HJRS HEC Journal Recognition System
Category Y
AL-HAYAT Research Journal
Jlali Research Institute of Social Science, Lahore
ISSN (Online): 3006-4767
ISSN (Print): 3006-4759
Volume 2 Issue 2 (Jan-Mar 2025)

Impact of Physical Fitness on Academic Success of University Students

Muhammad Zahid Mahmood
Lecturer Physical Education & Sport Sciences The Islamia University of Bahawalpur
Zahid.mahmood@iub.edu.pk

Irfan Haider
BS Physical Education and Sports Sciences The Islamia University of Bahawalpur
Irfanhaidersial80@gmail.com

Shahid Ali Khan
Director Physical Education, Government Degree Boys College, Korangi # 2 1/2, Karachi, 74900, College Education Department, Government of Sindh, Pakistan
shahid.physicaleducation@gmail.com

Abstract

This study explores the relationship between physical fitness and academic success among university students through a quantitative, experimental research design. Utilizing the Fitness Gram assessment, the investigation measured health-related physical fitness components including cardiovascular endurance, muscular strength, flexibility, muscular endurance, and body composition of 100 students from various departments at The Islamic University Bahawalpur. Academic achievement was evaluated using participants' cumulative grade point averages (CGPA). Standardized physical fitness tests, including the Harvard Step Test, Hand Grip Test, Sit and Reach, Push-Up Test, and BMI calculations, were administered using conventional fitness equipment. Data were analyzed using SPSS v27, applying Pearson and partial correlation analyses to determine the relationships between physical fitness and academic outcomes. Results revealed moderate to strong positive correlations between several fitness measures such as cardiovascular endurance, grip strength, flexibility, and muscular endurance and CGPA. The findings suggest that physical fitness is positively associated with higher academic performance, highlighting the potential of physical activity to enhance cognitive and educational outcomes. Regular physical activities within academic settings to support students' overall development.

Keywords: Physical fitness, Academic success, University students, Impact

Introduction

Background of Study

Physical fitness refers to a person's ability to do his routine work without any tiring, and his body system are working effectively and efficiently. He also enjoyed his leisure activities Without any fatigue. It includes various components such as cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. The capacity to persevere and maintain under trying conditions when an unfit individual would give up The condition that determines an individual's level of functioning (Elnashar, 1984). Physical fitness includes a number of elements that affect a person's health and performance, such as body composition, muscular strength, flexibility, cardiovascular endurance, and muscular endurance. (Getchell, 1979)

Fitness tests are taken of above components like for the cardiovascular endurance measurement copper's 12m run test, Harvard step test. To muscular strength chin-ups, dips and single rep sit-ups tests will be occurring. Muscular endurance is measured through maximum push-up test, crunch test and modified pull-ups test. Flexibility is also measured by sit and reach test, trunk hyperextension test and shoulder hyperextension test. Body composition is also calculated by skin fold test and hydrostatic weighing method (Malpeli, (2020). The psychological advantages from being physically active, such as a sense of improved health. lowers tension, anxiety, sadness, and stress levels. improved capacity for relaxation

and a decrease in sentiments of loneliness and hostility. Boost your optimistic outlook and self-perception. Enhance elderly people's memory and mental function. Enhancing work capacity, increasing energy for daily tasks, improving emergency preparedness, lowering the risk of heart disease, lowering blood LDL levels, lowering age-onset diabetes and insulin requirements, increasing heart stroke volume, which increases blood flow to muscles and organs, increasing the capacity to perform more demanding tasks, improving lung capacity and oxygen extraction, increasing muscle tone and size, improving flexibility for better posture control, lowering the risk of lower back pain, and boosting the immune system due to stress relief are all physical benefits of fitness (Husu, (2021)

Athletes may utilize the results of their fitness tests to help them create objectives and targets for improving their test scores as compared to their original test results. Test results may be used by coaches to help pick teams or individuals for a race, match, or other sports event. The exam gives the coach valuable information that they may use to create training plans for the future. Comparisons with normative tables, previous test results, and the accomplishments of other athletes in a team or club are made possible by well performed fitness tests. After an injury, a fitness test may be utilized as part of an athlete's rehabilitation program since the coach can use the findings to determine how close the athlete is to being totally fit by comparing them to their results when they were fully fit.

The importance of physical exercise as a habit that may significantly improve public health is becoming more widely acknowledged. Increased physical activity has been linked to improved weight management, and a decrease in mild to severe depressive and anxiety symptoms. This improved ability to engage in physical exercise may thus increase the probability that physical activity will be engaged in and, perhaps most importantly, result in a greater sense of well-being due to improved appearance and feeling (A'Naja, (2024). Adults who engage in regular physical activity (PA) are thought to gain from it in terms of their physical, mental, social, and cognitive health. The development of PA behaviors, which are often carried over into adulthood, is most important throughout adolescence. Nonetheless, studies of the general public have repeatedly shown that adolescence is a time when PA involvement declines.

It is important to make sure that universities provide students with frequent chances to participate in PA since they usually spend a large portion of their days there. It is advised that students complete at least 30 of their 60 daily minutes of PA while in class. Even though universities prioritize academic results, there is growing evidence that fitness via PA may improve academic results, underscoring the significance of health-promoting behaviors. These days, several states use health indicators or physical fitness as accountability metrics.

The US Centers for Disease Control and Prevention analyzed 50 studies in 2010 that looked at impact of physical fitness on academic success. They came to the conclusion that additional research is necessary, but that increasing or preserving PA time at college and university may enhance educational results. Because there were few studies using rigorous research techniques like randomized controlled trials (RCTs), it was difficult to make firm findings. Only seven high-quality studies evaluating the effects of PA on academic outcomes were found in a 2018 systematic review; the authors came to the conclusion that there is compelling evidence of PA's positive benefits on arithmetic achievement but conflicting data on its positive effects on overall academic performance. An expert panel was used in that study to determine the most crucial areas for future research on this subject, including the analysis of mechanistic issues such moderators of the association between PA and academics. Therefore, even though a number of RCTs have previously been carried out on this subject, more thorough, long-term assessments that look at the ways in which PA could enhance academic results are still required (Boedeker, 2021)

Statement of the Research problem

The problem to be addressed through this study is 'the analysis of university students' physical fitness and results considering the relation between physical fitness and academic successes. Here we are going to organize a physical fitness test for the university students to measure their fitness related to their health, through using the fitness methods, to analyze how their healthy body has effect on their academic performance. As being having strong body is beneficial for the physical fitness and academic performance.

Being physically healthy is a multifaceted condition of being. The capacity of the body to operate properly and efficiently is known as physical fitness. The six skill-related fitness components and five health related components of physical fitness make up this state of being, which enhances overall quality of life. The capacity to work efficiently, enjoy free time, stay healthy, withstand hypokinetic illnesses, and handle emergencies are all correlated with physical fitness. Although it differs from health and wellbeing, it is connected to both. Even though a variety of factors contribute to the development of physical fitness, consistent physical exercise is necessary for achieving optimum physical fitness (Corbin, 2024).

