

# Health-related physical fitness and its relationship to the level of academic achievement among a sample of secondary school students in the city of Amman

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**Abstracts:** This research set out to determine whether or not there was a correlation between students' levels of health-related physical fitness and their academic performance in Amman, the capital city of the Hashemite Kingdom of Jordan. An independent sample of (841) male pupils from Amman's public schools was used for the research. Their anthropometric data were used to quantify health-related physical fitness, and the school average was culled from students' final grades. The results showed that the study sample was split into six categories based on their level of health-related physical fitness, that there was a direct correlation between health-related physical fitness and academic achievement at the 0.001 level, and that the average percentage of body fat was 25.29%. In light of the findings, the researcher concluded that there is a direct and close relationship between the level of health-related physical fitness and the academic achievement among secondary school students. This is because the negative effects of a high percentage of fat and low physical fitness are not confined to the public health; rather, they extend to a low level of academic achievement and the associated psychological problems among students. As participating in sports has been shown to improve kids' health, mental well-being, social skills, and academic performance, the study's author suggests ramping up the number of sports offered to Amman's school students.

**Keywords:** Health-Related Physical Fitness, Academic Achievement.

## 1. INTRODUCTION

Since the middle of the past century, the relation between sports participation and academic success has piqued the curiosity of many scholars in the area of education (Trudeau & Shephard, 2009). Yet, this association remains fraught with scientific disagreement. As a result, there has been a growing body of literature exploring the hypothesis that students who engage in regular physical activity and improve their health-related physical fitness not only have a stronger relationship with their own academic success, but also with the success and failure of their peers. Researchers have shown a correlation between students' levels of physical exercise and fitness and their academic performance (Singh & McMahan, 2006). Many studies, including one conducted in Jordan, have found alarmingly high rates of hyperlipidemia and obesity in students, as well as a worrying decline in the prevalence of regular physical activity and a sharp decline in the prevalence of health-related fitness, particularly the component of cardiorespiratory fitness (Abu Baker & Daradkeh, 2010). A big majority of youngsters use the bus to and from school, and they also spend a great deal of time in front of the television and on computers, which has been attributed to the rise in material wealth in many nations (Bennett et al., 2006). In addition, students at schools that don't provide many sports programs are more likely to be overweight and have lifestyle problems (Luepker, 1999).

Physical fitness that is focused on health promotion, enhances quality of life, and mitigates illness risks linked with inactivity is called health-related fitness. Improvements in this area of fitness have been linked to a number of health benefits, including a stronger immune system, better study habits, better sleep, and a reduction in the prevalence of diseases like diabetes and heart disease (Burke et al., 2014).

As well as improving many psychological variables related to the educational process, such as the students' self-concept, the impact on their general personality, and their tendency towards internal causal attribution in attrition, the practice of sports activity in the school community is of paramount importance in developing health-related physical fitness and reducing obesity rates and the future health complications that may be associated with it. It was also shown that engaging in physical sport might help alleviate feelings of worry, tension, and anger. Health-related physical fitness is defined as the type that aims to develop health, improve the quality of life, and reduce the risk of

diseases associated with lack of movement. Studies showed that improving this type of physical fitness reflects positively on maintaining a healthy human body free from diseases and postural abnormalities, correcting some wrong physical and movement habits, providing the individual with proper shape, increasing the effectiveness of the immune system to resist diseases, increasing students' ability to deeply study and comprehending information, and improving students' ability to sleep (Burke et al., 2014).

The students' practice of sports activity in the school community is of paramount importance in developing health-related physical fitness and reducing obesity rates and the future health complications that may be associated with it, in addition to improving many psychological variables related to the educational process, including improvement in self-concept, positive impact on the general personality, increasing the tendency towards internal causal attribution in attributing the causes of success and failure, and increasing the social interactions within the school community. It was also found that sports activity has a role in reducing anxiety, stress and frustration.

