger predictor in the simultaneous model, while physical activity was no longer significant when analyzed together with sleep quality. This result may indicate that sleep has a more direct relationship with students' readiness to perform motor tasks. However, because the PSQI uses a scoring system in which higher scores indicate poorer sleep quality, future studies should ensure that the direction of scoring and interpretation is clearly adjusted before drawing practical conclusions. This is important to avoid misinterpretation of whether "higher sleep quality score" reflects better or poorer sleep.

Overall, these findings suggest that physical education programs in vocational schools should not only focus on movement practice but also promote healthy lifestyle education. Teachers may encourage students to increase daily physical activity, participate in structured exercise, reduce sedentary behavior, and maintain healthy sleep habits. These strategies are especially important for vocational students because their opportunities for structured physical education may decrease in higher grades due to industrial practice and curriculum demands.

Conclusions

This study found that physical activity and sleep quality were significantly related to motor ability among tenth-grade students at SMK Negeri 1 Sikur. Students with higher physical activity tended to have better motor ability, although the relationship was weak. Sleep quality showed a moderate relationship with motor ability and became the stronger predictor in the simultaneous model.

Together, physical activity and sleep quality significantly explained students' motor ability, although their contribution was limited. Therefore, schools should promote regular physical activity and healthy sleep habits as part of physical education and student development programs. Future studies are recommended to include other factors such as nutritional status, body mass index, physical fitness, sport participation, and screen time to provide a more comprehensive explanation of students' motor ability.

Referencess

Akbari, O., & Sahibzada, J. (2020). Students' Self-Confidence and Its Impacts on Their Learning Process. *American International Journal of Social Science Research*, *5*(1), 1–15. https://doi.org/10.46281/aijssr.v5i1.462

Apriyani, I., Suntoda, A., & Budiman, D. (2018). Uji Validitas Dan Reliabilitas Test Of Gross Motor Development-2 (TGMD-2) Dale A. Ulrich Pada Anak 9 Tahun. *TEGAR: Journal of Teaching Physical Education in Elementary School*, *2*(1), 40. https://doi.org/10.17509/tegar.v2i1.13780

David J. Smith. (2003). *A Framework for Understanding the Training Process Leading to Elite Performance | Sports Medicine*. https://link.springer.com/article/10.2165/00007256-200333150-00003

Kuswoyo, D. D. (2017). Hubungan Antara Kekuatan Otot Tungkai dengan Ketepatan Shooting ke Arah Gawang pada Peserta Ekstrakurikuler SMP Patra Mandiri 2 Palembang. *Jurnal Pendidikan Olahraga*, *7*(2), 37–40.

Kuswoyo, D. D., Pramono, H., & Rifai, A. (2017). Kontribusi Percaya Diri, Konsentrasi dan Motivasi terhadap Kinerja Wasit Persatuan Sepak Bola Seluruh Indonesia Provinsi Sumatera Selatan. *Journal of Physical Education and Sports*, *6*(3), Article 3. http://journal.unnes.ac.id/sju/index.php/jpes

Laby, D. M., Kirschen, D. G., Govindarajulu, U., & DeLand, P. (2018). The Hand-eye Coordination of Professional Baseball Players: The Relationship to Batting. *Optometry and Vision Science*, *95*(7), 557–567. https://doi.org/10.1097/OPX.0000000000001239

Luo, S., Soh, K. G., Soh, K. L., Sun, H., Nasiruddin, N. J. M., Du, C., & Zhai, X. (2022). Effect of Core Training on Skill Performance Among Athletes: A Systematic Review. *Frontiers in Physiology*, *13*. https://doi.org/10.3389/fphys.2022.915259

Purnomo, A. & Yendrizal. (2020). Effect of Hand-Eye Coordination, Concentration and Believe in the Accuracy of Shooting in Petanque. *Proceedings of the 1st International Conference of Physical Education (ICPE 2019)*. 1st International Conference of Physical Education (ICPE 2019). https://doi.org/10.2991/assehr.k.200805.027

Rahman, F., Budi, I. S., & Kuncoro, A. D. (2021). Efek Kombinasi Latihan Eccentric dan Neuromuscular

Electrical Stimulation (NMES) pada Daya Tahan Otot Tungkai Pemain Badminton Amatir: Case Report. *Jurnal Kesehatan Vokasional*, *6*(2), 70. https://doi.org/10.22146/jkesvo.62383

Renshaw, I., Chow, J. Y., Davids, K., & Hammond, J. (2010). A constraints-led perspective to understanding skill acquisition and game play: A basis for integration of motor learning theory and physical education praxis? *Physical Education & Sport Pedagogy*, *15*(2), 117–137. https://doi.org/10.1080/17408980902791586

Renshaw, I., & Chow, J.-Y. (2019). A constraint-led approach to sport and physical education pedagogy. *Physical Education and Sport Pedagogy*, *24*(2), 103–116. https://doi.org/10.1080/17408989.2018.1552676

Roth, R., Donath, L., Zahner, L., & Faude, O. (2021). Acute Leg and Trunk Muscle Fatigue Differentially Affect Strength, Sprint, Agility, and Balance in Young Adults. *Journal of Strength & Conditioning Research*, *35*(8), 2158–2164. https://doi.org/10.1519/JSC.0000000000003112

Saban, H., & Saban, Y. (2022). Relationship Between Self-Confidence And Academic Success. *Vision International Refereed Scientific Journal*, *7*(1), 51–60. https://doi.org/10.55843/ivisum2271051sh

Stamatelopoulou, F., Pezirkianidis, C., Karakasidou, E., Lakioti, A., & Stalikas, A. (2018). "Being in the Zone": A Systematic Review on the Relationship of Psychological Correlates and the Occurrence of Flow Experiences in Sports' Performance. *Psychology*, *09*(08), 2011–2030. https://doi.org/10.4236/psych.2018.98115

Sugiyono. (2012). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. CV. Alfabeta.

Wang, S. H., Qin, Y., Jia, Y., & Igor, K. E. (2022). A systematic review about the performance indicators related to ball possession. *PLOS ONE*, *17*(3), e0265540. https://doi.org/10.1371/journal.pone.0265540

Young, W. B. (2006). Transfer of Strength and Power Training to Sports Performance. *International Journal of Sports Physiology and Performance*, *1*(2), 74–83. https://doi.org/10.1123/ijspp.1.2.74