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The impact of physical activity on students' thinking: A cross sectional study

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Abstract

Background: This study was to ascertain the impact of physical activity in physical education classes on high school students' thinking indicators. This cross-sectional study involved more than 300 students from a secondary school in Bangladesh that was attended by teenager's student between the ages of 14 and 16.

Method: The "Cross out an Extra Word" test, which assesses students cognitive growth, served as the primary research methodology. For a period of four months, the test was taken before and after each physical education instruction. Employing statistical analysis: The study employed the student's T-criterion.

Results: Students who did not participate in physical education in the classroom did not significantly improve their test scores, suggesting that the test may have been adjusted after its initial execution before the session. Children who were exercising were able to improve test outcomes dramatically. Due to the good effects of physical activity on school student's thinking as well as their physical development, this study will serve as yet another incentive for students to practice physical culture.

Keywords: Activity; physical; health; exercise

Introduction

Health is an important moderating factor in a child's capacity to learn, even though academic achievement results from a complicated interaction between intelligence and contextual factors. The idea that healthy young learn more is empirically supported and widely accepted ^[1], and numerous studies have shown the health advantages of physical activity, such as improved bone health, psychosocial outcomes, cardiovascular and muscular fitness, and cognitive and brain health ^[2]. This chapter focuses on the connections between physical exercise, physical fitness, mental and cognitive health, and academic success. Before discussing the health advantages of exercise and fitness, it's crucial to remember that academic achievement is influenced by a variety of factors. Socioeconomic status ^[3], parental involvement ^[4], and a plethora of other demographic variables are some of these. A parent's expectations for their child's academic success are an important indicator of how well they will succeed in school. Another element that has been shown to have a big effect on academic success is attendance ^[5, 6]. Children must be present in order to learn the appropriate material, so attendance should be taken into account while evaluating other aspects that affect academic performance. The post engagement impacts of physical activity utilized as a break from academic study time include enhanced attention ^[7, 8], higher on-task behaviors ^[9], and improved academic performance ^[10]. In studies comparing first-graders housed in classrooms with stand-sit desks that allowed the child to stand at his or her discretion and classrooms with traditional furniture, it was found that the former students were much more likely to stand, resulting in a greater energy expenditure than those who were seated ^[11].

The following are the main elements of a healthy lifestyle: Exercise, a healthy diet, adequate sleep, giving up bad habits, and a few other things. Unfortunately, there is an increase in the number of preparatory or special health groups for children today who enroll in colleges and universities after high school. Children who have a basic level of health that enables them to freely participate in physical culture and sports are now less likely to meet. The majority of health issues are brought on by a sedentary lifestyle, or one with little exercise ^[12, 13]. This includes an obese, hypertension, and other issues ^[14, 15] concern. Therefore, it's crucial to foster in youngsters a love of exercise and physical activity from a young age ^[16, 17].

The improvement of physical fitness and the development of neurological abilities are two of physical culture's key objectives. For the adoption of such a part of a healthy lifestyle as physical activity, physical education lessons at school are essential instruments. Numerous research have been published to date on the advantages of school-based physical education sessions for the development of physical skills. According to the authors, a certain approach and a school curriculum are beneficial in fostering physical development in students of various genders and ages^[18, 19]. The goal of our study is to ascertain how physical exercise in physical education sessions affects students' thinking markers. Perhaps this might provide students another reason to enroll in physical education courses at their schools, colleges, or universities.

2. Methods & study design

Students in grades 7 through 9 at Katiadi Government High School in Bangladesh, aged 14 to 16, participated in the study. In all, nearly 300 students participated in that educational experiment. The current students of the school approached their studies with the utmost responsibility, performing all exercises and tests consciously. Students of any gender, weight, height, or level of physical fitness participated in the educational study.

2.1 Duration

The study was conducted for four months (March – June 2022). According to the schedule. The primary factor in our study was whether or not the student actively participated physically in the physical education process. Therefore, solely the effect of students' physical activity on their cognitive markers was taken into account.

2.2 Process

Under the guidance of a physical education teacher, all physical activities were carried out. In a typical classroom, the students took a test that lasted two minutes and asked them to cross out an extra word before the lecture^[20]. In front

of the students there are 30 lines with 5 words each, but only 4 of them have a common meaning (a segment of the test is shown in the form of a table 1). You have one minute to cross out the additional words as rapidly as you can. The lines' wording was different each time. The kids stayed in the same class after physical education class was over and repeated this test. Testing conducted after the physical education session revealed the impact of kids' active play on signs of thinking. Because students engage in other activities throughout the day or week that could influence test outcomes, the time period (before and after the lecture) was not selected at random.

