

## Analyzing the role of motor skill training on critical reading ability in elementary school students Análisis del papel del entrenamiento de habilidades motrices en la capacidad de lectura crítica en alumnos de primaria

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**Abstract.** This study used the systematic literature review to explore the role of motor skills training on critical reading skills in elementary school students. Data were obtained from articles searched through Google Scholar. The search focused on those published in Scopus-indexed journals between 2019 and 2024. As a result, 17,400 articles were found. These articles were screened again in several stages. Some criteria were applied to determine whether the articles should be included or excluded. In addition, the study employed specific keywords, such as "Role and Practice AND Motor Skills AND Critical Reading Ability AND Elementary School Students". These stages then generated 20 articles that fit the theme and met the inclusion requirements. During the article selection, this study followed the PRISMA guidelines. The key findings of this study confirmed that the development of gross and fine motor skills has a significant role in supporting the development of cognitive and academic abilities, especially in improving critical reading skills in elementary school students. This study revealed the positive relationship between motor skills and academic achievement, supported by stimulating physical environments and play-based learning approaches. This finding emphasizes the importance of integrating physical activity into the primary education curriculum. In addition, the findings highlighted the roles of support from various parties, including teachers, parents, and communities. Such supports are needed to ensure a conducive environment for developing students' motor and cognitive skills. Despite these findings, challenges such as lack of sports facilities, gender differences, and an unbalanced curriculum must be overcome to achieve optimal results. These findings imply the need for a holistic approach to education, emphasizing not only focuses on academics but also motor development to support critical reading skills for students' future academic success.

**Keywords:** Role, Practice, Motor Skills, Critical Reading Ability, Elementary School Students

**Resumen.** Este estudio utilizó la revisión sistemática de la literatura para revisar relacionados con el papel de la formación de habilidades motoras en las habilidades de lectura crítica en los estudiantes de primaria. Los datos se obtuvieron de artículos buscados a través de Google Scholar. La búsqueda se centró en los publicados en revistas indexadas en Scopus publicadas en 2019 - 2024. Las revistas se seleccionaron teniendo en cuenta criterios de inclusión y exclusión. Las palabras clave utilizadas fueron; «Rol Y Práctica Y Habilidades Motrices Y Capacidad De Lectura Crítica Y Estudiantes De Primaria». A partir de la búsqueda en el periodo 2019-2014, se encontraron 17.400 artículos. Además, se revisaron nuevamente en varias etapas y arrojaron 20 artículos que se ajustaban al tema y cumplían con los requisitos de inclusión. Durante la selección de artículos, este estudio siguió las directrices PRISMA. Los resultados de este estudio confirman que el desarrollo de las habilidades motrices, tanto gruesas como finas, tiene un papel significativo en el apoyo al desarrollo de las habilidades cognitivas y académicas, especialmente en la mejora de las habilidades de lectura crítica en los estudiantes de primaria. La relación positiva entre las habilidades motrices y el rendimiento académico, respaldada por entornos físicos estimulantes y enfoques de aprendizaje basados en el juego, subraya la importancia de integrar la actividad física en el currículo de la educación primaria. Además, se necesita el apoyo de diversas partes, incluidos los profesores, los padres y las comunidades, para garantizar un entorno propicio al desarrollo de las habilidades motoras y cognitivas de los alumnos. Sin embargo, hay que superar retos como la falta de instalaciones deportivas, las diferencias de género y un plan de estudios desequilibrado para lograr resultados óptimos. La consecuencia de estos resultados es la necesidad de un enfoque holístico y global de la educación que no sólo se centre en lo académico, sino que también integre el desarrollo motor para apoyar las habilidades críticas de lectura, que son esenciales para el futuro éxito académico de los estudiantes.

**Palabras clave:** Rol, Práctica, Habilidades motoras, Habilidad lectora crítica, Alumnos de primaria.

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### Introduction

Motor skills are a fundamental aspect of primary school-age children's development. They serve as a foundation for various other abilities, including academic ones. Motor skills can be categorized into two: gross motor and fine motor. Gross motor skills include large movements such as running and jumping, while fine motor skills involve more detailed movements such as writing and drawing. Learning is focussed on developing skills (N. Susanto, Nurhasan, et al., 2023). Previous research has shown that good motor

skills not only support children's physical and social development but also play an important role in promoting interactions with the environment (Rahayu et al., 2023; Ramdani & Azizah, 2019; Ulfah et al., 2021). In education, motor skills contribute significantly to the education will shape a creative, innovative and competitive generation (Matitaputty et al., 2024). Research shows that children with good motor skills tend to be more active and engaged in learning activities, which in turn increases their motivation and interest in learning (Prodyanasari et al., 2023; Wahono et al., 2022; Satria et al., 2023; Windawati et al.,

2023). These skills are very important in children's learning process, especially in primary school.

At school, one of the subjects that can specifically promote motor skills is physical education (PE). PE serves as a platform to develop motor skills, encouraging the development of other self aspects. For example, this subject is perceived as critical because scholars claim that children who master basic motor skills, such as running, jumping, and throwing, are better able to participate in various physical and academic activities (Raga et al., 2024; Riyanto et al., 2022). Moreover, PE commonly incorporates various fun and interactive physical activities. Through games and sports, children learn not only about physical skills but also about cooperation, discipline, and responsibility (Siswati et al., 2020; Yusroni & Alimah, 2023). After that, these skills were believed to contribute to children's cognitive and social development (Kustari & Mahendra, 2020; Mustafa & Sugiharto, 2020). Studies suggest that children who are skilled in interacting with their peers tend to be more confident and have better communication skills (Bahri et al., 2023; Nasution & Sutapa, 2020). Besides developing the aforementioned aspects, motor-skill training has an effect on students' psychological aspects. Research argues that children who are physically active tend to have lower stress levels and concentrate better on learning activities (Candra et al., 2023; Purwanto & Baan, 2022). This suggests that motor skill development should be an integral part of the education curriculum in primary schools.

As argued earlier, research shows that children who engage in regular physical activity have better cognitive abilities. Some of the most affected cognitive aspects are reading and critical thinking skills (Maesaroh et al., 2022; Sudaryanti et al., 2024). Thus, it is important to integrate motor skill practice in reading and other subjects to ensure that students not only learn academically but also develop physically (Noor, 2023; Perdani et al., 2021). Moreover, research shows that approaches that combine physical activity with academic learning can improve overall learning outcomes (Lestari & Puspitasari, 2021; Sari et al., 2022). This claim was also supported by earlier studies (Sary & Indah, 2023; Sari et al., 2023) revealing that physical engagement in learning activities, such as through play and sport, not only supports the development of motor skills but also positively impacts children's cognitive development, including critical thinking and creativity. The link between motor skills and cognitive ability, particularly in reading, becomes even clearer when research shows that fine motor skills have a significant contribution to writing and reading ability (Surtikayati & Ritonga, 2023; Yuniasih et al., 2023). Activities that involve fine motor skills, such as drawing and writing, assist children in recognizing letters and words, which are important foundations in the reading process (Mubarok et al., 2023; Muliawanti et al., 2022).

Although motor skills have been recognized to support learning, they often receive insufficient attention in the educational curriculum. The curriculum frequently focuses on academic aspects without adequately paying attention to

motor skill development. In fact, it can hinder children's ability to read and think critically effectively. This is in line with the findings of Candra et al. (2023), stating that the lack of integration of motor skills in the curriculum can have a negative impact on children's cognitive development. They emphasized that good motor skills not only support physical activity but also contribute to critical thinking and better reading comprehension (Candra et al., 2023). This curriculum-related challenge is exacerbated by environmental factors, such as the lack of adequate play facilities and supportive physical activities. Research noted that an unsupportive environment, such as a lack of open space for play and exercise, can hinder the development of children's motor skills (Selamet et al., 2022). The research also highlights that a lack of structured physical activity at school may result in children not getting the opportunity to optimally develop their motor skills, which in turn may affect their academic ability (Selamet et al., 2022).

Despite the importance of motor skills in education, as claimed in many studies, educational institutions that integrate this aspect into their curriculum are still very limited. This suggests the need for a more comprehensive evaluation and revision of the education curriculum, which not only focuses on academic aspects but also pays attention to the development of motor skills (Mustafa & Gusdiyanto, 2023). Thus, it is important to develop a balanced education program that includes physical education and physical activity as an integral part of the curriculum. Furthermore, the importance of physical education in the development of children's motor skills cannot be overlooked. Physical education provides opportunities for children to participate in enjoyable physical activities, which can improve their motor skills while supporting social and emotional development (Mustafa & Sugiharto, 2020). Research shows that children who engage in regular physical education have better cognitive abilities, including reading and critical thinking (Mustafa & Sugiharto, 2020). Thus, to improve the quality of education and support children's holistic development, greater attention should be paid to motor skill development in the education curriculum. This includes the provision of adequate facilities for play and exercise, as well as the integration of physical activities into daily learning (Mustafa & Sugiharto, 2020). With a more balanced approach, children are expected to develop good motor skills, which will support their academic abilities, including reading and critical thinking. Moreover, the ability to read and think critically is an ability that is demanded in learning in the global era. (Van et al., 2022). The rapid development of information and communication technology has resulted in a wide range of sources and reading materials. Primary school students, however, often struggle to select and filter information properly unless guided by parents or teachers. With information now easily accessible from various media, not all available content is relevant to the needs of young readers.

Based on the above discussion, this study aims to explore the role of motor skills training in enhancing critical

reading ability among elementary school students. Integrating motor skills practice into learning provides a holistic approach that not only improves children's motor skills, but also supports their cognitive development, particularly in critical reading ability. Experimental research involving control and treatment groups has shown that students who participated in regular motor skills exercise programs experienced significant improvements in critical reading ability compared to those who did not (Ardilla et al., 2023; Mubarok & Kharisma, 2021; Rahman et al., 2023). Therefore, it is important to design a curriculum that integrates physical, emotional, and cognitive aspects in order to create a more comprehensive and effective learning environment (Putri, 2019; Rifai et al., 2020; Triansyah, 2021). This research is expected to make an important contribution to understanding how motor skill training can be leveraged to improve critical reading ability and academic learning outcomes in general.

