

A Systematic Literature Review (SLR): The Role of Physical Fitness in the Success of Basic Athletic Techniques in College Students

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ABSTRACT

Physical fitness is one of the important elements in athletic learning because it relates to students' ability to display effective, efficient, and controlled movements on various basic techniques. However, studies that specifically examine the role of physical fitness in the success of basic athletic techniques in students are still scattered in various studies and have not been synthesized in a directed manner. The research data was obtained from relevant open-access scientific literature and systematically selected based on the inclusion and exclusion criteria that had been set, then analyzed using narrative synthesis. The results of the study show that physical fitness plays an important role as a foundation in the success of basic athletic techniques, especially through the components of speed, endurance, strength, agility, flexibility, and motion control. Studies have also shown that improving physical fitness tends to be followed by improving the quality of performance of basic athletic techniques, both in the context of training and learning. This research contributes to strengthening the conceptual understanding of the relationship between physical fitness and technical performance, as well as providing a scientific basis for the development of athletic learning in higher education that is more integrative and based on movement performance needs.

INTRODUCTION

Athletics occupies an important position in physical education and sports science because these branches form the foundation of movement through running, jumping, and throwing activities that demand the simultaneous integration of speed, endurance, strength, coordination, and movement control, so that the mastery of basic athletic techniques in students cannot be separated from the quality of physical fitness they possess ([Moroz & Gavryshko, 2022](#)). In the context of higher education, improving the quality of student fitness is also a strategic issue because an eight-week functional exercise intervention has been shown to improve functional movement patterns as well as fitness components such as speed, endurance, flexibility, power, and vital capacity in non-athletic male students, suggesting that physical readiness is an important prerequisite for more effective movement performance ([Li et al., 2025](#)).

Although the relationship between physical exercise and sports performance has been widely discussed, there is still an academic gap on how physical fitness specifically plays a role in the success of basic athletic techniques in students, as some studies place more emphasis on improving general fitness or developing professional competencies without focusing on their contribution to the success of basic athletic techniques in the student population ([Bazylevych et al., 2024](#)). This gap is becoming increasingly relevant practically because in college students, variations in body mass index and fine motor skills are known to explain about 30% of variations in athletic performance, so the factors of physical condition and motor quality need to be read as interrelated determinants in the success of mastering basic techniques ([Vranešić Hadžimehmedović et al., 2023](#)).

Based on this background, this study aims to systematically analyze the role of physical fitness in the success of basic athletic techniques in students through a synthesis of relevant, up-to-date, and open scientific literature, so that a more comprehensive understanding of the pattern of relationships between the components of fitness and basic technique performance can be obtained ([Elisyah et al., 2025](#)). In line with these goals, the formulation of the problem in this article is how physical fitness affects the success of basic athletic techniques in college students and what components of fitness most consistently contribute to mastery of techniques, while the research questions are directed at identifying forms of relationships, mechanisms of influence, and their implications for athletic learning in college ([Sattar et al., 2022](#)).

The scientific contribution of this article lies in the effort to bring together the findings that have been scattered about physical fitness, motor skills, and technical performance into a systematic review framework that specifically focuses on the context of students and basic athletic techniques, rather than on sports performance in general ([Hidayat et al., 2023](#)). Thus, the novelty of this article lies in the preparation of a conceptual and empirical synthesis that places physical fitness as a strategic variable in the success of basic athletic techniques in students, so that the results of the study are expected to enrich the development of movement learning theory as well as become an academic

reference for lecturers, coaches, and physical education curriculum developers in higher education ([Cuaresma, 2024](#)).

LITERATURE REVIEW

Physical fitness in the study of sports science is understood as the body's capacity to carry out physical activity efficiently through the integration of endurance, strength, speed, flexibility, coordination, and movement control components, while basic athletic techniques are understood as fundamental movement patterns embodied in running, jumping, and throwing skills that demand biomechanical efficiency and precision of execution ([Moroz & Gavryshko, 2022](#)). Theoretically, the relationship between physical fitness and technique success can be explained through the concepts of movement competence and physical preparedness, i.e. individuals who have better fitness and movement quality tend to show higher postural control, stability, and motor efficiency in the implementation of exercise skills ([Lin et al., 2022](#)). The relevance of this theory to research on students lies in the fact that athletic learning in college not only targets mastery of technique as the end result, but also demands physical readiness as the foundation for consistently displaying effective, safe, and repetitive movements ([Li et al., 2025](#)).

Mapping of previous studies shows that the relationship between physical condition and skill performance has been examined across a wide range of populations and sports, although not entirely focused directly on basic student-athlete techniques. In college students, body mass index and fine motor skills were found to be meaningful predictors of athletic performance, indicating that physical quality and motion control capacity together contribute to performance success ([Vranešić Hadžimehmedović et al., 2023](#)). In the context of fitness, the increase in aerobic and anaerobic components has also been shown to have a significant impact on the physical fitness of female athletes, with a significant effect on cardiorespiratory endurance, muscle strength, agility, and speed, thus reinforcing the assumption that engineering performance does not stand alone from the quality of its supporting fitness ([Sattar et al., 2022](#)). Meanwhile, a study on long jump learning in college students showed that differences in physical fitness levels were associated with an increase in technical indicators such as initial speed, step tempo, and repulsion effectiveness, thus showing that the quality of physical condition is directly related to the quality of technique implementation ([Yefremenko et al., 2023](#)).

