



Physical Activity as a Determinant of Physical Fitness and Motor Skill Development: A Descriptive-Analytical Review

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Abstract. Physical activity is a critical determinant of health-related physical fitness and motor skill development during childhood and adolescence, representing a foundational component of long-term athletic and functional performance. This study aims to systematically examine the relationship between physical activity, physical fitness, and motor competence through a structured literature-based analysis. A descriptive-analytical method was employed to synthesize findings from recent empirical studies (2020–2025) investigating the physiological and motor development outcomes associated with varying levels of physical activity. The findings indicate a consistent and statistically significant positive relationship between regular physical activity and key components of physical fitness, including cardiovascular endurance, muscular strength, flexibility, and body composition [1], [2]. Moreover, higher engagement in moderate-to-vigorous physical activity (MVPA) is strongly associated with enhanced motor skill proficiency, particularly in locomotor, non-locomotor (stability), and object control skills [3], [4]. From a physiological perspective, regular activity promotes neuromuscular coordination, metabolic efficiency, and musculoskeletal adaptation, which collectively contribute to improved motor performance and functional capacity [5]. Importantly, both structured (e.g., physical education programs and organized sports) and unstructured (e.g., free play and recreational activity) forms of physical activity demonstrate complementary roles in optimizing motor development trajectories. These findings reinforce the theoretical framework of physical literacy, which emphasizes the integration of movement competence, confidence, and motivation as essential components of lifelong physical engagement [6]. In conclusion, physical activity serves as a significant and multidimensional predictor of physical fitness and motor skill acquisition. The study highlights the necessity of integrating evidence-based physical activity interventions into educational curricula and public health strategies to support optimal growth, prevent sedentary behavior, and enhance long-term health outcomes among youth.

Keywords: Physical activity, Physical fitness, Motor skills, Physical literacy, Adolescents, Sport science.

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1 Introduction

Physical activity constitutes a fundamental component of human movement behavior and plays a crucial role in maintaining health and supporting optimal physical development across the lifespan. Its importance is particularly pronounced during childhood and adolescence, critical periods characterized by rapid physiological growth, neuromuscular development, and behavioral formation. Regular engagement in physical activity during these stages has been consistently associated with improved physical fitness, enhanced motor competence, and the establishment of lifelong active habits [1]–[3]. Conversely, insufficient physical activity is linked to diminished fitness levels, delayed motor development, and an increased risk of sedentary lifestyles and associated non-communicable diseases in later life [4], [5].

Physical fitness is commonly defined as a multidimensional construct encompassing health-related components such as cardiovascular endurance, muscular strength and endurance, flexibility, and body composition. These components collectively determine an individual's capacity to perform daily activities efficiently without excessive fatigue [6], [7]. Empirical evidence indicates that higher levels of physical fitness are positively associated not only with physiological health outcomes but also with cognitive performance, academic achievement, and psychological well-being among children and adolescents [8], [9]. However, recent global trends suggest a concerning decline in youth physical fitness, largely attributed to reduced participation in moderate-to-vigorous physical activity (MVPA) and increased engagement in sedentary behaviors, particularly screen-based activities [10].

In parallel, motor skill competence represents a critical domain of physical development, referring to an individual's ability to execute coordinated and goal-directed movements effectively. Motor skills are generally classified into locomotor (e.g., running, jumping), stability or non-locomotor (e.g., balancing, twisting), and object control skills (e.g., throwing, catching) [11]. The development of these skills is not automatic but requires structured practice, appropriate instruction, and diverse movement experiences. Within this context, physical activity serves as the primary mechanism through which motor skills are acquired, refined, and consolidated over time [12].

The relationship among physical activity, physical fitness, and motor competence is complex, dynamic, and reciprocal. Theoretical models, such as the developmental model proposed by Stodden et al., suggest that early motor competence influences subsequent physical activity engagement, which in turn enhances physical fitness and reinforces motor skill development [13]. Physiologically, regular physical activity contributes to improved neuromuscular coordination, cardiorespiratory efficiency, and musculoskeletal adaptation, thereby facilitating both fitness enhancement and motor performance [14]. At the same time, individuals with higher levels of motor competence are more likely to participate in physical activity due to increased self-efficacy and perceived competence, illustrating a bidirectional and reinforcing relationship among these variables [15].