2.3 Statistical analysis

The data and findings were analyzed using SPSS version 23.0 and micro-soft excel 2016. ($p < 0.05$) considered as significant outcome in the study.

2.4 Ethics & approval

This study was carried out in accordance with the required research ethics. Prior to the start of the participants' involvement in the study, the participants' agreement for participation was also sought. All information was gathered and examined anonymously.

3. Results

All physical exercises were performed under the supervision of a physical education teacher. Before the lesson, the students sat down in a regular classroom and performed a test for 2 minutes: "Cross out an extra word"

Table 1: A portion of the test "Cross out an extra word"

1	Azerbaijan	Turkmenistan	Cyprus	Italy	Lychee
2	Namibia	Ghana	Brazil	Argentina	Banana
3	Kenya	Bangladesh	India	China	Apple
4	Indonesia	Australia	Kiribati	Fiji	Pineapple
5	Canada	Mexico	Iraq	Norway	Mango
...	...	...	...	...	...

Table 2: Test results "Cross out an extra word"

Month	Physical education lesson	Number of students in lesson	Test before the lesson	Test after the lesson	Percentage (%)	P value
March	Engaged	295	12.3	15.6	12.5%	$p < 0.05$
	Not engaged	25	12.1	12.4	3.7%	$p > 0.05$
April	Engaged	297	12.9	15.1	13.8%	$p < 0.05$
	Not engaged	22	11.8	12.1	4.2%	$p > 0.05$
May	Engaged	278	13.1	16.2	15.5%	$p < 0.05$
	Not engaged	28	12.5	13.7	3.2%	$p > 0.05$
June	Engaged	305	13.5	16.1	17.4%	$p < 0.05$
	Not engaged	16	13	14.8	5.3%	$p > 0.05$

Prior to the commencement of the physical education session and subsequent to its conclusion, all children underwent the administration of the control exam entitled "Cross out an extraneous word". The test results are displayed in (Table 2). Table 2 illustrates that the performance of student who did not engage in physical activity, yet successfully finished the test, exhibited only marginal improvement. This recurring pattern is observed on a monthly basis. The average indicators demonstrated an improvement from 3.2% to 5.3% ($p > 0.05$). The circumstances vary for students who participated in physical education classes. Significant improvements were observed in the test indicators throughout the course of each of the four months, with an average

increase from 12.5% to 17.4% ($p < 0.05$). The findings of the educational experiment demonstrate the efficacy of physical workouts and physical education lessons in influencing the cognitive abilities of students.

4. Discussion

The objective of this study was to investigate the impact of physical activity on cognitive performance in school-aged student. The primary finding of this research study suggests that students who actively participated in physical education experienced notable enhancements in their cognitive performance measures. This study examines the efficacy of physical exercise in influencing cognitive performance

among adolescents aged 14-16. The performance of student who did not engage in physical exercises during physical education class shown a slight rise in the "Cross out the extra word" exam. This phenomenon can likely be attributed to the practice effect observed while administering the exam prior to the commencement of the lesson. This preliminary administration can be seen as a type of training or adjustment, as evidenced by the subsequent re-administration of the test to all the children following the physical education session. This phenomenon was consistently noticed over the duration of the investigation.

The research acknowledges the significant significance of physical education in schools in promoting the health and enhancing the motor skills of children. The beneficial impact of engaging in physical activity on some cognitive metrics ^[21, 22], and mental processes was also noted ^[23].

Throughout the duration of the study, there was a consistent improvement in cognitive markers on a monthly basis. This progress was observed across many instructional objectives, including athletics, endurance running, forward somersaults, and the utilization of outdoor and sports games as a means of promoting physical culture within the classroom. The findings will provide further encouragement for the field of physical education, as it is recognized that engagement in physical exercise fosters not only physical attributes but also

cognitive development in students.

5. Some benefits of physical activity

One of the most crucial things you can do for our health is to exercise regularly. Engaging in physical activity can enhance mental well-being, assist in weight management, lower the risk of illness, strengthen bones and muscles, and facilitate daily tasks. Improved thinking or cognition in youngsters aged 6 to 13 and a decrease in adults' transient anxiety are two advantages. Frequent exercise can help us maintain our cognitive, learning, and decision-making abilities as people get older. In addition to improving our sleep, it can lower our chance of developing anxiety and despair ^[24].