This article positions itself to answer this gap by collecting, selecting, and synthesizing empirical findings that have been scattered in studies on physical performance, engineering skills, and sports learning, and then interpreting them in a targeted manner in the context of basic athletic techniques in students. This position is relevant because systematic reviews of functional training show that functional training interventions are effective in improving physical and technical performance in the athlete population, but the available evidence is still scattered across sports and has not been consolidated for the context of student athletic learning ([Xiao et al., 2025](#)). Similar is seen in studies of core training, which show benefits on strength, sprints, jumps, balance, agility, and various

game skills, but have not specifically addressed how these components are connected to the success of basic athletic techniques in higher education settings ([Luo et al., 2023](#)). Therefore, the contribution of this article to the literature lies in strengthening the cross-study understanding that physical fitness is not just a background variable, but rather a performative basis that can explain the variation in the success of basic athletic techniques in students.

Based on the overall study, the conceptual synthesis of this study is based on the assumption that the success of basic athletic techniques in students is the result of the interaction between physical readiness, motor competence, and learning context, with physical fitness serving as the main foundation that allows movement to be carried out more stably, efficiently, and accurately. This assumption is supported by evidence that psychological strategies such as self-talk and mental imagery can improve the mastery of motor skills, but their effectiveness still works within a framework of performance development that requires physical readiness and quality of movement control ([Hidayat et al., 2023](#)). In addition, the study of the identification of sports talents emphasizes that physical factors, motor abilities, and non-physical factors should be seen as complementary systems, so that in the context of this study, physical fitness is positioned as a core component that needs to be read together, but still differentiated analytically from psychological and pedagogical factors ([Hamidi & Wazir, 2022](#)). This synthesis is a logical basis for the use of the systematic literature review approach in the methods section, because the problems studied require a systematic search of evidence to identify patterns of findings, gaps, and consistency of relationships between physical fitness and the success of basic athletic techniques in students.

RESEARCH METHODS

This study uses the Systematic Literature Review (SLR) strategy, which is a literature-based research approach that aims to identify, select, assess, and synthesize scientific findings in a systematic, transparent, and replicable manner related to the role of physical fitness in the success of basic athletic techniques in students. The selection of SLRs is based on the need to bring together evidence scattered across various empirical studies and scientific studies so that a more comprehensive pattern of findings can be obtained than the usual narrative reading of the literature ([Torres et al., 2024](#)). The reporting of the review process in this study refers to the principles of PRISMA 2020 and the strengthening of search strategy reporting through PRISMA-S, as both guidelines are widely used to improve the traceability of the process of identification, screening, and selection of articles in evidence synthesis studies ([Rethlefsen et al., 2021](#)). In the context of this study, SLR is positioned not just as a summary of the literature, but as an analytical procedure to read the consistency of the relationship between the components of physical fitness and the performance of basic athletic techniques in the student population.

The data sources in this study are all in the form of secondary data derived from open-access scientific literature, especially journal articles that are relevant to the research theme. The literature used as a data source includes quantitative empirical articles, experiments, quasi-experiments, observational studies, and

reviews that provide conceptual information and findings regarding physical fitness, motor skills, athletic learning, and basic engineering performance in students or equivalent populations in physical education and sports. Because this research is literature-based, the data units analyzed are not individuals or field respondents, but scientific documents that meet substantial and methodological requirements to answer the focus of the study. The use of journal articles as a unit of analysis is seen as in accordance with modern evidence synthesis practices that place articles as primary sources of traceable evidence, rather than popular sources or non-scientific documents that are weak in terms of academic validity ([Levay & Craven, 2023](#)).

Data collection was carried out through a systematic literature search protocol on relevant scientific databases and academic indexing engines, namely Google Scholar, PubMed, Scopus, and Crossref/DOAJ to ensure adequate coverage of open-access articles. The search process was carried out with a combination of keywords in Indonesian and English derived from the focus of the research, including: physical fitness, physical condition, motor competence, athletic performance, fundamental athletic techniques, track and field, college students, university students, students, physical fitness, basic athletic techniques, and athletic learning. These keywords are combined using Boolean operators such as AND, OR, and NOT to make searches more focused on the relationship between physical fitness and basic athletic skills. All search results are then exported to a digital worksheet for deduplication, metadata recording, and documentation of the selection stages. Strengthening the search strategy documentation is important because the quality of systematic review is greatly influenced by the clarity of search sources, the transparency of search strings, and the traceability of the article identification process ([Bodnaruc et al., 2024](#)). To help visualize the flow of article selection, this study follows the logic of the PRISMA 2020 flowchart that is commonly used in systematic review reporting ([Haddaway et al., 2021](#)).