From an educational perspective, schools represent a strategic setting for promoting physical activity and fostering holistic physical development. Physical education (PE) provides structured opportunities to develop both fitness and motor competence

through planned, progressive, and inclusive instructional approaches [16]. However, in practice, PE programs are often constrained by limited instructional time and curricular imbalances that prioritize physical fitness outcomes over the systematic development of fundamental motor skills. Such disparities may hinder long-term physical activity participation, particularly among students with lower initial motor competence [17].

Despite extensive research on physical activity and health, many studies have examined physical fitness and motor skills as separate constructs, resulting in a fragmented understanding of their interdependence. This gap limits the development of integrated intervention strategies that simultaneously target fitness enhancement and motor skill acquisition. Addressing this limitation is essential for advancing sport science research and informing evidence-based physical education practices aligned with the concept of physical literacy, which emphasizes the integration of competence, confidence, and motivation for lifelong physical activity [18].

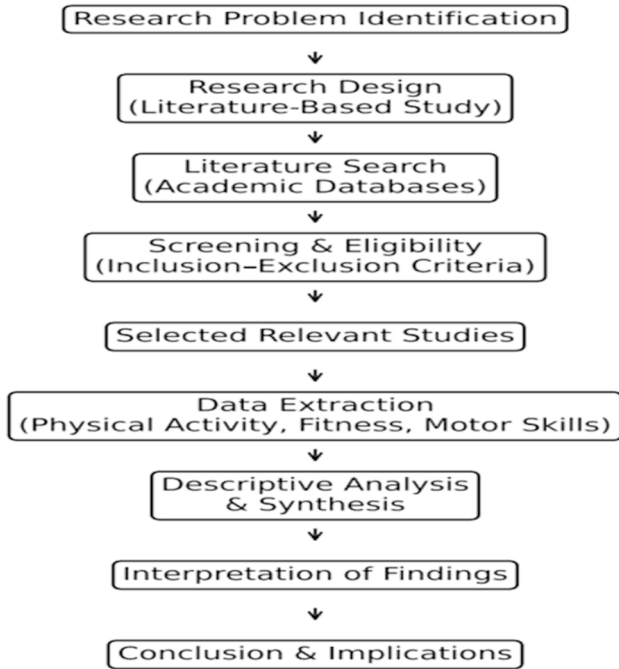
Therefore, this study aims to investigate the interrelationship between physical activity, physical fitness, and motor skills through a comprehensive descriptive-analytical review of recent literature. By synthesizing empirical findings, this study seeks to provide a coherent conceptual framework that elucidates the mechanisms underlying physical development and offers practical implications for physical education curriculum design and youth physical activity interventions.

2 Research Methodology

2.1 Research Design and Approach

This study employs a descriptive-analytical research design grounded in a structured literature review to examine the interrelationship between physical activity, physical fitness, and motor skill development. Rather than generating primary data, the study systematically synthesizes findings from existing empirical research to identify patterns, theoretical linkages, and emerging trends within the field of sport science [26]–[28].

The adoption of a literature-based approach is appropriate for developing a comprehensive conceptual understanding of the variables under investigation. This method facilitates the integration of diverse empirical findings and supports the evaluation of both theoretical frameworks and applied research outcomes. In particular, it enables the exploration of how varying levels and types of physical activity contribute to physiological adaptations and motor competence across developmental stages. To enhance methodological rigor, the review process was informed by established systematic review principles, including transparent selection procedures and structured synthesis [29].



2.2 Data Sources

The study utilizes secondary data derived from peer-reviewed scholarly publications in the fields of physical education, sport science, kinesiology, and human movement studies. Relevant literature was obtained from reputable academic databases, including Scopus, Web of Science, and Google Scholar, to ensure broad coverage and high-quality sources.