Some clinical studies showed that engaging in sports activity has a positive effect on brain functions (Dzankovic-Jerebicanin, 2014), while obesity and physical inactivity have been linked to an increased risk of many non-communicable and chronic diseases, such as cardiovascular disease, diabetes, high blood pressure, osteoporosis, arthritis, lumbago, and certain types of cancer (Hillman et al., 2008). Poor academic performance and cognitive impairment were also linked to lack of exercise and weight gain (Drieling et al., 2014). Many international scientific associations concerned with students' health and the prevention of infection with diseases have recommended to direct the attention of school systems toward ensuring that all students engage in moderate to vigorous levels of physical activity and enjoy a minimum level of health-related physical fitness (Cohen et al., 2021). Researchers have shown that kids who engage in sports have a more positive view of themselves, and that this boosts their confidence, which in turn helps them focus better in the classroom. All of these effects help in elevating the standard of education (Johnstone et al., 2022). The study's theoretical underpinnings informed the development of the study's overarching goal, which was to determine whether or not there was a correlation between students' levels of health-related physical fitness and their performance in the classroom in Amman, the capital city of the Hashemite Kingdom of Jordan (Pavlovic et al., 2021).

### **1.1. Problem statement**

Although research on the correlation between physical fitness and academic performance has been conducted with a number of different demographics, nothing is known about this correlation among Amman's secondary school students. Both academic performance and physical health are vital for kids' futures, so it's instructive to examine the relations between the two. Secondary school pupils in Amman may not be as physically active as they may be because of the city's fast development and modernization in recent years.

This research aims to examine the relation between health-related physical fitness and academic success among a group of Amman secondary school students. This research will look at the correlation between students' levels of physical fitness and academic performance, as well as the influence of demographic variables including age, race, and socioeconomic position. The research's results may help Amman, Jordan, secondary schools and policymakers improve students' health and academic performance via increased physical activity and improved study habits.

### **1.2. Research Questions**

1. What is the level of health-related physical fitness among secondary school students in the city of Amman?
2. What is the level of academic achievement among secondary school students in the city of Amman?
3. Is there a significant relationship between health-related physical fitness and academic achievement among secondary school students in the city of Amman?
4. Do gender, age, and socioeconomic status play a role in the relationship between health-related physical

fitness and academic achievement among secondary school students in the city of Amman?

5. How can schools and policymakers use the findings to promote health-related physical fitness and academic achievement among secondary school students in the city of Amman?

#### Importance and significance of the study

There are several reasons why it's crucial that researchers in Amman look at the correlation between kids' health-related fitness and their academic performance in high school.

Secondly, the results of this research may be used to improve the health and academic performance of Amman's secondary school students by shedding light on the correlation between the two. As a result, students' health and academic performance may improve.

Second, there is a dearth of studies examining the relation between physical fitness and academic success among Amman's secondary school students, despite the wealth of literature on the topic. This investigation fills a knowledge gap and provides new insight into this relation among a defined group of people.

Finally, this research may help shape academic attainment and physical education policies and practices in Amman's schools. Because of this, schools and policymakers will be better able to create and execute programs to improve kids' physical health and academic performance in secondary school.

Thus, the findings of this research may add to the existing body of information about the correlation between secondary school students' health-related physical fitness and their academic performance. This insight may guide future research into the correlation between these two crucial variables in different populations.

This study has the potential to fill a knowledge gap, guide policy and practice, and expand international understanding of the relation between health-related physical fitness and academic success among secondary school students.

### **1.3. Terminologies**

1. Cardiovascular endurance, muscle strength, muscle endurance, flexibility, and body composition are all examples of health-related physical fitness.

2. "Academic achievement" is a term for a student's degree of performance or accomplishment in school as assessed by their grades, test scores, or other scholastic evaluations.

3. Thirdly, secondary school is the next step in a student's formal education after elementary school and normally accommodates pupils aged 11 to 18.

4. Amman is the biggest city in Jordan and the capital of the country.

5. Physical fitness and academic performance may be affected by demographic variables, which include age, gender, socioeconomic level, and ethnicity.

6. Physical activity: any movement generated by skeletal muscles that results in energy expenditure, such as exercise, sports, and other physical activities. 6. Urbanization: the transfer of a population from rural to urban regions, often connected with economic and social progress.

6. Interventions in policy are measures done by policymakers or government officials to solve social or public concerns, usually via the creation of new laws, regulations, or other types of policy. Secondary school students' academic and physical success are two areas where policy interventions may be relevant in the context of this research.

## **2. LITERATURE REVIEW**

The correlation between secondary school students' health-related physical fitness and their academic performance has received more attention in recent years. There is a dearth of study on this relation in particular populations, including the city of Amman, despite the fact that there is a large body of literature on the subject. The purpose of this literature review is to give a synopsis of the studies that have examined the relation between health-related physical fitness and academic performance, with a special emphasis on secondary school students in the city of Amman.

