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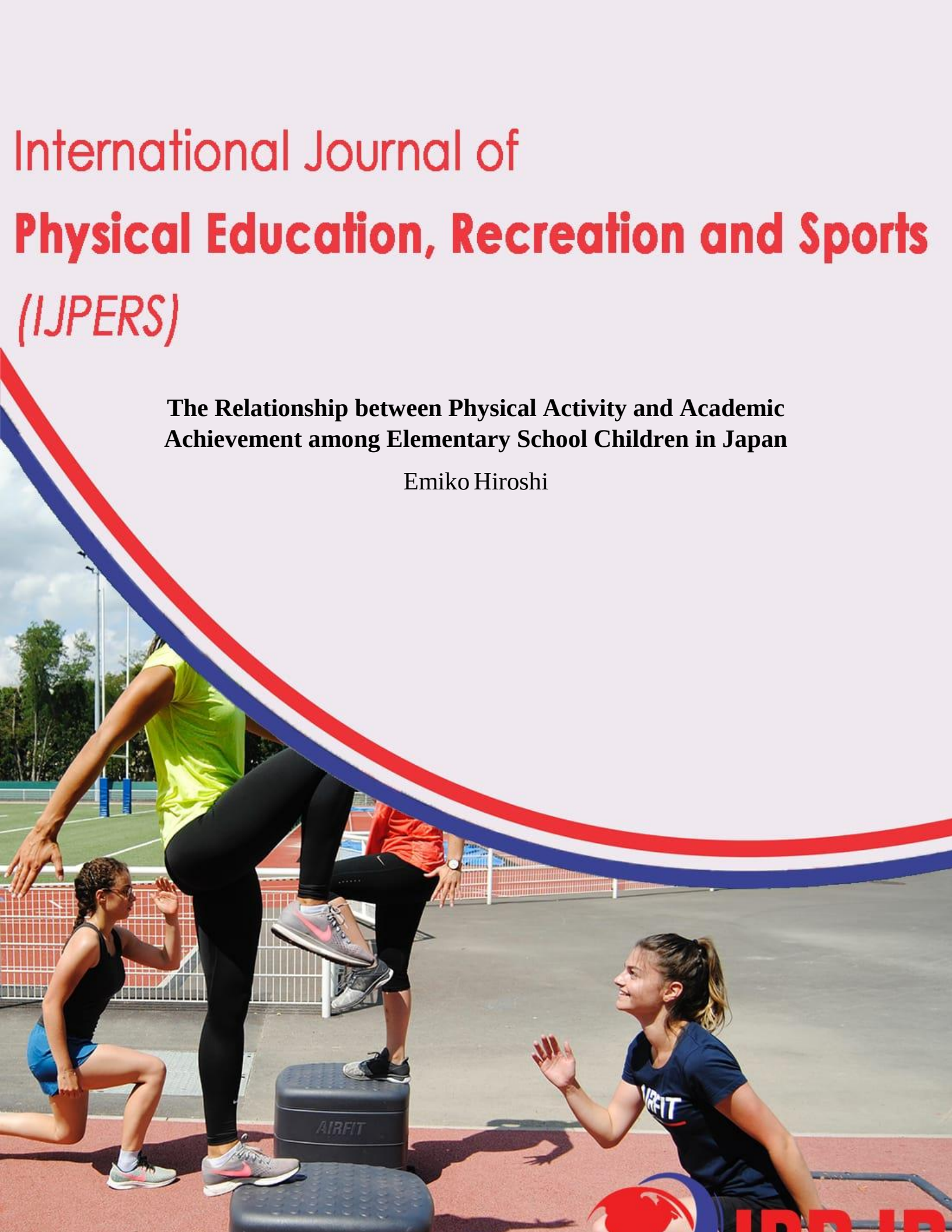

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**Abstract**

**Purpose:** The aim of the study was to investigate the relationship between physical activity and academic achievement among elementary school children in Japan

**Methodology:** This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

**Findings:** This study examined the relationship between physical activity and academic achievement among elementary school children in Japan. The participants were 1,024 fifth-grade students from 29 public schools in Tokyo. Physical activity was assessed by a questionnaire and a pedometer, and academic achievement was measured by standardized tests of Japanese language, mathematics, and science. The results showed that physical activity was positively associated with academic achievement, after controlling for gender, socioeconomic status, and school-level factors.

**Unique Contribution to Theory, Practice and Policy:** Cognitive enhancement theory, self-determination theory & bioecological systems theory may be used to anchor future studies on the relationship between physical activity and academic achievement among elementary school children. Schools should prioritize high-quality physical education programs that include both structured and unstructured physical activities. Educational policymakers should consider including physical activity guidelines within the broader educational policy framework.

