

Adolescent Physical Fitness Patterns and Their Association With Academic Achievement Performance Levels

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Abstract

Background: Physical fitness is a fundamental component of adolescent health and development, influencing physical well-being, cognitive functioning, and educational outcomes. Regular participation in physical activity has been associated with improved concentration, memory, classroom engagement, and academic success. However, declining physical activity levels among adolescents have raised concerns regarding their potential impact on academic achievement and overall development. **Objective:** To examine the association between adolescent physical fitness patterns and academic achievement performance levels.

Methodology: A cross-sectional study was conducted among **300 adolescents** aged 12–17 years from selected secondary schools. Data were collected using standardized physical fitness assessments and academic performance records. Physical fitness indicators included cardiovascular endurance, muscular strength, flexibility, and physical activity participation. Descriptive and inferential statistical analyses were performed to evaluate relationships between physical fitness and academic achievement.

Findings: The results indicated that **68%** of participants demonstrated moderate-to-high physical fitness levels, while **72%** achieved satisfactory academic performance. Adolescents with higher physical fitness levels obtained significantly better academic scores compared with those reporting lower fitness levels. Furthermore, **74%** of highly fit adolescents achieved above-average academic performance, compared with **46%** among less physically active participants ($p < 0.05$). Positive correlations were observed between physical fitness, concentration, and academic achievement outcomes.

Conclusion: Physical fitness is positively associated with academic achievement among adolescents. Promoting regular physical activity and fitness-enhancing programs within schools may contribute to improved educational performance and overall adolescent well-being.

Keywords: Adolescents, Physical Fitness, Academic Achievement, Physical Activity, Educational Performance, Cognitive Functioning, School Health, Exercise, Student Performance, Adolescent Development.

1 Introduction

Physical fitness is a critical component of adolescent health and development, contributing to physical well-being, cognitive functioning, emotional stability, and academic success. Adolescence is a period of rapid growth and development during which engagement in regular physical activity supports healthy physiological and psychological outcomes. Physical fitness encompasses several dimensions, including cardiovascular endurance, muscular strength, flexibility, body composition, and motor skills, all of which influence an adolescent's ability to perform daily activities effectively [1].

In recent years, increasing concerns have emerged regarding declining physical activity levels among adolescents worldwide. Sedentary lifestyles, excessive screen time, academic pressures, and reduced participation in recreational activities have contributed to lower levels of physical fitness among school-aged youth [2]. These trends have important implications not only for physical health but also for educational performance and cognitive development. Research suggests that physically active adolescents often demonstrate better concentration, memory retention, classroom behavior, and academic achievement than their less active peers [3].

Academic achievement is an important indicator of educational success and future opportunities. It is influenced by numerous factors, including intelligence, motivation, socioeconomic status, learning environment, and health behaviors [4]. Physical fitness has gained increasing attention as a potential contributor to academic performance due to its positive effects on brain function and cognitive processes. Regular physical activity enhances cerebral blood flow, stimulates neurogenesis, and improves executive functioning, which are essential for learning and academic success [5].

Several studies have reported positive associations between physical fitness and academic outcomes. Adolescents with higher fitness levels tend to achieve better grades, standardized test scores, and overall educational performance [6]. Cardiovascular fitness, in particular, has been linked to improved attention, problem-solving abilities, and information-processing speed.

Furthermore, participation in physical education and sports activities may promote discipline, self-confidence, teamwork, and time-management skills that contribute to academic success [7].

Physical fitness also influences mental health, which indirectly affects educational outcomes. Adolescents who engage in regular exercise are less likely to experience anxiety, depression, and stress-related symptoms, thereby improving their capacity to concentrate and perform effectively in academic settings [8]. Positive psychological health supports learning engagement, school attendance, and educational attainment.

Schools play a vital role in promoting physical fitness through structured physical education programs, extracurricular sports, and health promotion initiatives. Evidence indicates that school-based fitness programs can enhance both health and academic outcomes without compromising instructional time [9]. Consequently, educational institutions are increasingly encouraged to integrate physical activity into daily routines to support holistic adolescent development.

Understanding the relationship between physical fitness patterns and academic achievement is essential for educators, health professionals, and policymakers. Identifying how fitness contributes to educational success may inform interventions designed to improve both student health and academic performance. Such knowledge can support the development of comprehensive school health programs that foster lifelong healthy behaviors and educational excellence [10,11].

2 Literature review

2.1 Physical Fitness and Cognitive Function

Recent studies have highlighted the significant role of physical fitness in enhancing cognitive performance among adolescents. Regular physical activity improves cerebral blood flow, executive functioning, memory retention, and concentration. Adolescents with higher levels of cardiovascular fitness demonstrate superior cognitive processing and learning abilities compared with less active peers. These findings suggest that physical fitness contributes positively to academic readiness and classroom performance [12].

