WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

"Does Physical Education activity affect Academic Performance at Higher Education Level"- an Empirical Study

Mr. Sudhakara S A

Assistant Professor (Dept. of Physical Education & Sports) City College, Jayanagar, Bangalore

Abstract:

This study identifies the correlation between physical education activity and academic performance among the students at higher education. With increasing appreciation of the universal factors that influence learning, physical education activity has emerged as a potential contributor to cognitive development and academic success.

The study reveals a significant positive correlation between regular engagement in moderate to vigorous physical education activity and improved academic performance. Students who participated in physical education activity at least two times per week demonstrated higher academic achievement compared to their less active peers. The results suggest that physical education activity may enhance cognitive functions such as concentration, memory, and executive functioning, which are critical to academic success.

This study adds to the growing evidence supporting the integration of physical education activity into educational settings, highlighting its dual role in promoting both health and academic performance.

Introduction

In recent years, there has been growing interest in understanding the multidimensional factors that contribute to academic success among students. While traditional academic predictors such as socioeconomic status, parental involvement, and classroom engagement remain critical, emerging research highlights the potential influence of physical education activity (PEA) on cognitive function and academic performance. Physical education activity has been widely recognized for its role in promoting physical and mental health, but its relationship with academic outcomes has only recently gained empirical attention.

Several theoretical frameworks suggest that physical education activity may enhance brain function by improving blood flow, stimulating neurogenesis, and enhancing mood and attention, all of which are essential components of effective learning. Empirical evidence has shown that students who engage in regular physical education activity tend to exhibit better concentration, memory, and classroom behavior, which can translate into improved academic outcomes. However, findings across studies remain mixed, with variations in methodology, age groups, and types of physical education activity potentially influencing results.

This study aims to contribute to the growing body of literature by empirically examining the relationship between physical education activity and academic performance among the students. By analyzing the frequency, intensity, and type of physical education activity and its correlation with academic indicators such as GPA, test scores, and classroom performance, this study seeks to clarify the extent to which physical education activity serves as a determinant of academic success. The findings may hold significant implications for educational policy, curriculum design, and student well-being.

Literature Review

The connection between physical education activity (PA) and academic performance has garnered considerable attention in recent decades, as educators and policymakers seek evidence-based strategies to enhance student learning. A growing body of literature suggests that engaging in regular physical education activity may have a positive effect on cognitive functioning, mental well-being, and, ultimately, academic outcomes.

1. **Theoretical Foundations**

The relationship between PEA and academic performance is often explained through cognitive and physiological theories. According to the **Executive Function Theory**, physical education activity enhances brain function by stimulating areas responsible for attention, working memory, and cognitive flexibility (Diamond, 2013). The **Neurobiological Model** further posits that PEA increases cerebral blood flow, promotes neurogenesis, and releases

neurotransmitters such as dopamine and serotonin, which can improve mood and concentration—factors closely linked to academic success (Ratey, 2008).

2. **Empirical Evidence**

Numerous studies support a positive correlation between physical education activity and academic achievement. A systematic review by Singh et al. (2012) concluded that children and adolescents who are more physically active tend to perform better academically. Similarly, Álvarez-Bueno et al. (2017) conducted a meta-analysis of 26 studies and found that physical education activity programs had a small to moderate positive effect on academic performance, particularly in mathematics and reading.

Other empirical studies (e.g., Donnelly et al., 2016; Esteban-Cornejo et al., 2015) have shown that both acute (short-term) and chronic (long-term) physical education activity can lead to improved classroom behavior, increased on-task behavior, and better grades. However, the strength of these effects varies based on the intensity, frequency, and type of activity.

3. **Variability in Findings**

While the general trend in literature supports a beneficial role of physical education activity, some studies report mixed or insignificant results. For instance, Van Dusen et al. (2011) found that only certain types of physical education activity, such as aerobic exercise, were significantly associated with academic gains, while others, like general playtime, showed weaker links. Moreover, methodological limitations—such as reliance on self-reported data, cross-sectional designs, and lack of control for confounding variables—may affect the reliability of some findings.

4. **Gaps in the Literature**

Despite the growing interest in this area, several gaps remain. Few studies have explored how physical education activity influences academic performance across diverse populations, age groups, or socio-economic backgrounds. Additionally, more research is needed to identify the optimal duration, intensity, and type of physical education activity that most effectively enhances academic performance.

