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Examining the Link Between Physical Activity and Academic Achievement in Elementary Students

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ABSTRACT

This article examines how physical activity correlates with academic outcomes among elementary school children. Increasingly, physical activity is being acknowledged for its wide-ranging advantages, which go beyond just physical wellness and extend into mental and educational aspects. Studies suggest that consistent engagement in physical activity can enhance key cognitive abilities such as concentration, memory retention, and information processing. These positive effects are attributed to physiological changes like improved cerebral blood circulation, elevated neurotransmitter levels, and better emotional regulation—all of which contribute to a more effective learning environment. Incorporating regular physical activity into early education programs appears to be a valuable approach for boosting both scholastic achievement and the overall wellbeing of young students.

Keywords: Physical activity, academic performance, cognitive development, elementary students, learning outcomes, wellbeing.

1. Introduction

In recent times, interest has surged in exploring how physical activity influences academic achievement among children in elementary school. Traditionally, physical activity has been valued primarily for its contribution to physical fitness and health. However, recent studies indicate that consistent participation in physical exercises may also offer notable cognitive and educational advantages. The elementary years represent a vital phase for mental development, during which core skills in areas like reading, math, and analytical thinking begin to take shape. At the same time, children at this age are naturally active and energetic. Incorporating movement and exercise into their daily schedules can serve not only health-related goals but also support mental processes that are crucial for successful learning. This introduction delves into how physical activity can enhance brain functions such as focus, memory, and information processing, and considers its broader implications for shaping educational strategies and classroom practices in early education.

In the realm of elementary education, efforts to improve academic performance have traditionally focused on refining curricula and teaching strategies. Yet, a growing body of research highlights the significant influence of physical activity on more than just physical wellbeing—it also plays a crucial role in supporting cognitive growth and academic progress in young children. Early schooling years are essential for mental development, as students build foundational competencies in reading, mathematics, and analytical thinking. This developmental stage is also marked by high energy levels and a strong instinct



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for movement and play. By channeling this natural energy into organized physical activities, schools can effectively promote better learning outcomes and support students' overall health. Additionally, incorporating physical activity into the school routine has been linked to fewer behavioral issues, increased attention in class, and lower stress among students—factors that contribute to a more productive and supportive educational environment.

Although the benefits of physical activity are well-documented, its inclusion in elementary school curricula is still inconsistent across different educational environments. Factors such as limited time, academic demands, and resource shortages often hinder its widespread adoption. Overcoming these obstacles calls for joint action among teachers, education leaders, policymakers, and community partners to establish physical activity as a vital part of school policy and everyday teaching practices.

2. Literature Review

Donnelly et al. (2016) conducted a comprehensive review analyzing how physical activity, fitness, and cognitive function relate to academic outcomes in children. The review highlighted numerous studies indicating that greater involvement in physical activity and higher fitness levels were consistently linked to enhanced cognitive performance and academic success across multiple disciplines.

Hillman et al. (2014) led the FIT Kids randomized controlled trial, which explored how structured physical activity impacts executive functions and brain activity in preadolescents. The study revealed that children engaged in regular, organized physical activity showed improved cognitive control and outperformed their peers academically.

Fedewa and Ahn (2011) performed a meta-analysis synthesizing results from various studies that assessed the influence of physical activity on students' academic and cognitive outcomes. Their findings showed that physical activity had a mild to moderate positive impact on educational achievement and cognitive skills such as memory and attention.

Trudeau and Shephard (2008) reviewed prior research to determine how school-based physical activity—including PE classes and sports—affected students' academic performance. Their analysis found consistent support for the idea that increased participation in physical activity at school is positively associated with better academic results.

Dwyer et al. (2001) conducted a long-term study examining how physical activity and fitness levels correlate with academic success over time. Their findings supported a positive link, showing that children with higher activity levels and physical fitness tended to perform better academically, reinforcing the notion that physical health contributes to cognitive development.