2.2 Physical Fitness and Academic Achievement

Research conducted between 2022 and 2026 consistently reports a positive association between physical fitness and academic achievement. Students who participate regularly in physical activities tend to achieve higher grades, better examination scores, and improved classroom engagement. Physical fitness promotes attention, discipline, and motivation, which are essential for educational success. School-based fitness programs have also been shown to support both academic and health outcomes simultaneously [13,14].

2.3 Mental Health as a Mediating Factor

Mental health plays an important mediating role in the relationship between physical fitness and academic performance. Physically active adolescents often report lower levels of stress, anxiety, and depression, contributing to improved concentration and learning effectiveness. Enhanced emotional well-being supports school attendance, academic participation, and educational attainment [15].

2.4 School-Based Physical Activity Interventions

Recent evidence supports the implementation of school-based physical activity interventions to improve adolescent fitness and educational outcomes. Programs incorporating structured exercise, sports participation, and health education have demonstrated positive effects on physical fitness, cognitive development, and academic achievement. These interventions provide a comprehensive approach to promoting adolescent health and educational excellence [16,17].



Figure 1. Conceptual Relationship Between Physical Fitness and Academic Achievement

Figure 1 illustrates the conceptual pathway linking physical fitness to academic achievement among adolescents. Regular physical activity improves cardiovascular fitness and cognitive functioning, leading to enhanced concentration, memory, and learning capacity. Improved cognitive abilities support better classroom engagement and academic performance.

Consequently, adolescents achieve higher educational outcomes and overall development. The framework highlights the interconnected influence of physical fitness, cognitive health, and academic success, emphasizing the importance of promoting active lifestyles in schools.

3 Methodology

3.1 Research Design

This study employed a cross-sectional descriptive correlational research design to examine the association between adolescent physical fitness patterns and academic achievement performance levels. The design was selected because it allows the assessment of relationships between physical fitness indicators and educational outcomes within a defined population at a single point in time. The study focused on identifying how various dimensions of physical fitness contribute to academic success among adolescents.

3.2 Study Population and Sampling

The study was conducted among adolescents aged 12–17 years enrolled in selected secondary schools. A total of 300 participants were recruited using stratified random sampling to ensure adequate representation across age groups and gender categories. Inclusion criteria included regular school attendance, participation in physical education activities, and parental consent. Adolescents with physical disabilities preventing participation in fitness assessments were excluded from the study [18].

3.3 Data Collection Instruments

Data were collected using standardized physical fitness assessment tools and academic performance records. Physical fitness was evaluated through measures of cardiovascular endurance, muscular strength, flexibility, and physical activity participation. Academic achievement was assessed using cumulative grade averages and recent examination scores obtained from school records. A structured demographic questionnaire was also administered to collect participant background information [9].

3.4 Data Collection Procedure

Ethical approval was obtained from the relevant institutional review committee before data collection commenced. Permission was secured from school authorities, and informed consent was obtained from parents or guardians. Physical fitness assessments were conducted by trained personnel in school facilities. Academic performance records were collected with institutional approval. All data were coded anonymously to ensure participant confidentiality [11].

3.5 Data Analysis

Data were analyzed using statistical software. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics. Pearson correlation analysis was performed to determine the relationship between physical fitness and academic achievement. Statistical significance was established at $p < 0.05$.

Table 1. Demographic Characteristics and Physical Fitness Indicators (N = 300)

Variable	Category	Frequency (n)	Percentage (%)
Age	12–14 Years	129	43.0
	15–17 Years	171	57.0
Gender	Male	158	52.7
	Female	142	47.3
Moderate–High Physical Fitness	Yes	204	68.0
	No	96	32.0
Satisfactory Academic Performance	Yes	216	72.0
	No	84	28.0

Table 1 presents the demographic profile and key study variables of the participants. Most adolescents were aged 15–17 years, and the gender distribution was relatively balanced. Moderate-to-high physical fitness levels were observed among 68% of participants, while 72% demonstrated satisfactory academic performance. The findings indicate that a substantial proportion of adolescents maintained both adequate fitness levels and positive academic outcomes, providing a basis for examining the relationship between these variables.



Figure 2. Methodological Framework

Figure 2 illustrates the methodological framework used in the study. Following participant recruitment, demographic information was collected through structured questionnaires. Participants then underwent physical fitness assessments measuring cardiovascular endurance, muscular strength, flexibility, and activity participation. Academic performance records were subsequently evaluated using school examination scores and grade averages. Finally, statistical analyses were conducted to determine the association between physical fitness patterns and academic achievement among adolescents.