Priority was given to Scopus-indexed journals (2020–2025) to ensure the inclusion of recent and scientifically robust studies. These sources provide validated empirical evidence related to physical activity patterns, fitness outcomes, and motor skill development, thereby strengthening the reliability and academic credibility of the review.

2.3 Literature Search Strategy

A systematic search strategy was implemented using a combination of keywords and Boolean operators to optimize retrieval accuracy. Core search terms included “physical activity,” “physical fitness,” “motor skills,” “fundamental movement skills,” and “physical education.” These terms were applied across titles, abstracts, and keywords to capture relevant studies.

The search process followed a structured sequence involving identification, screening, eligibility assessment, and inclusion, consistent with systematic review guidelines such as PRISMA [30]. Both foundational studies and recent empirical research were

considered to ensure a balanced representation of theoretical development and contemporary evidence. Only publications written in English were included to maintain consistency in analysis and interpretation.

2.4 Inclusion and Exclusion Criteria

To ensure methodological consistency and relevance, explicit inclusion and exclusion criteria were applied.

Studies were included if they:

1. empirically examined relationships between physical activity and physical fitness and/or motor skill competence;
2. involved children, adolescents, or young adult populations;
3. were published in peer-reviewed journals or reputable conference proceedings; and
4. reported measurable indicators of physical fitness (e.g., $VO_2\text{max}$, muscular strength) or motor skill performance.

Studies were excluded if they:

1. consisted of non-scholarly works (e.g., editorials, opinion papers);
2. focused exclusively on elite or professional athletes without relevance to general or educational populations;
3. were duplicates; or
4. lacked sufficient methodological transparency or empirical data.

2.5 Data Extraction

Data from selected studies were systematically extracted using a standardized framework to ensure consistency and comparability. Extracted variables included: author(s), publication year, research design, sample characteristics (e.g., age, size), measures of physical activity (frequency, intensity, duration), indicators of physical fitness, categories of motor skills, and key findings related to the relationships among these variables.

This structured extraction process enabled the identification of trends and relationships across studies while minimizing bias in data interpretation.

2.6 Data Analysis and Synthesis

The collected data were analyzed using a descriptive synthesis approach, focusing on thematic integration rather than statistical aggregation. Studies were categorized into three primary domains:

1. physical activity and physical fitness outcomes;
2. physical activity and motor skill development; and
3. the interaction between physical fitness and motor competence.

The analysis emphasized identifying convergent findings, theoretical consistencies, and variations across study contexts. Particular attention was given to the role of moderate-to-vigorous physical activity (MVPA) in enhancing both physiological fitness and motor proficiency. Although meta-analysis was not conducted, the synthesis provides

a coherent interpretation of the evidence base and supports conceptual integration within sport science research [31].

2.7 Trustworthiness and Rigor

To ensure methodological rigor and reliability, several strategies were implemented. These included the use of peer-reviewed sources, clearly defined inclusion criteria, cross-study comparison, and transparent reporting of the review process. Additionally, triangulation of findings across multiple studies was applied to strengthen the validity of interpretations.

The adoption of systematic review principles enhances the credibility of the study and reduces potential bias in data selection and analysis [32].

2.8 Ethical Considerations

This study is based exclusively on previously published literature and does not involve direct human participation. Therefore, formal ethical approval was not required. All sources are appropriately cited to ensure academic integrity and proper attribution of original work.

3 Results and Discussion

The findings of this study are derived from a systematic synthesis of empirical literature examining the interrelationships among physical activity, physical fitness, and motor skill competence. The results are organized into four thematic domains: (1) characteristics of the reviewed studies, (2) the association between physical activity and physical fitness, (3) the relationship between physical activity and motor competence, and (4) the reciprocal interaction between physical fitness and motor skills.