### **2.1. Health-related Academic Prowess and Physical Health**

Heart rate variability, muscle strength, muscle endurance, range of motion, and body composition are all examples of health-related physical fitness indicators. A student's academic achievement may be defined as the degree of success or accomplishment they have attained in their formal education. There is a wealth of research on the relation between these two variables.

Academic success has been linked in many studies to students' levels of health-related physical fitness. For instance, one research of Castelli et al. (2007) indicated that more physically active middle school pupils had higher GPAs. Similarly, according to Bohr et al. (2013) discovered that high school pupils whose fitness levels were higher also performed better academically.

But some research has failed to find a correlation between physical health and success in the classroom. Mclsaac et al. (2015) discovered no statistically significant correlation between students' levels of physical fitness and their performance on standardized tests.

### **2.2. Causes and Effects of Physical Health on Academic Performance**

The correlation between fitness and academic success could change depending on a number of demographic variables. In middle schoolers, for instance, researchers discovered that gender moderated the relation between physical fitness and academic success (Castelli et al., 2007). In addition, research shows that high school students' socioeconomic status (SES) is a strong predictor of their academic performance, with lower SES students doing worse.

The correlation between being physically fit and doing well in school may change when urbanization increases stress levels. According to Luo et al. (2018), high school pupils in China's major cities had a more robust positive association between physical fitness and academic success than their rural counterparts.

### **2.3. Interventions in Public Policy to Increase Physical Activity and Academic Performance**

Many policy initiatives have been suggested to enhance physical fitness among secondary school students because of the correlation between physical health and academic success. One research found that students' health and academic performance both improved when PE sessions were held more often and for longer (Chomitz et al., 2009). Another research found that students' academic performance improved when they were given opportunities to engage in physical exercise throughout the school day (Donnelly & Lambourne, 2011).

If Amman continues to grow as a major metropolitan area, it may be crucial that the city's secondary school pupils benefit from governmental initiatives designed to improve their health and academic performance. Opportunities for physical exercise among students might be created via the creation of parks and other green spaces and the promotion of active transportation (Castelli et al., 2007).

Although there has not been a large-scale study of the correlation between health-related physical fitness and academic success among Amman's secondary school pupils, evidence from the available literature implies a

favorable association between these two elements. This relation may be modified by socioeconomic status, urbanization, and gender. The city of Amman has a unique opportunity for policy interventions to boost secondary school pupils' physical health and academic performance.

Students should prioritize both physical health and intellectual success. Academic accomplishment is the amount of success a student achieves in their academic studies, while physical health is the capacity to go about one's everyday tasks without feeling excessive exhaustion and with enough energy to enjoy one's leisure-time pastimes. Academic performance and physical fitness have been shown to be intertwined and mutually influential. Several academics over the last decade have looked at the correlation between secondary school students' fitness levels and their academic performance (Luo et al., 2018).

According to (Castelli et al., 2007; Chomitz et al., 2009), and Trudeau & Shephard (2008) have shown that students who are physically healthy also do better in the classroom. Students that are physically healthy tend to have higher academic outcomes than their less fit counterparts, according to a number of studies. Students in grades 3 and 5 who were more physically active than their classmates also fared higher on standardized assessments of scholastic performance, as shown in (Castelli et al., 2007). Similarly, a sample of Northeastern American public-school pupils revealed a favorable link between physical fitness and intellectual success (Chomitz et al., 2009).

Physical fitness has been linked to increased cognitive function, which in turn has been linked to higher scholastic success. Studies demonstrate that exercise boosts brain oxygenation and blood flow, leading to enhanced mental performance (Donnelly & Lambourne, 2011). Brain-derived neurotrophic factor (BDNF) is a protein that aids in the development and survival of new neurons in the brain, and it has been demonstrated that physical exercise raises BDNF levels (Donnelly & Lambourne, 2011). The favorable correlation between fitness and success in school may be due in part to both of these factors.

The correlation between fitness and academic performance may also be explained by the fact that fitness serves as a surrogate for other characteristics like family background and socioeconomic level (SES). Students from higher socioeconomic statuses have been shown to be more physically healthy and intellectually successful (Sirin, 2005). Despite this, research that account for socioeconomic status still find a favorable association between physical fitness and academic success (Castelli et al., 2007), indicating that the link between the two is not primarily attributable to socioeconomic status.

Although it is well-established that physical fitness is connected to academic success, little is known about which characteristics of fitness are most closely correlated with success in the classroom. Nevertheless, other research has indicated a stronger link between physical strength and endurance and academic performance (Luo et al., 2018), while yet other research has suggested that cardiovascular fitness is more essential (Castelli et al., 2007; Chomitz et al., 2009). Further study is required to determine which characteristics of physical fitness are most associated with success in the classroom.