Indeed, research on human movement has touched on many areas. For example, some popular studies investigated the achievement of physical education learning outcomes (Martono et al., 2024; Komari et al., 2024a; Komari et al., 2024b; Septiantoko et al., 2024; Suyato et al., 2024; Widiyanto et al., 2024; Putro et al., 2024; Harmanto et al., 2024; Zulfahri et al., 2024), motor development (Susanto et al., 2024; Susanto et al., 2024). Other studies examined specific areas of PE or sports, such as health and fitness sports (Widiyanto et al., 2024a; Widiyanto et al., 2024b; Syaukani et al., 2024; Pranoto, et al., 2024; Astuti et al., 2024; Wayoi et al., 2024; Akhmad et al., 2024), law and sports (Ardiyanto et al., 2024; HB et al., 2024a; HB et al., 2024b), sports communication (Charlina et al., 2024), active lifestyle with exercise (Tafuri et al., 2024a), interval training and physiological (Latino et al., 2024a), circuit training programme (Tafuri et al., 2024b; Tafuri et al., 2024c; Latino et al., 2024b; Latino et al., 2024c; Adirahma et al., 2024), injury risk on sports (Anam et al., 2024a; Fahrosi et al., 2024), endurance training and physiological (Latino et al., 2024c), therapeutic

sports (Zanada et al., 2024), movement skills (Susanto et al., 2023; Anam et al., 2024b; Pranoto et al., 2024), and sports training and performance (Kurniawan et al., 2024; Susanto et al., 2024), curriculum and management of physical education learning (Mardiyah et al., 2024a; Yani et al., 2024; Mardiyah et al., 2024b), and the management of sports education and archery (Hamsyah et al., 2024; Mulyanti et al., 2024; Setyawan et al., 2024a; Setyawan et al., 2024b; Destriani et al., 2024).

Despite the myriad research, there is a lack of scholarly research on the role of motor skills training on critical reading skills in elementary school students. The dearth of studies on this topic can impede understanding and scientific development in the field. Hence, it is imperative to research this issue by thoroughly reviewing existing literature studies

## Materials & Methods

This study employed a systematic literature review method by identifying, evaluating, and interpreting all relevant research results. It was conducted with a comprehensive strategy by searching articles in research journal databases. The search was performed through Google Scholar and focused on publications published between 2019 and 2024. This search generated 17,400 articles from various international journal indexing databases, including Scopus and other database sources. After that, the articles were screened again in several stages. Some criteria were applied to determine whether an article was included or excluded from the data analysis. For example, to be included in the review, the articles must be published in Scopus-indexed journals. In addition, the publication period was limited between 2019 and 2024. The keywords used in the journal search were "Role And Practice AND Motor Skills AND Critical Reading Ability AND Elementary School Students". The complete list of inclusion and exclusion criteria are shown in Table 1 below:

Table 1.  
Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Period	Journals published in 2019 - 2024	Journals published outside 2019-2024
Indexed	Scopus-indexed international journal	Non-Scopus-indexed international journal
Access	Open access	Close access (Subscription)
Language	English language journal	Non-English language journal
Article Type	Original research article	Review article, conference proceeding, book, book chapter, book series, editorial, etc.
Full Text	Articles fit the scope/ topic of research	Articles do not fit the scope/ topic of the research
Topic of Discussion	The article's content is relevant to the theme of the role of motor skills training on critical reading skills in elementary school students.	The article's content is not relevant to the theme of the role of motor skill training on critical reading skills in elementary school students.

After undertaking several stages of the screening process, 20 articles that fit the theme and met the inclusion requirements were selected. During the article selection, this study followed the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) guidelines. These guidelines are expected to produce systematic literature review reports that are more transparent, complete,

and accurate, thus facilitating evidence-based decision-making (Page et al., 2021). This systematic literature review gathered all available scientific evidence according to the inclusion and exclusion criteria (Martín-Moya et al., 2021). Figure 1 illustrates how the articles were selected under the PRISMA guidelines.

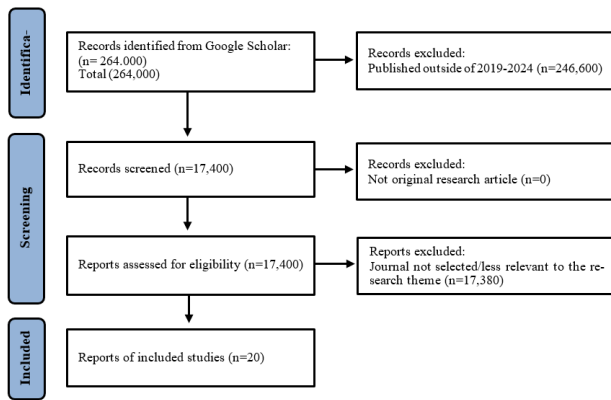


Figure 1. PRISMA flowchart of the article selection process

## Results

This section presents the results from the review of studies examining the impact of motor skills training on critical reading skills in elementary students. Out of 17,400 articles reviewed, 20 met the inclusion criteria and were analyzed. The findings highlight the significant role of motor skills in enhancing cognitive and academic abilities, particularly critical reading. The results also emphasize the benefits of stimulating physical environments and play-based learning, as well as the importance of support from teachers, parents, and communities. Additionally, challenges such as lack of facilities and curriculum imbalances are discussed. The detailed results are shown in Table 2.

Table 2.  
Literature Review Results

Author	Study objectives	Main Findings
(Wang & Wang, 2024)	The objective of this study was to systematically review and analyze the existing literature to determine the relationship between motor skills and academic achievement in school-aged children and adolescents. By synthesizing data from various studies, the authors aimed to identify whether and how different aspects of motor skills, including gross motor, fine motor, and coordination abilities, correlated with academic outcomes such as literacy, numeracy, and overall school performance.	The findings of this review indicated a significant positive correlation between motor skills and academic achievement in children and adolescents. Specifically, the results suggested that children with higher levels of motor proficiency tend to perform better academically, particularly in areas requiring fine motor skills such as writing and mathematics. The review also highlighted the potential benefits of incorporating motor skill development into educational curricula to support academic success.
(Buha et al., 2023)	This study investigated the relationship between reading skills and fine motor abilities in younger school-age children. The research sought to determine whether proficiency in fine motor skills, such as hand-eye coordination and dexterity, played a role in the development of early reading abilities and literacy skills in children.	The study revealed a significant relationship between fine motor abilities and reading skills in younger school-age children. Children with higher fine motor proficiency, particularly in tasks involving precision and coordination, demonstrated better reading performance. These findings suggest that interventions aimed at improving fine motor skills could have a positive impact on early literacy development.
(Samodra et al., 2023)	The purpose of this study was to analyze the gross motor skills of elementary school students in hill and coastal areas, comparing their motoric abilities to identify any significant differences attributable to geographical factors. The research sought to understand how environmental influences might impact the development of gross motor skills among children in different regions.	The findings indicate noticeable differences in gross motor skills between students from hill areas and those from coastal areas. Children from hill areas generally exhibited better balance and coordination, likely due to the challenging terrain, while those from coastal areas showed superior skills in activities requiring speed and agility. These results underscore the influence of environmental factors on motor development in children.
(Kashfi et al., 2019)	The objective of this study was to evaluate the effectiveness of a motor intervention program in enhancing motor skills and executive functions in children with learning disabilities. The study aimed to determine whether targeted motor exercises could improve cognitive processes such as working memory, attention, and planning.	The study found that the motor intervention program significantly improved both motor skills and executive functions in children with learning disabilities. Participants demonstrated enhanced coordination, balance, and fine motor control, along with noticeable improvements in executive functions, particularly in the areas of working memory and attentional control. These findings suggest that motor interventions can be a valuable tool in supporting the cognitive development of children with learning disabilities.
(Suryadi et al., 2023)	This systematic review aimed to explore the effectiveness of game-based models in stimulating motor skills among early childhood and elementary school students in Indonesia. The research sought to identify which types of games were most beneficial for motor skill development and how these models could be integrated into educational practices.	The review concluded that game-based models are highly effective in stimulating motor skill development in young children. Traditional and culturally relevant games were found to be particularly beneficial, fostering not only physical development but also social and cognitive skills. The study recommends incorporating these game models into the school curriculum to enhance child development.
(Saputra et al., 2021)	The objective of this study was to compare the effects of traditional games and drill exercises on the development of fundamental motor skills, specifically running, jumping, overhand throwing, and catching, among elementary school students. The research aimed to determine the more effective approach to improve motor skills based on students' varying levels of motor ability.	The study found that traditional games were more effective in enhancing fundamental motor skills in students with higher motor abilities. Meanwhile, drilling exercises were more beneficial for those with lower motor abilities. The results suggest that traditional games promote better skill development through engaging and interactive activities, particularly for students who already possess a certain level of motor proficiency.
(Schembri et al., 2019)	This study examined the relationship between the regular practice of physical activity and sports and the level of motor competence among primary school children. The research sought to identify key factors that influenced motor development. In addition, it determined how physical activity and sports contributed to enhancing motor skills in young children.	The study concluded that there was a strong positive correlation between regular participation in physical activities or sports and higher levels of motor competence among primary school children. Children who engaged in sports or physical activities for more than 120 minutes per week demonstrated significantly better motor skills compared to their less active peers. This finding highlights the importance of encouraging regular physical activity to promote motor development in children.
(Lee et al., 2020)	The study aimed to evaluate the impact of fundamental motor skills (FMS)-based afterschool programs on children's physical health outcomes, including fitness levels and body composition, as well as cognitive outcomes such as executive functions and academic performance. The objective was to determine whether participation in such a program could significantly enhance both the physical and cognitive development of elementary-aged children.	The study found that participation in the FMS-based afterschool program led to significant improvements in children's motor skills, physical fitness, and cognitive functions. Specifically, children who participated in the program showed enhanced executive functions and academic performance. Further, they showed reductions in body fat percentage and gained improvements in muscular strength and endurance.
(Fernández-Méndez et al., 2020)	This research investigated the relationship between spatial abilities, motor skills, and mathematical achievement in children aged 6 to 8. The study aimed to determine whether motor skills, particularly fine and gross motor skills, and visuospatial reasoning could predict mathematical performance, taking into account cognitive factors such as mental rotation abilities.	The results revealed that visuospatial reasoning was a significant predictor of mathematical performance in early school years, with its influence diminishing as children grow older. After controlling for visuospatial reasoning, the study found that mental rotation and fine motor skills contributed specifically to success in mathematical tasks such as written calculation and number ordering among young children.
(Oktarifaldi et al., 2024)	This study measured the fundamental motor skills (FMS) and motor coordination performance of elementary students in West Sumatra, Indonesia. It focused on how age, gender, and geographical location influenced these abilities. The research provided a baseline understanding of FMS development in the region, which could inform educational policies and interventions.	The findings indicated that a significant portion of the students in West Sumatra exhibited low levels of fundamental motor skills, with male students generally outperforming female students in locomotor and object control skills. Interestingly, the study also revealed that motor skills development did not progress consistently with age, as students aged 7 showed better motor skills than those aged 8 and 9.
(Samodra et al., 2024)	This research investigated whether there were significant differences in gross motor skills between boys and girls in rural areas, focusing on elementary school students in West Kalimantan, Indonesia. The study identified potential gender disparities in motor skill development and the implications for educational practices.	The study found that boys in rural areas generally performed better in gross motor skills than girls, with significant differences observed in specific motor tasks. These results suggest that gender disparities in motor skill development exist in rural settings, which may require targeted interventions to support the motor development of the girls.

