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Impact of Physical Activity on Academic Achievement of Secondary Level Students in Kathmandu

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Keywords

Academic achievement, physical activity, secondary-level students

Abstract

This study aims at exploring the impact of physical activity on the academic achievement of secondary-level students in Kathmandu District, Nepal. Cross-sectional research design was used, and data were collected from 31 students of grade nine and 10 studying at Pushpa Kunja High School through structured questionnaires. The results reveal an inverse relationship between physical activity and academic performance. Solo activities like running and walking positively affected academic achievement, while team sports and yoga showed inconsistent trends. A statistically significant negative correlation was also found between the intensity of physical activity and academic performance ($r = -0.392$, $p = 0.029$). It means; higher the students' achievement level, lesser the participation in vigorous activities. This would challenge the assumption of a universally positive relationship between physical activity and academic achievement and also highlights the importance of balancing them for good academic achievement. This study, therefore, calls for specific school-based interventions to ensure optimal physical activities for holistic development, considering the unique cultural and infrastructural factors related to Nepal's education system.

Introduction

Education and psychology are among the rising research topics attributed to physical activities' impact on academic achievement. Understanding how physical activities might ultimately impact academic outcomes becomes relevant to creating better performance and well-being among students within an educational setting. The World Health Organization WHO Global Action Plan 2018 defines physical activity as any bodily movement produced by the skeletal muscles, resulting in energy expenditure, and activities' impact on academic achievement, is in education and psychology. Understanding how physical activities might ultimately impact academic outcomes becomes relevant to creating better performance and well-being among students within an educational setting differ in intensity and take place in several domains such as part of work, domestic chores, and transport, or during leisure time or while participating in exercise or sports activities.

Physical inactivity has been ranked as one of the major public health problems of modern society (WHO, 2021). Evidence has shown that nearly one-fifth of the overall risk for coronary heart disease, type 2 diabetes, breast cancer, and colon cancer originate from physical inactivity (Centers for Disease Control and Prevention [CDC], 2010). Regular physical activity has been found to positively impact the health and academic achievement of school-going children, according to a comprehensive review by WHO/Europe. The review emphasizes the importance of increasing physical education in schools and promoting active classrooms to ensure that young people engage in at least 60 minutes of moderate-to-vigorous physical activity daily (WHO, 2021).

There are many dimensions of physical activity. This creates dimensions in frequency, talking about how often you engage in some kind of physical activity; intensity, referring to the level of effort while doing so; type, referring specifically to the activities one does; and duration, referring to the length of time of being physically active (Warren, et al., 2010). All these dimensions of physical activities are assumed to affect cognitive functioning, influencing further academic performance. It is thought to be mediated by a variety of factors, which include increased concentration, improved memory, and decreased symptoms of anxiety and depression (Ratey, 2008; Sallis, et al., 2000). For example, students who exercise regularly also tend to have higher grades and standard test scores compared with their less active peers (Davis et al., 2011).

Studies done among school and university students have indicated a likely correlation between physical activity and academic performance whereas physical inactivity likely exerts a deleterious effect on academic performance (Hariyanto, et al., 2023; James et al., 2023). Previous studies showed that the evidence is apparent for a positive relationship between physical activity and good academic performance (Hillman et al., 2008). Moreover, physical activity can improve classroom behavior and reduce disciplinary problems, thereby indirectly influencing academic achievement (Castelli et al., 2007). Adolescents' decline in health and well-being may be due to academic workload, lack of rest, poor access to sports, increased sedentary activities, and lack of self-discipline (Chaabna et al., 2022).

Because of the close relationship between mental and physical well-being, educational policies prioritize incorporating physical exercise into the curriculum, asserting that higher levels of student physical activity can enhance academic achievement (CDC, 2010). Not limited to academic performance, physical activity prepares a role model

person. In a study on teachers' health, Aryal (2020) suggests that teachers should enhance their lifestyles and activities to improve their health and provide healthy role modeling (Aryal et al., 2024) to their students. Physical activity among teachers encourages them to serve as healthy role models (Aryal 2022; Aryal & Maharjan, 2021).

Nevertheless, the complexity and strength of this relationship are influenced by several factors including the type, intensity, and duration of physical activities, individual differences, and more (Biddle & Asare, 2011). Martinez (2024) provides a strong link between school-based physical activities and their relation to the child's academic performance. Teachers' health behaviors, both positive and negative, have a significant impact on the health of their students (Aryal, 2022a). Frequent exercise helps to enhance classroom behavior and motivation in addition to enhancing cognitive functioning, attention, and memory, elements that support better classroom behavior and motivation. It has been demonstrated that schools with extensive physical education programs have greater graduation rates and test scores. Such would be critical in developing holistic development and academic success if physical activity were to be integrated into the curriculum.