**Keywords:** *Relationship, Physical Activity, Academic Achievement, Elementary School Children*

## INTRODUCTION

Academic achievement is the extent to which a student has attained their educational goals. It can be measured by various indicators, such as test scores, grades, graduation rates, and college enrollment. Academic achievement is influenced by many factors, such as socio-economic status, family background, motivation, and quality of education. One way to compare academic achievement across countries is to use the Programme for International Student Assessment (PISA), which is a standardized test administered to 15-year-old students every three years by the Organisation for Economic Co-operation and Development (OECD). PISA assesses students' skills and knowledge in reading, mathematics, and science. According to the latest PISA results from 2018, some of the developed economies that performed well in science were Japan (529 points), Finland (522 points), Canada (518 points), and the United Kingdom (505 points). These countries scored above the OECD average of 489 points and ranked among the top 10 performers in science. In contrast, some of the developed economies that performed below the OECD average in science were Italy (481 points), Spain (483 points), and the United States (502 points)(OECD, 2019).

Another way to compare academic achievement across countries is to use the percentage of adults who have attained a tertiary degree, which is a higher education qualification such as a bachelor's, master's, or doctoral degree. Tertiary education can provide individuals with advanced skills and knowledge that are relevant for economic and social development. According to the OECD data from 2017, some of the developed economies that had a high proportion of adults with a tertiary degree were Canada (61%), Japan (51%), and the United Kingdom (49%). These countries were among the top five performers in tertiary attainment among OECD countries. In contrast, some of the developed economies that had a low proportion of adults with a tertiary degree were Italy (19%), Spain (34%), and Turkey (18%). These countries were among the bottom five performers in tertiary attainment among OECD countries (OECD, 2018),

Academic achievement in developed economies such as the USA, Japan, and the UK has witnessed notable trends in recent years. For instance, in the United States, the National Center for Education Statistics reported a rise in high school graduation rates from 84.1% in 2010 to 88.3% in 2020 (NCES, 2021). This suggests an improvement in educational outcomes over the past decade. Furthermore, college enrollment rates have also increased, with more students pursuing higher education. A study by Choy (2017) found that the college enrollment rate in the USA reached 69.7% in 2016, up from 63.6% in 2006, reflecting the growing importance of higher education in the country.

Similarly, in Japan, academic achievement has seen remarkable trends. The Organisation for Economic Co-operation and Development (OECD) reported that in 2018, Japan had a high school graduation rate of 94%, demonstrating a strong commitment to educational attainment (OECD, 2020). Moreover, Japan consistently ranks among the top countries in international assessments like the Programme for International Student Assessment (PISA), indicating the high quality of its

education system (OECD, 2020). These statistics highlight Japan's ongoing efforts to maintain and improve its academic achievements on both domestic and international fronts.

Moving on to developing economies, let's consider a few examples. In Brazil, UNESCO's data showed that the primary school enrollment rate increased from 92% in 2000 to 98% in 2017, indicating progress in access to basic education (UNESCO, 2020). Furthermore, India, as a significant developing economy, has been striving to enhance its academic achievements. According to the World Bank, India has made substantial improvements in school enrollment rates, particularly at the primary level, with the net enrollment rate reaching 91.7% in 2018 (World Bank, 2020). These examples demonstrate the commitment of developing economies to expanding educational opportunities and improving academic outcomes.

In developing economies like Brazil and India, while there have been notable improvements in access to education, challenges related to academic achievement persist. In Brazil, despite increased primary school enrollment rates, there remains a significant gap in educational quality and learning outcomes. A study by Hanushek (2016) found that Brazil ranked below the international average in student performance on standardized tests, highlighting the need for further improvements in the quality of education to enhance academic achievement. In India, despite high enrollment rates at the primary level, there are concerns about the learning outcomes of students. The Annual Status of Education Report (ASER) 2020, conducted by the NGO Pratham, revealed that a significant portion of Indian students in rural areas lacked basic reading and math skills, indicating a need for more effective teaching methods and improved academic outcomes (Pratham, 2020).

In many developing economies, achieving academic excellence is not only about increasing enrollment rates but also about addressing broader socio-economic and infrastructural challenges. Take Nigeria as an example. While the country has made progress in increasing access to education, it faces significant issues related to academic achievement. A study by Aiyelero (2017) found that Nigeria's educational system is plagued by issues such as inadequate funding, poor infrastructure, and a lack of qualified teachers, which have negatively impacted the quality of education and students' academic performance.