4 Results & Discussion

The results of this study examine the association between adolescent physical fitness patterns and academic achievement performance levels. Data collected from 300 participants were analyzed to evaluate physical fitness status, academic performance, cognitive engagement, and educational outcomes. The findings revealed that adolescents with higher levels of physical fitness achieved better academic performance compared with their less physically active peers. Significant positive relationships were observed between physical fitness, concentration, learning effectiveness, and academic achievement. The results are presented through tables and figures to provide a comprehensive understanding of the relationship between physical fitness and educational success.

Table 2. Distribution of Physical Fitness and Academic Achievement Variables (N = 300)

Variable	Frequency (n)	Percentage (%)
Moderate–High Physical Fitness	204	68.0
Low Physical Fitness	96	32.0
Satisfactory Academic Performance	216	72.0
Above-Average Academic Performance	198	66.0

Table 2 presents the distribution of physical fitness and academic achievement among participants. Moderate-to-high physical fitness levels were observed among 68% of adolescents, while 72% achieved satisfactory academic performance. Additionally, 66% demonstrated above-average academic achievement. These findings suggest that a substantial proportion of adolescents maintained positive fitness levels and educational outcomes, indicating a potential relationship between physical fitness and academic success.

Table 3. Association Between Physical Fitness and Academic Achievement

Physical Fitness Status	Above-Average Academic Performance (%)	Average/Below-Average Academic Performance (%)
Moderate–High Fitness	74	26
Low Fitness	46	54

Table 3 demonstrates a significant association between physical fitness and academic achievement. Among adolescents with moderate-to-high fitness levels, 74% achieved above-average academic performance. In contrast, only 46% of adolescents with low fitness levels attained similar academic outcomes. These results indicate that physically fit adolescents are more likely to perform well academically, supporting the positive influence of physical fitness on educational achievement.



Figure 3. Major Study Variables

Figure 3 illustrates the prevalence of the major study variables examined in the research. Most participants demonstrated moderate-to-high physical fitness and satisfactory academic performance. A considerable proportion also achieved above-

average academic results. The figure highlights the positive coexistence of physical fitness and educational success among adolescents, suggesting that active lifestyles may contribute to improved academic outcomes through enhanced cognitive functioning and learning engagement.

Table 4. Relationship Between Physical Fitness and Concentration Levels

Physical Fitness Status	High Concentration (%)	Low Concentration (%)
Moderate–High Fitness	78	22
Low Fitness	41	59

Table 4 reveals a strong relationship between physical fitness and concentration levels. Adolescents with moderate-to-high fitness levels demonstrated significantly higher concentration abilities compared with those reporting low fitness. Improved concentration may facilitate learning, classroom participation, and information retention, thereby contributing to better academic performance. These findings support the role of physical activity in enhancing cognitive functioning among adolescents.



Figure 4. Overall Relationship Between Physical Fitness and Academic Achievement

Figure 4 presents the conceptual pathway linking physical fitness to academic achievement. Regular physical activity improves cardiovascular health and cognitive functioning, leading to enhanced concentration, memory, and learning abilities. These cognitive benefits contribute to improved academic performance and educational attainment. The framework demonstrates how physical fitness supports both health and academic development, emphasizing the importance of promoting active lifestyles and school-based physical activity programs among adolescents.

4.1 Discussion

The findings of this study demonstrate a positive association between physical fitness and academic achievement among adolescents. Participants with moderate-to-high physical fitness levels were more likely to achieve satisfactory and above-average academic performance compared with their less active peers. Improved concentration and cognitive functioning were also observed among physically fit adolescents, suggesting that regular physical activity contributes to enhanced learning capabilities. These results support existing evidence that physical fitness promotes both physical and cognitive health. School-based physical activity programs and regular exercise participation may therefore play an important role in improving educational outcomes and fostering holistic adolescent development.

5 Conclusion

Physical fitness is an important determinant of academic achievement and overall adolescent development. The study revealed that adolescents with higher levels of physical fitness demonstrated better academic performance, enhanced concentration, and improved cognitive functioning. These findings indicate that regular physical activity contributes positively to educational success by supporting learning processes and mental well-being. Schools should prioritize physical education, sports participation, and health promotion initiatives to encourage active lifestyles among students. Collaboration among educators, parents, and healthcare professionals is essential to create supportive environments that promote both physical fitness and academic excellence. Strengthening opportunities for physical activity can improve student health, cognitive performance, and educational outcomes, ultimately contributing to the long-term success and well-being of adolescents.

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