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Determinants of Player Performance: Evidence from Pelita Nusantara Kasih Surakarta High School Basketball Team in Developmental Basketball League

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Abstract
This study examines the determinants of player performance among the Pelita Nusantara Kasih Surakarta High School boys' basketball team, champions of the 2025 Developmental Basketball League (DBL). Specifically, it investigates the influence of Body Mass Index (BMI), turnovers, and minutes played on player efficiency. A quantitative correlational design was employed using secondary data from 50 player observations collected from the official DBL website and DBL Play across five championship matches. Player performance was measured using the Efficiency Rating, while multiple linear regression analysis was conducted with IBM SPSS 27. The results indicate that minutes played has the strongest positive and statistically significant effect on player efficiency ($\beta = 0.688$, $p < 0.001$). BMI also demonstrates a positive significant effect at the 10% significance level ($\beta = 0.203$, $p = 0.060$), whereas turnovers show no significant influence ($p = 0.635$). These findings suggest that greater playing time and optimal physical condition contribute substantially to player performance, while turnovers alone do not determine efficiency. The study provides evidence-based insights for coaches to optimize player rotation and physical conditioning to improve competitive performance.

Keywords: Basketball performance; body mass index; minutes played; turnovers; player efficiency.

1. Introduction

Sports represent structured physical activities performed to improve an individual's physical fitness, health, and psychological and social development (Pranata & Kumaat, 2022). Recreation aside, sports serve as an instrument for character development, fostering discipline, sportsmanship, teamwork, and decision-making capabilities in competitive environments (Djajasentana & Wicaksono, 2026). The roots of modern basketball trace back to the fall of 1891, when Dr. James Naismith, a physical education instructor at the YMCA International Training School in Springfield, Massachusetts, sought to create an engaging indoor activity for his students during the winter months. Originally conceived as a simple pastime using a peach basket as a goal, the game has since evolved into a complex global phenomenon (Oliver, 2004). Basketball has become one of the most popular sports globally, including in Indonesia. The game demands the mastery of basic skills such as dribbling, passing, shooting, and rebounding supported by peak physical, mental, and tactical abilities (Candra & Wahyuni, 2025).Every decision a player makes impacts the final match outcome significantly (Akbar et al., 2025).

The Indonesian Basketball Association Persatuan Bola Basket Seluruh Indonesia (PERBASI) systematically manages the basketball ecosystem in Indonesia. The organization holds responsibility for developing athlete training programs, drafting competition regulations, and improving the quality of coaching to elevate national basketball performance (Sena & I Putu,

2026). The Developmental Basketball League (DBL) stands as a primary catalyst for developing young athletes. This most prestigious inter-school competition provides an effective platform for assessing the technical, tactical, mental, and teamwork skills of student-athletes (Mansur, 2021; Muhammad et al., 2023).

Performance evaluation in the modern paradigm of sports science relies on objective statistical analysis rather than visual observation (Hidayatullah, 2020). Player performance culminating in team victory represents a synergy of physiological condition, duration of court involvement, and efficiency in decision-making. Elite basketball requires more than raw talent; it necessitates a sophisticated integration of physical readiness and tactical intelligence. Coaches face the constant challenge of optimizing lineup rotations based on volatile performance metrics.

Body Mass Index (BMI) functions as a fundamental indicator of body composition, directly influencing an athlete's capacity for explosive power, speed, and endurance throughout the high-intensity minutes of a match (Anam et al., 2026). This metric provides a baseline assessment of physical readiness that governs a player's interaction with the game's physical demands. Minutes played serves as a critical quantitative metric, reflecting not only the coach's trust but also the player's capacity to maintain a consistent rhythm under fatigue. Turnovers act as the ultimate indicator of offensive discipline and situational awareness; high turnover rates typically signal a deficit in decision-making quality, whereas efficient ball control reflects the maturity required for success in elite competitions. These three variables BMI, minutes played, and turnovers form a comprehensive nexus of physical and technical attributes that dictate the efficiency of a player's performance.

Reliance on game statistics often overlooks the context of a player's anthropometric profile. Physical characteristics such as BMI remain decisive factors in physical contact intensity within the paint area. Previous studies have tended to compartmentalize physical performance and technical performance, failing to capture the holistic dynamics where a player might show statistically efficient numbers while suffering from physical fatigue(Rumini et al., 2024). High court time can become an indicator of declining team effectiveness without disciplined turnover management in the highly competitive DBL ecosystem. Current literature reveals a necessity for a model capable of synchronizing physical profiles with game efficiency simultaneously. This study challenges the traditional view focusing solely on results (scoring) by integrating physical and technical variables. It shifts focus toward understanding the processes through which these variables interact to determine the success of a young athlete. Basketball performance is a multidimensional construct where physical readiness (BMI) must align with tactical efficiency (turnovers) and physical endurance (minutes played). Multiple linear regression analysis allows this study to disentangle the complex interplay between physical stature and in-game decision-making, providing a more granular understanding of success drivers at the high school elite level.

