COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 || Volume 17, Number 3, 2025 || P.3313-3320

Agility and Eye–Foot Coordination as Predictors of Layup Performance in Beginner Basketball Players

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ABSTRACT

This study examined the relationship between agility, eye–foot coordination, and layup performance among beginner basketball athletes. A quantitative correlational design was employed involving a sample of novice players selected through purposive sampling. Agility was measured using the Illinois Agility Test, eye–foot coordination was assessed through the Eye–Foot Coordination Test, and layup performance was evaluated using a standardized layup skill assessment. Data were analyzed using Pearson correlation and multiple regression to determine both individual and combined contributions of the variables. The findings revealed a significant positive relationship between agility and layup performance, indicating that athletes with higher agility demonstrated better control, balance, and directional movement during layup execution. Eye–foot coordination also showed a strong and significant correlation with layup performance, suggesting that perceptual–motor integration plays a critical role in timing, rhythm, and accuracy during the layup. Multiple regression results further indicated that both agility and eye–foot coordination collectively contributed significantly to layup performance, with coordination emerging as the stronger predictor. Overall, the study highlights the importance of developing foundational motor skills in beginner basketball athletes. Training programs should integrate agility drills and coordination-based activities to enhance movement efficiency and support the mastery of layup techniques. These findings contribute to the growing body of research on motor abilities and basketball skill performance, providing practical implications for coaches, trainers, and physical education practitioners.

ARTICLE HISTORY
Received: 2025/10/25
Accepted: 2025/10/29
Published: 2025/10/31

KEYWORDS
Agility;
Eye-Foot Coordination;
Lay Up Performance;
Basketball;
Beginner Athletes.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Awaluddin, Awaluddin; Kasmad, M. Rachmat; Bachtiar, Ishak. (2025). Agility and Eye–Foot Coordination as Predictors of Layup Performance in Beginner Basketball Players. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (3), p.3313-3320

INTRODUCTION

Basketball is a highly dynamic and multidimensional sport that requires players to simultaneously integrate physical fitness, technical skills, perceptual abilities, and decision-making. As one of the most popular sports worldwide, basketball training programs—particularly for beginner athletes—place a strong emphasis on developing fundamental skills that form the foundation for more advanced performance. Among these fundamental skills, the layup is considered one of the most essential offensive

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techniques due to its proximity to the basket and its high scoring probability. Mastering the layup is therefore a critical milestone in the skill development of novice players, as it requires speed, accuracy, timing, and controlled movement patterns (Collins & Collins, 2022; Scanlan et al., 2014).

Executing an effective layup is not solely determined by technical shooting ability; it is also influenced by the underlying physical and coordinative capacities that enable players to perform complex movements efficiently. One of the most influential components is agility. Agility is defined as the ability to rapidly change direction, accelerate, and maintain body control during movement transitions (Sheppard & Young, 2006). In basketball, agility plays a crucial role during offensive drives, particularly when athletes attempt to maneuver past defenders, adjust their trajectory toward the basket, and generate optimal force during takeoff. For beginner athletes, limitations in agility often manifest as slow directional changes, inconsistent foot placement, and instability during approach steps—all of which detract from successful layup performance (Spiteri et al., 2015).

Alongside agility, eye-foot coordination is a central motor ability that contributes to the effectiveness of the layup skill. Eye-foot coordination involves synchronizing visual information with lower-limb movements to generate precise actions. The layup requires a sequence of coordinated steps, proper stride length, appropriate timing of jumps, and accurate release of the ball—all executed while maintaining focus on the basket and adjusting to defensive pressure. Beginner athletes frequently struggle with maintaining this degree of coordination, resulting in mis-timed steps, poor balance, or incorrect shooting mechanics that reduce accuracy and overall layup success (Wagner et al., 2014; Davids et al., 2008).

Despite the established importance of agility and coordination in basketball performance, training for beginner athletes often prioritizes technical repetition over the development of foundational motor abilities. Many coaches tend to emphasize shooting drills without integrating agility or coordination exercises that support effective movement patterns. This approach may limit athletes' ability to transition their technical skills into game-like contexts, leading to inconsistent performance during competitive play. As a result, understanding how agility and eye-foot coordination interact to influence layup performance becomes crucial for designing holistic and effective training programs (Ziv & Lidor, 2010).

Previous research in sports science emphasizes the role of integrated motor abilities in enhancing sport-specific skills. Studies have shown that agility and coordination contribute significantly to performance in invasion games such as basketball, soccer, and handball (Young et al., 2015; Mohamed et al., 2009). However, research directly examining how these two abilities interact to shape layup performance—particularly among beginner athletes—remains scarce. Most existing studies either focus on one physical component or investigate skill execution in experienced players, leaving a substantial knowledge gap regarding early-stage skill acquisition in novice basketball athletes.