(Lê et al., 2021)	The purpose of this study was to investigate the role of motor skills, particularly handwriting and executive functions, in the literacy development of third-grade students. It aimed to model the potential influence of these motor skills on literacy outcomes, understanding how these cognitive and physical abilities contributed to the academic performance of children in reading and writing tasks.	The study revealed that both motor skills and executive functions significantly contributed to literacy development in third-grade students. Handwriting fluency was found to be particularly important, mediating the relationship between motor skills and literacy performance. This study emphasizes the importance of integrating motor skill development in early education to support academic achievement in literacy.
(Escolano-Pérez et al., 2020)	This study explored the relationship between fine motor skills and later academic competencies in preschool children. Specifically, the research sought to determine whether fine motor skills could predict academic performance in literacy and mathematics while also examining the role of gross motor skills in these outcomes.	The study found a significant association between preschoolers' fine motor skills and their subsequent academic competencies, particularly in literacy and mathematics. However, no association was observed with gross motor skills. These findings suggest that early development of fine motor skills is crucial for academic success, highlighting the need for targeted interventions in preschool education.
(Zhang et al., 2021)	The purpose of this research was to examine whether perceived competence mediated the relationship between children's ball skills and their engagement in physical activity and enjoyment. It aimed to provide insights into how children's self-perception of their motor abilities influenced their physical activity levels and their enjoyment of these activities.	The findings indicated that perceived competence significantly mediated the relationship between ball skills and student's physical activity and enjoyment. Students who perceived themselves as competent in ball skills were more likely to engage in physical activities and enjoy them. This highlights the importance of fostering children's self-confidence in their motor abilities to promote active and healthy lifestyles.
(Canli et al., 2023)	This study explored the factors influencing motor coordination among primary school students in Turkey. It focused on the roles of age, sex, and participation in physical activities. The research sought to identify how these variables affected motor coordination skills and to provide recommendations for improving these skills in young students.	The study found that age, sex, and physical activity participation significantly influenced motor coordination in primary school students. Older students and those who regularly participated in physical activities demonstrated better motor coordination, while differences were also observed between boys and girls. These results suggest the need for age-appropriate and gender-sensitive physical education programs to enhance motor skills in children.
(Pham et al., 2021)	This study evaluated the impact of the BRAINballs program on the gross motor skills of second-grade students in a primary school in Vietnam. The research aimed to determine whether this innovative physical education program, which integrates academic content with physical activity, could significantly enhance students' motor abilities.	The study found that the BRAINballs program significantly improved the gross motor skills of the students in the experimental group compared to the control group. The results showed that integrating physical education with academic content through the BRAINballs program led to better development of locomotor and object control skills in children, suggesting the effectiveness of this interdisciplinary approach in promoting physical and academic growth.
(Zhou & Tolmie, 2024)	The purpose of this longitudinal study was to explore the associations between gross and fine motor skills, physical activity, executive function, and academic achievement among children from the UK Millennium Cohort. The research aimed to understand how these factors interacted over time to influence children's academic outcomes.	The findings indicated strong associations between motor skills, particularly fine motor skills, and academic achievement. The study also found that physical activity and executive functions were closely linked to both motor skills and academic performance, with fine motor skills emerging as a critical predictor of literacy and numeracy outcomes. These results underline the importance of promoting motor skill development alongside cognitive and physical activities in early education.
(Zhang et al., 2020)	This study aimed to examine the role of actual and perceived motor competence in accessing physical activity and addressing health disparities among underserved Hispanic children. The research sought to understand how children's motor skills and perceptions of these skills influenced their engagement in physical activities and overall health.	The study found that both actual and perceived motor competence played significant roles in determining the level of physical activity among underserved Hispanic children. Children with higher actual motor competence and more positive perceptions of their abilities were more likely to participate in physical activities, which in turn contributed to better health outcomes. These findings highlight the importance of fostering both motor skills and positive self-perception in efforts to reduce health disparities in this population.
(Damsgaard et al., 2020)	The purpose of this study was to investigate whether motor-enriched encoding, which integrated motor activities with learning tasks, could enhance early letter recognition in children. The research aimed to provide evidence on the effectiveness of combining physical activities with cognitive learning processes in early childhood education.	The study revealed that motor-enriched encoding significantly improved early letter recognition in children. The integration of motor activities with letter learning tasks led to better retention and recognition of letters, suggesting that motor-enriched approaches can be an effective strategy in early literacy education. These findings support the incorporation of physical activities in teaching early literacy skills.
(Hazizah et al., 2024)	This study aimed to evaluate the effectiveness of the "Warrior Kids Games" in improving the self-efficacy abilities and fine motor skills of children aged 5-6. The research sought to determine whether these specially designed games could foster both psychological and physical development in young children.	The findings demonstrated that the "Warrior Kids Games" had a positive impact on both self-efficacy and fine motor skills in children. The games were effective in enhancing the children's confidence in their abilities and improving their fine motor skills, suggesting that such play-based interventions can be valuable tools in early childhood development programs.

## Discussion

The purpose of this systematic literature review was to investigate the role of motor skills training on critical reading ability in elementary school students. This was done to find out whether there is a significant relationship between motor skills training and the improvement of critical reading skills in elementary school students, as well as what the support factors and obstacles are in achieving this goal.

The effect of motor skill training on critical reading ability in primary school students has been widely investigated by earlier studies. Generally, the studies show a positive relationship between motor skills and academic achievement. The study by Wang and Wang (2024), for example, identified significant correlations between motor skills, particularly fine motor skills, and academic achievement, including literacy and numeracy, which are also relevant to critical reading ability. Buha et al. (2023) added that good fine motor skills can support early literacy performance, which is important for developing critical reading skills in children. Another study (Lê et al., 2021) underlined the importance of fine motor skills, such as handwriting, in literacy development, which is the basis

for critical reading ability. In addition, some studies emphasize the importance of integrating physical activity in students' cognitive development. Studies (Schembri et al., 2019; Zhou & Tolmie, 2024) showed that regular participation in physical activities and sports can improve motor competence, which in turn improves academic achievement, including critical reading ability. Similarly, Lee et al. (2020) found that extracurricular programs focusing on basic motor skills can significantly improve executive function and academic performance, including literacy. Research (Damsgaard et al., 2020) also supports the integration of motor activities with learning tasks to improve literacy, which is relevant to critical reading skills.

Based on the earlier discussion of the positive link between motor skills and critical reading, motor skill training, both gross and fine, plays an important role in children's cognitive and academic development. Gross motor skills, which involve larger movements, are influenced by various factors, including the physical environment. For instance, Samodra et al. (2024) found that differences in physical environments, such as mountainous and coastal areas, had a significant impact on the development of gross motor skills in students. In their study, children in mountainous areas

developed better balance and coordination skills due to adaptation to more challenging terrain. This suggests that the physical environment can shape motor development and indirectly supports cognitive abilities, including critical reading.

On the other hand, fine motor skills, which involve smaller, precise movements, are critical for tasks such as writing, an essential part of literacy and critical reading development. Escolano-Pérez et al. (2020) revealed that fine motor skills, such as hand coordination, are strongly associated with future academic abilities, particularly in literacy and math. Furthermore, Zhang et al. (2020) highlighted the role of actual motor competence and self-perceptions in children's physical activity participation, especially among underserved groups. Enhanced motor competence and positive self-perceptions encourage active engagement in physical activity, which indirectly supports cognitive health and academic outcomes, including critical reading.

Environmental influences and geographical context also play an important role in shaping students' motor skills. Studies by Oktarifaldi et al. (2024) and Samodra et al. (2024) showed that factors such as geographical location and gender differences affect the development of motor skills in primary school students, which in turn affects their critical reading ability. Similarly, research by Canli et al. (2023) and Zhang et al. (2020) emphasized that students' perceptions of their motor competence can influence their participation in physical activity, which is directly linked to the development of academic skills, including literacy and critical reading.

In addition, Suryadi et al. (2023) and Saputra et al. (2021) demonstrated that game-based learning models and traditional games effectively stimulate motor skill development in primary school children, further supporting critical reading skills. Fernández-Méndez et al. (2020) also found that fine motor and visuospatial skills are critical for mathematical achievement, which often involves critical thinking. Enhancing these skills can, therefore, contribute to literacy and critical reading development.

Specific intervention programs have also shown positive results in improving motor skills and critical reading ability. Kashfi et al. (2019) reported that a targeted motor intervention program can improve motor skills and executive function in children with learning difficulties, which is important for critical reading development. Pham et al. (2021), through the BRAINballs program, showed that the integration of physical education with academic content significantly improves gross motor skills and cognitive skills, which supports literacy. Finally, Hazizah et al. (2024) showed that specially designed games, such as "Warrior Kids Games," can improve fine motor skills and self-efficacy in early childhood, both of which are important for literacy and critical reading development. It can be concluded that motor skill training, both gross and fine, plays a significant role in the development of critical reading skills in primary school students. Various studies have shown that strong motor skills, especially fine motor skills such as

handwriting, not only correlate with general academic achievement but also have a direct impact on literacy and numeracy, which are the basis for critical reading. In addition, the physical environment and geographical context significantly influence students' motor skill development, which in turn impacts their critical reading ability. Intervention programs combining physical activity with academic learning have also been shown to effectively improve motor skills and cognitive abilities, including critical reading. These findings reinforce the importance of motor training as an integral component in the development of academic and cognitive abilities, particularly in critical reading.