Students who took part in daily physical education lessons performed better academically than those who did not, according to research by (McIsaac et al., 2015). The research also indicated that kids from low-income homes benefited the most from physical education's favorable benefits on academic attainment. The relation between exercise and brain health was the subject of a review by (Singh & McMahan, 2006). Researchers discovered that working out has a beneficial effect on several aspects of brain function. They also found that the positive benefits of exercise on brain development and function were greatest in young people.

Researchers Sibley & Etnier (2003) looked at how a program designed to get primary school kids moving may affect their grades. Breaks throughout the school day dedicated to physical exercise were the intervention. Students who took part in the physical exercise intervention performed better academically than those who did not, according to the research. The relation between kids being active and doing well in school was the subject of a review by Bohr et al. (2013). The authors discovered that regular physical exercise improved grades, IQ, and test scores.

Middle school pupils' academic performance was studied in the study of Tomporowski et al. (2007) to see if a physical exercise intervention affected their grades. An after-school sports program and a daily physical education session made up the intervention. Students who took part in the physical exercise intervention performed better academically than those who did not, according to the research.

There is strong evidence that fitness levels and academic performance go hand in hand among secondary school pupils. Cognitive abilities may benefit from increased physical fitness, which in turn may boost academic success. Promoting kids' health and success in school may be accomplished via promoting their participation in extracurricular activities and integrating exercise into their regular school schedules. To better promote physical fitness among secondary school kids, we need further study to determine which parts of fitness have the strongest correlation with academic performance.

Research into the correlation between students' levels of physical fitness and their academic performance in Amman's secondary schools is a vital topic of study with far-reaching consequences for the fields of education and public health. While there is considerable evidence between physical fitness with academic success, further study is required to determine the processes at play here and to pinpoint the parts of fitness that have the most correlation with academic success.

### 3. MATERIALS AND METHODS

#### 3.1. Study sample

The study sample consisted of (841) male secondary school students randomly selected from the schools of Amman, the capital of the Hashemite Kingdom of Jordan, during the period from (January) to (April) (2022), where Table (1) indicates their demographic characteristics.

**Table 1.** Demographics and characteristics of participants.

Parameter	UM	Mean± SD
Ege	Year	16.65±0.52
Weight	Kg	71.03±7.83
Height	M	1.69±0.06
BMI	kg/m2	24.69±2.39
<b>Education</b>	<b>Father's (%)</b>	<b>Mother's (%)</b>
No answer	6.1	13.8
Primary school	5.5	5.7
Middle school	2.3	3.0
Secondary school	25.4	25.6
Diploma degree	21.9	24.0
BA	28.2	23.2
Master and higher	10.7	4.8
<b>Cigarette smoking</b>	<b>(%)</b>	-
Currently smoker	8.0	-
An ex-smoker	4.6	-
No smoking	74.1	-
No answer	13.3	-

#### 3.2. Health-Related Physical Fitness and anthropometric measurements

We measured height and weight using a graduated scale accurate to the next centimeter and kilogram, respectively. Weight was used to determine body mass index (BMI), and a Skin Fold Caliper (Harpenden) was used to estimate body fat % by measuring the thickness of the skin fold over the triceps brachii muscle and beneath the Subscapularis. Lohman (1993) developed a prediction equation that scaled the quantity of fat based on the age of the population sampled. Cardiorespiratory fitness was evaluated using the Cooper Test; aerobic fitness was assessed by having students run and walk for (12) minutes while keeping track of their distance; abdominal muscle strength and endurance were evaluated by keeping track of the number of repetitions clocked in during (1) minute; dominant grip strength was evaluated using a Dynamometer; and leg muscle strength was evaluated using a Dynamometer. While determining a student's GPA, the final marks in all authorized courses were included in.

By turning the scores on health-related fitness assessments into percentile rankings and assessing the linear regression, the researcher was able to employ the statistical tools provided by the Statistical Package for the Social Sciences (SPSS), version (28). Subsequently, we assigned points to six categories of physical fitness as they relate to health: (70) (+ P3) for very high, (60-69.99) (+ P2) for high, (50-59.99) (+P1) for average, (40-49.99) (-P1) for acceptable, (> 30) (-P2) for weak, and (> 30) (-P3) for extremely bad.