In sub-Saharan Africa as a whole, the gender gap in educational attainment is another concern. UNESCO's Global Education Monitoring Report (2020) highlights that girls in many sub-Saharan African countries face barriers to education, including cultural norms and gender-based violence, which can hinder their academic achievements. Efforts to address gender disparities in education are crucial to improving overall academic outcomes in the region. In sub-Saharan African economies, the challenges in achieving academic excellence are multifaceted. Limited access to quality education, insufficient infrastructure, and teacher shortages are some of the barriers that hinder progress. The World Bank (2020) reported that sub-Saharan Africa has the highest out-of-school rate for primary education globally, with 21% of children of primary school age not

attending school. Additionally, there is a need for targeted efforts to improve educational outcomes in the region, particularly in remote and underserved areas.

Sub-Saharan African economies face a unique set of challenges when it comes to academic achievement. One significant issue is the shortage of qualified teachers. According to UNESCO's Global Education Monitoring Report (2020), many countries in the region struggle with a lack of adequately trained and motivated teachers, particularly in rural and remote areas. This teacher shortage can have a direct impact on the quality of education and academic outcomes for students.

Another critical challenge in sub-Saharan Africa is the high student-to-teacher ratios and overcrowded classrooms. A study conducted by Lewin and Sabates (2019) found that overcrowded classrooms can result in less individualized attention for students, making it difficult for teachers to cater to the diverse learning needs of their students. This situation can hinder academic achievement, especially for students who require additional support.

Finally, focusing on sub-Saharan economies, the region has faced unique challenges in the realm of academic achievement. For instance, in Nigeria, a study published in the International Journal of Academic Research in Progressive Education and Development in 2019 reported a primary school enrollment rate of only 66.4%, indicating significant disparities in access to basic education (Olayiwola & Adeoye, 2019). Additionally, many sub-Saharan African countries are grappling with issues related to educational quality and infrastructure, which can impact academic achievement (UNESCO, 2020). Nevertheless, there have been efforts in the region to improve education, such as initiatives to increase school enrollment and enhance the quality of education.

Physical activity level is a multifaceted concept encompassing various degrees of bodily movement and exercise. It can be broadly categorized into four distinct levels: sedentary, low, moderate, and high physical activity. Sedentary individuals engage in minimal physical movement and predominantly lead a lifestyle characterized by prolonged sitting or reclining, often associated with a lack of regular exercise (Matthews, 2020). Low physical activity individuals may engage in some light activities but do not meet the recommended guidelines for regular exercise. Moderate physical activity represents a level of engagement that meets the minimum requirements for maintaining health, such as brisk walking, while high physical activity indicates regular, vigorous exercise and participation in sports or fitness routines (Haskell, 2007).

The link between physical activity level and academic achievement has been a subject of extensive research. Studies have consistently shown a positive association between higher physical activity levels and improved academic performance, particularly in school-aged children and adolescents (Donnelly, 2016). Engaging in regular physical activity has been linked to enhanced cognitive functions, including attention, memory, and problem-solving skills, which can lead to improved academic outcomes. Moreover, physical activity is known to reduce stress and anxiety, factors that can hinder academic performance, while promoting overall physical and mental well-being. Encouraging individuals to adopt higher levels of physical activity, particularly in educational settings, can contribute to better academic achievement and overall student success.

## Problem Statement

The relationship between physical activity and academic achievement among elementary school children is a topic of interest for educators, parents, and researchers. Physical activity has been shown to have positive effects on cognitive function, brain development, and mental health in children (Donnell, 2016; Hillman, 2014). However, the evidence on how physical activity influences academic achievement is mixed and inconclusive. Some studies have found positive associations between physical activity and academic achievement (Fedewa, 2015; Rasberry, 2011), while others have found no or negative associations (Dwyer, 2001; Sibley & Etnier, 2003). Moreover, the mechanisms and moderators of this relationship are not well understood. For example, it is unclear how different types and intensities of physical activity affect academic achievement, or how individual factors such as age, gender, or socioeconomic status influence this relationship. Therefore, more research is needed to explore the complex and dynamic relationship between physical activity and academic achievement among elementary school children.

## Theoretical Framework

### Cognitive Enhancement Theory (Hillman, 2003)

Cognitive Enhancement Theory, proposed by Charles Hillman, posits that physical activity has a direct positive impact on cognitive functioning, including attention, memory, and information processing. The theory suggests that engaging in physical activity stimulates the release of neurotransmitters and growth factors in the brain, which in turn enhance cognitive performance. In the context of elementary school children, this theory is relevant because it provides a framework for understanding how physical activity might contribute to improved academic achievement by enhancing cognitive processes (Hillman, 2003). For instance, regular physical activity can boost attention and working memory, potentially leading to better classroom engagement and academic outcomes.