In Nepal, how physical activities align with academic achievement is an area of prime concern. Youth Vision 2025 Nepal has also acknowledged this and stressed the need to promote exercise and sports among students right from the school level (Government of Nepal, 2015). Even though the importance of physical activities is increasingly being recognized in many schools in Nepal, physical activities are not integrated into the school curriculum; hence, a question on everybody's mind is how physical activities impact the academic performance of students within the unique context of the Nepalese education system.

Most schools, particularly in the rural areas of Nepal, lack adequate infrastructure and resource facilities for physical education. This may limit students' chances to engage themselves in regular physical activities and consequently affect their academic performance (K.C. et al., 2020). Growing concerns about health-related issues, such as childhood obesity and its concomitant effects on cognitive function and school performance, reiterate the need for an understanding of the specific impact of physical activities on students' learning outcomes in Nepal (Thapa et al., 2019). Similarly, another study found that Male students who were physically active showed a positive correlation between physical activity and academic performance while no such correlation was found in female students (Basnet & Basnet, 2017). The low levels of physical activity among secondary school students in the Palpa district of Nepal highlight the need for interventions to promote physical activity. This study identified several factors associated with low physical activity levels, including limited break time at school, lack of parks or playgrounds near homes, and gender differences (Nepal, et al., 2023).

On this background, this study aims to explore the impact of physical activities on academic achievement in the Nepalese school system, despite existing international research. The research question is "What is the impact of physical activities on the academic achievement of secondary-level students in Kathmandu District?"

Methods

This research applied a cross-sectional study design of quantitative nature to identify how physical activities impact the academic achievement of secondary-level students in the Kathmandu district. The primary source

of data was used for this study. The data were collected from the students of grades 9 and 10 at Pushpa Kunja High School, Kathmandu. The school was selected using the purposive sampling technique. As the researcher had worked at that school as a sports instructor. Most of the parents did not want their children involved in sports activities because they claimed that their children who involved in sports activities cannot manage time for their studies and they cannot get an academic achievement that's why the researcher selected this school. The data, using the census method, was obtained from 31 students from two different grades, i.e., 15 students from grade 9 and 16 students from grade 10. Information on the level of physical activities and academic performance of students was solicited using a structured questionnaire. Correlation between physical activity academic achievement was calculated by using SPSS version 20, thus statistically enabling the researcher to summarize and interpret the data effectively concerning the objective of the study. Ethical considerations were considered in the entire study. Identities of participants and data were anonymized to ensure confidentiality.

Results

Demographic Information

The Demographic Information section provides a summary of the characteristics of the respondents in the study, including their grade level, gender, and age distribution. It reflects the total number of respondents in grades nine and ten, emphasizing gender representation and age categories (14-17 years).

Table 1

Demographic Information

		Grade		Total
		Nine	**Ten**	
Gender	Male	8 (47.06%)	9 (52.94%)	17 (100%)
	Female	7(50%)	7 (50%)	14 (100%)
Age of the Respondent	14.00	12 (100%)	0(0%)	12 (100%)
	15.00	3 (37.50%)	5 (62.50%)	8 (100%)
	16.00	0 (0%)	9 (100%)	9 (100%)
	17.00	0 (0%)	2(100%)	2 (100%)
Total respondents		**15 (100%)**	**16 (100%)**	**31 (100%)**

The demography profile of the respondents in table 1 offers insights into their distribution based on grade, gender, and age. A total sample size of 31 students was almost equally distributed across grades: 15 students were from Grade Nine (48.39%) and 16 students from Grade Ten (51.61%). A larger segment of male students was 54.84% (17), compared to the female constituent with 45.16% of 14 students. The sample distribution, by gender, was balanced in both grades: in Grade Nine, there were 8 males, accounting for 47.06%, and 7 females, accounting for 50%, while Grade Ten had 9 males, accounting for 52.94%, and 7 females, accounting for 50%. By age, the majority in Grade Nine were 14 years old, with 12 students accounting for 38.71% of the entire sample. The dominant ages of Grade Ten students were 15, with 5 students, and 16, with 9 students. Notably, all 17-year-old respondents were in Grade Ten, with 2 students, or 6.45%. This demographic distribution is typical of Nepalese secondary school age progression and provides a fair

representation necessary to examine the study's objectives**.**

Primarily Engaged in Physical Activities and Last Term's Average Grade Percentage

This section tries to determine the major activities of the students with their school academic achievement, based on their average grade percentage last term. Running, walking, team sports, and yoga group students into different groups; the grade percentages are also divided into four intervals such as below 40%, 40-60%, 60-80%, and above 80% only.

