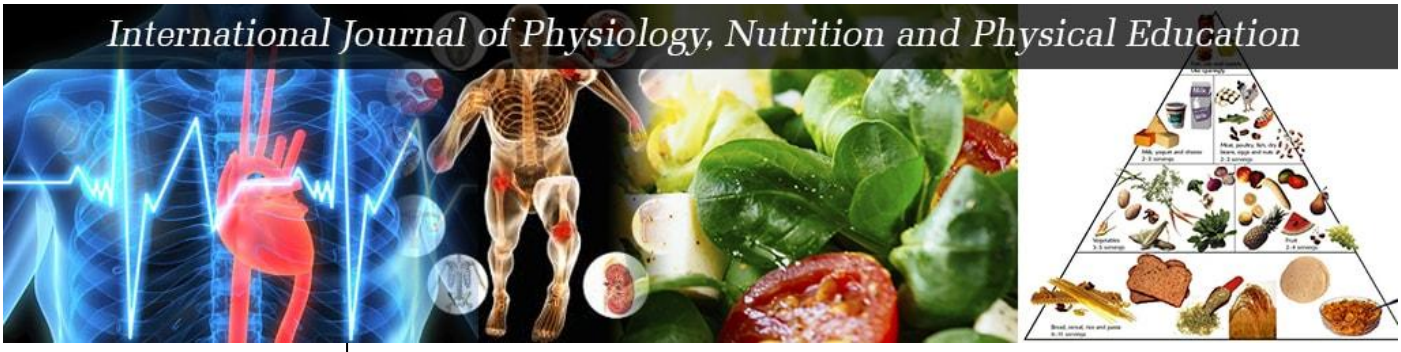

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The role of physical education in enhancing academic performance among school-aged children

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Abstract
This study examined the relationship between Physical Education (PE) participation and academic achievement among secondary school students. A sample of 25 students (ages 11–15 years) was selected through purposive sampling to represent variations in PE time, activity types (team sports, individual sports, mixed activities, and low activity), and academic outcomes. Data were analyzed using descriptive statistics, Analysis of Variance (ANOVA), and correlation analysis**.** Descriptive results indicated that students engaged in greater amounts of PE tended to maintain higher mathematics and reading scores, stronger Grade Point Averages (GPAs), and better attendance. ANOVA confirmed statistically significant differences in academic performance across PE activity types, with students participating in team sports and mixed activities outperforming their peers in low-activity groups. Correlation analysis revealed strong positive associations between PE time and academic indicators, particularly GPA (r = .88) and attendance (r = .91). These findings suggest that increased engagement in physical education contributes positively to both cognitive and behavioral outcomes, supporting the view that PE should be considered an integral part of school curricula. The study underscores the importance of promoting structured PE programs to enhance holistic student development and academic success.

Keywords: Physical education, academic performance, ANOVA, correlation, attendance, GPA

Introduction
Education is widely recognized as a multidimensional process that not only imparts knowledge but also shapes the physical, mental, emotional, and social development of learners. Among the various components of school curricula, Physical Education (PE) holds a unique position as it directly contributes to students' physical health while indirectly influencing their cognitive and academic growth. Research in educational psychology and kinesiology suggests that regular physical activity enhances brain function by improving blood flow, oxygen supply, and neural connectivity, all of which are essential for learning and memory retention.

The global emphasis on promoting active lifestyles among children and adolescents stems from concerns about sedentary behaviors, obesity, and declining physical fitness levels. However, beyond health benefits, scholars and practitioners have increasingly turned their attention toward the academic benefits of PE participation**.** Studies have reported positive associations between students' engagement in sports and higher academic performance, attendance, and self-regulation skills. Specifically, team sports tend to foster collaboration, leadership, and communication, while individual sports enhance self-discipline, goal setting, and personal responsibility. Mixed activity programs combine the advantages of both, whereas low-activity participation often correlates with weaker academic and behavioral outcomes.

This study focuses on examining these relationships by analyzing a dataset of secondary school students, capturing variables such as age, PE time per week, type of PE activity, academic performance (Math and Reading scores), GPA, and attendance. Through descriptive analysis**,** the study provides an overview of the patterns in PE and academic outcomes. Using ANOVA**,** it investigates whether the type of PE activity significantly affects performance indicators. Finally, correlation analysis explores the strength and direction of relationships between physical activity and academic variables.