The inclusion criteria in this study are set as follows: (1) articles published in the last five years, namely 2021–2025; (2) articles in the form of open-access scientific journals; (3) the article directly or substantively discusses the topic of physical fitness, athletic performance, motor ability, learning basic athletic techniques, or the relationship between these variables; (4) the subject of the study is in the context of students, physical education students, novice athletes, or populations that are conceptually still relevant to explain the performance of basic techniques; (5) the article is available in full text so as to allow adequate data extraction; and (6) articles written in Indonesian or English. The exclusion criteria include: (1) articles that are only in the form of editorials, opinions, brief proceedings, or conference abstracts without full text; (2) articles that do not provide open access; (3) articles that focus on sports without conceptual relevance to physical fitness and basic techniques; (4) duplicate articles; and (5) articles that do not provide sufficient information to be analyzed according to the focus of the research. The establishment of these explicit criteria is important to maintain selection consistency, minimize study selection bias, and improve synthesis reproducibility ([Elsman et al., 2024](#)).

In this study, the unit of analysis is a scientific journal article that has passed the title selection stage, abstract, and full text review. Each selected article is then extracted into a data matrix that contains key information, namely the author's name, year of publication, study context or population, research design, variables studied, instruments or forms of physical fitness measurement, indicators of technical performance or athletic skills, as well as key findings relevant to the focus of the research. Since this study is oriented towards conceptual-empirical synthesis, the article is not treated as a mere bibliography, but as a unit of evidence that is compared based on methodological characteristics and the substance of the results. To support the consistency of recording, the data extraction process is carried out using Microsoft Excel or similar spreadsheets, while the organization of references can be assisted with Mendeley/Zotero to facilitate deduplication and citation management. The use of digital aids in systematic review is now considered important because it can improve the regularity of documentation, selection efficiency, and transparency of the scientific work process ([Holst et al., 2025](#)).

The data analysis technique used is a systematic narrative synthesis with stages: data reduction, categorization of findings, comparison between studies, and drawing of conceptual patterns. In the first stage, articles that passed the selection were read in depth to identify how each study defined physical fitness and the success of basic athletic techniques. In the second stage, the findings are grouped into analytical themes such as the dominant fitness component, the type of athletic skill being studied, the context of learning or training, and the form of the relationship between fitness variables and technique performance. In the third stage, a comparison between findings was carried out to see the consistency, differences, and trends of results based on the study design and population. In the final stage, the findings are synthesized into an analytical proposition that explains the role of physical fitness in the success of basic athletic techniques in students. Meta-analysis was not used due to the heterogeneity of the research design, the variation of fitness indicators, and the differences in the measurement instruments of the technique which were estimated to be quite high, so that narrative synthesis was seen as more appropriate to produce a complete conceptual understanding. This choice is in line with practice in systematic reviews that use a narrative approach when data are not homogeneous or inadequate for direct statistical incorporation ([Bauer et al., 2023](#)).

RESEARCH RESULTS

The results of the search and literature selection show that publications relevant to the topic of the role of physical fitness on the success of basic athletic techniques in students are dominated by articles published in 2022–2025, with a tendency to increase attention to the relationship between fitness quality, movement competence, and technical performance in the context of physical education, functional training, and sports learning. Characteristically, the identified publications came from journals in the fields of physical education, sports science, public health, and sports psychology, with a design dominated by experiments, quasi-experiments, randomized controlled trials, and systematic

reviews. In experimental study groups in a student setting, an eight-week functional training intervention reported improvements in functional movement quality and all major fitness indicators, namely the 50-meter sprint, the 1,000-meter run, the sit and reach, the standing long jump, and the vital capacity, suggesting that many studies positioned fitness as a variable that could be modified through structured exercise programs ([Li et al., 2025](#)). At the level of publication mapping, the most frequent themes that emerged were improving motor skills, fitness development, and the effectiveness of learning or training models on movement performance, while articles that explicitly linked physical fitness to basic student athletic techniques appeared in a more limited number and spread across various research contexts ([Das, 2025](#)).

Based on the synthesis of the content of the article, the first pattern of findings shows that physical fitness is consistently presented as the foundation of movement performance and the success of exercise skills. In studies that assessed predictors of student athletic performance, fine motor skills and body mass index were found to explain about 30% variation in athletic performance, indicating that performance on athletic tasks was influenced not only by the techniques studied, but also by the physical condition and quality of motor control of the participants ([Vranešić Hadžimehmedović et al., 2023](#)). In the context of university female athletes, aerobic and anaerobic fitness are reported to have a significant influence on overall physical fitness, with noticeable effects on cardiorespiratory endurance, muscle strength, muscle endurance, flexibility, agility, and speed, so the literature places the fitness component as an element that can explain variations in movement performance capacity ([Sattar et al., 2022](#)). In review studies, functional training interventions have also been reported to improve physical and technical performance in athletes from various sports, so that in publications there is a pattern of incorporation between fitness indicators and technical skill indicators in a single outcome measurement framework ([Xiao et al., 2025](#)).