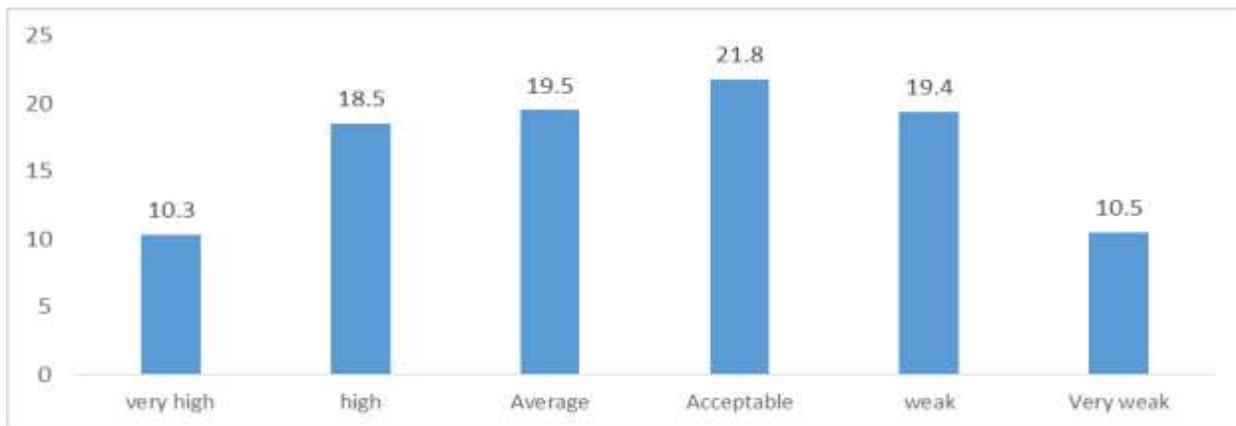
#### 4. RESULTS

Table (2) shows the arithmetic means and standard deviation of the physical fitness variables for the study sample.

**Table 2.** Health-related physical fitness variables.

Parameter	UM	Mean± SD
Grip strength	kg	31.84±5.8
Sit - up Test	Reps /Min	20.36±10.7
push-up test	Reps /Min	17.18±11.32
Sit and Reach Test	cm	4.43±7.06
Legs muscle strength	kg	35.84±5.81
Cardiorespiratory fitness (Cooper test)	meter	1738.82±411.5
Skinfold thickness of the triceps brachii muscle	mm	12.83±6.64
Skinfold thickness under the scapula bone	mm	13.84±6.7
Skinfold thickness & under the scapula bone	mm	26.67±12.4
Body fat percentage	%	25.29±9.04

Figure (1) shows the ratios of the study sample according to the level of health-related physical fitness



**Figure (1).** Ratios of the Study Sample According To The Level Of Health-Related Physical Fitness

By Translating The Raw Scores In The Options Into Percentile Rankings, The Research Sample Group Is Shown To Be Spread Across Six Levels Of Health-Related Physical Fitness In Figure (1). Table No. 3 Displays The Findings Of A Linear Regression Study Conducted To Determine Whether Or Not There Is A Correlation Between Academic Performance And Health-Related Physical Fitness.

**Table (3).** Results of Linear Regression Analysis to Find Out the Relationship between Academic Achievement and the Level of Health-Related Physical Fitness.

Model	Sum of Squares	df	Mean Square	F	R	Sig.
Regression	36479.524	1	36479.524	457.154	0.59	0.00**
Residual	66949.726	839	79.797			
Total	103429.250	840				

Sig Level (0.001)

## 5. DISCUSSION

According to Table (3), there is a direct relationship between health-related physical fitness and academic success. The findings of certain investigations in this area are consistent with a straight linear link. Researchers in the Netherlands found a correlation of 0.33 between student fitness and academic performance, whereas in Iceland, researchers found a correlation of 0.80 among a group of middle schoolers. The impact of physical activity and a high level of physical fitness and the associated positive physiological adaptations on the various functions of the human body can be used to explain the correlation between students' high levels of fitness and fitness and their increased levels of academic achievement. Sports participation and a high level of health-related physical fitness, especially the cardiorespiratory fitness component, have been shown to have beneficial effects on brain physiology, function, and efficiency by increasing the size of the capillaries feeding it, which in turn increases the amounts of oxygenated blood reaching the brain in its various parts, and by stimulating the growth of new nerve cells in the (Hippococcus) region. There are fundamental differences in the structure and composition of the brain between physically active and inactive students, as evidenced by studies showing that students with high levels of fitness and sports activity have a larger and more efficient and functional Hippocampus region than students with low levels of fitness and sports activity (Chaddock et al., 2010).