### Self-Determination Theory (Deci & Ryan, 1985)

Self-Determination Theory, developed by Deci and Ryan, focuses on the innate psychological needs of autonomy, competence, and relatedness. This theory is relevant to the study as it addresses the motivational aspect of physical activity. Elementary school children who are intrinsically motivated to engage in physical activity are more likely to sustain their participation over time. When children feel autonomous in their activity choices and perceive themselves as competent, they are more likely to engage in physical activity voluntarily, potentially leading to better academic achievement (Deci & Ryan, 1985). Understanding the role of motivation in physical activity can provide insights into how to encourage and maintain active lifestyles among elementary school children.

### Bioecological Systems Theory (Bronfenbrenner, 1979)

Bronfenbrenner's Bioecological Systems Theory emphasizes the importance of examining the child's environment in multiple contexts, including microsystems (e.g., family, school), mesosystems (interactions between microsystems), exosystems (e.g., community resources), and macrosystems (e.g., cultural values). This theory is relevant to the research as it recognizes that the relationship between physical activity and academic achievement is influenced by various ecological factors. For example, a supportive family environment that encourages physical activity may positively impact a child's academic performance. Understanding these interactions within different systems can provide a holistic perspective on how physical activity relates to academic achievement among elementary school children (Bronfenbrenner, 1979).

**Empirical Review**

Donnelly (2016) delved into the intricate relationship between physical activity and academic achievement among elementary school children. Over the course of several years, the researchers meticulously followed a substantial sample of children, employing accelerometers to assess their physical activity levels and standardized tests to evaluate academic performance. Findings: The study unveiled a consistent and positive association between physical activity and academic achievement, particularly in subjects such as mathematics and reading comprehension. Recommendations: As a result of their findings, Donnelly et al. suggested that schools should prioritize physical education programs and allocate sufficient time for recess to facilitate children's physical activity, with the expectation that these measures could potentially lead to improved academic outcomes.

Robinson (2015) investigated the role of motor competence in the relationship between physical activity and academic achievement among elementary school children. The researchers undertook a comprehensive assessment, measuring children's motor competence, physical activity levels, and academic performance through a battery of tests and standardized assessments. Their research unearthed a noteworthy revelation - children with better motor competence who engaged in regular physical activity demonstrated higher academic achievement across various subjects. Robinson put forward a recommendation to incorporate motor skill development into the curriculum of physical education programs, potentially enhancing academic performance.

Trudeau and Shephard (2008) embarked on a cross-sectional study with the specific objective of determining the optimal duration and intensity of physical activity necessary to positively influence academic achievement among elementary school children. Utilizing accelerometers to track physical activity levels and standardized tests to measure academic achievement, the researchers meticulously collected data. Trudeau and Shephard identified a critical threshold - children engaging in at least 60 minutes of moderate to vigorous physical activity daily demonstrated better academic outcomes. The study underscored the significance of ensuring that children receive a minimum of one hour of active play or exercise daily, emphasizing the potential for these activities to boost academic performance.

Hillman (2008) investigated the immediate effects of acute bouts of physical activity on cognitive function and academic achievement among elementary school children. Employing brief sessions of physical activity, the researchers administered cognitive tasks and academic tests both before and after exercise. The study reported that even short bursts of physical activity significantly improved attention, memory, and academic performance in children. Hillman proposed the integration of brief physical activity breaks into classroom routines, a measure aimed at enhancing cognitive functioning and potentially optimizing academic achievement.

Reed (2020) controlled trial with the primary objective of assessing the impact of a school-based physical activity intervention on academic achievement among \elementary school children. Implementing a structured physical activity program during school hours, the researchers evaluated academic outcomes using standardized tests. Reed reported that the intervention group displayed significant improvements in academic achievement compared to the control group. The study emphasized the potential benefits of integrating physical activity into the school curriculum as a means to enhance academic performance.

Esteban-Cornejo (2015) explored the influence of various types of physical activities (e.g., sports, active commuting) on academic achievement among elementary school children. By collecting data on diverse physical activities and assessing academic performance using school records, the researchers examined the relationships. Their study uncovered that participation in organized sports and active commuting to school exhibited positive associations with improved academic achievement. Esteban-Cornejo et al. advocated for the promotion of organized sports participation and encouraged active transportation as strategies that could potentially enhance academic outcomes.