Moreover, the university student's health is the top most concern of the universities so the institute is going to measure fitness of students and will find health of students of the university. The results will consider to find the more accuracy on the good physical condition of the pupils and promote the healthiness in whole institute. This is due to the fact that previous research has shown that various cognitive skills, including execution, decision-making, perception, concentration, and memory, can be enhanced through regular physical activity. The WHO categorizes components of fitness into two categories: robust and fit. Health refers to the body's physical and mental liberation from sickness, while fitness denotes an individual's capacity to execute everyday tasks optimally while conserving energy and avoiding undue weariness. This is corroborated by studies indicating that the brain requires 0.1 kcal/min to sustain life. Intense concentration necessitates an energy expenditure of 1.5 kcal per minute by the brain.

The findings indicated that cognition necessitates energy expenditure. Consequently, physical fitness and participation in sports activities, together with a healthy lifestyle, play a crucial role in enhancing students' physical capabilities for both physical and cognitive learning activities. (Zhang, 2025) contend that prior to influencing academic performance, physical or fitness activities are associated with many possible processes, including certain high-level cognitive capacities such as focus, memory, decision-making, attentiveness, and cognitive processing speed. Numerous research has been published in international publications regarding the impact and correlation of physical fitness on academic performance.

Significance of Study

Contrary to the belief that sports could detract from academic accomplishment, studies constantly indicate that physically fit children tend to do better in the classroom. Physical workouts boost cognitive function, memory, and problem-solving ability. Moreover, conducting intersecting matches during examinations acts as a stress reliever as it helps students conquer test anxiety, and their mindset experiences a good shift after the match, regardless of the result. Early exposure to sports within the curriculum has a vital effect in molding a student's long-term discipline, collaboration, and devotion. Participating in physical activities teaches children the significance of dedication, time management, and goal-setting. By addressing physical health, mental performance, and academic accomplishment, this review prepares kids not just for academic. Excellency but also for success in future life.

Physical activity (PA) holds a particularly significant place in health promotion and prevention. It decreases risks for various illnesses like as overweight and all-cause mortality and is helpful for physical, psychological and social health as well as for academic achievement. Students participating in sports learn to manage their time well, balancing training, tournaments, and academic commitments. Physical fitness has a vital role in boosting students psychological well-being, which is directly connected to academic achievement. Physical activities produce endorphins, the body 's natural mood lifters, which alleviate tension and anxiety. Lower tension levels may help to increased attention and concentration on academic activities. Additionally, the feeling of satisfaction and self-esteem derived from sporting triumphs may spill over into academic endeavors, giving children with the confidence and determination required to flourish in their academics. A happy mental state is vital for successful learning and academic performance, as well as balancing them with your study. By scheduling daily base physical activity into the routine life, university students can optimize their cognitive abilities, emotional well-being and theses all abilities will lead to enhance academic performance.

Hypothesis of the study

H1: Physical fitness significantly predicts academic success among university students.

H2: There is a statistically significant relationship between physical fitness and academic performance among university students.

H3: Physical fitness exerts a substantial influence on the academic success of university students.

Objectives of the study

1. To find out the impact of physical fitness on academic success of university students.
2. To investigate in the depth, the relation between physically fit students and their academic favorable results.
3. To analyzed a relation between physical fitness and academic success of university students.
4. To determine the significance effect of fitness on student's academics.

Limitation of the study

Followings were the limitations of the study.

- Only BS students were the population.
- limitation included the population of the participants.
- The lack of health-related fitness components testing laboratory.
- The participant's daily routine tough schedule.
- The researcher too tough schedule of daily routine.

Literature Review

Physical Fitness of University Students

Physical fitness refers to a someone's ability to do his routine work without any tiring, and his body system are working effectively and efficiently. He also enjoyed his leisure activities Without any fatigue. It includes various components such as cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. The capacity to persevere and maintain under trying conditions when an unfit individual would give up (RICHARDS, 2024).

Component of Physical Fitness

There are two major types components fitness that are health-related and skill -related components of fitness,

Cardiovascular Endurance

Cardiovascular fitness is capacity of heart and lungs to provide oxygen and blood to the muscle for extended period of time. It shows how effectively the body performs the daily tasks. Regular physical activity helps to boost the functioning of heart and lungs, allowing individuals to perform physical activities with less fatigue and greater stamina. Developing cardiovascular endurance is essential for overall health, as it supports better circulation, enhances energy consumption, and reduces the risk of heart diseases.

Body Composition

Body composition means the percentage of water, bone, fat in the human body. It gives the true picture health and body weight. Body composition classified by William Sheldon as Ectomorph, Mesomorph, and Endomorph in his book Atlas of Man. Body composition also defined by the measurement of the body as body mass index (BMI). BMI, or Body Mass Index, is a measure of body fat based on height and weight that applies to human beings (Mayya, 2022).

Flexibility

Flexibility refers to the movement of joints freely across their mobility of joints. Flexible persons can bend and twist at their joints with ease. Research show that the flexibility is effective in avoiding certain forms of muscular tendon injuries and maybe useful in lowering low back discomfort. However, everyone requires flexibility to conduct tasks of everyday life (Mayya, 2022).

Muscular Strength

Muscular Strength is the capacity of the muscle to produce force. It is determined by how much power a muscle can generate during a one contraction. Practically this reflects how much weight that a person can lift with one utmost effort. Muscular strength is vital in nearly all sports. Weight training resulted in an increase in size and strength of muscles (Anjali, 2024).

Muscular Endurance

Muscular Strength is the ability of a muscle to generate a force. It is defined by how much force a muscle can create during a single maximum contraction. Practically this represents how much weight that a person can raise with one maximum effort. Muscular strength is crucial in practically all sports. Weight training resulted in an increase in size and strength of muscles (Mayya, 2022).

Academic Success in Higher Education

The measures of academic performance set forth by any educational institution play a vital role in producing quality graduates who will become the leaders and workforce in any organization in the future, which indirectly contributes to the social and economic growth of the nation. Various measures of academic performance of students followed in the academic institutions under the general guidelines of the higher education authority of the state attract the attention of potential recruiters from industries, in addition to enable them to grasp good opportunities for higher studies or government services (Arun, 2024).

SGPA The academic performance of an individual student at the end of each semester shall be indicated in terms of SGPA. The overall grading of the class is done based on the SGPA levels and the students will be awarded with particular grades in each subject they passed. The SGPA is awarded only to those students who pass all the courses in a semester. The SGPA shall be calculated is given below: (Arun, 2024).

The CGPA is a much broader term to bring out the overall performance evaluation of a student in a progressive manner. Though the SGPA gives specific output of a semester, the CGPA provides the cumulative effect of the student's academic growth. Grade Point System of University of Madras. The CGPA is generally awarded only to those students who pass all the courses in the entire program. The CGPA of a student for the entire program is calculated as given below: (CGPA= (Total earned weightage grade points for the entire program)/ (Total credits for the entire program) (Suleiman, 2024).