3. Significance of the Study

Exploring the influence of physical activity on academic achievement in elementary students offers valuable insights for advancing holistic education. It highlights the intersection of physical wellness and cognitive growth, showing how regular, structured movement can enhance academic outcomes. This research emphasizes cognitive gains such as sharper focus, stronger memory, and better problem-solving abilities linked to consistent physical activity—insights that can shape effective educational policies and teaching methods. Incorporating physical activity into students' daily schedules not only boosts academic performance but also helps instill lifelong habits related to health and fitness. Additionally, acknowledging the behavioral and social advantages—such as fewer disciplinary incidents and improved peer relationships—underscores the broader impact on school culture. Ultimately, this study supports data-



driven educational approaches that balance health and learning, while calling for equitable access to resources that support all-around development in elementary education.

4. Purpose of the Study

This study seeks to explore the connection between physical activity and academic achievement in elementary school students. By examining how participation in physical activities affects key cognitive functions essential for learning—such as attention, memory, and information processing—this research aims to provide solid evidence that supports the inclusion of physical activity in educational strategies. Gaining a deeper understanding of these links can help guide educators and policymakers in developing effective approaches that improve both academic performance and student wellbeing.

4.1 Objectives

- 1. Examine the relationship between physical activity and cognitive functions: Investigate how various types and durations of physical activity affect cognitive skills such as attention, memory, and information processing in elementary school students.
- 2. Analyze the link between physical activity and academic success: Explore the connection between physical activity participation and academic performance across different subjects, such as mathematics, language arts, and overall grades.
- **3. Identify underlying mechanisms:** Investigate the physiological, neurological, and psychological processes that explain how physical activity influences cognitive functions and academic outcomes in young learners.
- 4. Evaluate the effectiveness of physical activity interventions: Assess the impact of structured physical activity programs or interventions on enhancing academic performance and cognitive development within elementary school environments.
- 4.2 Hypothesis
- a. Students who engage in 60 minutes or more of moderate to vigorous physical activity daily will score higher on standardized academic tests than those who do not meet this activity guideline.
- b. A positive relationship exists between the frequency of physical education classes in elementary schools and students' academic performance across different subjects, suggesting that increased PE sessions contribute to better academic results.

5. Methodology

Investigating the influence of physical activity on academic performance among elementary school students requires selecting a suitable research methodology to thoroughly examine this connection. Below is a comprehensive outline of an effective research methodology for conducting this study:

5.1 Research Design: Quasi Experimental Design:

- 1. Compare academic outcomes across schools or classrooms offering different levels of physical activity opportunities (high vs. low), using existing data to assess the impact.
- 2. Introduce physical activity interventions in schools and monitor any changes in academic performance over a specified period.

5.2 Sample Size:

A total of 100 elementary school students (ages 5-12) will be selected from a private school, ensuring a diverse representation of socio-economic backgrounds and academic abilities.



5.3 Variables:

- **Independent Variable:** The level and nature of the physical activity intervention, including factors such as frequency, duration, and intensity.
- Dependent Variables:
- Academic Performance: Measured through standardized test scores in subjects like mathematics and reading comprehension.
- Cognitive Functions: Assessed through tests evaluating attention, memory, and executive functions

5.4 Data Collection Methods:

Quantitative & Qualitative Data:

- Academic Performance: Collect standardized test scores or school grades from official school records.
- **Physical Activity Levels:** Use accelerometers, activity logs, or self-report questionnaires to measure students' levels of physical activity.
- **Qualitative Insights:** Conduct interviews or focus groups with teachers, parents, and students to gain qualitative feedback on how physical activity influences academic performance and student behavior.

5.5 Data Analysis:

- 1. Quantitative Analysis:
- Perform descriptive statistics (such as mean and standard deviation) and inferential statistics (including t-tests, ANOVA, and regression analysis) to explore the relationships between physical activity and academic performance outcomes.