### ***The Relationship of Motor Skills Training with Improved Reading Ability***

The relationship between motor skill training and improved critical reading ability in elementary school students has received significant attention in recent years. Research by Sudirjo and Sudrazat (2024) showed a positive relationship between physical activity and cognitive function in children, particularly in areas like literacy and numeracy that support critical reading skills. This finding is in line with research by Buha et al. (2023), who emphasized that strong fine motor skills contribute to early literacy performance, which is an important foundation for the development of critical reading skills. In this context, motor skills, especially fine motor skills, are strongly related to early reading and writing success.

As Milne et al. (2018) pointed out, literacy-related movement skills, such as those required for handwriting, can improve their reading ability by improving fine motor control, increasing focus and concentration, and improving letter and word recognition. While fine motor skills like writing are central to literacy, gross motor skills also play a role. For example, before the child's fingers are strong enough to hold the writing utensils, they need sufficient shoulder stability. Similarly, Lê et al. (2021) highlighted the importance of fine motor skills, such as handwriting, in literacy development, which directly supports critical reading ability. Furthermore, participation in physical activities integrated with motor skills training also contributes to improving cognitive abilities associated with critical reading. Studies (Schembri et al., 2019; Zhou & Tolmie, 2024) showed that regular physical activity improves motor competence, contributing to improved academic achievement, including critical reading ability. Finally, Yoga et al. (2023) found that structured physical activity not only improves motor skills and physical fitness but also contributes to overall academic ability.

Fine motor skills, including abilities such as writing and drawing, serve as a foundation for the development of more complex literacy. Research by Indradjati and Rahayu (2021) shows that an environment that supports physical activity can improve motor skills, which in turn contributes to better cognitive abilities. A good physical environment, such as access to adequate sports facilities and green open spaces, has a significant impact on individual participation

in physical activity. This study is in line with findings showing that regular physical activity is positively associated with the development of motor skills, especially in children and the elderly (Indradjati & Rahayu, 2021; Yoga et al., 2023).

Similarly, Sudirjo and Sudrazat (2024) showed that participation in physical activity can improve cognitive function, which is important for critical reading ability. Thus, the combination of motor skills, physical activity, and environmental support can create optimal conditions for the development of critical reading ability in primary school students. Moreover, the importance of motor skills in education cannot be overlooked. Research by Adhianto and Arief (2023) confirmed that active lifestyle interventions through physical activity in children can have a positive impact on cognitive abilities, including critical reading skills. Regular physical activity not only improves motor skills but also supports the development of executive function, an important aspect of critical and analytical thinking processes. Thus, promoting motor skill development through various physical activities and structured education can be an effective strategy for improving critical reading skills in elementary school students. Yoga et al. (2023) also found that planned physical activities can improve motor skills and physical fitness, which contribute to improved academic performance.

The importance of a holistic approach to education, integrating motor skill development with academic learning, is becoming increasingly clear. Research by Buha et al. (2023) shows that motor skill development can improve students' literacy, which is a key component in critical reading. Consequently, educational programs that emphasize motor skill development can make a significant contribution to improving critical reading ability in primary school students. In order to achieve this goal, it is important to engage various stakeholders, including educators, parents, and communities. Adhianto and Arief (2023) showed that environmental support is crucial in facilitating beneficial physical activities for students. Therefore, collaboration between schools and communities is essential in fostering an environment conducive to both motor skills and critical reading ability.

It can thus be concluded that there is a significant positive relationship between motor skills and critical reading ability in primary school students. Motor skill development, especially through planned physical activities and adequate environmental support, not only improves literacy and numeracy but also improves cognitive functioning, which is essential for critical reading. Thus, a holistic approach integrating physical activity and motor skills into primary education can be an effective strategy to improve academic performance, especially in critical reading.

### ***Supporting Factors for Improving Critical Reading Skills of Elementary Students***

The improvement of critical reading skills in primary school students is of great importance in an educational context. A variety of supporting factors have been identified in

research suggesting that motor skills, physical environment, and play-based learning methods contribute significantly to the development of this ability. For example, Sudaryanti et al. (2024) showed that challenging physical environments, such as mountainous areas, can accelerate the development of gross motor skills, which indirectly supports cognitive development, including critical reading skills. This finding suggests that an environment rich in physical and social stimulation can facilitate a more immersive learning experience for students. In addition, self-perception of motor competence is also influential in encouraging students' active participation in physical activity. Syarifuddin et al. (2024) emphasized that positive perceptions of motor ability can increase student engagement in motor exercises that benefit critical reading skills. When students feel confident in their motor skills, they are more likely to engage in activities that support learning, including critical reading and analysis of texts. Good motor skills can lead to cerebellum activation, which can affect motor function, child focus, language skills, and memory. (Abdelkarim et al., 2017). Children who have good focus and language skills will find it easier to analyze and evaluate what they read. When reading, children need to understand the explicit and implied meaning, which requires good memory. Once the child can understand well, it will be the basis for appropriately analyzing and evaluating the reading.

Game-based learning models have also been shown to be effective in developing motor skills and critical reading skills. Research showed that traditional games and game-based learning models can improve students' motor skills, which contributes to improving critical reading skills (Fajarwati & Arini, 2023; Husniyah et al., 2021). Well-designed games not only improve physical skills, but can also stimulate students' interest and motivation in learning, thus creating a more interactive and fun learning atmosphere. Furthermore, traditional games have cultural values that can enrich students' learning experiences. According to Buahana and Suparno (2022), traditional games not only serve as a tool to improve motor skills but also as a means to teach social and cultural values to children. By understanding and appreciating their own culture, students can develop better critical thinking skills when analyzing texts and broader contexts. Hence, cultural issues are appropriate if used as material in critical reading. Children will be trained to solve problems and provide solutions to cultural problems that exist in society.

In an educational context, it is important to integrate various approaches in teaching to support the development of critical reading skills. Gunawan et al. (2024) showed that the use of interactive learning media and educational games can increase student engagement in the learning process. By utilizing technology and innovative learning methods, educators can create a more interesting and effective learning environment for students. Gross and fine motor skills are also interrelated with cognitive abilities. Supriyadi (2020), for instance, indicated that the development of motor skills can have a positive impact on cognitive abilities, including

critical reading ability. Students who engage in regular physical activity tend to have better executive function, which is important for critical and analytical thinking. In this sense, collaboration between teachers, parents, and the community is essential in supporting the development of motor skills and critical reading. Sudaryanti et al. (2024) added that support from the surrounding environment is very important in facilitating physical activities that are beneficial for students. By involving various stakeholders, education can become more holistic and integrated.

To summarize, motor skills, challenging physical environments, and game-based learning models are important in improving the critical reading ability of elementary school students. Research shows that motor development, which is influenced by the physical environment and social stimulation, positively impacts cognitive abilities, including critical reading. In addition, innovative learning methods such as traditional games and interactive media not only improve motor skills but also enrich students' learning experiences, thus encouraging engagement and motivation in the learning process. The integration of motor games in reading lessons can increase students' motivation and criticism in reading. Motivation can help students understand each part of the text fluently and improve their learning outcomes and critical thinking. Research has shown that motivated children have a larger vocabulary, can read well, and perform better than their less motivated classmates (Bozgun & Can, 2023). Another key factor identified in this study was collaborative support between teachers, parents, and communities to facilitate the development of these skills, confirming the importance of a holistic approach in education to achieve more effective and sustainable learning outcomes.

### ***Factors inhibiting the improvement of critical reading skills of elementary school students***

Improving the critical reading skills of primary school students is often hindered by a variety of interrelated factors. One of the main barriers identified is the lack of access to sports facilities and infrastructure that support physical activity. According to Zhang et al. (2020), underserved groups, such as students in remote areas, may experience difficulties participating in physical activity due to limited facilities. This can have a negative impact on their motor and cognitive development, which in turn affects critical reading ability (Arigawati & Kusnandi, 2023). The inability to engage in adequate physical activity can reduce students' opportunities to develop important motor skills, which are the basis for better reading ability. In addition, geographical location also plays a role in developing students' motor skills. Earlier studies (Amin et al., 2021; Khasanah et al., 2023; Oktarifaldi et al., 2024; Samodra et al., 2024) showed that unfavorable geographical locations, such as rural areas far from sports facilities, can hinder students' participation in physical activity. Gender differences are also considered as an inhibiting factor, where gender stereotypes that limit children's participation in physical activity

can hinder the development of motor skills and critical reading ability. For example, girls are often less encouraged to engage in sports than boys, which can affect their self-confidence and motor skills (Rafiah & Aulia, 2021).

Low self-perceptions of motor competence can also be a significant barrier to developing motor skills and critical reading ability. Canli et al. (2023), for example, showed that students with negative perceptions of their motor abilities are less likely to engage in physical activity. This lack of self-confidence can reduce their opportunity to practice and develop the skills needed for critical reading. When students feel inadequate, they may be reluctant to participate in activities that can improve their motor and cognitive skills. Another factor that can hinder the improvement of critical reading skills is the lack of support from the surrounding environment, including family and school. Fabanyo et al. (2023) showed that parental and teacher support is crucial in encouraging children to engage in physical activity and learning. Without this support, students may feel less motivated to participate in activities that improve their motor skills and critical reading ability. In addition, limitations in the education curriculum can also be a barrier. Many schools may not have enough programs to integrate physical activity with academic learning. In fact, Azzahroh and Putri (2023) showed that an unbalanced curriculum, which focuses more on academics without paying attention to physical aspects, can hinder the development of students' motor skills. When students do not have the opportunity to participate in structured physical activities, they miss out on the benefits that can be gained from the experience, including improved critical reading skills.

Thus, it can be concluded that the improvement of critical reading skills in primary school students is influenced by various interrelated barriers, especially limited access to sports and physical activity facilities. These barriers significantly hinder the development of motor and cognitive skills required for critical reading. Therefore, it is important to address these factors comprehensively to support the development of students' critical reading skills.

### **Conclusion**

The findings of this study confirm the relationship between motor skills training and improved critical reading skills in primary school students. Reviewed studies suggest that motor skills, both gross and fine, play an important role in supporting cognitive and academic development, including critical reading skills. The studies showed a positive correlation between motor skills and academic achievement, with fine motor skills such as handwriting and hand-eye coordination shown to support early literacy, which is important for developing critical reading skills. In addition, the integration of physical activities that support motor development also contributes to improved executive function and critical thinking skills, which are essential in understanding



and analyzing text in depth.