Role of Physical Activity

Health is an important aspect for academic attainment and exercise is connected with greater academic results. Recent research of Korean teenage students indicated that robust PA was significantly connected with academic achievement in males, whereas moderate PA was positively correlated with academic success in both genders. In addition, recent investigations revealed that the link between academic accomplishment and PA was gender-dependent, and was responsive to the PA intensity (Al-Ansari, 2015).

Barrier to Physical Fitness Among University Students

Sultoni and Suherman conducted study to identify the factors that impede university students from engaging in physical activity. The study indicated that students with lower levels of physical activity had a larger barrier to social influence as compared with students with moderate physical activity. Furthermore, a notable disparity existed between students with low and high levels of physical activity. Students having a low degree of physical exercise exhibited greater hurdles to social influence and lack of willpower than those with extensive physical activity (Al Salim, 2023)

Preditor and Criterion Variable

A predictor variable (independent variable) is used to predict a dependent variable's value. It is manipulated or measured to determine its effecton the dependent varible. Health related fitness componets such as cardovascular endurance, muscular strength, muscular endurance, flwxibility and body comosition. A criterion variable (dependent variable) is the outcome being studied.

RESEARCH METHODOLOGY

Research design

This study is an experimental and quantitative method to investigate the impact of physical fitness on academic success. The quantitative approach focuses on collecting and analyzing numerical data to understand patterns, relationships, and trends. By using a structured data collection method, such as experimental method, this study aims to measure the variables of interest (e.g., physical fitness and academic success) in a systematic way.

All health-related fitness components were assessed using the Fitness Gram Test. Fitness-Gram is a methodology for assessing physical fitness levels using a series of tests that evaluate the skill-related and health related components of physical fitness.

Population

The Islamia University was the population of this research. The BS students were selected from the department of Physical Education, Social Work, Sociology, Psychology, Veterinary and Animal Sciences, Education, Biotechnology, Biochemistry, English Literature, English Linguistics, Urdu, Data Science, Computer Science, Physics, Software Engineering, Architecture, Fine Arts, Computer Science Engineering, Bachelor in Business Administration (BBA).

Sampling and sample size

Sampling is the choosing of group from being which data was taken. In this study the data was gathered from the different departments of university through simple random sampling technique. There were about 10,000 students of BS program in different disciplines and 10% students were picked. This experimental investigation was done with 100 participants who picked 50 girls' students and 50 boys from various departments of university. Data was collected in accordance with ethical guidelines, including obtaining permission and securing informed consent through signed forms. Participants' information was kept strictly confidential.

Research instruments

1. Stop watches	2. Dynamometer	3. Standard mat
4. Standard height measuring ruler	5. Standard bench for push-ups	6. Stepping benches
7. Standard weight measuring scale made in Pakistan	8. 16 inches high box for measuring girls' cardiovascular endurance	9. Chairs
10. Flexometer	11. 20 inches high box for measuring the boy's cardiovascular endurance	

The equipment was utilized to gather data to the investigation. All the devices are conventional measuring tools and physical fitness components measurer (OGUNLEYE, 2019).

Data Collection Procedure

Every participant was instructed on the different modalities of each activity and the research goals before the conducting of health-related physical fitness tests.

Harvard Step Test

The Harvard Step test was used to measure the cardiovascular and respiratory endurance. Equipment's that were used are Stepping bench, chair and boxes 20 inches high for boys and 16 inches high for girls and stopwatch. The stepping rate was set by the metronome. The count was up, up, down, down. The step on and off on the bench/chair/box at a rate of 30 steps per minute for 5 minutes. Students were properly warm-up through researcher instruction before performing the test. After 5 minutes of stepping students had to sit on nearby chair and have 1-minute rest after then their carotid pulse rate was counted in following discipline:

- 1 to 1.5 minutes
- 2 to 2.5 minutes
- 3 to 3.5 minutes

After calculation of cardiac pulse rate put all the calculation into Physical Efficiency Index formula to calculate the cardiovascular and respiratory endurance which that is (100×test duration in seconds) divided by (2×sum of heart beats in the recovery periods).

Hand Grip Test

Hand grip test was used to measure the isotonic muscular strength of arm. Equipment's were used are dynamometer and stopwatch. The student stand and make the 90 degree angle of his/her powerful hand. Hold the dynamometer and grip it firm. Participant's fingers were adjusted according to their hand length. Their arm with dynamometer was not touch by anything else while performing the test

Sit and Reach Test

The sit and reach event test the flexibility of the lower back and the hamstrings. The flexometer was used to test the flexibility. Before finishing the exercise, the students remove their shoes and sit on the floor with their knees completely stretched. One hand is put on top of the other with palms down and legs flat as the pupils reach along the measuring line as far as possible. At every try student attempted to stretch as far as possible and held for three seconds while the distance is being measured. The students' legs must stay straight and the soles of the students' feet should be flat on the box throughout the event. The measurements are reported to the closest centimeter. Students made three efforts and the maximum reach was regarded as his/her finest attempts and concluded to results.

Push-Up Test

Muscular endurance of upper body of boys was measured by 1-minute bench push-ups and for girls 1-minute modified knee push-ups. The students properly warm up before performing the test. They had performed the maximum push-up according to their strength in 1 minute.

Body Mass Index (BMI)

For the body composition Body Mass Index (BMI) was used to check the weight according their height and ensure that how many students falls into healthy, overweight, obesity and underweight category. A standard weight measuring and height measuring scale was used. Students were already informed by the researcher not to eat anything 6 hours prior to measurement. The height and weight of the students were measured with bare foot with the standard measuring scale.

Academic Achievement

The criteria variable was academic achievement, which was assessed by pupils Cumulative Grade Point Averages (CGPA). For the purpose of this research, CGPA is defined as an indication of student accomplishment and student success. Cumulative Grade Point Averages (CGPA) was obtained from archive data for the cumulative academic year, autumn semester. Cumulative Grade Point Averages (CGPA) contained averages from a broad variety of undergraduate and graduate degrees provided by the university and included averages from participants that were classed as full-time students. Later their CGPA percentage was picked in the results.

Data analysis

For this research, data was gathered, processed and analyzed using the Statistical Package for Social Sciences (SPSS) 27 software. The researcher used a series of Pearson Product Moment Correlation Coefficient analyses to study and examine the strength of the linear relationship between two quantitative variables: predictor variable (cardiovascular endurance, flexibility, muscular strength, muscular endurance and body composition) and the criterion variable (Cumulative Grade Point Averages) in university sports club.