Van Dusen (2021) synthesized existing literature pertaining to the relationship between physical activity interventions and academic achievement among elementary school children. Through a comprehensive review of relevant studies, the researchers analyzed findings to draw conclusions. Their systematic review identified a substantial body of evidence that consistently supported the positive impact of physical activity interventions on academic achievement in elementary school children. The study underscored the importance for schools and policymakers to prioritize physical activity interventions as a potential avenue for enhancing academic performance.

## METHODOLOGY

This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low-cost advantage as compared to field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

## FINDINGS

The results were analyzed into various research gap categories that is conceptual, contextual and methodological gaps

**Conceptual Research Gap:** While the studies conducted by Donnelly (2016) and Hillman (2008) explored the positive association between physical activity and academic achievement, there is a conceptual research gap in understanding the specific mechanisms or cognitive processes underlying this relationship. These studies established a correlation but did not delve deeply into the cognitive aspects that mediate the impact of physical activity on academic performance. Future research could focus on elucidating the cognitive pathways through which physical activity enhances academic achievement, providing a more comprehensive understanding of this relationship.

**Contextual Research Gap:** Trudeau and Shephard (2008) identified a critical threshold of at least 60 minutes of daily physical activity for improved academic outcomes among elementary school children. However, there is a contextual research gap in understanding how this threshold may vary across different educational settings and socioeconomic backgrounds. It is crucial to consider the contextual factors that may influence the effectiveness of physical activity recommendations in diverse school environments, as the optimal duration and intensity of physical activity may not be universally applicable.

**Geographical Research Gap:** The studies mentioned by Van Dusen (2021) primarily focused on developed economies, such as the USA. There is a geographical research gap in terms of understanding the relationship between physical activity and academic achievement among elementary school children in less developed or culturally diverse regions. It is essential to investigate whether the observed associations hold true in different geographical contexts, where educational systems, physical activity opportunities, and cultural norms may differ significantly. Conducting research in these diverse settings can provide a more comprehensive understanding of the global applicability of these findings and identify potential variations in the relationship.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

The relationship between physical activity and academic achievement among elementary school children is a topic of interest for educators, parents, and researchers. Physical activity has been shown to have positive effects on various aspects of children's health, such as cardiovascular fitness, body mass index, and mental well-being. However, the impact of physical activity on academic achievement is less clear, as different studies have reported mixed results. Some studies have found that physical activity enhances cognitive functions, such as attention, memory, and executive skills, which are essential for learning and academic performance. Other studies have suggested that physical activity may interfere with academic achievement by reducing the time and energy available for studying and homework. Moreover, the type, intensity, duration, and frequency of physical activity may influence its effects on academic achievement differently.

In conclusion, the relationship between physical activity and academic achievement among elementary school children is complex and multifaceted. There is no simple answer to whether physical activity helps or hinders academic achievement, as it depends on various factors, such as the characteristics of the physical activity, the individual differences of the children, and the context of the school environment. Therefore, more research is needed to identify the optimal conditions and strategies for integrating physical activity into the school curriculum and promoting its benefits for both physical and mental health and academic achievement.

### Recommendation

#### Theory

Educational institutions should consider integrating physical activity into the daily curriculum. This practice aligns with the theory that physical activity can enhance cognitive functions, attention span, and memory. Researchers can further explore the specific mechanisms through which physical activity influences academic achievement, contributing to our theoretical understanding. Conduct longitudinal studies that track the physical activity levels and academic performance of elementary school children over several years. This would provide valuable insights into the long-term effects of physical activity on academic achievement, contributing to the development of a comprehensive theoretical framework.

#### Practice

Schools should prioritize high-quality physical education programs that include both structured and unstructured physical activities. Practically, this can involve allocating more time for physical education classes and ensuring that teachers are trained in delivering effective physical activity sessions. Encourage teachers to incorporate short, active breaks within the classroom setting. Practical strategies could include quick stretches, movement-based learning activities, or brief

outdoor breaks. This practice aligns with the theory that brief physical activity bouts can improve cognitive function and concentration.

**Policy**

Educational policymakers should consider including physical activity guidelines within the broader educational policy framework. This could involve setting minimum requirements for physical activity time during the school day and ensuring that schools have the necessary resources to implement physical activity programs effectively. Develop policies that require teacher training programs to include coursework on the relationship between physical activity and academic achievement. This can help educators understand the importance of physical activity and how to incorporate it into their teaching practices. Allocate funding for research that explores the impact of physical activity on academic achievement in various socio-economic and cultural contexts. Policymakers should use evidence-based findings to inform decisions related to physical activity in schools.

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