The boys' basketball team of SMA Pelita Nusantara Kasih Surakarta successfully secured the championship title during the 2025 DBL competition. This success suggests effective management of player performance aligned with these variables. This study analyzes the influence of Body Mass Index (BMI), turnovers, and minutes played on player performance within the team statistically. The findings contribute theoretical insights into the determinants of student basketball performance and serve as an evaluation tool for coaches to optimize evidence-based athlete development strategies.

2. Method

This study employs a quantitative descriptive approach with a correlational design to analyze the factors influencing player performance. The population of this study consists of the boys' basketball team of Pelita Nusantara Kasih Surakarta High School participating in the 2025 DBL series. The sample comprises 60 players, selected through purposive sampling based on secondary data gathered from the official DBL website and the DBL Play application, covering five matches held at Sritex Arena, Solo, on September 17, 19, 22, 23, and 25, 2025.

The independent variables in this study include: (1) Body Mass Index (BMI), obtained from the players' physical data on the official DBL website and calculated as the ratio of body weight (kg) to the square of height (cm); (2) Turnovers, derived from official game statistics on the DBL Play application; and (3) Minutes Played, recorded from each player's total time on the court as provided by the DBL Play statistics. The dependent variable is Player Performance, calculated using the Efficiency Rating formula: (Points + Rebounds + Assists + Steals + Blocks) / Total Matches Played. The collected data were analyzed using IBM SPSS software through multiple linear regression analysis to examine the simultaneous and partial effects of the independent variables on player performance.

3. Results

Table 1. Descriptive statistics

	Mean	Min	Max	Std. Dev	N
Efficiency	1,036	0	3,2	0,860	50
Turnover	1,82	0	6	1,674	50
BMI	0,378	0,221	0,566	0,058	50
Minute Played	0,65659	0	1,50	0,373	50

Source: SPSS 27's output

Table 1 shows the descriptive statistics of the study variables based on 50 observations. Efficiency has a mean value of 1.036 (SD = 0.860), while Turnover records a mean of 1.82 (SD = 1.674). BMI has a mean of 0.378 (SD = 0.058), indicating relatively low variation among players. Minute Played shows a mean value of 0.65659 (SD = 0.373). Overall, Turnover exhibits the highest variability, whereas BMI demonstrates the most consistent distribution.

Table 2. Normality test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		50
Normal Parameters[a,b]	Mean	-,3938351
	Std. Deviation	,61860828
Most Extreme Differences	Absolute	,107
	Positive	,107
	Negative	-,077
Test Statistic		,107
Asymp. Sig. (2-tailed)[c]		,200[d]
Sig.		,154

One-Sample Kolmogorov-Smirnov Test			
			Unstandardized Residual
Monte Carlo Sig. (2-tailed)[e]	99% Confidence Interval	Lower Bound	,144
		Upper Bound	,163

Source: SPSS 27's output

Table 2 presents the results of the Kolmogorov–Smirnov normality test. The test produced an Asymp. Sig. (2-tailed) value of 0.200, which is greater than the significance level of 0.05. In addition, the Monte Carlo Sig. value of 0.154 also exceeds 0.05. Therefore, the residuals are normally distributed, indicating that the normality assumption required for regression analysis has been satisfied.

Table 3. Heteroscedasticity test

Model	R	R Square	Adj R Square	Std. Error
1	0,707	0,499	0,467	0,6284

Source: SPSS 27's output

Table 3 presents the results of the White heteroscedasticity test. The regression model produced an R^2 value of 0.499, resulting in a calculated χ^2 value of 24.95 (50 × 0.499). Since the calculated χ^2 value is lower than the critical χ^2 value of **66.339** at the 5% significance level, the model does not exhibit heteroscedasticity. Therefore, the assumption of homoscedasticity is satisfied, indicating that the residual variance is constant across observations.

Table 4. Multicollinearity test

	Unstandardized	Std.Error	Coeff Beta	t	Sig	Tolerance	VIF
Turnover	-0,32	0,067	-0,62	-0,477	0,635	0,649	1,541
BMI	2,997	1,553	0,203	1,930	0,060	0,983	1,017
Minute Played	1,584	0,299	0,688	5,304	0,000	0,647	1,546

Source: SPSS 27's output

Table 4 presents the results of the multicollinearity test. The Tolerance values for Turnover (0.649), BMI (0.983), and Minute Played (0.647) are all greater than 0.10, while the corresponding VIF values (1.541, 1.017, and 1.546) are below 10. These results indicate that there is no multicollinearity among the independent variables. Therefore, all independent variables can be included in the regression model, as they do not exhibit strong intercorrelations.