Table 2

Primarily Engaged in Physical Activities and Last Term's Average Grade Percentage

Primarily Engaged in Physical Activities	**Last Term's Average Grade Percentage**				**Total**
	Below 40%	**40-60%**	**60-80%**	**Above 80%**	
Running	0 (0%)	1 (25%)	1 (25%)	2 (50%)	4 (100%)
Walking	0 (0%)	2 (28.57%)	2 (28.57%)	3 (42.86%)	7 (100%)
Team sports	3 (25%)	5 (41.67%)	4 (33.33%)	0 (0%)	12 (100%)
Yoga	1 (12.5%)	1 (12.5%)	5 (62.5%)	1 (12.5%)	8 (100%)
Total	**4 (12.90%)**	**9 (29.03%)**	**12(38.71%)**	**6 (19.36%)**	**31 (100%)**

Table 2 describes the relation between the student's primary physical activities and their average grade percentages in the last term. Out of the 31 respondents, the highest percentage, 38.71%, had grades ranging between 60-80%; 29.03% of the students had grades between 40-60%; 19.36% scored above 80%; while 12.90% scored below 40%.

Among the students who mainly involved running, high academic performance was recorded by 50% for marks above 80%, and the remaining participants were equally distributed between 40-60% and 60-80% each, i.e., 25%. The participants who mainly involved walking also turned in good performance: 42.86% above 80%, 28.57% each within 40-60% and 60-80%, and none were below 40%. Conversely, team sports students had a wider range of achievement, with 41.67% scoring between 40-60%, 33.33% between 60-80%, while 25% scored below 40%, and none above 80%. On the other extreme, yoga performers showed more uniform academic achievement for which 62.5% scored between 60-80%. In contrast, in the three other grading categories, including less than 40% and above 80%, there was only 12.5% each.

Results suggest that individual sports such as running and walking are associated with improved academic performance, while team sports and yoga present varied grade outcomes, possibly reflecting varying levels of concentration, self-discipline, and cognitive benefits derived from these activities.

Relationship between Intensity Physical Activities and Academic Achievement

This section examines the correlation between students' academic achievement, as indicated by their average grade percentage from the previous term, and the level of physical activity they engage in. This study analyses the direction and strength of the relationship between these variables using Spearman's rho.

Table 3

Relationship between Intensity Physical Activities and Academic Achievement

			Physical Activity of Students	Last Term's Average Grade Percentage
Spearman's rho	Physical Activity of Students	Correlation Coefficient	1.000	-.392*
		Sig. (2-tailed)		.029
		N	31	31

***. Correlation is significant at the 0.05 level (2-tailed).**

Table 3 shows the relationship between the intensity of physical activities and academic achievement of secondary-level (grades 9 and 10) students. The correlation was significantly low and negative ($r = -0.392$, $p = 0.029$) at a 0.05 significance level. This signifies that students who secured better academic achievement were less engaged in physical activities.

Generally, physical fitness positively correlates with academic achievement as shown in different literatures. But in this study negative correlation was found between the amount of physical activity and academic achievement of the students.

Discussion

This study included Grade Ten students aged 15-16, with 6.45% of the 17-year-old respondents in Grade Ten, a typical Nepalese secondary school age progression, providing a fair representation of the study's objectives. We found that running and walking significantly improved academic performance, with 50% of students scoring above 80%. Team sports students scored between 40-60% and 60-80%, while yoga performers scored between 60-80%. The results suggest that individual sports like running and walking improve academic performance, while team sports and yoga have varied grade outcomes, possibly due to different concentration levels and cognitive benefits. This study found a low and negative correlation between the intensity of physical activities and academic achievement in secondary-level students, suggesting that students with better academic performance were less physically active.

However, Hs and Pratiwi (2021) found a direct relationship between physical fitness and academic achievement, as higher levels of fitness were associated with better attendance, classroom performance, and behavior. Engaging in physical activity also positively impacts mental well-being by lowering stress, despair, and frustration that may impede the learning process as well as Penjor (2021) claimed in their research that participating in extracurricular activities, especially in sports and games, had a notable beneficial impact on student's academic achievement. Participants thought that participating in these activities enhanced their academic achievements.