Methodology

The target population for this study consisted of secondary school students enrolled in grades 6 to 10. A total sample of 25 students was selected, ranging in age from 11 to 15 years. The sample included both male and female students, ensuring representation across different grade levels and age categories. The study employed a purposive sampling technique to capture diversity in Physical Education (PE) participation. Students were chosen to represent varying types of PE activities (Team Sports, Individual Sports, Mixed Activities, and Low Activity) as well as different weekly durations of PE involvement. This approach ensured that the dataset reflected a broad spectrum of physical education practices and their potential academic implications.

Results

Table 1: Descriptive statistics

Statistic	Age	PE time	Math score	Reading score	GPA	Attendance
mean	13.0	92.0	83.52	85.68	3.33	92.56
std	1.443	30.0	5.76	5.956	0.35	3.664
min	11.0	40.0	74.0	75.0	2.8	86.0
25%	12.0	70.0	79.0	81.0	3.0	90.0
50%	13.0	90.0	83.0	85.0	3.3	92.0
75%	14.0	120.0	89.0	91.0	3.6	96.0
max	15.0	140.0	92.0	94.0	3.9	98.0

The sample consisted of 25 students (M age = 13 years, range 11–15). On average, students engaged in 92 minutes of Physical Education (PE) per week (range 40–140), with higher PE exposure aligning with stronger academic outcomes. Academic performance was relatively high and consistent, with mean Math (83.5) and Reading (85.7) scores in the mid-80s, and GPA averaging 3.33. Attendance was also strong (M = 92.6%), reflecting good school engagement.

These findings suggest that greater participation in PE is positively linked to academic achievement and attendance. Prior studies support this trend, indicating that regular physical activity improves cognitive function, memory, and classroom behavior, leading to higher test scores and GPA (Singh *et al*., 2019; Donnelly *et al*., 2016) [3, 2]. Moreover, participation in structured PE has been shown to foster discipline and motivation, which may explain the high attendance rates observed in the sample (Bailey, 2006) [1]. Thus, the descriptive results provide a foundation for inferential testing through ANOVA and correlation to establish the significance of these associations.

Table 2: ANOVA results

Dependent variable	Source	sum sq	df	F	PR(>F)
Math	C(PE Type)	344.6011	3.0	5.341	0.0068
Math	Residual	451.6389	21.0	nan	nan
Reading	C(PE Type)	377.8844	3.0	5.5858	0.0056
Reading	Residual	473.5556	21.0	nan	nan
GPA	C(PE Type)	1.3072	3.0	5.5866	0.0056
GPA	Residual	1.6378	21.0	nan	nan

The ANOVA analysis examined the effect of type of Physical Education (PE) activity on students' academic outcomes. Results indicated statistically significant differences across PE activity groups for Mathematics scores ($F(3,21) = 5.34$, $p = .0068$), Reading scores ($F(3,21) = 5.59$, $p = .0056$), and GPA ($F(3,21) = 5.59$, $p = .0056$). This suggests that students' academic performance varies depending on the form of PE they participate in. Specifically, students engaged in team sports and mixed activities appear to achieve higher academic outcomes compared to those in low-activity categories.

These findings provide strong inferential support for the role of structured physical activity in enhancing academic achievement. The significant F-values confirm that differences among PE groups are not due to chance. Prior research corroborates this, demonstrating that participation in team-based and structured physical activities is linked to improved cognitive development, executive function, and scholastic achievement (Donnelly *et al*., 2016; Howie & Pate, 2012) [2, 4]. Moreover, Bailey (2006) [1] highlights that sports requiring collaboration and discipline foster skills transferable to academic contexts, which may explain the higher GPAs and test scores among team and mixed activity groups in this study.