3.1 Characteristics of the Reviewed Studies

The analyzed studies predominantly involved children and adolescents across school-based and community contexts, reflecting the developmental focus of contemporary sport science research. Methodologically, the literature comprised cross-sectional, longitudinal, and experimental designs, providing both correlational and causal insights. Physical activity was commonly assessed using objective instruments such as accelerometers alongside subjective measures including self-report questionnaires and activity logs. Physical fitness outcomes were evaluated using standardized protocols (e.g., aerobic capacity tests, muscular strength assessments), while motor competence was typically measured using validated fundamental movement skill (FMS) batteries.

The diversity of geographical settings and educational systems represented in the reviewed studies highlights the global relevance of the relationships under investigation. Furthermore, the convergence of findings across varied contexts strengthens the generalizability of the evidence base.

3.2 Physical Activity and Physical Fitness

The synthesis consistently demonstrates a positive and statistically robust association between physical activity—particularly moderate-to-vigorous physical activity (MVPA)—and key components of physical fitness. Individuals engaging regularly in MVPA exhibit significantly higher levels of cardiovascular endurance, muscular strength, and muscular endurance, alongside more favorable body composition profiles [1]–[3].

From a physiological perspective, these findings can be explained by adaptive responses to repeated physical loading, including improved cardiorespiratory efficiency, enhanced mitochondrial density, and neuromuscular adaptation [4]. Participation in structured environments, such as physical education programs and organized sport, further amplifies these outcomes by providing systematic training stimuli. Conversely, insufficient physical activity is consistently associated with reduced aerobic capacity and increased risk of adverse health indicators, including obesity and metabolic dysfunction [5].

These results reaffirm the role of physical activity as a primary determinant of physical fitness during developmental stages and emphasize the importance of achieving recommended MVPA thresholds (≥ 60 minutes/day) as outlined by global health guidelines [6].

3.3 Physical Activity and Motor Skill Competence

The reviewed literature also indicates a strong and consistent relationship between physical activity participation and motor skill proficiency. Higher levels of engagement in diverse movement activities are associated with improved performance across locomotor, stability (non-locomotor), and object control skills [7], [8].

Motor learning theory suggests that skill acquisition is facilitated through repeated practice, variability of movement experiences, and task-specific feedback [9]. Physical activity provides the necessary context for such processes, enabling the refinement of coordination, balance, and movement efficiency. Importantly, both structured activities (e.g., physical education, sports training) and unstructured play (e.g., free play) contribute meaningfully to motor development.

In contrast, limited exposure to movement opportunities is associated with delayed motor development and reduced movement competence, which may negatively influence subsequent participation in physical activity. This highlights the importance of early and continuous engagement in varied physical activities to support optimal motor development trajectories.

3.4 Interrelationship Between Physical Fitness and Motor Skills

Beyond their independent associations with physical activity, physical fitness and motor competence demonstrate a reciprocal and reinforcing relationship. Individuals with higher motor proficiency are more likely to engage in physical activity due to increased self-efficacy and perceived competence, which in turn contributes to further improvements in physical fitness [10].

This bidirectional relationship aligns with the developmental model proposed by Stodden et al., which conceptualizes motor competence, physical activity, and fitness as dynamically interconnected across developmental stages [11]. Physiologically, improved motor control enhances movement efficiency, reducing energy expenditure and facilitating sustained participation in physical activity. Conversely, low motor competence may act as a barrier to participation, leading to reduced activity levels and diminished fitness outcomes.

This cyclical interaction underscores the importance of early motor skill development as a foundation for lifelong physical activity engagement and health-related fitness.

3.5 Summary of Key Findings

The synthesis of the reviewed literature reveals several key conclusions. First, physical activity is consistently associated with improvements in health-related physical fitness components, including cardiovascular endurance, muscular strength, and flexibility. Second, higher levels of physical activity are linked to enhanced motor skill competence across multiple domains. Third, physical fitness and motor skills interact in a reciprocal manner, reinforcing each other through sustained participation in physical activity. Finally, insufficient physical activity during early developmental stages is associated with lower fitness levels and delayed motor skill acquisition.