In this study, factors supporting the improvement of primary school students' critical reading skills include a stimulation-rich physical environment, a game-based learning model that is effective in developing motor and cognitive skills, and support from various parties such as teachers, parents, and the community. A physically challenging environment can accelerate the development of gross motor skills, which in turn supports cognitive abilities. In addition, the use of interactive media and traditional games in learning not only improves motor skills but also motivates students to be more involved in the learning process. Conversely, there are also inhibiting factors that can reduce the effectiveness of efforts to improve critical reading skills. These barriers include lack of access to sports facilities and infrastructure that support physical activity, especially in remote areas, as well as gender differences that affect participation in physical activity. Low self-perception of motor competence is also a limiting factor, as students who are not confident in themselves tend to be reluctant to participate in activities that can improve their motor and cognitive abilities. In addition, an unbalanced curriculum that emphasizes academics without integrating physical activity may hinder the development of motor skills necessary for critical reading.

These findings suggest that a holistic approach integrating motor skill development with academic learning is essential in primary education. To improve students' critical reading skills, a comprehensive effort is needed, including improving access to sports facilities, implementing game-based learning methods, and gaining strong support from students' surrounding environment. Thus, students can optimally develop motor and cognitive skills that support critical reading skills, which are key to their future academic success.

### Conflicts of interest

The authors declare no conflicts of interest.

### References

- Abdelkarim, O., Ammar, A., Chtourou, H., Wagner, M., Knisel, E., Hökelmann, A., & Bös, K. (2017). Relationship between motor and cognitive learning abilities among primary school-aged children. *Alexandria Journal of Medicine*, 53(4), 325–331. <https://doi.org/10.1016/j.ajme.2016.12.004>
- Adhianto, K. G., & Arief, N. A. (2023). Hubungan Aktivitas Fisik Terhadap Kebugaran Jasmani Peserta Didik Sekolah Menengah Pertama. *Jambura Journal of Sports Coaching*, 5(2), 134–141. <https://doi.org/10.37311/jjsc.v5i2.20978>
- Adirahma, A. S., Widiyanto, W. E., Setyawan, H., Hamsyah, K., Darmawan, A., Nurkadri, N., Novita, N., Safrudin, S., HB, G., Harmanto, H., Pranoto, N. W., & Pavlovic, R. (2024). Badminton training management strategy with circuit training method to improve athlete performance among students. *Retos*, 61, 108–120. <https://doi.org/10.47197/retos.v61.109067>
- Akhmad, I., Heri, Z., Hariadi, H., Nurkadri, N., Novita, N., Ali, S. K. S., Mohamed, M. F., Ismail, W. M., Balakrishnan, V. A., Gontara, S. Y., & Setyawan, H. (2024). Physical activity levels among Malaysian University and State University of Medan Students: gender difference and the influence of BMI. *Retos*, 60(SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas), 429–438. <https://doi.org/10.47197/retos.v60.109190>
- Anam, K., Setiowati, A., Nurrachmad, L., Indardi, N., Azmi, D. A. N., Aditia, E. A., Irawan, F. A., Susanto, N., Latino, F., Tafuri, F., Pavlović, R., Setyawan, H., & Kozina, Z. (2024). Injury Risk Analysis of Soccer Academy Students: A Review of Functional Movement Screen Scores and Demographic Data. *Retos*, 55, 900–907. <https://doi.org/10.47197/retos.v55.105955>
- Ardiyanto, S. Y., HB, G., Nurkadri, N., Novita, N., Bahriyanto, A., Setyawan, H., Putro, B. N., Harmanto, H., Darmawan, A., Latino, F., & Tafuri, F. (2024). Legal and social perspectives on the phenomena of supporter violence in sport. *Retos*, 60(SE-Revisiónes teóricas sistemáticas y/o metaanálisis), 232–241. <https://doi.org/10.47197/retos.v60.108804>
- Arigawati, N. H., & Kusnandi, K. (2023). Berpikir Kritis Siswa Ditinjau dari Gender dan Gaya Kognitif Field Dependent dan Field Independent. *JlIP - Jurnal Ilmiah Ilmu Pendidikan*, 6(8), 6125–6133. <https://doi.org/10.54371/jiip.v6i8.2408>
- Astuti, Y., Orhan, B. E., Setyawan, H., Karacam, A., & Susanto, N. (2024). Exploring the Connection between Physical and Mental Health in Women and Dog Ownership. *Retos*, 58, 190–204. <https://doi.org/10.47197/retos.v58.106626>
- Azzahroh, L. S., & Putri, R. K. (2023). Analisis Kemampuan Literasi Matematis Siswa SD Ditinjau dari Perbedaan Gender dan Kemampuan Matematis. *Journal of Mathematics Education and Science*, 6(1), 37–45. <https://doi.org/10.32665/james.v6i1.560>
- Bozgun, K., & Can, F. (2023). The Associations between Metacognitive Reading Strategies and Critical Reading Self-Efficacy: Mediation of Reading Motivation. *International Journal on Social and Education Sciences*, 5(1), 51–65. <https://doi.org/10.46328/ijsones.383>
- Buahana, B. N., & Suparno, S. (2022). Pengaruh Permainan Tradisional Benteng Terhadap Keterampilan Motorik Kasar Anak Prasekolah. *Edu Cendikia: Jurnal Ilmiah Kependidikan*, 2(03), 507–512. <https://doi.org/10.47709/educendikia.v2i03.1912>
- Buha, N., Banković, S., & Gligorović, M. (2023). The Relationship between Reading Skills and Fine Motor Abilities in Younger School-Age Children. *Specijalna Edukacija i Rehabilitacija*, 22(2), 149–165. <https://doi.org/10.5937/specedreh22-41085>
- Candra, O., Pranoto, N. W., Ropitasari, R., Cahyono, D., Sukmawati, E., & CS, A. (2023). Peran Pendidikan

- Jasmani dalam Pengembangan Motorik Kasar pada Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 7(2), 2538–2546. <https://doi.org/10.31004/obsesi.v7i2.4506>
- Canli, T., Canli, U., Taskin, C., & Aldhahi, M. I. (2023). Motor Coordination in Primary School Students: The Role of Age, Sex, and Physical Activity Participation in Turkey. *Children*, 10(9), 1524. <https://doi.org/10.3390/children10091524>
- Charlina, C., Roziyah, R., Ismail, S., Piliang, W. S. H., Siswanto, S., Setyawan, H., Zulbahri, Z., Darmawan, A., Shidiq, A. A. P., Eken, Ö., Pavlovic, R., Latino, F., & Tafuri, F. (2024). Effective Verbal Communication in Physical Education Learning and Sports Coaching to Improve Achievement and Health: A Systematic Review. *Retos*, 56(SE-Revisiones teóricas, sistemáticas y/o metaanálisis), 1139–1147. <https://doi.org/10.47197/retos.v56.107308>
- Damsgaard, L., Elleby, S. R., Gejl, A. K., Malling, A. S. B., Bugge, A., Lundbye-Jensen, J., Poulsen, M., Nielsen, G., & Wienecke, J. (2020). Motor-Enriched Encoding Can Improve Children's Early Letter Recognition. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.01207>
- Destriani, D., Yusufi, H., Destriana, D., Setyawan, H., García-Jiménez, J. V., Latino, F., Tafuri, F., Wijanarko, T., Kurniawan, A. W., Anam, K., Shidiq, A. A. P., Rahmatullah, M. I., & Eken, Ö. (2024). Results of Beginner Archery Skills Among Adolescents Based on Gender Review and Shot Distance. *Retos*, 56, 887–894. <https://doi.org/10.47197/retos.v56.106629>
- Escolano-Pérez, E., Herrero-Nivela, M. L., & Losada, J. L. (2020). Association Between Preschoolers' Specific Fine (But Not Gross) Motor Skills and Later Academic Competencies: Educational Implications. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.01044>
- Fabanyo, V. R., Bakar, M. T., & Chandra, F. E. (2023). Analisis Kemampuan Pemecahan Masalah Matematis Siswa pada Materi Bangun Ruang Sisi Datar Berdasarkan Gender. *Jurnal Pendidikan Guru Matematika*, 3(1). <https://doi.org/10.33387/jpgm.v3i1.5741>
- Fahrosi, A. T., Anam, K., Setiowati, A., Sugiarto, S., Susanto, N., Wijanarko, T., Setyawan, H., Fitriady, G., Eken, Ö., Kozina, Z., Latino, F., Tafuri, F., & Vicente García-Jiménez, J. (2024). Analysis of injury risk levels in young footballers: A review of functional movement screens and static balance scores. *Retos*, 58. <https://doi.org/10.47197/retos.v58.107683>
- Fernández-Méndez, L. M., Contreras, M. J., Mammarella, I. C., Feraco, T., & Meneghetti, C. (2020). Mathematical achievement: the role of spatial and motor skills in 6–8 year-old children. *PeerJ*, 8, e10095. <https://doi.org/10.7717/peerj.10095>
- Gunawan, G., Masna, M., Suwika, I. P., & Imamah, Z. (2024). Upaya Meningkatkan Perkembangan Motorik Kasar Anak Prasekolah melalui Permainan Lempar Tangkap Bola Kecil. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 8(2), 245–254. <https://doi.org/10.31004/obsesi.v8i2.5393>
- Hamsyah, K., Nopembri, S., Komari, A., Setyawan, H., Hermawan, H. A., Eken, Ö., Sugiyanto, S., Shidiq, A. A. P., Pavlovic, R., Latino, F., Tafuri, F., Pranoto, N. W., & Rahmatullah, M. I. (2024). Implementation of Archery Class Management at the Pre-Extracurricular Program Stage To Increase Elementary School Students' Interest. *Retos*, 55, 849–856. <https://doi.org/10.47197/retos.v55.105258>
- Harmanto, H., Setyawan, H., Umar, F., Safrudin, S., Bahriyanto, A., Yeni, M., Ginting, A., Novita, N., Nurkadri, N., Kurniawan, A. W., HB, G., Pranoto, N. W., & Pavlovic, R. (2024). Integrating citizenship education into secondary school physical education lessons in Indonesia: an approach to reducing character degradation. *Retos*, 60, 865–876. <https://doi.org/10.47197/retos.v60.108758>
- Hazizah, N., Rusdinal, R., Handrianto, C., Ismaniar, I., & Rahman, M. A. (2024). Warrior Kids Games on Improving the Self-Efficacy Abilities and Fine Motor Skills of 5–6 Years-Old Children. *Retos*, 56, 639–647. <https://doi.org/10.47197/retos.v56.104892>
- HB, G., Ardiyanto, S. Y., Nurkadri, N., Novita, N., Widiyanto, W. E., Setyawan, H., Putro, B. N., Harmanto, H., Darmawan, A., & Radulovic, N. (2024). Ensuring fairness and transparency in sports through compliance to legal principles and ethical standards. *Retos*, 60, 204–216. <https://doi.org/10.47197/retos.v60.108935>
- HB, G., Ardiyanto, S. Y., Setyawan, H., Putro, B. N., Kurniawan, A. W., Zulbahri, Z., Gerdijan, N., Eken, Ö., Latino, F., & Tafuri, F. (2024). Legal Review of Bullying Cases against Students with Disabilities in Physical Education Learning at Schools: A Systematic Review. *Retos*, 57, 840–848. <https://doi.org/10.47197/retos.v57.107448>
- Husniyah, R., Asrizal, A., & Usmeldi, U. (2021). Literatur Review Pengaruh Pembelajaran Berbasis Kecakapan Hidup (Life Skill) Terhadap Hasil Belajar Fisika Peserta Didik. *KONSTAN - JURNAL FISIKA DAN PENDIDIKAN FISIKA*, 6(2), 74–79. <https://doi.org/10.20414/konstan.v6i2.93>
- Indradjati, P. N., & Rahayu, A. (2021). Pengaruh Lingkungan Terbangun terhadap Aktivitas Fisik Untuk Kesehatan Lanjut Usia. *Jurnal Kesehatan Lingkungan Indonesia*, 20(2), 112–119. <https://doi.org/10.14710/jkli.20.2.112-119>
- Kashfi, T. E., Sohrabi, M., Kakhki, A. S., Mashhadi, A., & Nooghabi, M. J. (2019). Effects of a Motor Intervention Program on Motor Skills and Executive Functions in Children With Learning Disabilities. *Perceptual and Motor Skills*, 126(3), 477–498. <https://doi.org/10.1177/0031512519836811>
- Komari, A., Setyawan, H., Kriswanto, E. S., Sujarwo, S.,