The second pattern of findings shows that the literature that is directly related to the learning or implementation of basic athletic techniques shows the repetition of results that the quality of physical conditions is related to the quality of technique implementation. In a study on the long jump learning program in students from martial arts, participants with different levels of physical fitness showed an improvement in technique results after participating in the program, with changes in indicators of initial speed, last step tempo, repulsion time, and jump results, so this article places physical fitness as a differentiating variable related to the success of learning long jump techniques ([Yefremenko et al., 2023](#)). In a study on the development of arm and leg movements in the starting phase of the 100-meter run for female students, the results showed significant differences in tests related to the stability of jumps, 30-meter runs, and 100-meter run achievement after harmonic exercises, which placed movement compatibility and specific physical abilities as part of the success of the start and completion of the run ([Shaghathi & Mohsen, 2025](#)). In another study in the 400-meter running learning, the use of Fit Light-assisted educational exercises was reported to improve some kinematic manifestations and running performance learning, so

that in the group of athletic articles, it was seen that the results of learning techniques were often reported along with changes in underlying physical or motion indicators ([Kalaf, 2024](#)).

The third pattern of findings shows the dominance of approaches that combine fundamental motor skills with physical fitness as close to each other in physical education. In the Eco-Athletics model for physical education students, the experimental group showed a significant improvement in motor skills fundamentals and environmental awareness compared to the control group, with large effect measures on both variables, which placed athletic learning as a means of strengthening basic movement skills ([Elisyah et al., 2025](#)). In systematic reviews of neuromuscular training, most studies show improvements in postural control, fundamental motor skills, muscular fitness, speed, endurance, and flexibility, so publications in this field show a pattern that increased physical capacity and movement competence often appear simultaneously in the results of studies ([Lin et al., 2022](#)). Meanwhile, studies of children who received Kids' Athletics interventions reported improvements in fundamental movement skills, social-emotional development, and physical activity, so that articles on education-based athletics more often portrayed athletics as a vehicle for physical literacy development that brings together fitness, skills, and active behavior ([Huang & Choosakul, 2025](#)).

The methodological pattern of the reviewed literature shows that field studies mostly use pretest-posttest designs with control groups, quasi-experiments, or randomized controlled trials, while synthesis studies use PRISMA or other forms of systematic review to organize cross-study findings. In a systematic review of blended learning in college physical education, the majority of studies analyzed assessed motor skills as the main outcome, with a small percentage assessing fitness such as lung capacity, sit and reach, pull-up, 1,000-meter run, and 800-meter run, suggesting that methodologically university sports education studies tend to combine motor outcomes and fitness outcomes ([Wang et al., 2022](#)). Another systematic study of flipped learning in university physical education classes also reported positive results on cognitive, affective, and motor aspects in various sports, suggesting that cutting-edge methodological trends are moving towards multidimensional evaluation, rather than mere single-technique achievement ([Dafun Jr. et al., 2024](#)). In a study of machine learning in physical education, sports, and recreation, the results of the review showed an increase in the analysis of athletic performance, injury prevention, and personalization of training, indicating that the recent literature is also beginning to highlight the support of data-driven approaches in reading the relationship between physical condition and skill development ([Fadare et al., 2025](#)).

Thematically, the results of the literature synthesis can be grouped into four main categories. The first category is fitness as the basis of performance capacity, which is characterized by studies that place endurance, strength, speed, flexibility, and agility as basic indicators of participants' physical readiness. The second category is fitness and motor competence as a predictor of skills, which includes articles that show the relationship between motor quality or body

condition and athletic performance outcomes or basic skills. The third category is learning/exercise interventions that improve fitness as well as technique outcomes, which include functional, neuromuscular, or athletic learning models of exercise that produce concurrent changes in physical and motion indicators. The fourth category is the contextual study of physical education and college sports, which shows that research on college students more often positions technique, fitness, and movement competence as interrelated outcomes. In relation to population characteristics, articles on student athlete competencies also show that physical, mental, emotional, and social competencies are related to athletic behavior such as discipline, determination, goal setting, sportsmanship, and fair play, so that in publication data student athletic performance appears as a multidimensional construct ([Cuaresma, 2024](#)). In addition, a systematic study of physical and psychological factors in talent identification also noted that physical fitness, anthropometry, and motor abilities are the most commonly used indicators in mapping sports performance potential, thus showing that fitness variables are consistently present in the performance and skills research landscape ([Hamidi & Wazir, 2022](#)).

Table of Synthesis of Additional Research and Analysis Results

Table 1. Characteristics of the Reviewed Study

N o.	Study	Research Focus	Design	Population/Conte xt	Yea r
1	Li et al.	Functional training for non-athletic male students	Randomized controlled trial	University students	2025
2	Vranešić Hadžimehmedović et al.	Predictors of Student Athletic Performance	Quantitative correlational	Faculty of Kinesiology Students	2023
3	Sattar et al.	Aerobic and anaerobic fitness in female university athletes	Pretest-posttest experiment	University female athletes	2022
4	Yefremenko et al.	Long jump technique learning	Educational experiments	Students	2023
5	Shaghati and Mohsen	Harmonic training at the start of the 100-meter run	Experiments	Female students	2025
6	Kalaf	Fit Light educational exercises for running 400 meters	Control group experiments	Physical education students	2024
7	Elisyah et al.	Model Eco-Athletics	Quasi-experiment	Physical education students	2025
8	Lin et al.	Neuromuscular training	Systematic review	Physical education intervention studies	2022
9	Huang and Choosakul	Kids' Athletics	Intervention with SEM	Students in motion education	2025
10	Wang et al.	Blended learning in physical education	Systematic review	University students	2022

11	Dafun Jr. et al.	Flipped learning in physical education	Systematic review	University students	2024
12	Lent	Student-Athlete Competencies	Quantitative descriptive	Student-athletes	2024

Study characteristics show that the literature used is dominated by experimental, quasi-experimental, and systematic review research, so the evidence base in this study tends to be strong to describe the relationship between physical interventions, physical fitness, and sports skill performance ([Li et al., 2025](#)); ([Lin et al., 2022](#)). The distribution of the year of publication also shows that this theme is most intensively discussed in 2022–2025, which indicates that the issue of the relationship between physical fitness and mastery of techniques is getting more attention in the study of physical education and sports science ([Wang et al., 2022](#)); ([Dafun Jr. et al., 2024](#)).

