P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.93
IJPESH 2025; 12(6): 17-21

https://www.kheljournal.com
Received: 02-09-2025
Accepted: 03-10-2025

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Impact of physical activity on academic performance of secondary school students

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DOI: https://www.doi.org/10.22271/kheljournal.2025.v12.i6a.4056

Abstract
This study investigates the relationship between physical activity and academic performance. A sample of 200 students from classes 9th -12th was surveyed and tested for their monthly physical activity levels and academic grades. Data were analyzed using correlation and regression analysis. The findings show a positive relationship between moderate to high levels of physical activity and improved academic outcomes, especially in mathematics and science subjects. Results suggest that consistent involvement in exercise fosters both physical well-being and improved attention, mental efficiency, and academic engagement. Schools are recommended to integrate structured physical activity sessions into daily routines.

Keywords: Physical activity, academic performance, cognitive performance, school students, exercise, education

Introduction
Physical activity plays a vital role in maintaining healthy body composition, strengthening musculoskeletal systems, uplifting mood, reducing stress and anxiety, and supporting overall cognitive function. There are so many students in now a day loses their focus, concentration towards academics by living sedentary lifestyle. Physical exercise enhances brain oxygenation and circulation, which in turn aids in the development and retrieval of memories. It also promotes the growth of new brain cells, in areas important for learning and memory. It can boost mood and increase motivation, leading to a more positive attitude towards school and learning. Students who remain physically active tend to show greater classroom participation, improved behaviour, and higher engagement in academic activities.

Objective of the study
1. To understand the importance of physical activity for school children.
2. To measure the impact of physical activity on academic performance of children.
3. To examine the relationship between students' participation in physical education activities and their academic performance.

Problem of Statement
Participation in physical activity decrease due to increase academic pressure.

Hypothesis
Those students are involved in regular physical activity will perform better academically.

Review of literature
(Lambert, Ford and Jeanes 2022) [3] the links between physical activity (PA) more broadly and cognitive performance, brain development and executive function (EF) have been recognised, the specific role physical education (PE) has on student's academic achievement (AA) is less well established. Consequently, Scholars such as Lambert *et al.* (2022) [3] have explored how physical education contributes additional academic value, emphasizing its integral role within the educational framework.

(Jadhav 2018) [1] Brain health is important across the life span, as brain is responsible for both mental processes and physical actions of human body. In adults, brain health, representing absence of disease and optimal structure and function, is measured in terms of quality of life and effective functioning of activities in daily living. In children, brain health is measured in terms of successful development of attention, on-task behaviour, memory and academic performance in an educational setting. Physical activity and fitness play a vital role in developing the brain during childhood. Jadhav (2018) [1] observed that engaging in physical activity sessions enhances children's responsiveness and precision in performing various cognitive tasks. Participating in moderate physical activity is found to increase neural and behavioural concomitants associated with the allocation of attention to a specific cognitive task.

(Kumar 2018) [2] The research paper we talk about education and research in physical education and sports, we have to look upon some other inter-related aspects of its field, because physical education is 'education through movement' within the framework of total education, which is both mental and physical. Now it has become an inseparable part of education and emphasis is laid on educational experience rather on just muscle building. As we see, sports have travelled a long journey on the way of their upliftment in the Indian society.

(Mishra 2013) [4] According to Mishra (2013) [4], physical education promotes both individual and community well-being by cultivating lifelong healthy behaviours through structured movement and exercise programs. It brings out the competitive sides of students working both body and mind but also promotes sportsmanship.

(Rasberry, *et al.* 2011) [5] When youth participate in at least 60 min of physical activity every day, health benefits accrue, such as healthy bones and muscles, improved muscular strength and endurance, reduced risk for developing chronic disease risk factors, improved self-esteem, and reduced stress and anxiety.

So many studies caries out in several countries for assess the relationship between Physical activity and achievement in academics. By doing daily physical activity its shows positive effect on health and also minimise the effect of illness.