Table 5. Linear regression analysis

Coefficients[a]					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1,081	,597		-1,812	,076

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Turnover	-,032	,067	-,062	-,477	,635
BMI	2,997	1,553	,203	1,930	,060
Minute Played	1,584	,299	,688	5,304	,000
a. Dependent Variable: Efisiensi					

Source: SPSS 27's output

The results show that Turnover has a negative but statistically insignificant effect on efficiency ($\beta = -0.062$; $p = 0.635 > 0.10$). BMI has a positive and significant effect on efficiency at the 10% significance level ($\beta = 0.203$; $p = 0.060 < 0.10$), indicating that players with higher BMI tend to have better efficiency. Minutes Played also has a positive and highly significant effect on efficiency ($\beta = 0.688$; $p = 0.000 < 0.05$), suggesting that increased playing time contributes to higher player efficiency.

4. Discussion

Turnover and Player Performance

The regression analysis in this study indicates that the turnover variable does not have a significant influence on player performance efficiency. Although turnovers are theoretically detrimental to a team, the negative effect does not appear statistically significant in the data for the SMA Pelita Nusantara Kasih Surakarta boys' basketball team. This phenomenon can be understood through the mechanics of the Efficiency Rating formula utilized in this study, which calculates a player's cumulative positive contributions such as points, rebounds, assists, steals, and blocks in aggregate (Dwita Larasati et al., 2025). Consequently, the negative impact of turnovers is effectively offset by a player's productivity in other areas that carry greater weight for the team's overall performance. Furthermore, players with significant offensive responsibilities, such as playmakers or primary ball-handlers, inherently face a higher risk of committing turnovers (Yuan, 2025). These players are also the primary architects of the team's scoring and playmaking opportunities. Coaches often grant players the autonomy to take risks to dismantle opposing defenses. These high-risk, high-reward passes may occasionally result in turnovers; however, when successful, they frequently lead to crucial scoring opportunities that are vital to the team's victory.

Moreover, a team with a solid defensive transition can effectively mitigate the consequences of a turnover. When players demonstrate the ability to transition rapidly from offense to defense, the damage caused by a lost possession is significantly diminished (Zahra & Hariyanto, 2026). Taken together, these findings suggest that in high-level competitive basketball, a player's performance cannot be judged solely by the minimization of errors. Instead, overall efficiency is driven by a player's total productive output, their ability to execute tactical roles, and their contribution to the team's offensive momentum.

Body Mass Index and Player Performance

The regression analysis indicates that Body Mass Index (BMI) has a significant and positive influence on player performance efficiency for the Pelita Nusantara Kasih Surakarta boys' basketball team. This finding confirms that players with a higher, yet optimal BMI tend to record better efficiency scores, underscoring the critical role of anthropometric profiles in shaping on-court contributions among adolescent basketball athletes (Maulana et al., 2025). In the context of competitive basketball, BMI serves as a functional proxy for an athlete's physical robustness, reflecting the foundation of muscle mass and body size necessary to thrive in high-intensity match environments (Nikolaidis et al., 2015).

Players with an optimal BMI are typically better equipped to withstand the physical rigors of the paint area, providing the necessary stability to secure rebounds, maintain balance during contested shots, and establish advantageous court positioning against physically imposing opponents (Aliriad et al., 2023; Xu et al., 2022). This physical maturity acts as a catalyst for technical efficiency; adequate muscle mass improves stability and movement control, thereby reducing the likelihood of technical errors resulting from a loss of balance or premature fatigue (Utama et al., 2025). Consequently, players with a more favorable body composition are able to perform more effectively in both offensive and defensive situations, directly translating their physical readiness into positive statistics such as points, rebounds, and blocks captured by the efficiency index.

Furthermore, a higher BMI supports greater resistance to physical loads throughout the course of a match. A stronger body composition allows athletes to sustain playing intensity and explosive power for longer periods, thereby increasing the frequency of productive actions (Sentana et al., 2025). From a behavioral perspective, this physical capability may boost a player's confidence in taking offensive or defensive initiatives such as driving to the basket or contesting rebounds more aggressively which further increases the likelihood of producing optimal performance. Finally, tactical deployment often reinforces this relationship, as coaches tend to entrust players with larger size and mass to roles that demand area control and physical engagement. Taken together, these results demonstrate that BMI is not merely an isolated metric, but a fundamental prerequisite that facilitates the transformation of technical skills into tangible contributions, confirming that a robust anthropometric profile is essential for achieving peak performance efficiency in high school basketball.