Researchers looking into the effects of sports training on adults found that those who participated in a program that emphasized the anaerobic energy system had gains in memory, knowledge retrieval, and analysis capacity. The results of recent research into the effects of sports on the brain have shown that physical activity has a beneficial effect on the genes present there, prompting them to send signals that cause the production of proteins called (Brain-Derived Neurotropic Factor), which serve a crucial purpose by fostering the development of functional work efficiency in the living nerve cells and the growth of new neurons, as well as by aiding in the enhancement of communication and neuronal synapses. Sports activity and a high level of health-related physical fitness have been shown to reduce depression rates; this is due to an increase in the production of feel-good hormones like serotonin and endorphins, which are released during and after exercise (Armini et al., 2022). Moreover, many studies have shown that these factors also have a positive adaptive effect on the mental and psychological health of the individual. Since people who suffer depression and anxiety tend to have a lower-than-normal proportion of these hormones, some clinicians administer them to patients who are prone to sadness and anxiety (Ponzi et al., 2021). Several research' findings on sports' beneficial effects on a wide range of psychological variables of relevance and educational aspects point to further benefits for kids' academic performance and overall development. Student athletes and those with high levels of physical fitness tend to have a more positive self-image than their peers who do not participate in sports or who are less physically fit (Henning et al., 2022). The causal attribution of success and failure is only one example of how various psychological factors connected to the educational process and academic accomplishment may be affected by engaging in sports and increasing physical fitness (Delgado-Floody et al., 2022). Researchers have found that students who are physically active or fit are more likely to attribute external causes to their academic and life outcomes, while those who are physically inactive or have very low levels of fitness are more likely to attribute internal causes (Lee et al., 2021).

Students who have an internal attribution style tend to attribute the causes of their success and failure to internal, under their control factors like ability and readiness, while students who have an external attribution style tend to attribute the causes of their success and failure to external, under their control factors like the influence of others, the difficulty of the task, luck, and destiny (Kepoglu, 2021). Students that lean more toward an internal attribution have been shown to be more self-motivated learners and achievers than those who lean more toward an external attribution (Villa & Sebastian, 2021). There is a positive impact of sports activity on the student's orientation towards the dimension and style of the extraverted and poised personality and a distance from the style of the introverted and emotional personality, which leads to an increase in the school social adaptation proclivity (Lee et al., 2015).

We conclude that the positive changes that occur as a result of engaging in sports activity and the increase in the level of physical fitness among students, on the functions of the human body organs represented in positive

changes in the brain and nerves and the improvement of memory centers, and on the psychological level, which is represented by increasing levels of self-confidence, decreasing rates of feeling anxiety, tension, and depression, an increase in positive emotions, etc.

## 6. CONCLUSIÓN

The researcher concludes that the negative impacts of the low level of health-related physical fitness and obesity among students are not limited to the health aspect, but in addition to these effects, there is an impact on the low level of academic achievement among students, and in light of this it is recommended to increase opportunities for practicing sports for the sake of health and participation in sports activities for all students according to their abilities and physical levels, at the school and family levels, and work must be done to bring about changes in the concept of the share of sports activity directed to students and make it closer to achieving the goal of spreading health awareness of exercise, and developing the health-related physical fitness.

## 7. RECOMMENDATIONS

These suggestions are based on the results of the present investigation. Physical education should be a mandatory element of the school day. To guarantee that children are receiving adequate physical activity to improve fitness, schools should include it into their daily routines. Moreover, teachers and parents should encourage students to engage in physical activities on their own time. To achieve this goal, schools might create after-school sports teams or encourage children to participate in active hobbies with their families. Prioritizing the creation of student-specific physical fitness programs should be a top priority for schools. This may be accomplished by measuring students' current fitness levels and developing interventions targeted at specific problem areas. Further investigation is needed to determine which components of physical fitness are most associated with success in the classroom. This information will be useful to teachers and officials in Amman, Jordan, as they work to improve programs that encourage children to be active and improve their grades. Lastly, officials, teachers, and parents in the Amman area should be made aware of the study's findings to help spread the word about the positive impact physical fitness has on pupils' ability to learn. Improvements in academic performance and the development of lifelong habits that promote health and success are possible via increased opportunities for physical activity.

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