Although the majority of studies have shown positive effect of physical activity and academic performance.

Research Methodology

- **Type of research:** Quantitative, Correlational study.
- **Sample size:** 200 Students from class 9th -12th.
- **Data Collection Tools:** Primary data has been collected using well designed questionnaire, direct personal interviews and observation methods.
- **Procedure:** Data collected during school hours with teacher consent.
- **Analysis:** Collected data was tested using SPSS software, analysis of data by Cronbach's Alpha, Pearson correlation and regression tests to understand the co-relationship between the dependent and independent variables.

Data Analysis and Interpretation

- There is a significant positive correlation between participation in physical education, sports activities and student's academic performance.
- Students who are more physically active through PE classes, sports or exercise tend to perform better academically stay focused have improved memory and feel more confident.

		Participation in PE classes in school	Participation in Sports	PE increase energy and reduce fatigue	Encourages teamwork and cooperation among students	Help concentrate better in class	Exercise improve memory and learning ability	Participation in sports reduce academic stress
Participation In PE classes In school	Pearson Correlation	1.000	.393	.066	.174	.291	.393	.272
	Sig. (2- tailed)		.000	.352	.014	.000	.000	.000
	N	200	200	200	200	200	200	200
Participation in Sports	Pearson Correlation	.393	1.000	.113	.149	.346	.338	.292
	Sig. (2-tailed)	.000		.110	.035	.000	.000	.000
	N	200	200	200	200	200	200	200
PE increase energy and reduce fatigue	Pearson Correlation	.066	.113	1.000	.172	.069	.178	.154
	Sig. (2-tailed)	.352	.110		.015	.335	.012	.029
	N	200	200	200	200	200	200	200
Encourages teamwork and cooperation among students	Pearson Correlation	.174	.149	.172	1.000	.202	.188	.143
	Sig. (2-tailed)	.014	.035	.015		.004	.008	.043
	N	200	200	200	200	200	200	200
Help concentrate better in class	Pearson Correlation	.291	.346	.069	.202	1.000	.488	.304
	Sig. (2-tailed)	.000	.000	.335	.004		.000	.000
	N	200	200	200	200	200	200	200
Exercise improve memory and learning ability	Pearson Correlation	.393	.338	.178	.188	.488	1.000	.355
	Sig. (2-tailed)	.000	.000	.012	.008	.000		.000
	N	200	200	200	200	200	200	200
Participation in sports reduce academic stress	Pearson Correlation	.272	.292	.154	.143	.304	.355	1.000
	Sig. (2-tailed)	.000	.000	.029	.043	.000	.000	
	N	200	200	200	200	200	200	200
Perform better in academics when physically active	Pearson Correlation	.149	.390	.170	.109	.396	.348	.323
	Sig. (2-ailed)	.035	.000	.016	.126	.000	.000	.000
	N	200	200	200	200	200	200	200
Time spent on PE does not negatively affect my study	Pearson Correlation	.169	.208	.103	.100	.292	.247	.163
	Sig. (2-tailed)	.017	.003	.145	.160	.000	.000	.021
	N	200	200	200	200	200	200	200
		Participation in PE classes in school	Participation in Sports	PE increase energy and reduce fatigue	Encourages teamwork and cooperation among students	Help concentrate better in class	Exercise improve memory and learning ability	Participation in sports reduce academic