Minute Played and Player Performance

The regression analysis indicates that Minutes Played serves as the most dominant predictor of player performance efficiency, exhibiting the strongest influence among all independent variables examined in this study. This result underscores that court time is a crucial determinant of an athlete's overall contribution and statistical accumulation during competition. This occurs primarily because players with longer court time possess greater opportunities to provide tangible contributions across various aspects of the game, including scoring, rebounding, playmaking, and defensive contributions such as steals and blocks. Since performance is measured via an efficiency index that aggregates these statistical metrics, increased court time naturally provides a broader platform for generating higher performance values, whereas limited playing time inherently restricts a player's opportunity to compile positive statistics.

Beyond the mere accumulation of data, extended playing time facilitates a crucial psychological and physical rhythm that is essential for achieving peak efficiency. Players who remain on the court for longer durations are better able to acclimate to the game's tempo, allowing for more precise decision-making and improved anticipation of both offensive and defensive scenarios Raval & Pagaduan (2021). This immersion in the match flow minimizes the cold start effect, where players with limited minutes often struggle to find their rhythm, thereby hindering their statistical productivity. In this context, the relationship between performance and playing time is reciprocal: high performance justifies an increase in minutes, while increased playing time provides the platform for sustained, high-level performance.

This dynamic creates a positive feedback loop, in which players entrusted with core roles gain the confidence and tactical understanding necessary to maximize their efficiency ratings (Zahra & Hariyanto, 2026). Ultimately, Minutes Played functions not only as a facilitator of statistics but also as a catalyst for the integration of individual skills into the team's broader tactical structure. Thus, a coach's decision to allocate extended playing time is often a validation of a player's skill level, physical condition, and tactical acumen, reinforcing that those who consistently demonstrate excellence are systematically rewarded with the court time required to drive the team toward competitive success.

5. Conclusion and Recommendation

This study concludes that among the variables examined, Minutes Played serves as the most dominant predictor of player performance efficiency, highlighting its crucial role in accumulating positive statistical contributions and reflecting both the coach's strategic trust and the player's rhythm during competition. Furthermore, Body Mass Index (BMI) exerts a significant positive influence on performance efficiency, underscoring the importance of optimal physical composition as a foundation for strength, stability, and endurance for maintaining competitiveness in high-intensity matches. Conversely, Turnovers do not show a statistically significant effect on individual efficiency, suggesting that in an elite-level ecosystem, turnovers are often perceived as a byproduct of an aggressive, high-paced offensive system rather than a defining metric of individual failure, as the negative impact is effectively offset by other positive offensive contributions.

Based on these findings, it is recommended that coaches prioritize rotation management as a key strategic lever, as increased court time directly correlates with higher performance efficiency. Additionally, coaching staffs are encouraged to implement evidence-based physical conditioning programs to ensure athletes maintain an optimal BMI, thereby enhancing their physical competitiveness and stability during physical contact in the paint area. While turnover frequency was not statistically significant in this model, athletes should continue to develop situational awareness and decision-making skills to maintain offensive discipline. Finally, future research is encouraged to incorporate broader metrics to provide a more holistic view of player performance within the DBL ecosystem.

References

Akbar, F. R. P., Ramadi, R., & Ashari, I. (2025). Mengasah Teknik Dasar Permainan Bola Basket: Fokus Gerakan Tangan di SMAN 8 Tangerang Selatan. *Seminar Nasional Dan Publikasi Ilmiah 2025 FIP UMJ*.

Aliriad, H., Adi S, Fahrudi, A., Apriyanto, R., & Da'i, M. (2023). Exploring the relationship between body mass index and physical fitness: Implications from a comprehensive study in

a secondary school setting. *Edu Sportivo: Indonesian Journal of Physical Education*, *4*(2), 136–147. https://doi.org/10.25299/es:ijope.2023.vol4(2).12775

Anam, K., Indardi, N., Setiowati, A., Muafi, S., & S, A. (2026). Physical Activity, Body Mass Index, and Functional Movement-Based Injury Risk. *Fizicna Reabilitacia Ta Rekreacijno-Ozdorovci Tehnologii*, *11*(2), 131–138. https://doi.org/10.15391/prrht.2026-11(2).08

Candra, O., & Wahyuni, P. (2025). *Teknik Dasar Bola Basket (Teori/Praktek dan Pembelajarannya)* (Gustiranda, Ed.). Eureka Media Aksara.