The researcher began data screening by reviewing the results captured in the Excel documents containing both the predictor variable (cardiovascular endurance, flexibility, muscular strength, muscular endurance and body composition) and the criterion variable (Cumulative Grade Point Averages) in club sports students, and then repeated the screening process after entering the participant data into SPSS. The researcher sorted through the data and scanned for inconsistencies on each variable. The research conducted to comparing the predictor variable (cardiovascular endurance, flexibility, muscular strength, muscular endurance and body composition) to the criterion variable (Cumulative Grade Point Averages). The researcher ensured that the assumption of bivariate normal distribution was met based on a visual inspection of the scatterplot. The assumption of linearity was tested by the researcher by using a scatter plot comparing the predictor variable (cardiovascular endurance, flexibility, muscular strength, muscular endurance and body composition) to the criterion variable (Cumulative Grade Point Averages). The researcher ensured that the assumption of linearity was me

ANALYSIS OF RESULTS

Table No: I Demographic Information

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I	50	50.0	50.0	50.0
	2	50	50.0	50.0	100.0
	Total	100	100.0	100.0	

University

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	100	100.0	100.0	100.0

Age

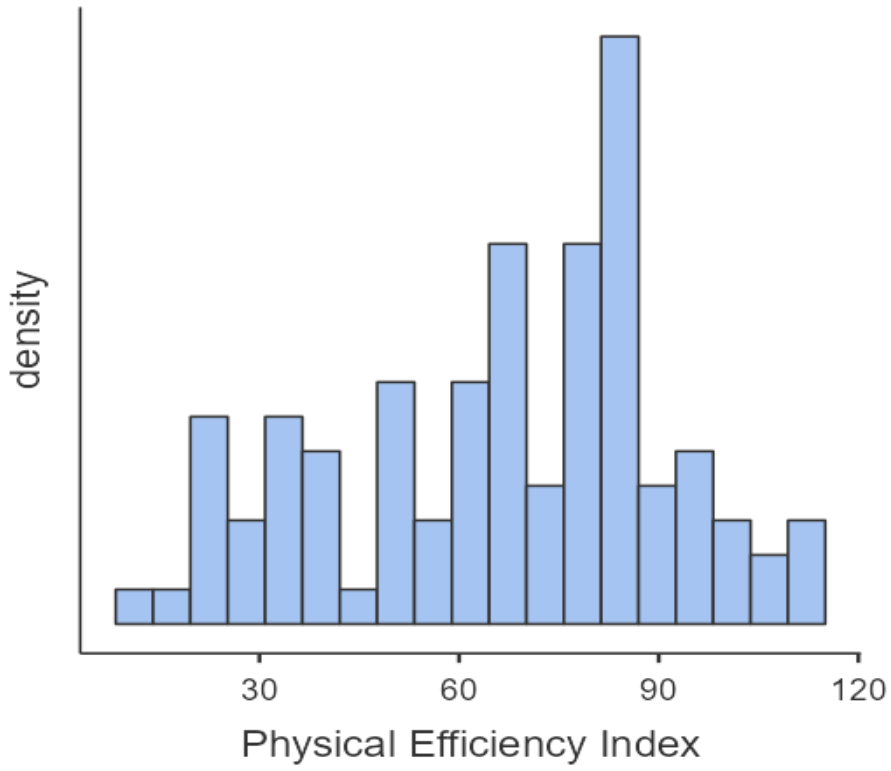
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17-21	58	58.0	58.0	58.0
	22-26	42	42.0	42.0	100.0
	Total	100	100.0	100.0	