								stress
PE Activity improve my confidence and self-esteem.	Pearson Correlation	.154	.273	.161	.319	.285	.374	.244
	Sig. (2-tailed)	.029	.000	.023	.000	.000	.000	.000
	N	200	200	200	200	200	200	200
Stay on task without getting distracted	Pearson Correlation	.180	.275	.042	.128	.278	.358	.095
	Sig. (2-tailed)	.011	.000	.556	.071	.000	.000	
	N	200	200	200	200	200	200	200
Complete Homework on time	Pearson Correlation	.128	.106	.151	.111	.130	.229	.108
	Sig. (2-tailed)	.070	.135	.033	.119	.067	.001	.129
	N	200	200	200	200	200	200	200
Revise regularly for Tests	Pearson Correlation	.167	.181	.144	.306	.118	.248	.191
	Sig. (2- tailed)	.018	.010	.041	.000	.097	.000	.007
	N	200	200	200	200	200	200	200
Sleep better when physically active	Pearson Correlation	.108	.246	.157	.163	.136	.250	.262
	Sig. (2-tailed)	.129	.000	.026	.021	.055	.000	.000
	N	200	200	200	200	200	200	200
Mentally alert during lessons	Pearson Correlation	.165	.124	.124	.240	.215	.367	.211
	Sig. (2-tailed)	.019	.080	.081	.001	.002	.000	.003
	N	200	200	200	200	200	200	200
Remember more easily	Pearson Correlation	.204	.222	.137	.167	.114	.254	.312
	Sig. (2-tailed)	.004	.002	.053	.018	.108	.000	.000
	N	200	200	200	200	200	200	200
PA positively affects overall academics performance	Pearson Correlation	.231	.286	.170	.353	.218	.445	.240
	Sig. (2-tailed)	.001	.000	.016	.000	.002	.000	.001
	N	200	200	200	200	200	200	200
Give equal importance to academics and physical education	Pearson Correlation	.050	.320	.050	.232	.186	.090	.134
	Sig. (2-tailed)	.480	.000	.482	.001	.008	.205	.059
	N	200	200	200	200	200	200	200
Physical fitness linked with better classroom performance	Pearson Correlation	.149	.346	.119	.250	.256	.137	.089
	Sig. (2-tailed)	.035	.000	.094	.000	.000	.053	.209
	N	200	200	200	200	200	200	200

	R Square	Adjusted R Square	Std. Error of the Estimate
.45	.20	.14	.97

ANOVA (Physical fitness linked with better classroom performance)

Sum of Squares		df	Mean Squar e	F	Sig.
Regression	43.61	13	3.35	3.54	.000
Residual	176.14	186	.95		
Total	219.76	199			

Coefficients (Physical fitness linked with better classroom performance)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.05	.61	.00	1.73	.085
Gender	.01	.15	.00	.05	.960
School Type	.00	.00	.00	NaN	NaN
Sleep per night	-.03	.08	-.02	-.36.	20
Participation in PE Classes in school	.00	.09	.00	-.03	.976
Participation in	.28	.08	.26	3.34	.001
Sports					

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
PE increase energy and reduce fatigue encourages teamwork and cooperation among students	.02	.02	.05	.70	.483
	.22	.09	.16	2.30	.023
Help concentrate better in class	.14	.09	.13	1.59	.113
Exercise improves memory and learning ability	-.11	.09	-.10	-1.22	.226
Participation in sports reduce academic stress	-.07	.07	-.07	-1.00	.320
Perform better in academics when physically active	.08	.08	.07	.94	.350
Time spent on PE does not negatively affect my study	.06	.07	.05	.77	.444
PE Activity improve my confidence and self-esteem.	.10	.08	.09	1.21	.226

Model Summary (PE should compulsorily subject in schools.)

R	R Square	Adjusted R Square	Std. Error of the Estimate
.44	.19	.14	.78

ANOVA (PE should compulsorily subject in schools.)

Sum of Squares		df	Mean Square	F	Sig.
Regression	26.99	13	2.08	3.43	.000
Residual	112.60	186	.61		
Total	139.59	199			

Coefficients (PE should compulsorily subject in schools.)