3.6 Implications For Practice and Policy

The findings have significant implications for educational practice and public health policy. In particular, they highlight the need for integrated physical education programs that simultaneously target fitness development and motor skill acquisition. A balanced approach is essential to support comprehensive physical development and to promote long-term engagement in physical activity.

From a policy perspective, the declining levels of physical activity among youth—driven by increased sedentary behavior, screen exposure, and limited access to safe recreational environments—require targeted interventions and structural support [12]. Schools, communities, and policymakers must collaborate to create environments that facilitate regular and meaningful participation in physical activity.

Table 1. Synthesis of Empirical Studies on Physical Activity, Physical Fitness, and Motor Skills

No	Study Focus	Population	Design	Key Variables	Principal Findings
1	Motor skill development	Children (6–12 yrs)	Longitudinal	PA, FMS	Regular PA enhances fundamental motor skills
2	Fitness outcomes	Youth	Cross-sectional	PA, fitness	Higher PA linked to improved aerobic and muscular fitness
3	MVPA impact	Adolescents	Cross-sectional	MVPA, fitness	MVPA predicts higher overall fitness levels
4	Motor competence	School-aged children	Experimental	Motor skills, PA	Improved motor competence increases PA participation
5	Long-term development	Children	Longitudinal	Motor skills, fitness	Motor competence predicts long-term fitness outcomes
6	Conceptual model	Youth	Theoretical	PA, fitness, motor skills	Reciprocal interaction among variables
7	Intervention effects	Students	Experimental	PA intervention	Structured PA improves fitness and motor skills

4 Discussion

The present study reinforces the central role of physical activity as a multidimensional driver of both physical fitness and motor competence. The synthesized evidence demonstrates that regular engagement in physical activity contributes to physiological adaptation and motor learning processes, thereby supporting holistic physical development.

From a physiological standpoint, repeated exposure to physical stimuli promotes cardiovascular and musculoskeletal adaptations that enhance physical fitness. Simultaneously, from a motor learning perspective, physical activity provides essential opportunities for skill acquisition through practice, feedback, and variability of movement

experiences. This dual function positions physical activity as a critical component within sport science and physical education frameworks.

Importantly, the findings highlight a dynamic and reciprocal relationship between motor competence and physical fitness. Individuals with higher levels of motor skill proficiency are more likely to engage in physical activity due to increased confidence and perceived ability. This engagement, in turn, further enhances fitness outcomes, creating a positive developmental cycle. Conversely, low motor competence may act as a barrier to participation, reinforcing sedentary behavior patterns.

The role of physical education is particularly significant in this context. Well-designed programs that integrate fitness development with structured motor skill instruction can promote balanced and inclusive physical development. However, the tendency of some programs to prioritize fitness outcomes at the expense of motor skill development may limit long-term engagement in physical activity, particularly among less-skilled students.

Despite the well-established benefits of physical activity, global trends indicate declining participation levels among youth. Contributing factors include increased digital engagement, reduced opportunities for active play, and limited curricular time for physical education. Addressing these challenges requires comprehensive strategies that extend beyond schools to include family, community, and policy-level interventions.

Overall, the findings underscore the need for integrated, developmentally appropriate, and evidence-based approaches to physical activity promotion. Future research should prioritize longitudinal and intervention-based designs to further clarify causal pathways and identify effective strategies for enhancing both physical fitness and motor competence across diverse populations.

5 Conclusion

This study demonstrates that physical activity functions as a central and integrative determinant of both physical fitness and motor skill competence across developmental stages. The synthesized evidence indicates that consistent engagement in physical activity—particularly moderate-to-vigorous intensity—contributes to significant improvements in key components of health-related fitness, including cardiovascular endurance, muscular strength, and body composition [1], [2]. Concurrently, physical activity provides essential opportunities for the acquisition and refinement of motor skills, encompassing locomotor, stability (non-locomotor), and object control domains [3].