- García-Jiménez, J. V., Pavlovic, R., Nowak, A. M., Susanto, N., Kurniawan, A. W., Gusliana HB, G. H. B., Shidiq, A. A. P., Putra, A. M. I., & Roziah, R. (2024). The Effect of Physical Education (PE) Class Management Using Badminton Materials to Improve Elementary School (ES) Students' Concentration. *Retos*, 55, 520–526. <https://doi.org/10.47197/retos.v56.104609>
- Komari, A., Yulianto, H., Solikhin, M. N., Sadewa, Y. R., & Setyawan, H. (2024). Differences in the Implementation of Physical Education (PE) planning Containing 21st-century Skills Based on Period of Work and Gender. *Retos*, 57, 697–706. <https://doi.org/10.47197/retos.v57.105895>
- Kurniawan, A. W., Wiguno, L. T. H., Mu'arifin, M., Setyawan, H., Shidiq, A. A. P., García-Jiménez, J. V., Eken, Ö., Latino, F., Tafuri, F., Pranoto, N. W., Rahmatullah, M. I., & Anam, K. (2024). I-Spring Assisted Development of a Basketball Shooting Technique Program. *Retos*, 55, 874–881. <https://doi.org/10.47197/retos.v55.105437>
- Kustari, N. E., & Mahendra, A. M. (2020). Studi Deskriptif Mengenai Keterampilan Motorik Kasar Siswa Sekolah Dasar Se-Kecamatan Cileunyi. *Jurnal Penelitian Pendidikan*, 20(3), 382–391. <https://doi.org/10.17509/jpp.v20i3.27089>
- Latino, F., Martinez-Roig, R., Setyawan, H., Susanto, N., Anam, K., Saraiello, E., & Tafuri, F. (2024). Physiological Responses of Wheelchair Basketball Athletes to a Combined Aerobic and Anaerobic Training Program. *Retos*, 57, 800–808. <https://doi.org/10.47197/retos.v57.107483>
- Latino, F., Martinez-Roig, R., Susanto, N., Setyawan, H., Anam, K., Saraiello, E., Tafuri, D., & Tafuri, F. (2024). Endurance Training and Physiological Variables: Effects on sub-elite Volleyball Players. *Retos*, 58, 522–527. <https://doi.org/10.47197/retos.v58.107636>
- Latino, F., Martinez-Roig, R., Susanto, N., Setyawan, H., Anam, K., Saraiello, E., & Tafuri, F. (2024). High-Intensity Interval Training and Physiological Demands in Wheelchair Tennis Players: A Pilot Study. *Retos*, 58, 238–246. <https://doi.org/10.47197/retos.v58.107485>
- Latino, F., Susanto, N., Anam, K., Setyawan, H., Saraiello, E., & Tafuri, F. (2024). The effects of circuit training versus high-intensity interval training on the endurance of volleyball athletes: a randomized controlled trial. *Retos*, 58, 1050–1060. <https://doi.org/10.47197/retos.v58.107877>
- Lê, M., Quémart, P., Potocki, A., Gimenes, M., Chesnet, D., & Lambert, E. (2021). Modeling the Influence of Motor Skills on Literacy in Third Grade: Contributions of Executive Functions and Handwriting. *PLOS ONE*, 16(11), e0259016. <https://doi.org/10.1371/journal.pone.0259016>
- Lee, J., Zhang, T., Chu, T. L. (Alan), Gu, X., & Zhu, P. (2020). Effects of a Fundamental Motor Skill-Based Afterschool Program on Children's Physical and Cognitive Health Outcomes. *International Journal of Environmental Research and Public Health*, 17(3), 733. <https://doi.org/10.3390/ijerph17030733>
- Lestari, S. D., & Puspitasari, I. (2021). Aktivitas Permainan Estafet Bola Modifikasi untuk Meningkatkan Keterampilan Motorik Kasar Anak Usia 3-4 Tahun. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 6(2), 752–760. <https://doi.org/10.31004/obsesi.v6i2.1024>
- Mardiyah, S. U. K., Setyawan, H., García-Jiménez, J. V., Eken, Ö., Latino, F., Pranoto, N. W., Darmawan, A., Shidiq, A. A. P., Rahmatullah, M. I., Tafuri, F., & Anam, K. (2024). Differences in the Implementation of Physical Education (PE) Learning Management Based on Years of Work: Analysis of Differences in the Quality of Quality Assurance Culture. *Retos*, 55, 797–803. <https://doi.org/10.47197/retos.v55.104865>
- Mardiyah, S. U. K., Setyawan, H., Pavlovic, R., Darmawan, A., Susanto, N., & Kozina, Z. (2024). Management for Strengthening Literacy Learning Culture Physical Education in Secondary Schools in Indonesia. *Sportske Nauke i Zdravlje*, 14(5), 81–91. <https://doi.org/10.7251/SSH24V081M>
- Martono, M., Suherman, W. S., Nugroho, S., Setyawan, H., Sulistiyono, S., Pambudi, D. K., Puri, L. W., Septiantoko, R., Hermawan, Y., García-Jiménez, J. V., Pavlovic, R., Eken, Ö., Pranoto, N. W., Darmawan, A., Shidiq, A. A. P., & Rahmatullah, M. I. (2024). Achievement of Physical Education Learning Results Based on Gender Review and Learning Motivation on High School Students in the Yogyakarta Region, Indonesia. *Retos*, 55, 1045–1052. <https://doi.org/10.47197/retos.v55.106831>
- Matitaputty, J. K., Saputra, N., Judijanto, L., & Susanto, N. (2024). *PjBL-based digital history model to improve historical concept skills and historical consciousness*. 18(2), 430–440. <https://doi.org/10.11591/edulearn.v18i2.21152>
- Mubarok, M. Z., & Kharisma, Y. (2021). Perbandingan Metode Latihan Interval Ekstensif dan Intensif Terhadap Peningkatan Daya Tahan Aerobik. *Physical Activity Journal*, 3(1), 77. <https://doi.org/10.20884/1.paju.2021.3.1.4813>
- Muliawanti, S. F., Amalian, A. R., Nurashiah, I., Hayati, E., & Taslim, T. (2022). Analisis Kemampuan Membaca Pemahaman Siswa Kelas III Sekolah Dasar. *Jurnal Cakrawala Pendas*, 8(3), 860–869. <https://doi.org/10.31949/jcp.v8i3.2605>
- Mulyanti, C., Prasetyo, Y., Sumarjo, S., Setyawan, H., Kurniawan, A. W., Shidiq, A. A. P., Eken, Ö., Pavlovic, R., Latino, F., Tafuri, F., Wijanarko, T., Rahmatullah, M. I., & Anam, K. (2024). Differences in Archery Skill Results for Vocational School Students and Beginners Based on Shooting Distance. *Retos*, 55, 957–962.