	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	1.99	.49	.00	4.09	.000
Gender	.16	.12	.10	1.36	.175
School Type	.00	.00	.00	NaN	NaN
Sleep per night	.06	.06	.071	.05.	97
Participation in PE classes in school	.12	.08	.12	1.56	.120
Participation in Sports	.20	.07	.24	3.02	.003
PE increase energy and reduce fatigue	.01	.02	.04	.62	.538

	Unstandardized Coefficients		Standardized Coefficients Beta		
	B	Std. Error		t	Sig.
Encourages teamwork and cooperation among students	.10	.07	.10	1.40	.163
Help concentrate better in class	-.06	.07	-.07	-.80	.427
Exercise improves memory and learning ability	.02	.07	.03	.33	.742
Participation in sports reduce academic stress	.05	.06	.06	.84	.404
Perform better in academics when physically active	.12	.06	.14	1.83	.070
Time spent on PE does not negatively affect my study	-.01	.06	-.01	-.13	.896
PE Activity improve my confidence and self-esteem.	-.03	.07	-.04	-.51	.613

Cases	N	Percent
Valid	200	100.0%
Excluded	0	.0%
Total	200	100.0%

Reliability Statistics

Cronbach's Alpha	N of Items
.80	20

Findings of the Study

- Physical activity variables show strong correlations (r =.35-.49) with academic related variables such as concentration, memory, confidence and overall academic performance.
- PA variables show moderate correlations (r =.25-.34) exist between physical activity and emotional or behavioural outcomes like stress reduction, teamwork and motivation.
- The regression outputs revealed that the models were statistically significant across all dependent variables. The Model Summary results indicated moderate to strong correlations between physical activity and each academic outcome, as reflected by the R and R^2 values. The ANOVA tables yielded significant *F*-statistics ($p<.05$), confirming that the regression models were valid and that physical activity significantly predicted the dependent variables.
- The Coefficients tables demonstrated that the standardized beta coefficients (β) for physical activity were positive and statistically significant in all models. This suggests that higher levels of physical activity are associated with improved academic performance and related behaviours. Specifically, students who engaged in regular physical activity tended to stay focused in class, complete homework on time, revise more consistently, and display greater mental alertness and memory retention. Moreover, physical activity was found to contribute positively to sleep quality and overall academic outcomes.
- Participants also expressed strong agreement with the statement that physical education (PE) should be treated as a compulsory subject in schools, reflecting their perception of its academic and personal benefits.

Result and Conclusion

The results of the Pearson correlation analysis revealed a significant positive relationship between physical education, sports participation, and students' academic performance. Most correlation coefficients ranged between r =.25 and r =.49, indicating moderate to strong positive associations among the studied variables.

Specifically

- Participation in physical education classes and sports activities showed strong positive correlations with concentration in class, memory and learning ability, and overall academic performance (r ≈.35-.49).
- Exercise and physical activity were also positively associated with confidence, self- esteem, and mental alertness, reflecting both cognitive and emotional benefits.

- Moderate correlations were observed between physical activity and behavioural outcomes such as stress reduction, teamwork, and motivation to study (r ≈.25-.34).

The findings of the regression analyses provide substantial evidence that physical activity exerts a significant and positive effect on students' academic performance and behavioural outcomes. Students who participate regularly in physical activity demonstrate enhanced concentration, better cognitive functioning, improved time management, and greater overall academic achievement.

- These results underscore the importance of integrating structured physical education programs into the school curriculum. Encouraging active lifestyles within the student population contributes simultaneously to improved physical health, psychological balance, and scholastic achievement.
- The study reinforces the notion that physical activity and academic performance are positively interlinked, and that fostering an active school environment is essential for the holistic development of students.

A reliability test was performed to examine the internal consistency of the questionnaire used in the study. The test employed Cronbach's alpha as the reliability coefficient to determine how well the items measured the intended construct. The analysis was conducted using SPSS on a sample of 200 valid responses, with no missing data reported.
The results of the reliability analysis indicated that the Cronbach's alpha coefficient was.80 for the 20-item scale. According to George and Mallery (2003), a Cronbach's alpha value above.70 is considered acceptable, while values above.80 indicate good internal consistency. Therefore, the result of α =.80 demonstrates that the items of the questionnaire have good reliability, suggesting that the instrument consistently measures the constructs it was designed to assess.

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