Importantly, the findings confirm the existence of a reciprocal and reinforcing relationship among physical activity, physical fitness, and motor competence. Individuals with higher levels of motor skill proficiency are more likely to participate in physical activity due to increased self-efficacy and perceived competence, which in turn facilitates further physiological adaptation and fitness enhancement [4]. This dynamic interaction aligns with contemporary theoretical models of motor development and physical literacy, emphasizing the interconnected nature of movement competence, motivation, and long-term engagement in physical activity [5].

From an applied perspective, the results underscore the necessity of implementing integrated and developmentally appropriate physical education programs that simultaneously target fitness development and motor skill acquisition. A balanced pedagogical approach is essential to support comprehensive physical development and to foster sustained participation in physical activity throughout the lifespan. In light of declining global physical activity levels among youth, these findings further highlight the need for coordinated educational and policy interventions to promote active lifestyles and reduce sedentary behavior [6].

In conclusion, physical activity should be conceptualized not merely as a health behavior, but as a foundational mechanism underpinning physical fitness, motor competence, and lifelong movement engagement. Future research is encouraged to employ longitudinal and intervention-based designs to further elucidate causal pathways and to identify effective strategies for optimizing physical development across diverse populations.

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References

1. M. Em *Et Al.*, “Developing Technology-Based Instructional Videos To Enhance Cognitive And Physical Performance In Physical Education Developing Technology-Based Instructional Videos To Enhance Cognitive And Physical...| 48,” *Asean Journal Of Educational Research And Technology*, Vol. 5, No. 1, Pp. 47–56, 2026.
2. T. Soenyoto, A. S. A. Darmawan, H. Aliriad, And M. B. R. Utama, “Smart Physical Education,” *Journal Of Human Sport And Exercise*, Vol. 20, No. 4, Pp. 1122–1132, Jun. 2025, Doi: 10.55860/Ydz9ex90.
3. M. Suty Nugraha, A. Richard Victorian, And E. Safitri, “Development Of Meas-Uring Tools For Swimming Physical Tests On Students Physical Education,” *J Phys Educ*, Vol. 12, No. 2, Pp. 153–159, 2023, [Online]. Available: [Http://Journal.Unnes.Ac.Id/Sju/Index.Php/Peshr](http://journal.unnes.ac.id/sju/index.php/peshr)
4. M. Suty Nugraha, A. Richard Victorian, And E. Safitri, “Development Of Meas-Uring Tools For Swimming Physical Tests On Students Physical Education,” *J Phys Educ*, Vol. 12, No. 2, Pp. 153–159, 2023, [Online]. Available: [Http://Journal.Unnes.Ac.Id/Sju/Index.Php/Peshr](http://journal.unnes.ac.id/sju/index.php/peshr)
5. A. R. Santri And G. M. Anggita, “The Effect Of Physical Activity On Physical Fitness In Early Childhood,” *Sports Medicine Curiosity Journal*, Vol. 2, No. 1, Pp. 33–42, Oct. 2023, Doi: 10.15294/Smcj.V2i1.72306.