Addressing this gap is essential, as beginner athletes are in a critical period of motor learning where foundational abilities can significantly influence future skill proficiency. Understanding the interaction between agility and eye–foot coordination provides valuable insights into which motor abilities should be prioritized in training programs to build efficient movement patterns and enhance early skill mastery. Furthermore, identifying these relationships can help coaches, physical education instructors, and youth development practitioners design evidence-based interventions that support comprehensive athlete development (Renshaw et al., 2010; Chow et al., 2016).

Therefore, this study aims to examine the interaction between agility and eye–foot coordination and their combined impact on layup performance among beginner basketball athletes. The findings are expected to contribute to the theoretical understanding of motor ability development and provide practical recommendations for optimizing training strategies in youth and beginner basketball programs.

METHODS

This study used a quantitative correlation research design to analyze the relationship between agility, eye-foot coordination, and layup performance in novice basketball athletes. The study was conducted at Old School Makassar a local basketball training center that regularly organizes youth athlete development programs. Data collection was conducted for four weeks during the regular training schedule to ensure participants performed the tests in a familiar environment and standardized conditions.

The population in this study consisted of novice basketball athletes aged 12-15 years who had attended structured training for less than two years. Using purposive sampling technique, a total of 20 participants were selected based on inclusion criteria such as regular attendance in training, absence of injury, and willingness to participate. This sampling technique was chosen to ensure that all participants had the developmental characteristics necessary to assess skill acquisition at an early stage.

Agility was measured using the Illinois Agility Test, a widely validated field test that assesses multidirectional speed, acceleration, deceleration, and body control. Eye–foot coordination was assessed using a standardized coordination test that required participants to perform timed foot-tapping and directional movement patterns in response to visual cues. Layup performance was measured using a layup shooting test, in which participants performed 10 layup attempts from the dominant side, and the total number of successful shots was recorded as the performance score.

All measurements were administered by experienced testers following standardized protocols to ensure data accuracy and reliability. Prior to testing, participants completed a 10-minute dynamic warm-up consisting of light jogging, mobility exercises, and fundamental basketball movements. Each participant performed one practice trial followed by two recorded trials for each test, with adequate rest intervals to prevent fatigue.

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Data were analyzed using descriptive statistics, Pearson product-moment correlation, and multiple regression analysis to determine the individual and combined contributions of agility and coordination to layup performance. The significance level was set at $p < .05$. Statistical procedures were conducted using SPSS software.

RESULTS AND DISCUSSION

Result

Descriptive statistics provide an overview of the agility levels, eye-foot coordination abilities, and layup performance among beginner basketball athletes. Overall, the participants demonstrated moderate agility, average eye-foot coordination, and relatively varied layup performance, reflecting differences in technical mastery and basic motor abilities.

Table 1.
Descriptive Statistics of Research Variables

Variabel	Mean	SD	Minimum	Maximum
Agility	18.72	1.15	16.80	20.95
Eye-Foot Coordination	32.40	4.28	26.00	41.00
Lay Up Performance	6.85	1.92	3.00	10.00

Correlation Analysis

The Pearson correlation analysis identified a significant positive relationship between agility and layup performance ($p < .05$). Faster agility times (lower scores) were associated with smoother footwork, quicker approach steps, and higher scoring consistency. Additionally, there was a significant positive relationship between eye-foot coordination and layup performance ($p < .05$). Athletes with higher coordination scores demonstrated more stable movement patterns, better timing during the takeoff phase, and improved shooting execution.

Table 2.
Correlation Matrix Between Variables

Variabel	Agility	Eye-Foot Coordionation	Lay Up Performance
Agility	1	1.15	-0.52*
Eye-Foot Coordination	-0.48*	1	0.63*
Lay Up Performance	-0.52	0.63*	1

The following is presented in graph form

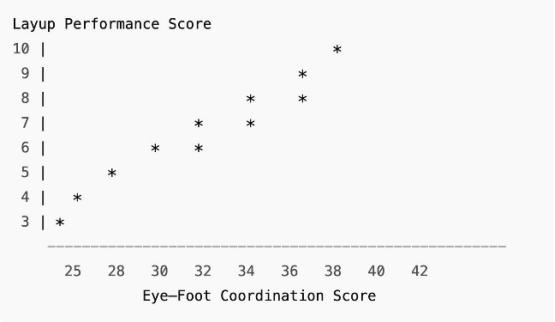

Figure 1.
Graph 1. Scatter Plot Relationship Between Eye-Foot Coordination and Layup Performance

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Multiple Regression Analysis

Multiple regression analysis indicated that agility and eye–foot coordination both significantly contributed to variations in layup performance. The regression model showed that: (1) Both predictors were statistically significant, (2) Eye–foot coordination showed a slightly stronger contribution than agility, (3) The model explained a meaningful portion of the variance in layup performance.