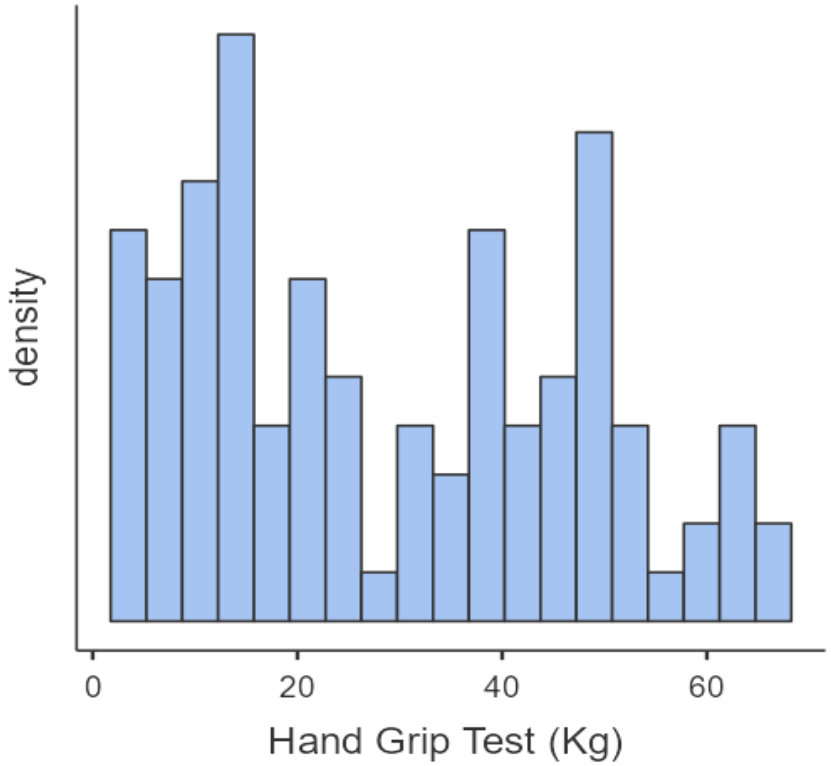
Table No: 2 Descriptive Statistics

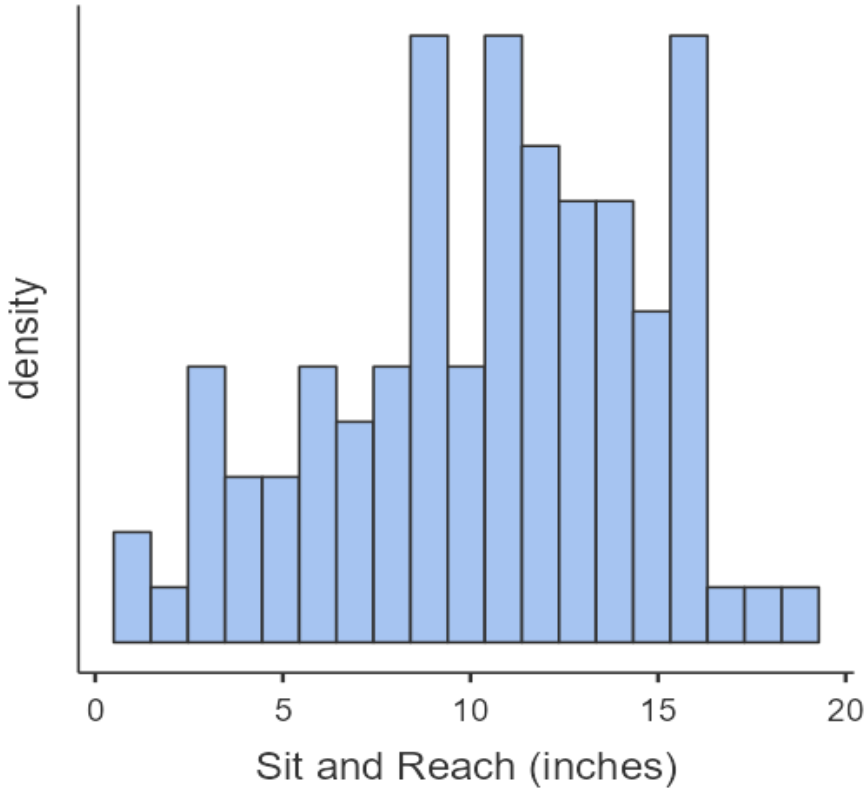
Descriptive Statistics

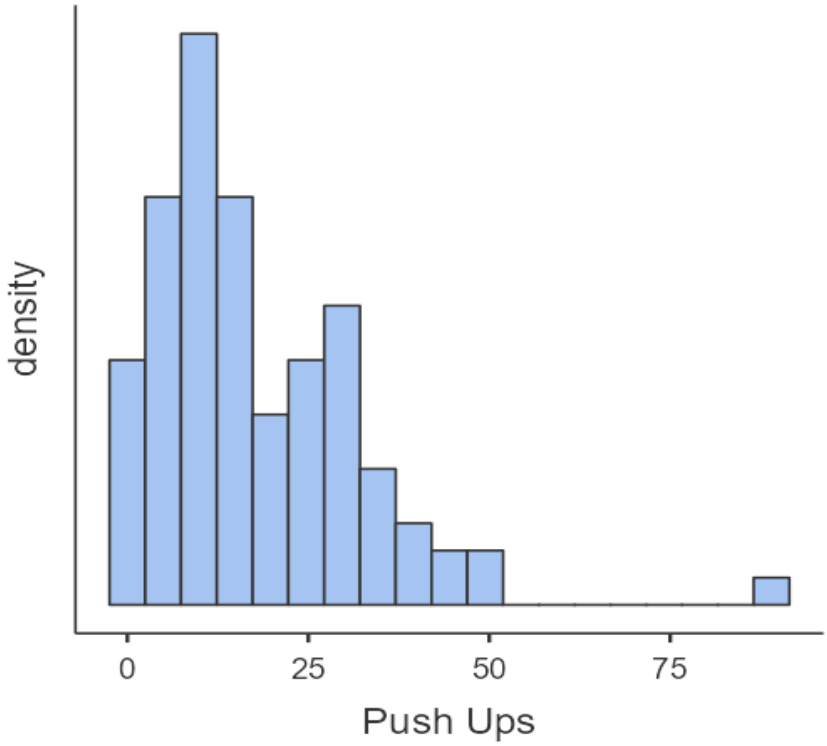
	Physical Efficiency Index	Hand Grip Test (Kg)	Sit and Reach (inches)	Push Ups	Age	CGPA/Marks	Gender	BMI
N	100	100	100	100	100	100	100	100
Missing	0	0	0	0	0	0	0	0
Mean	66.4	28.9	10.5	17.8	20.9	75.8		22.3
Median	68.3	25.0	10.6	14.5	21.0	71.1		21.6
Standard deviation	24.8	18.7	4.15	14.1	2.13	64.2		3.88
Minimum	11.9	2.00	1.20	1.00	17.0	45.2		16.3
Maximum	113	65.0	19.0	90.0	26.0	702		35.8

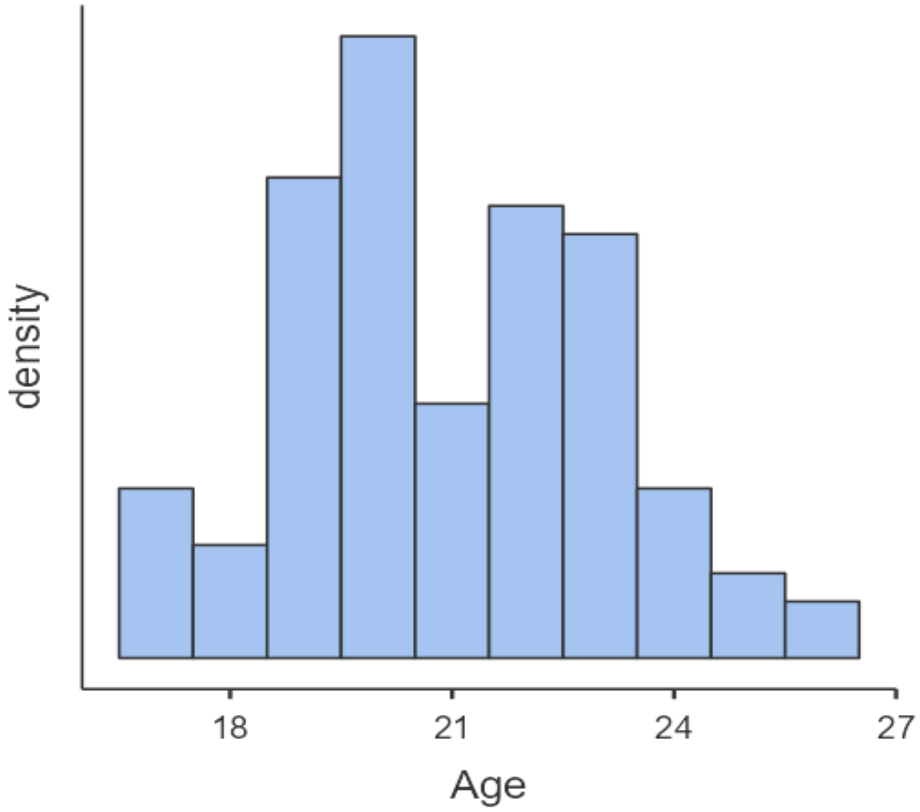
Table no. 2 indicates that the mean of Physical Efficiency Index is 68 which lie in good category. The Grip Strength test mean is 28.9 that too is high average strength of the whole participants. Flexibility average is 10.5 which show a good category. CGPA percentage is 75.8 % indicates the high average academic background. BMI mean is 22.3 that fall in healthy category. Push-Ups mean is 17.8 that show average result.