6. I. Akhmad *Et Al.*, “The Relationship Between Physical Activity And Physical Fitness Of Elementary School Students,” *International Journal Of Human Movement And Sports Sciences*, Vol. 12, No. 1, Pp. 229–237, Jan. 2024, Doi: 10.13189/Saj.2024.120124.
7. R. And D. Bailey, “Physical Education Learning Outcomes,” 2nd Ed., Vol. 2, Unesco’s World Sports, 2024, Ch. 2, Pp. 1–46. Accessed: Apr. 30, 2025. [Online]. Available: [Https://Curriculum.Gov.Mt](https://Curriculum.Gov.Mt)
8. I. Ma, P. Satya Hasmara, S. Pgri Jombang, J. Timur, And C. Author, “The Relationship Between Physical Activity And Physical Fitness Of Elementary School Students Aged 10-12 Years,” *Journal Respecs (Research Physical Education And Sport)*, Vol. 5, Pp. 81–88, 2023, Doi: 10.31949/Respecs.V5i1.4059.
9. D. Milenković, J. Radonjić, N. Nikić, And I. Zubić, “The Influence Of Physical Education Over A Semester On The Psycho-Physical Development In Elementary School Students,” *Physical Education Theory And Methodology*, Vol. 24, No. 1, Pp. 87–94, Feb. 2024, Doi: 10.17309/Tmfv.2024.1.11.
10. W. Wulan Agustin And S. Aryanti, “Analysis Of Physical Fitness On Student Learning Outcomes,” 2021. [Online]. Available: [Https://Jurnal.Unimed.Ac.Id/2012/Index.Php/Jpehr](https://Jurnal.Unimed.Ac.Id/2012/Index.Php/Jpehr)
11. F. Dambroz And I. Teoldo, “Better Decision-Making Skills Support Tactical Behaviour And Reduce Physical Wear Under Physical Fatigue In Soccer,” *Front Physiol*, Vol. 14, 2023, Doi: 10.3389/Fphys.2023.1116924.
12. P. Indarto, N. Nasuka, M. Furqon Hidayatullah, S. Sulaiman, And H. Setyawati, “Journal Of Physical Education And Sports Physical Education Curriculum In Elementary Schools: Efforts For Sustainable Movement Education,” *Jpes*, Vol. 14, No. 1, 2025, [Online]. Available: [Http://Journal.Unnes.Ac.Id/Sju/Index.Php/Jpes](http://Journal.Unnes.Ac.Id/Sju/Index.Php/Jpes)
13. A. Watson, A. Timperio, H. Brown, K. Best, And K. D. Hesketh, “Effect Of Classroom-Based Physical Activity Interventions On Academic And Physical Activity Outcomes: A Systematic Review And Meta-Analysis,” Aug. 25, 2017, *Biomed Central Ltd.* Doi: 10.1186/S12966-017-0569-9.
14. H. M. S. Ompoc And J. C. Aguinaldo, “Evaluating The Effectiveness Of Ai-Driven Applications In Enhancing The Physical Fitness Of Tertiary Physical Education Students,” *International Journal Of Human Movement And Sports Sciences*, Vol. 13, No. 1, Pp. 74–82, Feb. 2025, Doi: 10.13189/Saj.2025.130109.
15. L. Nur, R. Giyartini, And S. Sumardi, “Gross Motor Skills: Outbound Activities In Elementary Students,” *Juara : Jurnal Olahraga*, Vol. 5, No. 1, Pp. 93–99, 2020, Doi: 10.33222/Juara.V5i1.781.
16. L. C. Dapp, V. Gashaj, And C. M. Roebbers, “Physical Activity And Motor Skills In Children: A Differentiated Approach,” *Psychol Sport Exerc*, Vol. 54, May 2021, Doi: 10.1016/J.Psychsport.2021.101916.
17. F. Rida Satriawan *Et Al.*, “Hubungan Aktivitas Fisik Terhadap Kebugaran Jasmani Dan Keterampilan Motorik Peserta Didik Sekolah Dasar The Relationship Of Physical Activity To The Physical Fitness And Motor Skills Of Students Elementary School 1*,” *Jambura Journal Of Sports Coaching*, Vol. 6, No. 1, 2024.
18. Wibowo C, “Analysis Of Fundamental Motor Skills And Physical Activity Among Elementary School Students,” *Indonesia Journal Of Sport Manahement*, Vol. 4, No. 1, Pp. 178–185, 2024, Accessed: Nov. 07, 2024. [Online]. Available: [Https://Ejournal.Unma.Ac.Id/Index.Php/Ijasm/](https://Ejournal.Unma.Ac.Id/Index.Php/Ijasm/)