Djajasentana, P. A., & Wicaksono, A. (2026). Analisis Performa Tim Juara dan Runner-Up pada Final DBL Jakarta 2025: Kajian Statistik Pertandingan. *Jurnal Kejora: Jurnal Kesehatan Jasmani Dan Olah Raga*, *11*(1), 47–54.

Dwita Larasati, N. K. C., Dharma Hita, I. P. A., & Jaya Mahotama, I. B. G. (2025). Efektivitas Dribble Rendah dalam Permainan Bola Basket: Kajian Studi Literatur. *JURNAL ANGGARA : Jurnal Pendidikan Olahraga, Kesehatan, Rekreasi Dan Terapannya*, *2*(2), 69–77. https://doi.org/10.63987/anggara.v2i2.201

Hidayatullah, F. (2020). Analisis Indikator Performa Bola Basket Yang Mempengaruhi Skor Pemenang Pertandingan Pelajar Sekolah Menengah. *STAND: Journal Sports Teaching and Development*, *1*(1), 49–55.

Mansur. (2021). *The Analysis of The Implementation of The Development Basketball League Event in Aceh in 2018*. https://api.semanticscholar.org/CorpusID:238289434

Maulana, A., Amalia, B., Hendrawan, F., & Ramadhan, M. H. (2025). Pengaruh Kemampuan Fisik dan teknik Bermain Terhadap Peforma Pemain Bola Basket Pada Club Spartans Banjarbaru. *Riyadhoh : Jurnal Pendidikan Olahraga*, *8*(2), 257. https://doi.org/10.31602/rjpo.v8i2.20985

Muhammad, M. N., Masjkur, M., & Aidi, M. N. (2023). Penerapan Model Regresi Logistik Biner dan Random Forest terhadap Prospek Atlet Muda pada Liga Basket DBL Tahun 2019. *Xplore: Journal of Statistics*, *12*(3), 252–262. https://doi.org/10.29244/xplore.v12i3.1162

Nikolaidis, P. T., Asadi, A., Santoso, E. J. A. M., Gonzalez, J. C., Padulo, J., Chtourou, H., & Zemkova, E. (2015). Relationship of body mass status with running and jumping performances in young basketball players. *Muscles, Ligaments and Tendons Journal*, *5*(3).

Pranata, D., & Kumaat, N. (2022). Pengaruh olahraga dan model latihan fisik terhadap kebugaran jasmani remaja: Literature review. *Jurnal Kesehatan Olahraga*, *10*(02), 107–116.

Raval, K. M. R., & Pagaduan, J. C. (2021). Factors that Differentiate Winning and Losing in Men's University Basketball. *Montenegrin Journal of Sports Science and Medicine*, *10*(2), 13–17. https://doi.org/10.26773/mjssm.210902

Sena, A. A. N. A. P., & I Putu, A. D. H. (2026). Jurnal Ilmiah Multidisiplin Analisis Komprehensif Perkembangan Bola Basket: Tinjauan Pembelajaran, Teknik Biomekanika, Kebugaran Jasmani, Teknologi dan Sistem Pembinaan di Indonesia. *Jurnal Ilmiah Multidisplin*, *4*(2). https://doi.org/10.60126/jim.v4i2.1386

Sentana, B., Akbar Izzuddin, D., Wijaya, H. H., Universitas, S., & Karawang, I. (2025). *Hubungan Indeks Massa Tubuh, Kadar Lemak dan Power Otot Tungkai Pada Three Point Atlet Bola Basket di Club Amores Warrior Karawang*. https://ejournal-fkip.unisi.ac.id/joi

Utama, M. B. R., Subekti, M., S, A., & Ihsani, S. I. (2025). Komponen Dominan Fisik dalam Kabaddi: Apakah ini Prediktor yang Benar? *Jurnal Sains Keolahragaan Dan Kesehatan*, *10*(1), 71–83. https://doi.org/10.5614/jskk.2025.10.1.7

Xu, X., Zhang, M., & Yi, Q. (2022). Clustering Performances in Elite Basketball Matches According to the Anthropometric Features of the Line-ups Based on Big Data Technology. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.955292

Yuan, S. (2025). Research on the Team Strategy Indicators and Championship Success Rate of Basketball Players. *World Journal of Education and Humanities*, *7*(1), p37. https://doi.org/10.22158/wjeh.v7n1p37

Zahra, S. A., & Hariyanto, A. (2026). *Analisis SWOT Kegagalan Tim Nasional Bola Basket 5 on 5 Putri Indonesia pada Asean University Games 2024*. *9*(2).