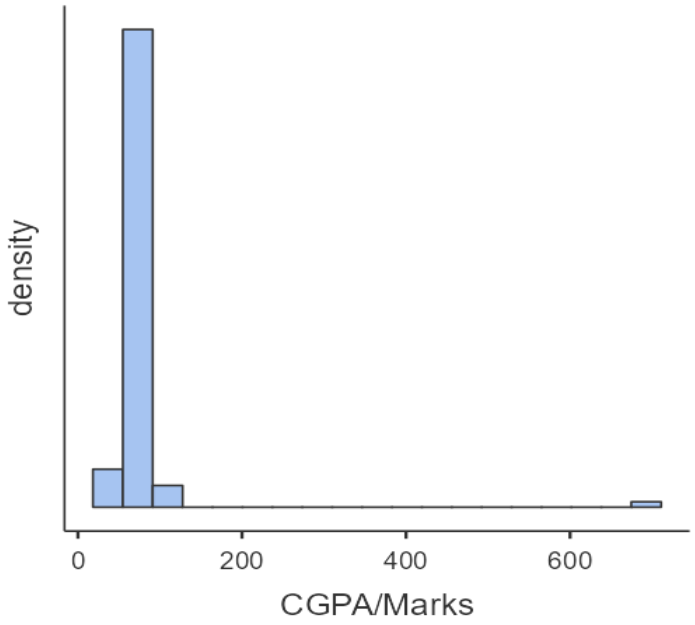



density
0
20
40
60
Hand Grip Test (Kg)


density
0
5
10
15
20
Sit and Reach (inches)







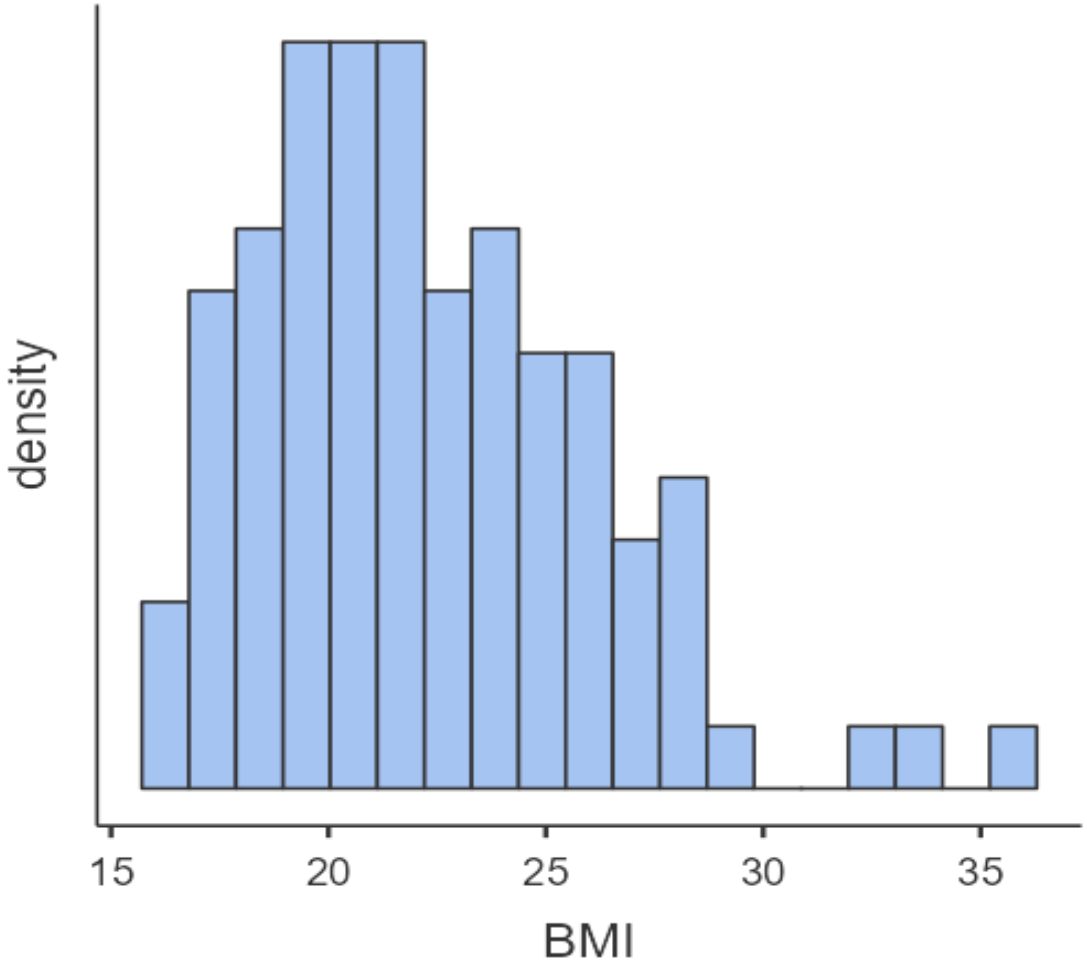


Table No: 3 Correlation Matrix

		Physical Efficiency Index	Hand Grip Test (Kg)	Push Ups	Sit and Reach (inches)	BMI
Physical Efficiency Index	Pearson's r	—				
	df	—				
	p-value	—				
Hand Grip Test (Kg)	Pearson's r	0.584	—			
	df	98	—			
	p-value	< .001	—			
Push Ups	Pearson's r	0.567	0.615	—		
	df	98	98	—		
	p-value	< .001	< .001	—		
Sit and Reach (inches)	Pearson's r	0.406	0.260	0.358	—	
	df	98	98	98	—	
	p-value	< .001	0.004	< .001	—	
BMI	Pearson's r	-0.032	0.205	-0.194	-0.127	—
	df	98	98	98	98	—
	p-value	0.622	0.020	0.973	0.896	—

Note. H_a is positive correlation

Table No 4.3 indicates that Efficiency Index, Hand Grip Test, Push Ups, Sit and Reach, and BMI. The Pearson's correlation coefficient (r) values indicate the strength and direction of relationships, with positive values showing a direct correlation and negative values showing an inverse correlation. Significant correlations ($p < 0.05$) include strong positive relationships between Hand Grip Test and Push Ups ($r = 0.615$, $p < 0.001$), and between Physical Efficiency Index and Hand Grip Test ($r = 0.584$, $p < 0.001$). BMI shows weak or negligible correlations with the other variables, with no significant relationship with the Physical Efficiency Index ($r = -0.032$, $p = 0.622$). The degrees of freedom (Df) for all correlations are 98.