19. A. Manshuralhudlori, A. Kristiyanto, R. Syaifullah, F. Fajar Ekawati, F. Umar, And S. Riyadi, "Reliability And Validity Of Children's Basic Motor Skills Testing: A Systematic Literature Review," *Retos*, Vol. 65, No. 65, Pp. 1156–1168, 2025, Doi: 10.47197/Retos.V65.112.
20. R. Dewi And I. Verawati, "The Effect Of Manipulative Games To Improve Fundamental Motor Skills In Elementary School Students," *International Journal Of Education In Mathematics, Science And Technology*, Vol. 10, No. 1, Pp. 24–37, 2021, Doi: 10.46328/Ijemst.2163.
21. A. R. Santri And G. M. Anggita, "The Effect Of Physical Activity On Physical Fitness In Early Childhood," *Sports Medicine Curiosity Journal*, Vol. 2, No. 1, Pp. 33–42, Oct. 2023, Doi: 10.15294/Smcj.V2i1.72306.
22. W. Alam *Et Al.*, "Edukasi Sadar Bencana Melalui Physical Activity Berbasis Mobile Application," *Jurnal Pengabdian Kepada Masyarakat Bina Darma*, Vol. 2, No. 3, Pp. 254–262, 2022.
23. S. Hanif, Pinky, I. Ahmed, R. Nawaz, H. Shabbir, And K. Asif, "Association Of Fatigue Level And Physical Activity Among University Students: A Cross-Sectional Survey," *Journal Of Health And Rehabilitation Research*, Vol. 4, No. 1, Pp. 1642–1646, Mar. 2024, Doi: 10.61919/Jhrr.V4i1.675.
24. H. Ding *Et Al.*, "Assessment Of Wearable Device Adherence For Monitoring Physical Activity In Older Adults: Pilot Cohort Study," *Jmir Aging*, Vol. 7, 2024, Doi: 10.2196/60209.
25. K. C. Kowalski, P. R. E. Crocker, R. M. Donen, And B. Honours, "The Physical Activity Questionnaire For Older Children (Paq-C) And Adolescents (Paq-A) Manual," 2004.
26. R. Nuryadin, "Indonesian Journal Of Primary Education The Use Of Ai (Artificial Intelligence) In Education (Literature Review)," © 2023-*Indonesian Journal Of Primary Education*, Vol. 7, No. 2, Pp. 143–158, 2023, [Online]. Available: [Http://Ejournal.Upi.Edu/Index.Php/Ijpe/](http://Ejournal.Upi.Edu/Index.Php/Ijpe/)
27. B. Septa Martaviano Triaiditya And D. Ari Santoso, "Review Aplikasi Teknologi Digital Di Olahraga Tennis Meja," *Prosiding Seminar Nasional Iptek Olahraga*, 2021.
28. Y. G. Simbolon And M. F. Makorohim, "Learning Models In Football Passing: Literature Review Study," *Gladi : Jurnal Ilmu Keolahragaan*, Vol. 16, No. 03, Pp. 324–335, Jun. 2025, Doi: 10.21009/Gjik.163.01.
29. A. R. Sanjaya And M. Faruk, "Metode Pelatihan Small Side Games : A Literature Review," *Jurnal Nasional*, Vol. 1, No. 2, Pp. 65–75, 2021.
30. R. Ferraz, D. Ribeiro, A. R. Alves, J. E. Teixeira, P. Forte, And L. Branquinho, "Using Gamification In Teaching Physical Education: A Survey Review," *Montenegrin Journal Of Sports Science And Medicine*, Vol. 20, No. 1, Pp. 31–44, 2024, Doi: 10.26773/Mjssm.240304.
31. M. G. Fauzan, A. Rahmat, And C. Carsiwan, "Pembelajaran Media Audio Visual Dalam Pendidikan Jasmani: Systematic Literatur Review," *Bravo's: Jurnal Program Studi Pendidikan Jasmani Dan Kesehatan*, Vol. 12, No. 2, Pp. 148–158, Jun. 2024, Doi: 10.32682/Bravos.V12i2/27.
32. M. G. Segovia And C. Kennett, "Digitalization And Sports Sponsorship Strategy: A Review And Research Agenda," *Ann Appl Sport Sci*, Vol. 10, No. 4, 2022, Doi: 10.52547/Aassjournal.1066.

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