Table 2. Key Findings of Each Study

N o.	Study	Key Findings	Thematic Categories
1	Li et al.	Functional training improves the quality of functional movement, 50 m sprint, 1000 m run, sit and reach, standing long jump, and vital capacity	Fitness as a basis for performance
2	Vranešić Hadžimehmedović et al.	Fine motor skills and BMI explain about 30% variation in athletic performance	Skill predictors
3	Sattar et al.	Aerobic and anaerobic fitness have a significant effect on endurance, strength, flexibility, agility, and speed	Fitness as a basis for performance
4	Yefremenko et al.	Long jump learning improves initial speed, step tempo, repulsion time, and jump results	Interventions improve fitness and technique outcomes
5	Shaghathi and Mohsen	Harmonic training improves stability in jumps, 30 m runs, and 100 m run achievements	Interventions improve fitness and technique outcomes
6	Kalaf	Fit Light improves kinematic manifestation and 400m running performance learning	Interventions improve fitness and technique outcomes
7	Elisyah et al.	Eco-Athletics improves the fundamentals of motor skills with a large effect size	Context of college physical education
8	Lin et al.	Neuromuscular training improves postural control, motor skills, muscular fitness, speed, endurance, and flexibility	Interventions improve fitness and technique outcomes
9	Huang and Choosakul	Kids' Athletics improves fundamental movement skills, physical activity, and social-emotional development	Context of physical education
10	Wang et al.	Blended learning most often improves motor skills and some fitness indicators	Context of college physical education
11	Dafun Jr. et al.	Flipped learning has positive results on cognitive, affective, and motor aspects	Context of college physical education

12	Lent	Physical, mental, emotional, and social competencies are related to athletic behavior	Skill predictors
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Key findings suggest that almost all studies place physical fitness, movement quality, or motor competence as components directly related to skill performance or engineering outcomes. This pattern is seen both in physical intervention studies, performance predictor studies, and physical education learning studies, so that the literature reviewed shows consistency that the success of athletic techniques does not stand alone, but is related to the physical readiness and movement quality of participants ([Vranešić Hadžimehmedović et al., 2023](#)); ([Sattar et al., 2022](#)); ([Yefremenko et al., 2023](#)).

Table 3. Synthesis Theme Grouping

N o.	Main Themes	Number of Studies	Representative Studies
1	Fitness as a basis for performance	2	Li et al.; Sattar et al.
2	Fitness and motor competence as predictors of skills	2	Vranešić Hadžimehmedović et al.; Lent
3	Interventions improve fitness and technique outcomes	4	Yefremenko et al.; Shaghati and Mohsen; Kalaf; Lin et al.
4	Contextual studies of physical education/college	4	Elisyah et al.; Huang and Choosakul; Wang et al.; Dafun Jr. et al.

The distribution of themes shows that the largest group of findings is in two domains, namely interventions that improve fitness as well as engineering outcomes, and contextual studies of physical education/college. This means that the cutting-edge literature more often discusses the relationship between fitness and skills through an exercise program or learning model approach, rather than just through a simple measurement of relationships between variables ([Kalaf, 2024](#)); ([Elisyah et al., 2025](#)); ([Huang & Choosakul, 2025](#)).

Table 4. Study Methodology Pattern Reviewed

N o.	Methodology/Design	Number of Studies
1	Experiment/pretest-posttest/control group	5
2	Systematic review	3
3	Quantitative correlation/descriptive	2
4	Quasi-experiment	1
5	Intervention with SEM	1

The methodological pattern shows the dominance of experimental design and systematic review. This suggests that the available evidence is more directed towards assessing changes before-after interventions or summarizing the

effectiveness of different practice and learning approaches. Thus, the synthesis results in this article are indeed more suitable to be displayed in the form of thematic categories, methodological trends, and findings patterns than a single quantitative meta-analysis, because the heterogeneity of the design and outcome indicators is quite high (Li et al., 2025); (Xiao et al., 2025).