Table No: 4

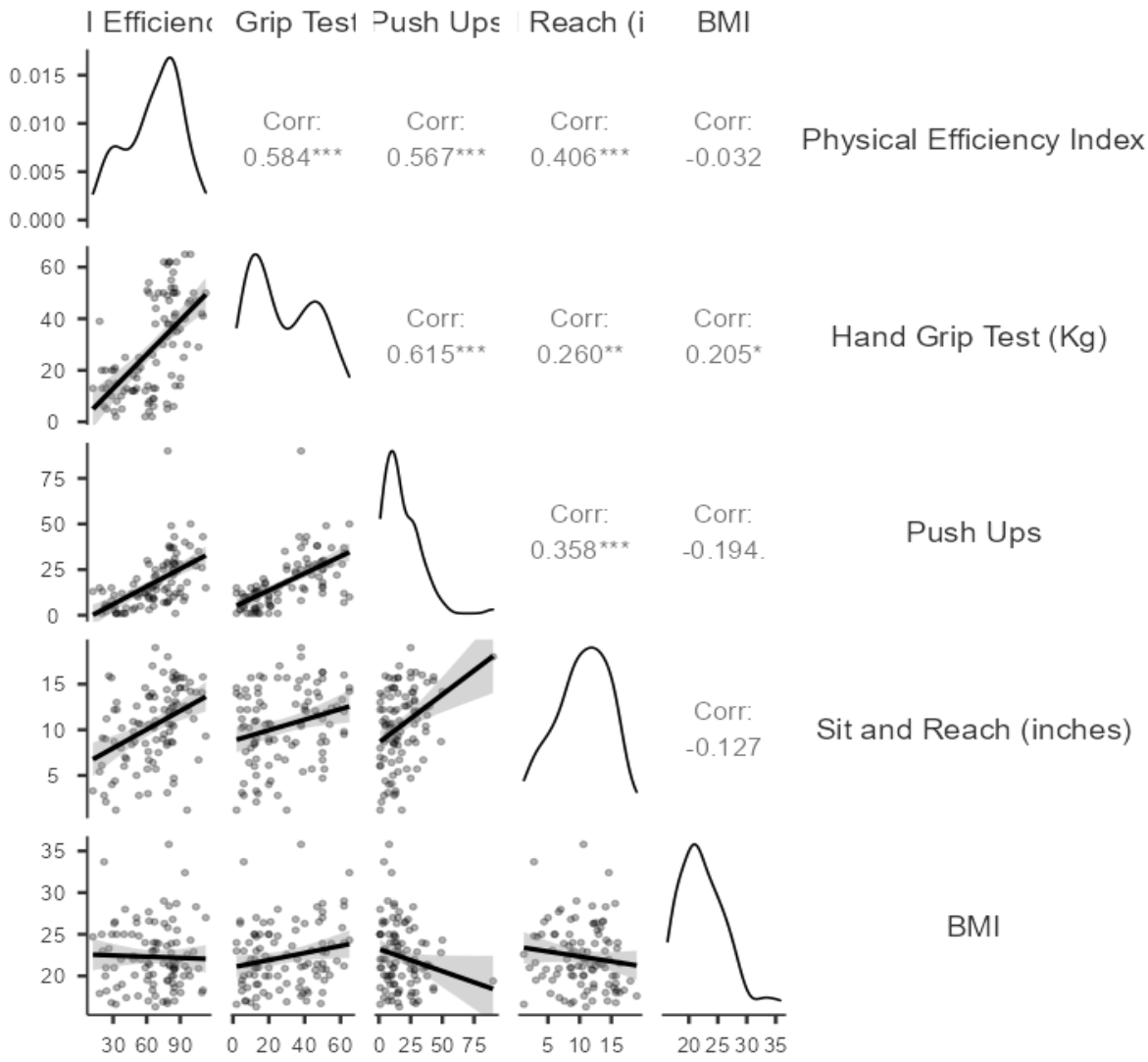


Table No: 5 Partial Correlation

		Physical Efficiency Index	BMI	Push Ups	Hand Grip Test (Kg)	Sit and Reach (inches)
Physical Efficiency Index	Pearson's r	—				
	p-value	—				
BMI	Pearson's r	-0.033	—			
	p-value	0.744	—			
Push Ups	Pearson's r	0.563	-0.198	—		
	p-value	< .001	0.050	—		
Hand Grip Test (Kg)	Pearson's r	0.581	0.204	0.608	—	

Table No: 5 Partial Correlation

		Physical Efficiency Index	BMI	Push Ups	Hand Grip Test (Kg)	Sit and Reach (inches)
Sit and Reach (inches)	p-value	< .001	0.043	< .001	—	
	Pearson's r	0.403	-0.129	0.353	0.254	—
	p-value	< .001	0.203	< .001	0.011	—

Note. controlling for 'CGPA/Marks'

Partial correlation matrix examines relationships between Physical Efficiency Index, BMI, Push Ups, Hand Grip Test, and Sit and Reach, while controlling for CGPA/Marks.

1. Physical Efficiency Index has a moderate positive correlation with Push Ups ($r = 0.563$), Hand Grip Test ($r = 0.581$), and Sit and Reach ($r = 0.403$), all statistically significant ($p < 0.001$).

2. BMI shows a weak negative correlation with Physical Efficiency Index ($r = -0.033$, $p = 0.744$) and Sit and Reach ($r = -0.129$, $p = 0.203$), indicating a weak link between BMI and these fitness measures.

3. Push Ups are positively correlated with Hand Grip Test ($r = 0.608$, $p < 0.001$) and Sit and Reach ($r = 0.353$, $p < 0.001$), but negatively correlated with BMI ($r = -0.198$, $p = 0.050$), suggesting BMI may slightly hinder push-up performance.

4. Hand Grip Test shows a weak positive correlation with BMI ($r = 0.204$, $p = 0.043$) and moderate positive correlations with all other variables, suggesting stronger grip strength is linked to overall fitness.

5. Sit and Reach (flexibility measure) has a weak positive correlation with Hand Grip Test ($r= 0.254$, $p = 0.011$) but a negative correlation with BMI, reinforcing that higher BMI may limit flexibility

FINDINGS, CONCLUSION AND RECOMENDATIONS

Findings

The correlation matrix presents the relationship between various physical fitness measures using Pearson's correlation coefficient (r). A positive relation exists between the Physical Efficiency Index (PEI) and other strength and flexibility tests, with Hand Grip test ($r = 0.584$, $p < .001$) and Push-Ups ($r = 0.567$, $p < .001$) showing strong correlations. Similarly, Sit and Reach (a flexibility measure) has a moderate correlation with PEI ($r = 0.406$, $p < .001$). BMI, however shows weak or negative correlations with most fitness variables, including PEI ($r = 0.032$, $p = 0.622$) and Push-Ups ($r = 0.584$, $p = 0.973$), suggesting BMI may not strongly predict physical performance in these areas. Statistically significant relationships are marked by p-values < .05, indicating meaningful association particularly between strength related tests and overall efficiency.

The hand grip strength of males is 44.68 which is also in average category is good but the girls hand grip mean is 14.12 that is in poor category but the overall mean of all the participant is 29.4 that lie in poor category. The flexibility mean of girls is 8.6 inches that lie in average category and boys' flexibility mean is 11.59 that is considered in good category, but the overall mean of flexibility of all the participants is in good category. The push-ups mean of girls is 9 which lie in poor category, the boys' pushups mean is 27.36 that is in good category, but the overall mean of push-ups of all the participants is 18 that lie in average category.

The main findings highlight that higher amount of self-disciplined and device-based physical activity, as well as higher physical fitness levels, are associated with greater cognitive performance, motor skills, and long-term memory in students which leads them to being physically fit to achieve the greater percentage in their academics. Additionally, considerable evidence was found for the associations between physical activity or physical fitness and academic outcomes. (Marrero-Rivera, 2024).

It is founded that some variables like health related components of fitness and BMI show the strong relationship with academic success. However, the study also showed a link between physical fitness and academic achievement, and

grooming potential, indicating that students perform better in academic performance if they engage in physical exercise and become physically fit.

Discussion.