- <https://doi.org/10.47197/retos.v55.106081>
- Mustafa, P. S., & Gusdiyanto, H. (2023). Perbandingan Kurikulum Pendidikan Jasmani Antara Indonesia dengan Finlandia: Kajian Review. *Biomatika: Jurnal Ilmiah Fakultas Keguruan Dan Ilmu Pendidikan*, 9(2), 117–128. <https://doi.org/10.35569/biormatika.v9i2.1534>
- Mustafa, P. S., & Sugiharto, S. (2020). Keterampilan Motorik Pada Pendidikan Jasmani Meningkatkan Pembelajaran Gerak Seumur Hidup. *Sporta Saintika*, 5(2), 199–218. <https://doi.org/10.24036/sporta.v5i2.133>
- N. Milne, K., Cacciotti, K., & Davies. (2018). The relationship between motor proficiency and reading ability in Year 1 children: a cross-sectional study. *BMC Pediatrics*, 18(294), 2–10. <https://doi.org/10.1021/ac60271a039>
- Nasution, S. T., & Sutapa, P. (2020). Strategi Guru dalam Menstimulasi Keterampilan Motorik AUD Pada Era Pandemi Covid 19. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(2), 1313–1324. <https://doi.org/10.31004/obsesi.v5i2.849>
- Oktarifaldi, Nopembri, S., Yudanto, & Bin Shahril, M. I. (2024). The Fundamental Motor Skills and Motor Coordination Performance of Children in West Sumatera Province, Indonesia. *Pedagogy of Physical Culture and Sports*, 28(1), 4–15. <https://doi.org/10.15561/26649837.2024.0101>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., & McDonald, S. (2021). The PRISMA 2020 Statement: An Updated Guideline For Reporting Systematic Reviews. *The BMJ*, 372. <https://doi.org/10.1136/bmj.n71>
- Perdani, R. R. W., Purnama, D. M. W., Afifah, N., Sari, A. I., & Fahrieza, S. (2021). Hubungan Stimulasi Ibu Dengan Perkembangan Anak Usia 0-3 Tahun di Kelurahan Penengahan Raya Kecamatan Kedaton Bandar Lampung. *Sari Pediatri*, 22(5), 304. <https://doi.org/10.14238/sp22.5.2021.304-10>
- Pham, V. H., Wawrzyniak, S., Cichy, I., Bronikowski, M., & Rokita, A. (2021). BRAINballs Program Improves the Gross Motor Skills of Primary School Pupils in Vietnam. *International Journal of Environmental Research and Public Health*, 18(3), 1290. <https://doi.org/10.3390/ijerph18031290>
- Pranoto, N. W., Fauziah, V., Anugrah, S., Fitriady, G., Setyawan, H., Geantă, V. A., Sibomana, A., & Ndayisenga, J. (2024). The effectiveness of diet and exercise in the management of obesity. *Retos*, 58, 951–959. <https://doi.org/10.47197/retos.v58.105295>
- Pranoto, N. W., Fauziah, V., Muchlis, A. F., Komaini, A., Rayendra, R., Susanto, N., Fitriady, G., Setyawan, H., Pavlovic, R., Sibomana, A., & Ndayisenga, J. (2024). in motor skills of s Exploration of Children's Motor Skills with Stunting Vs. Non-Stunting. *Retos*, 54, 224–234. <https://doi.org/10.47197/retos.v54.103107>
- Prodyanatasari, A., Purwasih, Y., & Fernanda, J. W. (2023). Sehat dan Bahagia dengan Senam Ceria bersama Siswa SDN Blimbing I Kabupaten Kediri. *Jurnal Pengabdian Masyarakat Bhinneka (JPMB)*, 2(1), 31–36. <https://doi.org/10.58266/jpmb.v2i1.73>
- Purwanto, D., & Baan, A. B. (2022). Pengaruh Aktivitas Pendidikan Jasmani Terhadap Keterampilan Motorik Kasar Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(6), 5669–5678. <https://doi.org/10.31004/obsesi.v6i6.3158>
- Putri, M. A. (2019). Peningkatan Antioksidan Endogen yang Dipicu Latihan Fisik. *Jurnal Kedokteran YARSI*, 26(3), 163–172. <https://doi.org/10.33476/jky.v26i3.760>
- Putro, B. N., Nurkadri, N., Sahabuddin, S., Laksana, A. A. N. P., Setyawan, H., HB, G., Harmanto, H., Darmawan, A., Tafuri, F., & Latino, F. (2024). Examining physical education learning outcomes of senior high school students: the impact of gender and learning frequency. *Retos*, 60(SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas), 393–404. <https://doi.org/10.47197/retos.v60.109042>
- Rafiah, H., & Aulia, S. (2021). Exploration the Mathematical Creative Thinking of Elementary School Students in a Gender Perspective. *Math Didactic Jurnal Pendidikan Matematika*, 7(2), 133–143. <https://doi.org/10.33654/math.v7i2.1145>
- Raga, A., Muslimah, H. N. M. N., Suyatno, D. N. A., & Saparuddin, M. (2024). Upaya Meningkatkan Kemampuan Motorik Kasar Anak Melalui Gerak dan Lagu Usia 5-6 Tahun Kelompok B di RA Ma'arif NU 003 Palaran. *BOCAH: Borneo Early Childhood Education and Humanity Journal*, 3(1), 15–24. <https://doi.org/10.21093/bocah.v3i1.7537>
- Rahayu, E. T., Syafrida, R., Ferianto, F., Nurunnabilah, N., & Syahnurmala, H. (2023). Efektifitas Penggunaan Inovasi Media Kiorroga terhadap Kemampuan Motorik Kasar Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(4), 4232–4242. <https://doi.org/10.31004/obsesi.v7i4.5096>
- Rahman, F., Cahyadi, M. M., Jasmine, S. A., Larasati, Ayu, A. S., & Pristianto, A. (2023). Penerapan Model Latihan Plyometric untuk Meningkatkan Daya Kelincahan pada Komunitas Sepatu Roda Voodoo. *Jurnal Pustaka Mitra (Pusat Akses Kajian Mengabdikan Masyarakat)*, 3(5), 233–237. <https://doi.org/10.55382/jurnalpustakamitra.v3i5.627>
- Ramdani, L. A., & Azizah, N. (2019). Permainan Outbound untuk Perkembangan Motorik Kasar Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 4(1), 494. <https://doi.org/10.31004/obsesi.v4i1.407>
- Rifai, A., Bustomi, D., & Hambali, S. (2020). Perbandingan Latihan Footwork Dan Shadow Terhadap

- Kelincahan Atlet Tim Bulutangkis Pb. Setia Putra. *Jurnal Kejaora (Kesehatan Jasmani Dan Olah Raga)*, 5(1), 25–31. <https://doi.org/10.36526/kejaora.v5i1.848>
- Riyanto, P., Fitrianti, H., Rediani, N. N., & De Lima, C. N. (2022). Keterampilan Motorik Kasar Anak Prasekolah: Analisis Program Intervensi Motorik. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 6(3), 432–439. <https://doi.org/10.23887/jppp.v6i3.53617>
- Samodra, Y. T. J., Suryadi, D., Wati, I. D. P., Supriatna, E., Santika, I. G. P. N. A., Suganda, M. A., & Dewi, P. C. P. (2023). Analysis of Gross Motoric Analysis of Elementary School Students: A Comparative Study of Students in Hill and Coastal Areas. *Pedagogy of Physical Culture and Sports*, 27(2), 139–145. <https://doi.org/10.15561/26649837.2023.0206>
- Samodra, Y. T. J., Yosika, G. F., Gustian, U., Mashud, M., Arifin, S., Suryadi, D., Wati, I. D. P., Syam, A., Candra, A. R. D., Wati, M. G., & Candra, A. T. (2024). Are Boys and Girls in Rural Areas Equal in Terms of Gross Motor Skills? *Retos*, 54, 94–99. <https://doi.org/10.47197/retos.v54.103005>
- Saputra, H., Hanif, A. S., Sulaiman, I., Ningrum, D. T. M., & Razali, R. (2021). The Effect of Traditional Games and Drill with Motor Ability on Skills (Running, Jumping, Overhand Throw and Catching) at Elementary School. *International Journal of Human Movement and Sports Sciences*, 9(6), 1097–1103. <https://doi.org/10.13189/saj.2021.090603>
- Schembri, R., Quinto, A., Aiello, F., Pignato, S., & Sgrò, F. (2019). The Relationship Between the Practice of Physical Activity and Sport and the Level of Motor Competence in Primary School Children. *Journal of Physical Education and Sport*, 19(5). <https://doi.org/10.7752/jpes.2019.s5297>
- Selamet, Supiana, & Zaqiah, Q. Y. (2022). Kebijakan Pengembangan Kurikulum Pendidikan Islam. *AL-MUNADZOMAH*, 1(2), 97–111. <https://doi.org/10.51192/almunadzomah.v1i2.320>
- Septiantoko, R., Murdiono, M., Saliman, S., Setyawan, H., García-Jiménez, J. V., Latino, F., Tafuri, F., Pranoto, N. W., Kurniawan, A. W., Anam, K., Shidiq, A. A. P., Rahmatullah, M. I., & Eken, Ö. (2024). Differences in Achievement in Physical Education Learning Outcomes for High School Students Based on Parental Occupation: Analysis of Differences in Parental Social Status in Providing Learning Motivation. *Retos*, 55, 882–888. <https://doi.org/10.47197/retos.v55.105980>
- Setyawan, H., Alim, A. M., Listyarini, A. E., Suri, P. T., Mahsusi, J., Rahmatullah, M. I., Sugiarto, T., Shidiq, A. A. P., Kozina, Z., Eken, Ö., Latino, F., Tafuri, F., & Pranoto, N. W. (2024). Implementation of Archery Class Management at the Pre-Extracurricular Program Stage To Improve Archery Skills of Elementary School Students. *Retos*, 55, 867–873. <https://doi.org/10.47197/retos.v55.105275>
- Setyawan, H., Suyanto, S., Ngatman, N., Purwanto, S., Suyato, S., Darmawan, A., Shidiq, A. A. P., Eken, Ö., Pavlovic, R., Latino, F., Tafuri, F., Wijanarko, T., Ermawati, S. E. S., & Gusliana HB, G. H. B. (2024). The Effect Of Implementing Physical Education Class Management Archery Material To Improve Concentration Elementary School Students. *Retos*, 56, 879–886. <https://doi.org/10.47197/retos.v56.105216>
- Sudaryanti, S., Prayitno, P., Arifiyanti, N., & Maharani, O. (2024). Pengembangan Kemampuan Motorik dan Sosial Emosional Anak Usia Dini Menggunakan Permainan Tradisional. *Jurnal Pendidikan Anak*, 13(1), 114–125. <https://doi.org/10.21831/jpa.v13i1.387>
- Sudirjo, E., & Sudrazat, A. (2024). Bagaimana Intervensi Gaya Hidup Aktif melalui Aktifitas Fisik pada Anak? Sebuah Tinjauan Sitematis. *Jurnal Pendidikan Kesehatan Rekreasi*, 10(1), 109–123. <https://doi.org/10.59672/jpkr.v10i1.3480>
- Supriyadi, A. (2020). Pengaruh Model Outdoor Education Terhadap Keterampilan Motorik Kasar Untuk Pendidikan Anak Usia Dini. *Jurnal Master Penjas & Olahraga*, 1(1), 12–20. <https://doi.org/10.37742/jmpo.v1i1.3>
- Surtikayati, Y., & Ritonga, R. (2023). Peningkatan Kemampuan Membaca Permulaan Menggunakan Metode Multisensori Siswa Kelas I Sekolah Dasar. *Mitra Pilar: Jurnal Pendidikan, Inovasi, Dan Terapan Teknologi*, 2(2), 53–62. <https://doi.org/10.58797/pilar.0202.02>
- Suryadi, D., Nasrulloh, A., Yanti, N., Ramli, R., Fauzan, L. A., Kushartanti, B. W., Sumaryanti, S., Suhartini, B., Budayati, E. S., Arovah, N. I., Mashud, M., Suganda, M. A., Sumaryanto, S., Sutapa, P., Abdullah, N. M. bin, & Fauziah, E. (2023). Stimulation of Motor Skills Through Game Models in Early Childhood and Elementary School Students: Systematic Review in Indonesia. *Retos*, 51, 1255–1261. <https://doi.org/10.47197/retos.v51.101743>
- Susanto, N., Dinata, W. W., Ihsan, N., Bahtra, R., Andria, Y., Pranoto, N. W., Anam, K., Sofyan, D., Lourenço, C. C. V., Burhaein, E., García-Jiménez, J. V., & Setyawan, H. (2023). Instrument for Assessing Basketball Skills in Junior High School Students in Indonesia. *Journal of Physical Education and Sport*, 23(12), 3220–3227. <https://doi.org/10.7752/jpes.2023.12368>
- Susanto, N., García-Jiménez, J. V., Nowak, A. M., Setyawan, H., Pavlovic, R., Rusdiawan, A., & Syaekani, A. A. (2024). Development Assessment Model for Talent Identification of Young Indonesian Basketball Players: Anthropometrics, Biomotor, Technical, and Tactical Skills. *International Journal of Human Movement and Sports Sciences*, 12(4), 625–635. <https://doi.org/10.13189/saj.2024.120403>
- Susanto, N., Nurhasan, N., Mintarto, E., Rohmansyah, N. A., Syahrudin, & Hiruntrakul, A. (2023). The effect of learning models on creativity, knowledge, and big ball game skills in high school students. *International Journal*