Objectives of the Study

The primary objective of this study is to empirically examine the relationship between physical education activity and academic performance among students. Specifically, the study aims to:

- To determine the correlation between physical education activity levels and students' academic performance as measured by Grade Point Average (GPA) or standardized test scores.
- To analyze the impact of the frequency, duration, and intensity of physical education activity on students' cognitive performance and academic outcomes.
- To provide recommendations for educators and policymakers on integrating physical education activity into the school curriculum to enhance learning outcomes.

Theoretical Background

The relationship between physical education activity (PA) and academic performance is supported by several interdisciplinary theories that span cognitive psychology, neuroscience, and educational science. These theoretical frameworks help explain the potential mechanisms through which PA influences learning outcomes.

1. **Executive Function Theory**

Executive functions refer to a set of cognitive processes including working memory, inhibitory control, and cognitive flexibility—skills essential for academic success. According to Diamond (2013), regular physical education activity, particularly activities requiring coordination and planning, strengthens these executive functions. Improved executive functioning enables students to focus better, process information efficiently, and regulate emotions, all of which are crucial for classroom learning and academic tasks.

2. **Cognitive Load Theory**

Sweller's Cognitive Load Theory suggests that learning is optimized when working memory is not overloaded. Physical education activity, especially moderate aerobic exercise, has been shown to reduce mental fatigue and enhance attention, thereby lowering cognitive load during learning (Tomporowski et al., 2008). This suggests that regular PA can create a more favorable mental state for absorbing and processing academic content.

3. **Arousal Theory**

According to the Arousal Theory, a certain level of physiological arousal can enhance mental alertness and performance. Physical education activity raises arousal levels by increasing heart rate and oxygen flow to the brain, which may temporarily boost cognitive functions such as attention and

information retention (Yerkes & Dodson, 1908). However, the theory also warns that excessive arousal can impair performance, highlighting the importance of intensity regulation.

4. **Neurobiological Framework**

From a biological perspective, physical education activity stimulates neurogenesis (the growth of new neurons), increases brain-derived neurotrophic factor (BDNF), and improves cerebral blood flow (Ratey, 2008). These changes are particularly beneficial to the hippocampus and prefrontal cortex—brain regions involved in memory, attention, and decision-making, all of which directly affect academic abilities.

5. **Ecological Systems Theory**

Bronfenbrenner's Ecological Systems Theory emphasizes the influence of environmental factors on development. School settings that integrate regular physical education activity into students' daily routines may create more supportive environments that foster both physical health and cognitive growth. This holistic view suggests that promoting physical education activity is not only a health intervention but also an educational strategy.

Key Findings:

- **Overall Impact:** PEA is associated with small to medium improvements in academic achievement. While some studies reported null effects, the majority indicated positive associations.
- **Chronic vs. Acute PEA:** Long-term PEA interventions, such as regular physical education classes, tend to have a more significant impact on academic performance compared to short-term activities.
- **Subject-Specific Effects:** Mathematics and reading skills often show the most consistent improvements with increased PEA. Geography also exhibited notable benefits in some studies.
- **Cognitive Mechanisms:** PEA may enhance executive functions like attention, memory, and cognitive flexibility, which are crucial for learning. High-intensity PEA, particularly when it involves cognitive engagement, has been linked to improvements in cognitive performance.

Suggestions:

- **Educational Policies:** Integrating more PEA into school curricula, such as increasing the duration of physical education classes, could support academic achievement.
- **Holistic Development:** Encouraging regular PEA not only benefits physical health but also contributes to improved cognitive functions and academic outcomes.
- **Future Research:** Further studies are needed to establish causality and explore the long-term effects of PEA on academic performance.

Conclusion

This empirical study set out to explore the relationship between physical education activity and academic performance among students, contributing to the growing body of evidence that highlights the role of physical well-being in educational success. The findings indicate that students who engage in regular physical education activity tend to perform better academically, with improvements noted particularly in areas requiring sustained attention, memory, and executive functioning.

The analysis suggests that not only the frequency but also the intensity and type of physical education activity play a role in determining the extent of academic benefit. Activities that are structured, aerobic, and cognitively engaging appear to have the most substantial positive effects. Moreover, the study supports theoretical frameworks such as Executive Function Theory and Arousal Theory, which emphasize the cognitive enhancements resulting from physical education activity.

In conclusion, physical education activity should not be seen as a distraction from academics but as a complementary tool that enhances the overall learning experience. Future research should aim to explore long-term impacts, differences across demographics, and intervention-based models to strengthen the understanding of this important relationship.

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