It's important to highlight that the differences observed between boys and girls in areas such as body fat percentage, aerobic capacity, flexibility, and strength are consistent with previous findings for their age group. Typically, girls have a higher body fat percentage and greater flexibility, while boys tend to have better aerobic capacity and greater strength. The notable association between body fat percentage and academic performance among girls supports earlier research suggesting that being overweight can negatively impact academic achievement in females. While this effect is generally not seen in boys, there are occasional exceptions. Additionally, the data does not show significant gender-based differences in how aerobic fitness relates to academic performance, although some individual cases suggest a possible connection.

However, in the present research percentage of body fat was not demonstrated to be one of the characteristics differentiating between low and high academic achievers, in contrast to the particular strength tests push-ups, as well as the sit-and-reach flexibility test. Some discriminating characteristics could be connected, and should be evaluated jointly as fitness variables and not as distinct elements. Significant associations were identified between various strength tests and academic ability, and more so among males (18-26year-olds) and older girls (18- and 26-year-olds).

As boys usually have sharp mind because boys' students always engage in outdoor activities experience a growth spurt from the curricular and extra-curricular activities. Additionally, the correlation of academic performance with fitness components in university students seemed to display a propensity to rise in relevance with an increase in their fitness level. The findings of the present research revealed that cardio vascular fitness intervenes the association among physical fitness and Academic success of university students. The findings revealed a substantial link reflecting that student who more active would attain higher successes in academic accomplishments.

Conclusion

The findings of this research reveal a favorable association between physical fitness components and academic success in a sample of university students, with more substantial correlations reported among females and boys. Furthermore, future research study in processes about physical fitness/academic success -relationship between boys and girls, will enhance our understanding of how academic success and physical fitness may contribute to overall development.

We identified a meaningful association between academic performance and physical fitness and health related components of fitness. It was observed that students with lower academic performance exhibited notably higher diastolic blood pressure and levels of sleeplessness, along with significantly reduced cardiovascular endurance. These findings underline the necessity of using diverse programs that may enhance these aspects, particularly those linked to physical activity and sleep habits that affect to boost fitness level with the purpose of increasing academic accomplishment.

Recommendation

- Encouraging regular participation in physical activities among university students can lead to greater life satisfaction by enhancing psychological well-being, cardiovascular health, and future career fulfillment.
- There is a demonstrated link between physical fitness and academic success, with exercise shown to improve long-term memory and cognitive functioning through enhanced brain plasticity.
- Engaging in consistent physical activity throughout the academic years may provide long-term protective benefits against age-related memory decline and reduce the risk of neurodegenerative diseases like Alzheimer's.
- Students who maintain active lifestyles tend to benefit from better brain oxygenation, metabolic efficiency, self-esteem, and emotional stability—factors that contribute positively to learning and academic outcomes.
- Universities should consider introducing structured fitness initiatives and short wellness programs to support students' physical and mental health holistically.
- This research highlights a potential association between students' fitness levels and their CGPA, suggesting that improved physical health may have a favorable impact on academic achievement.

- Faculty members across all university departments, including the Physical Education Department, should work together to incorporate fitness activities into their teaching methods to support improvements in students' physical health and academic success.
- The university must provide the necessary infrastructure and resources to effectively implement and integrate physical fitness initiatives within the educational experience of students.
- Specific strategies should be developed to encourage more female students to participate consistently in physical fitness routines, which can lead to better outcomes in both health and academic performance.
- For more accurate research findings, future studies should ensure uniform testing procedures for all participants. This includes not only the core assessments but also standardized pre-test routines such as warm-up and stretching exercises. Research has shown that stretching is crucial for improving flexibility, expanding range of motion, and preventing injuries.
- Future research should also explore other health-related factors, such as sleep patterns and nutrition, which may impact overall well-being. Both the quality and duration of sleep, along with dietary habits, are known to influence mental clarity, emotional balance, and physical performance—all of which are connected to academic success.
- A growing number of studies are examining the connection between physical fitness and academic achievement among university students, reflecting increasing interest in how these factors interact.
- Future research should explore how group-based physical activities influence academic motivation and peer relationships among university students.
- Studies should investigate gender-specific barriers and motivators to physical fitness to support more inclusive health interventions.
- Research should examine the effects of sedentary behavior and screen time on students' academic performance and cognitive well-being.

References

Al Salim, Z. A. (2023). Barriers to physical activity participation among university students in Saudi Arabia. Inf. Sci. Lett,, 12, 252-360.

Al-Ansari, A. A. (2015). Predicting academic performance of dental students using perception of educational environment. Journal of dental education, , 79(3), 337-344.

A'Naja, M. N. ((2024)). ACSM worldwide fitness trends: future directions of the health and fitness industry., . ACSM's Health & Fitness Journal, (1),(28), 14-26.

Anjali, S. L. (2024). A Study on Self–esteem and Academic Achievement of Undergraduates. Archives of Current Research International,, 6(24), 95-101.

Arun, R. N. (2024). The Influence of Online Education on the Behavioral Patterns of University Students in India. . Advancements in Communication and Systems,, 335-348.

Boedeker, P. T. (2021). Study protocol for testing the association between physical activity and academic outcomes utilizing a cluster-randomized trial. . Contemporary Clinical Trials .

Corbin, C. B. (2024). Assessing Health Risk With Musculoskeletal Fitness Tests in Youth. Journal of Physical Education, Recreation & Dance,, 6(95), 26-33.

Elnashar, A. M. (1984). Physical fitness status of Egyptian children aged 9-18 years. British Journal of Sports Medicine,, 1(18), 26-29.

Getchell, B. (1979). Physical fitness. A way of life.

Husu, P. V.-Y. ((2021). Measurement of physical fitness and 24/7 physical activity, standing, sedentary behavior, and time in bed in working-age finns: study protocol for FINF. Methods and protocols, 1(5).

Malpeli, R. T.-H. ((2020).). Fit for life! Levels 7 & 8 health & physical education for the Victorian curriculum. Cengage Learning.

Marrero-Rivera, J. P. (2024). . The relationship between physical activity, physical fitness, cognition, and academic outcomes in school-aged Latino children:. a scoping review. Children,, 3(11), 363.

Mayya, S. S. (2022). . Academic stress and associated sociodemographic variables: A study of pre-university students in Karnataka, India. . Journal of education and health promotion,, 1(11), 230.

OGUNLEYE, B. O. (2019). Impact of physical fitness activities on students' Basic Science achievement in selected Nigerian secondary schools. Annual Journal of Technical University of Varna, Bulgaria,, 2(3), 21-31.

RICHARDS, A. (2024). Children's fitness, physical activity and motor competency; before, during and in the recovery from the COVID-19 pandemic.

Suleiman, I. B. (2024). Key factors influencing students' academic performance. Journal of Electrical Systems and Information Technology, 1(11), 41.

Zhang, F. E. (2025). Measurement Instruments When Comparing Academic Performance and Physical Activity: A Comprehensive Systematic Review. Journal of School Health.