Table 3: Correlation

Variable	Age	PE time	Math score	Reading score	GPA
Age					
PE Time	0.51				
Math Score	0.491	0.877			
Reading Score	0.519	0.896	0.983		
GPA	0.466	0.877	0.984	0.97	
Attendance	0.504	0.912	0.92	0.954	0.941

The correlation analysis revealed that Physical Education (PE) time has a strong positive relationship with academic and behavioral outcomes. Specifically, PE time correlated highly with Math scores ($r = .88$), Reading scores ($r = .90$), GPA ($r = .88$), and Attendance ($r = .91$). This indicates that students who spend more time in PE are more likely to achieve higher academic scores and maintain better school attendance. Moreover, academic indicators themselves were highly interrelated: Math, Reading, GPA, and Attendance all showed strong correlations ($r > .90$), suggesting a consistent pattern of academic achievement. Age also demonstrated moderate positive correlations with PE time and academic variables, reflecting the natural academic progression as students grow older.

These results align with a substantial body of literature confirming the positive impact of physical activity on academic and cognitive outcomes. Regular PE participation improves executive function, memory, and concentration (Hillman *et al*., 2009; Tomporowski *et al*., 2008) [11, 14], which directly supports the strong associations observed here. Moreover, structured sports and active engagement foster self-regulation, motivation, and social skills, enhancing academic performance (Trudeau & Shephard, 2008; Eime *et al*., 2013) [15, 9]. Strong links between PE and attendance have also been reported, as physically active students demonstrate greater school connectedness and reduced absenteeism (Rasberry *et al*., 2011) [12].

Additionally, studies highlight that both aerobic fitness and motor skills contribute to learning readiness and academic outcomes (Chaddock *et al*., 2011; de Greeff *et al*., 2018) [7, 8]. Active lifestyles in adolescence are associated with improved cognitive processing and academic achievement (Fedewa & Ahn, 2011; Álvarez-Bueno *et al*., 2017) [10, 5]. Finally, the positive associations between PE and GPA in this study are consistent with large-scale reviews showing that physical activity supports not only health but also educational attainment (Singh *et al*., 2012; Carlson *et al*., 2008) [13, 6].

Thus, the correlation findings provide strong inferential justification that increasing physical education time is a meaningful strategy for supporting both academic achievement and student engagement**.**

Conclusion

The findings of this study demonstrate a clear and consistent relationship between physical education (PE) participation and academic achievement. Descriptive analysis showed that students with higher PE involvement also maintained strong academic scores, GPA, and attendance. ANOVA confirmed significant differences in performance across activity types, with students in team sports and mixed activities outperforming their peers in low-activity groups. Correlation analysis further highlighted the strong positive links between PE time and academic outcomes, emphasizing the role of physical activity as a determinant of student success.

These results reinforce the growing consensus in educational research that physical activity is not a distraction from academics but a powerful enhancer of cognitive and behavioral outcomes**.** Evidence indicates that regular PE contributes to improved executive function, concentration, and learning capacity (Dwyer *et al*., 2001; Donnelly & Lambourne, 2011) [17, 18]. Moreover, participation in structured sports nurtures skills such as teamwork, discipline, and goal orientation**,** which are transferable to classroom performance (Marques *et al*., 2017; Bailey *et al*., 2009) [1, 16]. High attendance rates among more active students are also consistent with studies linking physical activity to greater school engagement and reduced absenteeism (Kantomaa *et al*., 2013; Rasberry *et al*., 2011) [19, 12].

From a policy perspective, these findings suggest that schools should not view PE as competing with academic instruction, but rather as an integral component of educational success. Expanding opportunities for quality physical education and sports participation can foster holistic development, ensuring that students benefit academically, socially, and physically. Future research should explore longitudinal effects of PE on academic trajectories and investigate the role of intensity, frequency, and type of activity in shaping educational outcomes.