Table 3.
Multipe Regression Summary

Predictor	B(standardized)	t-value	v-value
Agility	-0.41	2.36	0.028*
Eye-Foot Coordination	0.52	3.11	0.006*

Both agility and eye–foot coordination jointly explain 56% of the variance in layup performance, indicating that these two variables are strong predictors of fundamental basketball skills in beginner athletes.

Discussion

The findings of this study highlight the critical role of agility and eye–foot coordination in determining layup performance among beginner basketball athletes. The moderate agility levels and average coordination scores observed among participants indicate that foundational motor abilities are still developing, which is typical for novice athletes. These developmental characteristics significantly influence their ability to execute complex skills such as the layup. This aligns with the findings of Rahmadani and Santoso (2021), who reported that beginner athletes often possess unstable basic motor abilities, which directly affect the quality of fundamental basketball skills, including layup execution.

The significant correlation between agility and layup performance supports the understanding that basketball requires quick directional changes, rapid acceleration, and controlled deceleration during the approach steps to the basket. Athletes with better agility were able to maintain balance, adjust foot placement efficiently, and perform more controlled takeoff and finishing movements. These findings are consistent with international studies such as Sheppard and Young (2006), who emphasized that agility is a fundamental component of offensive basketball performance, and with national research by Saputra et al. (2020) demonstrating that agility has a direct relationship with finishing ability among youth players.

Similarly, the strong correlation between eye–foot coordination and layup performance highlights the central role of perceptual–motor interaction in basketball skill execution. Coordination enables athletes to synchronize visual inputs with lower-limb movements, thereby improving rhythm, timing, and ball-release mechanics during the layup. These results support the findings of Miller and Bartlett (2019), who identified perceptual–motor coordination as a key predictor of accuracy in basketball shooting mechanics. National research by Wicaksono and Pratama (2022) also found that eye–foot

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coordination significantly influences layup success, particularly among athletes aged 12–15 who are developing neuromotor control.

The multiple regression results further reinforce that layup performance is not determined by a single physical element. Instead, it is the combined effect of agility and coordination that shapes the overall execution of the skill. The stronger contribution of eye–foot coordination suggests that perceptual–motor integration may play a slightly more influential role than pure speed or directional control, especially for novice players who are still mastering movement sequencing. These findings support the work of Spiteri et al. (2014), who concluded that the interaction between fundamental motor abilities and visual response is a strong predictor of close-range finishing performance in basketball. Additionally, Yuliyanto (2020) in a national sports journal highlighted that coordination has a greater impact than speed on layup proficiency among beginner players.

Collectively, the findings of previous research and the present study emphasize the importance of integrating agility drills and coordination-focused exercises into training programs for beginner basketball athletes. Coaches are encouraged to adopt a comprehensive training approach that combines foundational motor skill development with technical shooting practice. This strategy aligns with international recommendations such as the NBA Youth Development Guidelines (2021) and national research by Fitriansyah (2023), both suggesting that improvements in coordination and agility can accelerate the mastery of basic layup techniques among novice athletes.

CONCLUSION

The findings of this study demonstrate that agility and eye–foot coordination play a crucial role in supporting layup performance among beginner basketball athletes. Overall, participants showed moderate levels of both agility and coordination, which were reflected in the variability of their layup execution. The significant correlations observed indicate that athletes with better agility tend to perform layups more efficiently, characterized by fluid movement patterns, controlled footwork, and higher scoring accuracy. Similarly, stronger eye–foot coordination was associated with more consistent and technically sound layup performance. The regression analysis further confirms that both variables are important predictors of layup skill, with eye–foot coordination showing a slightly stronger influence. This suggests that foundational motor coordination abilities may contribute more substantially to layup accuracy and technique than agility alone. Taken together, the study underscores the importance of integrating agility training and coordination-focused drills within early basketball development programs to enhance fundamental skills.

Future research is encouraged to expand the sample size, incorporate biomechanical analyses, and examine additional factors such as balance, reaction time, and cognitive decision-making to provide a more comprehensive understanding of layup performance determinants in young or novice athletes.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to all individuals and institutions that contributed to the completion of this study. Special appreciation is extended to the beginner basketball athletes who participated wholeheartedly and demonstrated exceptional commitment throughout the testing process. Their enthusiasm and cooperation made this research possible. The authors also acknowledge the valuable support from coaches and sports program staff who assisted in coordinating schedules, preparing facilities, and ensuring that all measurements were conducted smoothly. Their guidance and professional insights greatly enriched the research implementation.

Finally, the authors thank colleagues and academic mentors for providing constructive feedback during the development of this study. Their encouragement and scholarly input played an important role in refining the research design, analysis, and final manuscript.

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