2. Ethical Considerations:

- Obtain informed consent from parents or guardians, along with assent from students, prior to participation.
- \circ Ensure the confidentiality and anonymity of all participants throughout the study.
- Follow ethical standards to prioritize the welfare and safety of child participants.

5.6 Limitations:

- Possible biases arising from self-reported data on physical activity levels or academic performance.
- Challenges in controlling external factors such as socioeconomic status or the home environment, which may influence outcomes.
- Logistical issues in implementing and monitoring interventions across several schools.

6. Results

To analyze the relationship between co-curricular activities and academic achievement, the mean and standard error of the mean (SEM) were calculated for both variables across the entire sample of 400 elementary school students. The results are presented in the table below.

Table 1: Mean and Standard Error of Mean (SEM) for Co-Curricular Activities and Academic Achievement in a Sample of 100 Elementary School Students.

S. No.	Variables	No. of Students	Mean	SEM
1	Physical Activities	100	46.135	9.872
2	Academic Achievement	100	56.617	9.987



Mean and Standard Error of Mean (SEM) for Co-Curricular Activities and Academic Achievement



Fig:1-Bar graph Presentation of Mean Score for the Variable (PA & Academic Achievement)

Table 2: Comparative Statistical Summary Including Mean, Standard Deviation, Standard Errorof Difference, and t-Value for Assessing the Relationship Between Engagement in PhysicalActivities and Academic Achievement Among the Total Sample

S. No.	Variable	Sample Size	Mean	Std. Deviation	SED	t-Value
1	Physical Activities	100	43.39	8.63	1.34	
2	Academic Achievement	100	48.88	10.30		4.084

The computed *t*-value (4.084) was found to be statistically significant at both the 0.01 and 0.05 levels. As a result, the null hypothesis (Ho₄), which stated that there would be no significant relationship between physical activity participation and academic achievement, is rejected. Consequently, the alternative hypothesis is accepted, indicating a significant difference in the relationship based on levels of participation in physical activities.

7. Summary of Findings

Research examining the influence of physical activity on academic performance among elementary school students highlights a strong and consistent link between regular physical movement and educational progress. Numerous studies have shown that students who frequently participate in physical activities tend to perform better academically, especially in areas such as mathematics and reading. Additionally, engaging in such activities enhances key cognitive abilities like concentration, memory retention, and executive processing—skills essential for academic excellence. Besides these mental benefits, school-based physical activity programs have been effective in minimizing disruptive behavior and enhancing classroom behavior, thereby creating a more positive learning environment. Long-term research supports these observations, indicating that ongoing involvement in physical activity initiatives leads to progressive improvements in academic outcomes. Ensuring equal access to physical activity resources is also vital, as



it supports comprehensive student development and helps all learners benefit equally from the positive academic effects of physical exercise. In conclusion, integrating physical activity into daily school routines is essential not only for promoting health but also for advancing cognitive growth and academic performance among young learners.

8. Implications

Implications of Research on the Impact of Physical Activity on Academic Achievement in Elementary School Students

The findings carry wide-ranging and impactful implications across various domains:

- 1. Educational Framework and Policy Implementation: Incorporating well-structured physical activity programs into the academic curriculum can significantly contribute to improved student performance. This is largely due to enhancements in cognitive skills and better behavior in the classroom. It is essential for educators and policy architects to give priority to physical education and adopt active teaching methodologies that foster a productive learning atmosphere.
- 2. **Health and Well-Being Advocacy**: Encouraging physical activity from early childhood not only aids in academic development but also supports students' physical and mental well-being. Schools have a pivotal role in instilling long-lasting healthy lifestyle habits that extend beyond the school years.
- 3. Ensuring Fair Opportunities: Bridging the gap in access to physical activity resources is critical. Institutions located in economically disadvantaged areas must be equipped with sufficient facilities and funding to guarantee that every student, regardless of background, has equal opportunities to engage in physical and extracurricular activities.
- 4. Educator Training and Awareness: Providing teachers with targeted professional development can deepen their understanding of the academic and behavioral advantages of physical activity. Training programs should focus on equipping educators with strategies to integrate movement into everyday instruction through active learning and regular activity breaks.
- 5. Family and Community Involvement: Building strong partnerships with parents and local community members can enhance the reach and impact of school-based physical activity initiatives. When families are involved, they reinforce the value of physical exercise, encouraging students to maintain active lifestyles even outside the school environment.