Visualization of Research Results

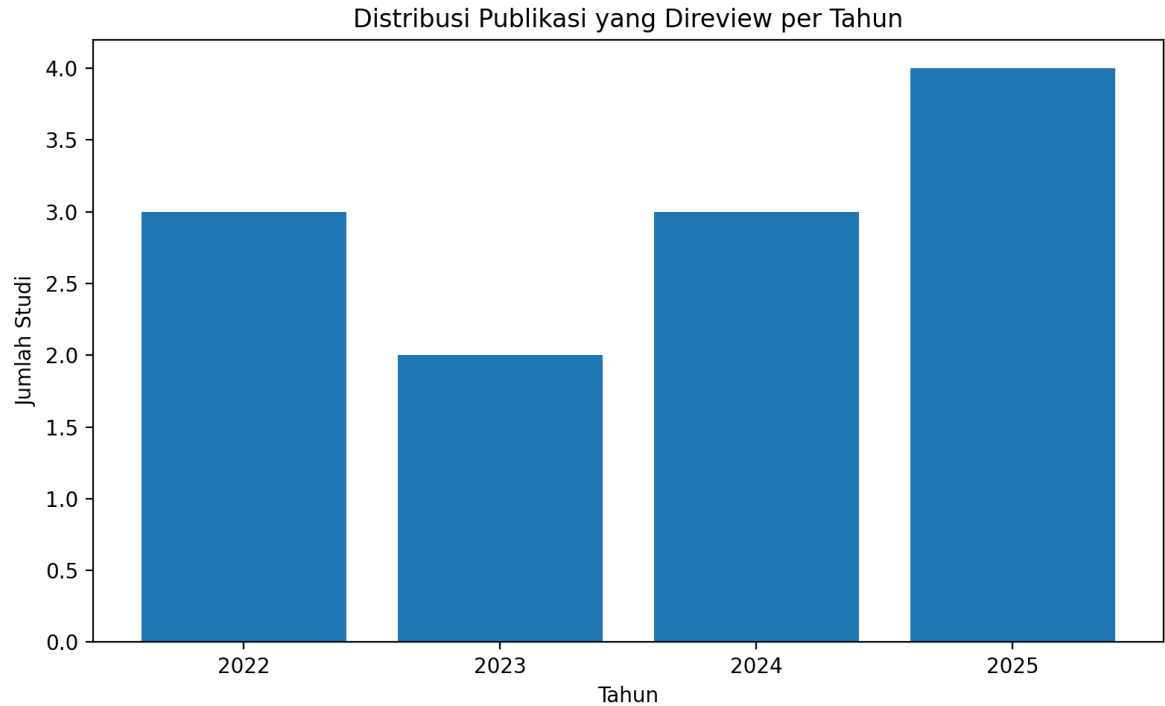


Figure 1. Distribution of Published Reviewed Publications per Year

Visualization 1 shows the distribution of the published publications reviewed by year of publication. This graph shows the concentration of articles in the period 2022–2025, with a tendency to increase in 2024–2025, thus showing that the topics of physical fitness, motor competence, and technical performance in physical education and athletics are still actively developing in the latest literature (Dafun Jr. et al., 2024).

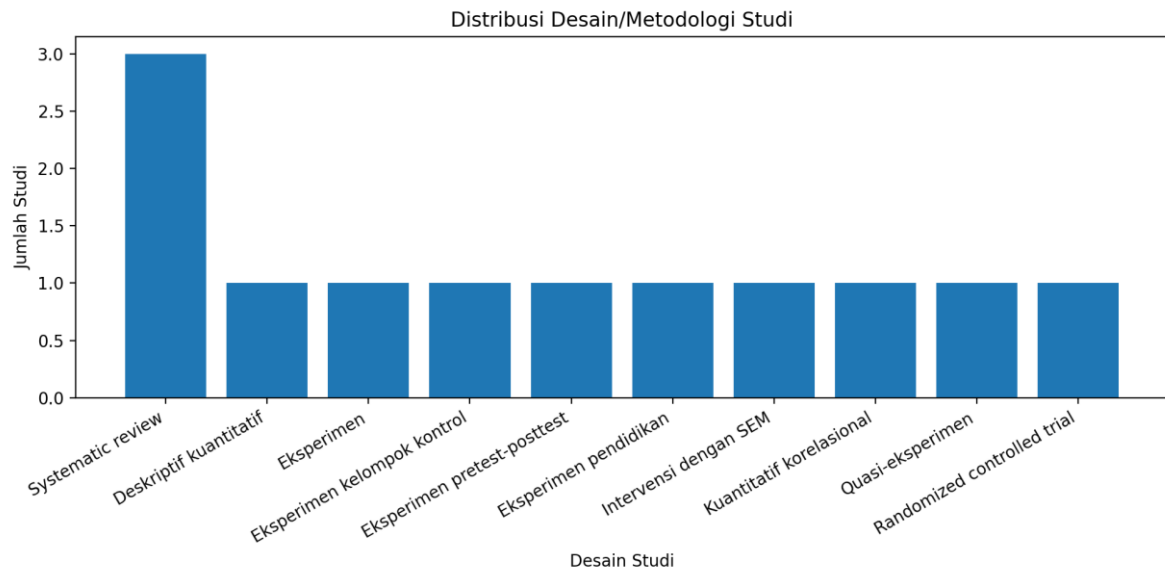


Figure 2. Distribution of Design/Study Methodology

Visualization 2 shows the distribution of the study methodology. This graph confirms the dominance of experimental approaches and systematic reviews, suggesting that studies on this topic are primarily directed at testing the effects of interventions or synthesizing evidence on the effectiveness of exercise and physical learning ([Lin et al., 2022](#)).