According to the WHO, physical activity is any skeletal muscle-driven movement that involves the use of energy. Any movement, whether it be for recreation, transportation to and from locations, or employment, is considered physical exercise. Physical activity, whether at a moderate or high intensity, is beneficial to health. Walking, cycling, wheeling, sports, active recreation, and play are popular forms of physical activity that anybody can enjoy, regardless of skill level ^[25]. Physical inactivity is one of the leading risk factors for noncommunicable diseases mortality. People who are insufficiently active have a 20% to 30% increased risk of death compared to people who are sufficiently active ^[25].

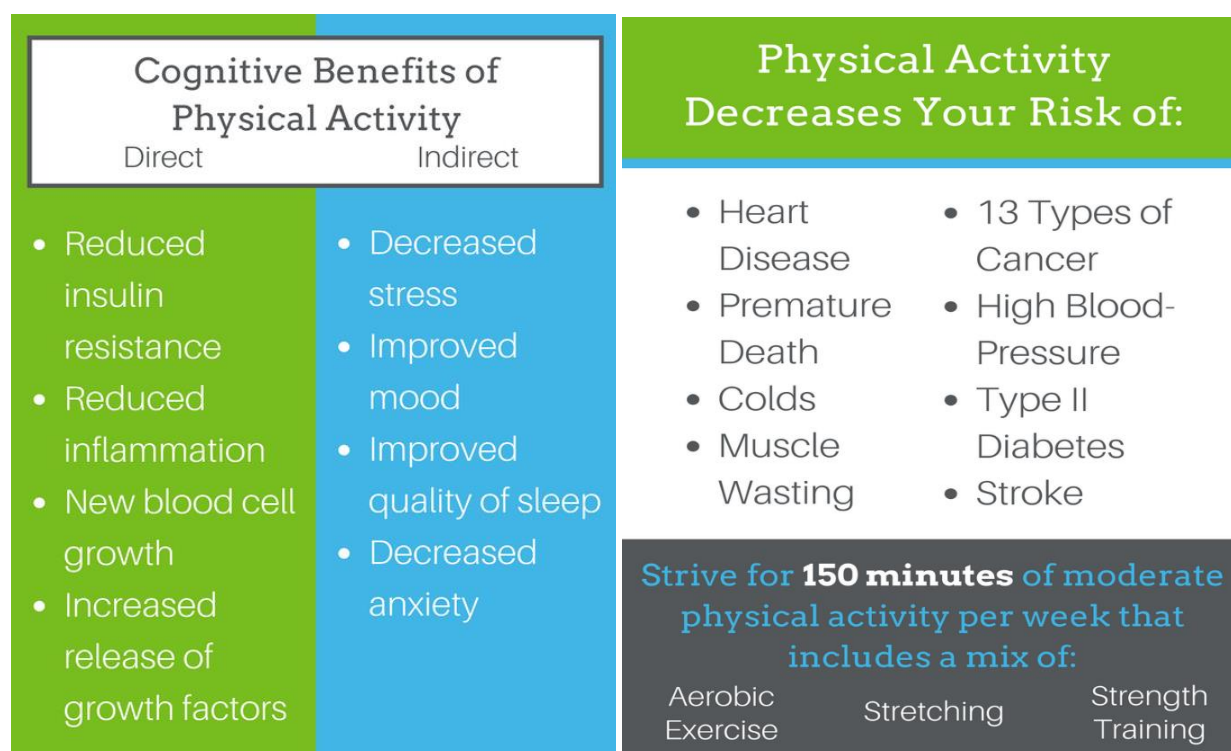


Fig 1: Health advantages of physical activity, (Source: Eugene civic alliance, USA)

Limitations of study

This study was conducted in a single institution that cannot provide overall findings for majority of students throughout the nation. Further study needed to find better result regarding this prospect.

6. Summary

Time spent engaged in physical activity is related not only to a healthier body but also to enriched cognitive development and lifelong brain health. Collectively, the findings across the

body of literature in this area suggest that increases in aerobic fitness, derived from physical activity, are related to improvements in the integrity of brain structure and function that underlie academic performance. This study investigates the issue of young school children's health and their inactive lifestyle. The significance of physical education lessons in promoting the health and overall development of kids is assessed. The study has provided evidence for the benefits of physical activity in a physical education session on cognitive indicators among school student.

Compliance with ethical standards**Disclosure of conflict of interest**

There is no conflict of interest regarding this paper.

Author contribution

All author contributed significantly to design and development of this work.

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