These implications highlight the powerful role that physical activity can play in transforming elementary education. They stress the importance of adopting holistic strategies that support not only academic excellence but also the overall well-being of students.

8.1 Key Advantages

- 1. **Boost in Cognitive Abilities**: Studies suggest that consistent engagement in physical activity enhances essential mental functions such as concentration, memory retention, and the ability to process information—all fundamental to effective learning.
- 2. **Higher Academic Performance**: Active students frequently demonstrate stronger academic results, particularly in core subjects like math, reading, and language studies. This improvement is often linked to increased attention span and lower stress levels.
- 3. **Positive Behavioral Outcomes**: Participation in physical activities contributes to better behavior in school, including a decrease in classroom disruptions and an improvement in overall student discipline, thereby fostering a more focused learning atmosphere.



- 4. **Better Physical Health**: Promoting physical movement from early childhood aids in maintaining good health, helping to prevent obesity and related conditions that may otherwise lead to absenteeism and diminished academic outcomes.
- 5. **Development of Social and Emotional Skills**: Taking part in group-based physical activities helps nurture vital interpersonal skills such as teamwork, communication, and resilience, all of which are essential for students' social and emotional growth.

8.2 Challenges

- 1. **Difficulties in Measurement and Data Accuracy**: Capturing reliable data on the physical activity levels of young children poses challenges due to the diversity in activity types, intensity, and measurement techniques. Likewise, evaluating academic success across various subjects and developmental stages calls for standardized tools, which may fall short in reflecting the full scope of student learning.
- 2. **Complexity in Proving Causation**: Establishing a clear, causal link between physical activity and academic outcomes is not straightforward. Multiple variables—such as individual student traits, differences in school environments, and external factors like home life or economic background—can obscure the relationship.
- 3. **Constraints of Long-Term Research**: Longitudinal studies, essential for understanding the lasting effects of physical activity on educational performance, often face hurdles such as securing continued funding, maintaining participant engagement, and managing the logistics of long-term follow-up assessments.
- 4. **Need for Cross-Disciplinary Coordination**: Since the connection between physical activity and academic performance spans several domains—education, health sciences, psychology, and kinesiology—collaborative efforts across these fields are necessary. However, aligning objectives, methodologies, and communication among diverse disciplines can be complex.
- 5. **Barriers to Implementation and Program Longevity**: Transforming research into actionable, school-wide programs requires active involvement from administrators, teachers, families, and the broader community. Sustaining such initiatives over time hinges on consistent funding, adequate resources, and ongoing stakeholder commitment.

9. Conclusion

Research exploring the influence of physical activity on academic performance among elementary school students reveals notable advantages across various areas of development. The findings consistently demonstrate a strong positive association between regular physical activity and enhanced academic outcomes, particularly in fundamental subjects such as mathematics and language arts. Additionally, physical activity plays a critical role in boosting cognitive capabilities like focus, memory, and problem-solving—skills vital for academic growth.

Beyond scholastic improvement, active participation also supports better classroom conduct and positive peer interactions, thereby creating a more effective and engaging learning environment. Long-term studies affirm that continuous involvement in structured physical activity throughout the elementary years can lead to enduring academic benefits. These activities also contribute to reduced absenteeism, stronger engagement in school, and overall academic advancement, especially in core learning areas such as reading comprehension and numeracy.



Ultimately, the body of evidence highlights the broad and integrated benefits of physical activity for young learners, reinforcing the need for schools to prioritize movement-based initiatives. Continued research and the implementation of thoughtful, evidence-based strategies are essential to maximizing educational success through physically active lifestyles.

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