References

1. Bailey R. Physical education and sport in schools: A review of benefits and outcomes. J Sch Health. 2006;76(8):397-401.
2. Donnelly JE, Hillman CH, Castelli D, Etnier JL, Lee S, Tomporowski P, *et al*. Physical activity, fitness, cognitive function, and academic achievement in children: A systematic review. Med Sci Sports Exerc. 2016;48(6):1197-1222.
3. Singh A, Saliasi E, van den Berg V, Uijtdewilligen L, de Bruijn AG, Jolles J, *et al*. Physical activity and performance at school: A systematic review of the literature. Scand J Med Sci Sports. 2019;29(4):476-491.
4. Howie EK, Pate RR. Physical activity and academic achievement in children: A historical perspective. J Sport Health Sci. 2012;1(3):160-169.
5. Álvarez-Bueno C, Pesce C, Cavero-Redondo I, Sánchez-López M, Martínez-Vizcaíno V. Academic achievement and physical activity: A meta-analysis. Pediatrics. 2017;140(6):e20171498.
6. Carlson SA, Fulton JE, Lee SM, Maynard LM, Brown DR, Kohl HW, *et al*. Physical education and academic achievement in elementary school: Data from the Early Childhood Longitudinal Study. Am J Public Health. 2008;98(4):721-727.
7. Chaddock L, Hillman CH, Buck SM, Cohen NJ. Childhood aerobic fitness predicts cognitive performance one year later. J Sports Sci. 2011;29(5):421-430.
8. de Greeff JW, Bosker RJ, Oosterlaan J, Visscher C, Hartman E. Effects of physical activity on executive functions, attention, and academic performance in preadolescent children: A meta-analysis. J Sci Med Sport. 2018;21(5):501-507.
9. Eime RM, Young JA, Harvey JT, Charity MJ, Payne WR. A systematic review of the psychological and social benefits of participation in sport for children and adolescents. Int J Behav Nutr Phys Act. 2013;10(1):98.
10. Fedewa AL, Ahn S. The effects of physical activity and physical fitness on children's achievement and cognitive outcomes: A meta-analysis. Res Q Exerc Sport. 2011;82(3):521-535.
11. Hillman CH, Pontifex MB, Raine LB, Castelli DM, Hall EE, Kramer AF. The effect of acute treadmill walking on cognitive control and academic achievement in preadolescent children. Neuroscience. 2009;159(3):1044-1054.
12. Rasberry CN, Lee SM, Robin L, Laris BA, Russell LA, Coyle KK, *et al*. The association between school-based physical activity, including physical education, and academic performance: A systematic review. Prev Med. 2011;52 Suppl 1:S10-S20.
13. Singh A, Uijtdewilligen L, Twisk JW, van Mechelen W, Chinapaw MJ. Physical activity and performance at school: A systematic review of the literature including a methodological quality assessment. Arch Pediatr Adolesc Med. 2012;166(1):49-55.
14. Tomporowski PD, Davis CL, Miller PH, Naglieri JA. Exercise and children's intelligence, cognition, and academic achievement. Educ Psychol Rev. 2008;20(2):111-131.
15. Trudeau F, Shephard RJ. Physical education, school physical activity, school sports and academic performance. Int J Behav Nutr Phys Act. 2008;5(1):10.
16. Bailey R, Armour K, Kirk D, Jess M, Pickup I, Sandford R, *et al*. The educational benefits claimed for physical education and school sport: An academic review. Res Pap Educ. 2009;24(1):1-27.
17. Dwyer T, Sallis JF, Blizzard L, Lazarus R, Dean K. Relation of academic performance to physical activity and fitness in children. Pediatr Exerc Sci. 2001;13(3):225-237.
18. Donnelly JE, Lambourne K. Classroom-based physical activity, cognition, and academic achievement. Prev Med. 2011;52 Suppl 1:S36-S42.
19. Kantomaa MT, Stamatakis E, Kankaanpää A, Kaakinen M, Rodriguez A, Taanila A, *et al*. Physical activity and school absenteeism: A population-based study. Pediatrics. 2013;131(4):e1276-e1283.
20. Marques A, Santos DA, Hillman CH, Sardinha LB. How does academic achievement relate to cardiorespiratory fitness, self-reported physical activity, and objectively reported physical activity: A systematic review in children and adolescents aged 6–18 years. Br J Sports Med. 2017;52(16):1039-1047.
21. Singh A, Klaren RE, Mandic S, Uijtdewilligen L, van Mechelen W, Chinapaw MJ. Effects of physical activity interventions on cognitive and academic performance in children and adolescents: A meta-analysis. Sports Med. 2018;48(3):371-388.

22. Sibley BA, Etnier JL. The relationship between physical activity and cognition in children: A meta-analysis. Pediatr Exerc Sci. 2003;15(3):243-256.
23. Stevens TA, To Y, Stevenson SJ, Lochbaum MR. The importance of physical activity and physical education in the prediction of academic achievement. J Sport Behav. 2008;31(4):368-388.
24. Trost SG. Active education: Physical education, physical activity and academic performance. Active Living Res Res Brief.; 2009.