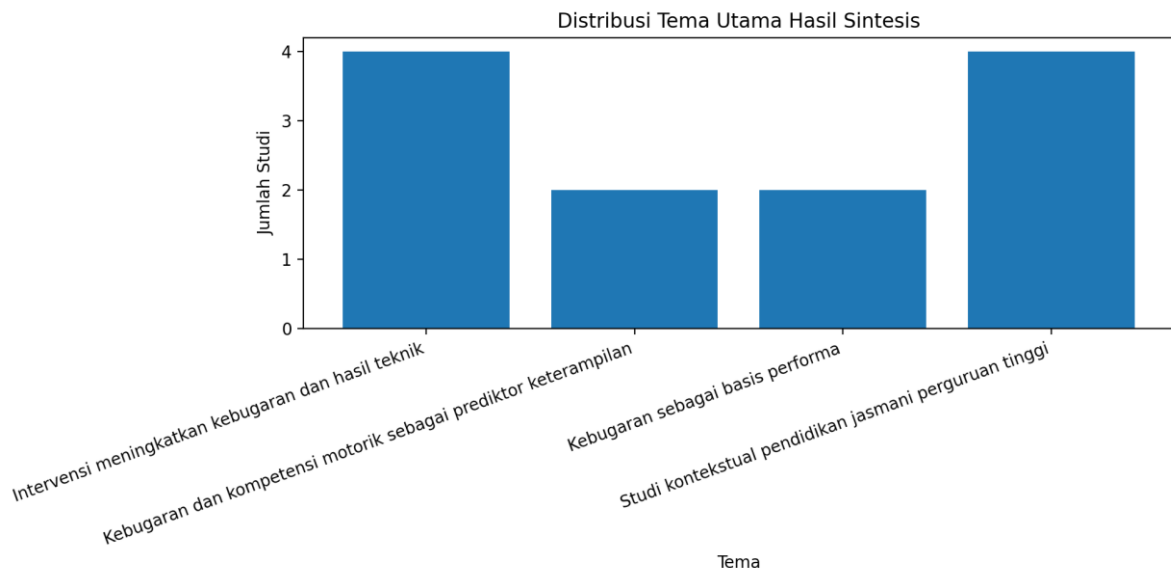


Figure 3. Distribution of the Main Themes of the Synthesis Results

Visualization 3 shows the distribution of the main themes of the synthesis. This graph shows that the theme of intervention and the context of physical education are the most dominant categories, so the results of the review illustrate that the relationship between physical fitness and technique success is more studied through training programs, learning models, and sports education contexts ([Wang et al., 2022](#)); ([Elisyah et al., 2025](#)).

Discussion

The results of the synthesis show that the purpose of the study to analyze the role of physical fitness on the success of basic athletic techniques in students is basically answered through a relatively consistent pattern of findings, namely that physical fitness functions as a performance foundation that allows basic athletic skills to be executed more effectively. In the literature reviewed, the relationship appears to be through two main pathways, namely the direct pathway in the form of the relationship between the fitness component and athletic performance, and the indirect pathway in the form of improving technical skills after an intervention that at the same time improves physical capacity. These findings are in line with the results of studies showing that the quality of functional movement and fitness components such as speed, endurance, flexibility, power, and vital capacity can increase simultaneously after functional training in students, so that the success of technique performance cannot be separated from the physical readiness that underpins it ([Li et al., 2025](#)). At the level of performance prediction, fine motor skills and body mass index have also been shown to explain some variation in student athletic performance,

confirming that physical quality and motor control quality work simultaneously in producing skill performance ([Vranešić Hadžimehmedović et al., 2023](#)). Thus, the formulation of research problems regarding how physical fitness affects the success of basic athletic techniques in students can be answered by placing fitness as a performative prerequisite that increases the chances of achieving stable, efficient, and successful execution of techniques.

In a theoretical framework, these findings can be interpreted through the concepts of movement competence, physical preparedness, and motor learning that place the body not only as a medium for implementing techniques, but as a basic condition for the formation of effective movement patterns. The synthesis shows that as the fitness component develops, learners tend to have a better ability to generate coordination, stability, rhythm, and biomechanical efficiency in athletic tasks. This is consistent with evidence that neuromuscular training provides improvements in postural control, fundamental motor skills, muscular fitness, speed, endurance, and flexibility, which shows a close relationship between physical readiness and movement quality ([Lin et al., 2022](#)). This relationship is also strengthened by a meta-analysis showing that motor competence is positively associated with various physical fitness characteristics in adolescents, although approaches to measuring motor competence are still very diverse ([Burton et al., 2023](#)). From a conceptual point of view, this means that basic athletic technique is not merely the result of repetition of technical instructions, but rather a representation of the integration between physical capacity, the quality of motor control, and the experience of structured training.