- on *Disability and Human Development*, 22(1), 17–22.
- Susanto, S., Setyawan, H., Susanto, N., García-Jiménez, J. V., Latino, F., Tafuri, F., & Eken, Ö. (2024). The Influence Of Modified One-Hole Game Media In Improving Fine Motor Skills In Early Childhood. *Sports Science and Health*, 14(5), 151. <https://doi.org/http://dx.doi.org/10.7251/SSH24V151S>
- Susanto, Setyawan, H., García-Jiménez, J. V., Pavlovic, R., Nowak, A. M., & Susanto, N. (2024). Analysis of One-Hole Game Tools in Developing Fine Motor Skills in Early Childhood. *Sportske Nauke i Zdravlje*, 14(5), 135–139. <https://doi.org/10.7251/SSH24V135S>
- Suyato, S., Setyawan, H., Sukarti, S. E. E., Shidiq, A. A. P., Darmawan, A., HB, G., Zulbahri, Z., Eken, Ö., Pavlovic, R., Latino, F., & Tafuri, F. (2024). The Integration of Social values in Physical Education and Sport to Develop Teenage Students' Character: a Systematic Review. *Retos*, 58, 960–968. <https://doi.org/10.47197/retos.v58.107763>
- Syarifuddin, S., Nufus, M. S., Sasoko, W. H., Zukhruf, A., Ramdan, F., Rosnani, R., & Kurnia, A. (2024). Analisis Tingkat Keterampilan Guru Sekolah Dasar di Kota Bima dalam Pengembangan Pembelajaran Berbasis Media Interaktif. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 4(1), 35–48. <https://doi.org/10.53299/jppi.v4i1.387>
- Syaukani, A. A., Jariono, G., Susanto, N., & Setyawan, H. (2024). Perception on health and exercise among indonesian older adults: a sequential exploratory study in javanese rural communities. *Retos*, 59, 156–164. <https://doi.org/10.47197/retos.v59.107148>
- Tafuri, F., Martinez-Roig, R., Anam, K., Susanto, N., Setyawan, H., Saraiello, E., & Latino, F. (2024). Effects of a circuit training program in improving cardiorespiratory fitness, upper extremity strength, and agility in paraplegic subjects. *Retos*, 58, 552–559. <https://doi.org/10.47197/retos.v58.107488>
- Tafuri, F., Martinez-Roig, R., Setyawan, H., Susanto, N., Anam, K., Saraiello, E., Avino, U., & Latino, F. (2024). Circuit training improves physiological conditions among wheelchair basket players. *Retos*, 58, 138–146. <https://doi.org/10.47197/retos.v58.107484>
- Tafuri, F., Martinez-Roig, R., Susanto, N., Setyawan, H., & Latino, F. (2024). Physically Active Lifestyles within the School context: Morpho-Physiological and Functional Aspects. *Retos*, 58, 48–60. <https://doi.org/10.47197/retos.v58.106154>
- Ulfah, A. A., Dimiyati, D., & Putra, A. J. A. (2021). Analisis Penerapan Senam Irama dalam Meningkatkan Kemampuan Motorik Kasar Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 5(2), 1844–1852. <https://doi.org/10.31004/obsesi.v5i2.993>
- Van, L. H., Li, C. S., & Wan, R. (2022). Critical reading in higher education: A systematic review. *Thinking Skills and Creativity*, 44, 101028. <https://doi.org/https://doi.org/10.1016/j.tsc.2022.101028>
- Wahono, R. H. J., Supeno, S., & Sutomo, M. (2022). Pengembangan E-LKPD dengan Pendekatan Saintifik untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Sekolah Dasar dalam Pembelajaran IPA. *Jurnal Basicedu*, 6(5), 8331–8340. <https://doi.org/10.31004/basicedu.v6i5.3743>
- Wang, L., & Wang, L. (2024). Relationships between Motor Skills and Academic Achievement in School-Aged Children and Adolescents: A Systematic Review. *Children*, 11(3), 336. <https://doi.org/10.3390/children11030336>
- Wayoi, D. S., Setyawan, H., Suyanto, S., Prasetyo, Y., Lastiono, S. T., Nurkadri, N., Putro, B. N., Harmanto, H., Darmawan, A., HB, G., & Eken, Ö. (2024). Implementing management of the physical fitness education program for the drug rehabilitation patients in drug addict therapy centre. *Retos*, 60, 309–319. <https://doi.org/10.47197/retos.v60.104433>
- Widiyanto, Setyawan, H., Suharjana, García-Jiménez, J. V., Pavlovic, R., Nowak, A. M., & Shahri, M. I. Bin. (2024). The differences of learning outcomes in students archery skill according to physiological ability. *Jurnal Cakrawala Pendidikan*, 43(2). <https://doi.org/10.21831/cp.v43i2.63268>
- Widiyanto, W., Setyawan, H., Suharjana, S., Purwanto, S., Indra, E. N., Prayudho, S., García-Jiménez, J. V., Pavlovic, R., Nowak, A. M., Susanto, N., Darmawan, A., Purnomo Shidiq, A. A., & Andriansyah, A. (2024). The Differences Result in Serve Skill of Junior Tennis Players Assessed Based on Gender and Age. *Retos*, 54, 272–278. <https://doi.org/10.47197/retos.v54.102757>
- Widiyanto, W., Setyawan, H., Suharjana, S., Purwanto, S., Indra, E. N., Sujarwo, S., Prayudho, S., García-Jiménez, J. V., Pavlovic, R., Eken, Ö., Purwanto, S., Darmawan, A., Shidiq, A. A. P., Rahmatullah, M. I., & Wali, C. N. (2024). Fitness Levels of Elementary School Students Based on Gender and Race in Indonesia: Are There Differences? *Retos*, 55, 963–968. <https://doi.org/10.47197/retos.v55.105679>
- Yani, A., Henjilito, R., Noviardila, I., Hasan, B., Setyawan, H., Shidiq, A. A. P., Gerdijan, N., Latino, F., Eken, Ö., Zulbahri, Z., Kurniawan, A. W., & HB, G. (2024). The Role of School Supervisors in the Quality Assurance of Physical Education Learning: A Systematic Review. *Retos*, 57, 589–597. <https://doi.org/10.47197/retos.v57.107189>
- Yoga, D., Purbodjati, P., & Kumaat, N. A. (2023). Pengaruh Aktivitas Fisik terhadap Keterampilan Motorik dan Kebugaran Jasmani Peserta Didik. *Bravo's : Jurnal Program Studi Pendidikan Jasmani Dan Kesehatan*, 11(2), 240. <https://doi.org/10.32682/bravos.v11i2.3083>
- Yusroni, M., & Alimah, S. (2023). Stimulasi Keterampilan Motorik Anak Melalui Permainan Tradisional. *Citius :*

- Jurnal Pendidikan Jasmani, Olahraga, Dan Kesehatan*, 3(2), 155–162. <https://doi.org/10.32665/citius.v3i2.2443>
- Zanada, J. F., Setyawan, H., Susanto, N., Bahtra, R., Wijanarko, T., Anam, K., Fitriady, G., García-Jiménez, J. V., Pavlovic, R., & Nowak, A. M. (2024). Reducing Dysmenorrhea In School-Aged Teenagers By Practising Yoga: A Literature Review. *Retos*, 54, 76–83. <https://doi.org/10.47197/retos.v54.103066>
- Zhang, T., Lee, J., Barnett, L. M., & Gu, X. (2021). Does Perceived Competence Mediate between Ball Skills and Children's Physical Activity and Enjoyment? *Children*, 8(7), 575. <https://doi.org/10.3390/children8070575>
- Zhang, T., Lee, J., Chu, T. L. (Alan), Chen, C., & Gu, X. (2020). Accessing Physical Activity and Health Disparities among Underserved Hispanic Children: The Role of Actual and Perceived Motor Competence. *International Journal of Environmental Research and Public Health*, 17(9), 3013. <https://doi.org/10.3390/ijerph17093013>
- Zhou, Y., & Tolmie, A. (2024). Associations between Gross and Fine Motor Skills, Physical Activity, Executive Function, and Academic Achievement: Longitudinal Findings from the UK Millennium Cohort Study. *Brain Sciences*, 14(2), 121. <https://doi.org/10.3390/brainsci14020121>
- Zulbahri, Z., Putra, A. N., Syampurma, H., Wulandari, I., Lawanis, H., Sari, D. N., Sasmitha, W., Nurrochmah, S., Nurkadri, N., Putro, B. N., HB, G., Harmanto, H., Eken, Ö., Pavlovic, R., & Tafuri, F. (2024). Physical education learning outcomes of senior high school students based on gender and intellectual intelligence review. *Retos*, 60, 362–369. <https://doi.org/10.47197/retos.v60.108990>

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