When compared to previous studies, the results of this study are mainly in line with research showing that improvement in athletic technique is often accompanied by an increase in supporting physical capacity. In long jump learning, for example, improved technique outcomes were found to be accompanied by improvements in indicators such as preset speed, step tempo, and repulsion time, which showed a direct relationship between physical readiness and the quality of technique execution ([Yefremenko et al., 2023](#)). Similarly, harmonic training at the start of a 100-meter run resulted in improvements in running indicators and motion stability, thus confirming that technique improvement is highly dependent on the quality of specific physical abilities ([Shaghati & Mohsen, 2025](#)). These results are also consistent with reviews showing that functional training is effective in improving physical and technical performance in the athlete population, although the magnitude of the effects may vary by type of exercise, training experience, and program duration ([Xiao et al., 2025](#)). However, there are also findings that suggest that the relationship between motor competence and certain aspects of fitness is not always uniform in all contexts; for example, some studies report inconsistent linkages on flexibility or on certain dimensions when measurements and sample characteristics differ, so that variation in results remains to be understood as a consequence of instrument and population heterogeneity ([Alves et al., 2023](#)).

The scientific contribution of this article lies in its ability to organize the findings that were previously scattered into a single synthesis that specifically highlights the student context and basic techniques of athletics. Many previous

publications have addressed fitness, motor competence, or sports learning within the general framework of physical education, but have not entirely placed basic athletic techniques as the focus of the analysis. By conducting a directed synthesis, this article expands the understanding that physical fitness in college students is not just an indicator of health or a byproduct of athletic learning, but a core component that affects the quality of engineering achievement. The practical contribution is also clear to lecturers, coaches, and curriculum developers, namely the need for athletic learning in higher education to be integratively designed between engineering teaching and fitness reinforcement, rather than rigidly separated. This is supported by evidence that learning models such as blended learning and flipped learning in college physical education tend to be more effective when learning outcomes are understood multidimensionally, covering the motor, cognitive, and affective domains ([Wang et al., 2022](#)); ([Dafun Jr. et al., 2024](#)). In the development of theory, this article reinforces the position that learning basic athletic techniques needs to be understood in the framework of physical literacy and movement competence, not just in the logic of procedural mastery of techniques.

This research still has limitations that need to be recognized proportionately. First, as an SLR, the quality of the conclusions was strongly influenced by the methodological quality of the studies reviewed, while studies on this topic showed variations in design, sample size, measurement instruments, and operational definitions regarding physical fitness and engineering skills. Second, not all articles directly examine students in the context of basic athletic engineering; Some of the literature used comes from physical education, other sports, or conceptually adjacent age populations, so generalizations to the student's athletic context need to be done carefully. Third, the heterogeneity of the outcome indicators makes this study more appropriate using narrative synthesis than meta-analysis, but the consequence is that the estimation of the magnitude of the effect cannot be calculated in aggregate. These limitations are in line with meta-analytical findings that studies of motor competence and physical fitness still face a diversity of assessments as well as a lack of adequate longitudinal observations ([Burton et al., 2023](#)). In addition, longitudinal research in college students in other fields shows that physical fitness may decline during the study period, suggesting that student fitness status is a dynamic variable and easily influenced by educational context, lifestyle, and academic load ([Tang et al., 2024](#)).

The implications of these findings lead to the need for more specific, measurable, and contextual follow-up research. Future research needs to focus on student populations with longitudinal designs or controlled experiments that simultaneously measure physical fitness components, the quality of basic athletic techniques, as well as possible mediating factors such as physical activity, motor competence, and self-efficacy. This is important because several studies show that cardiorespiratory fitness can act as a mediator between motor competence and physical activity, indicating a more complex relationship mechanism than simple direct associations ([Kaioglou et al., 2022](#)). For physical education and coaching practitioners, the results of this study suggest the need for athletic

learning programs that combine technique training with specific fitness reinforcement, variation of movement experience, and ongoing competency development, as exposure to organized physical activity has been shown to be associated with better motor competence ([Škundrić et al., 2023](#)). At the institutional policy level, the physical education curriculum in higher education also needs to provide more space for structured and development-oriented athletic learning, considering that education-based athletic programs can simultaneously improve physical and motor indicators ([Pehoiu, 2025](#)).

Conclusion

Based on the results of a systematic literature review, this study shows that physical fitness has an important role in the success of basic athletic techniques in students. This role is seen in the consistent relationship between the components of fitness, such as speed, endurance, strength, agility, flexibility, and quality of motion control, and the quality of the implementation of basic athletic skills. The synthesis of findings shows that students who have better physical condition tend to show more effective, stable, and efficient engineering performance, while various training and learning interventions that improve physical fitness also tend to be followed by improved engineering results. Thus, the purpose of the study to analyze the role of physical fitness on the success of basic athletic techniques in students can be stated to be achieved.

This article makes a theoretical and conceptual contribution by affirming that basic athletic techniques cannot be understood solely as the result of mastery of movement procedures, but as an output of the interaction between physical readiness, motor competence, and structured learning experiences. In the practical realm, the results of this study confirm the importance of athletic learning design in higher education that integrates technical training with the development of physical fitness systematically. This contribution is relevant for the development of physical education learning, student sports coaching, and curriculum design that is more based on the needs of real movement performance.

Further research needs to be directed towards more specific studies of the student population with an empirical design that is able to directly measure the relationship between the physical fitness component and the indicators of basic athletic technique. In addition, it is necessary to develop a learning and practice model that not only focuses on mastering techniques, but also on building physical capacity that supports the success of these techniques. With such a development direction, future research results are expected to strengthen the scientific basis for more effective, measurable, and contextual athletic learning practices in higher education environments.

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