Coe et al. (2006) examined how PE participation and in-school physical activity impacted the academic performance of 214 sixth-grade students. Findings indicated that enrolling in PE did not have a significant effect on academic achievement, however, students who engaged in intense physical activity got better grades compared to those who did not. Moderate physical activity did not impact grades, and there was no uniform

connection between PE participation or physical activity levels and standardized test results. The results emphasize how crucial vigorous physical exercise is, indicating that intense activity may be more advantageous for academic achievement than simply attending physical education classes.

Similarly, Biddle et al. (2011) studied "Correlates of physical activity in youth: A review of quantitative systematic reviews." The research aimed to identify factors associated with physical activity in children and adolescents by conducting a systematic review of quantitative studies not involving interventions and targeting individuals aged under 19. Data collection required finding systematic reviews of research published from 2000 to 2010 that quantitatively assessed factors associated with physical activity in youth. Age and gender were identified as factors impacting physical activity levels, with positive motivation and body image promoting increased activity levels. Factors like perceived obstacles, prior physical activity, and engagement in sports, smoking, inactive behavior, social/cultural influences, and access to facilities also contributed to physical activity levels, resulting in minor to moderate impacts.

In 2016, research was carried out by Paudel et al. (2016) on the physical activity levels and related factors among high school students in Banke, Nepal. The research involved 405 high school students from grades 11 and 12, attending 19 different schools in Nepalgunj. The study discovered that a large proportion of high school students engaged in physical activity, with just 5% reporting being inactive. Daily tasks such as transportation and chores were the primary sources of physical activity, not recreational activities. Females were not as involved in physical activities as men were. Nonetheless, there were no significant differences in activity levels according to age within both male and female groups.

Thapa et al. (2019) carried out research with high school students in an urban district of Nepal to assess physical activity and the factors associated with it. The GPAQ was utilized to examine data from 945 students in a cross-sectional study. The research found that 39% of students reported low levels of physical activity, with 8% of males and 31% of females being affected. Variables such as educational institution category, transportation system, familial support, and availability of leisure venues such as playgrounds/parks were linked to decreased levels of physical activity. In total, 31% of teenagers and 14% of young people did not meet the physical activity guidelines set by the WHO.

Sallis et al. (2000) carried out an extensive examination of the factors impacting the physical activity of children and adolescents. 108 studies were examined for children aged 3-12 and adolescents aged 13-18, with 40 variables tested for children and 48 variables tested for adolescents. Approximately 60% of reported links to physical activity showed statistical significance. Preferences, diet, access to facilities, and time spent outdoors were discovered to impact physical activity in individuals of all ages. Furthermore, physical activity levels showed consistent associations with ethnicity, age, gender, participation in community sports, parental support, and previous activity.

Hs and Pratiwi (2021) in "The Impact of Physical Activity on Academic Achievement" sought to evaluate how physical activity relates to academic performance. The research analyzed data from 62 studies and government

records on students' sports participation using specific government research guidelines. Results showed a direct relationship between physical fitness and academic achievement, as higher levels of fitness were associated with better attendance, classroom performance, and behavior. Engaging in physical activity also positively impacts mental well-being by lowering stress, despair, and frustration that may impede the learning process.

Penjor (2021) investigated how extracurricular activities affect academic achievement among high school students. This study was based on a mixed-method approach and included 156 students from five distinct classes, utilizing four-point Likert scale survey questionnaires used for the quantitative method and open-ended questions for the qualitative method combination of survey questionnaires and open-ended questions. Findings indicated that participating in extracurricular activities, especially in sports and games, had a notable beneficial impact on students' academic achievement. Participants thought that participating in these activities enhanced their academic achievements.

A comprehensive review was completed by James et al., (2023), on the impacts of physical activity (PA) on academic achievement among school-age children. Their study examined the relationship between physical activity and academic achievement within a very diverse school community. According to PRISMA guidelines, keyword searches were conducted in Science Direct, PubMed, and SPORT Discus. The results indicate that physical activity is typically associated with improved academic achievement, particularly when done at moderate to vigorous levels for 90 minutes or more per week, in sessions lasting between 30-60 minutes. Different types of sports, especially those focusing on aerobic and agility elements, could lead to better academic performance. In general, PA was discovered to have the potential to improve academic performance without causing any harm.

In a study by Nepal et al. (2023), the prevalence and factors influencing physical activity levels among secondary school students in Palpa district, Nepal were examined cross-sectionally. Data collected from 506 eighth and ninth-grade students indicated that just 25.31% consistently participated in physical activity, while 23.10% met the recommended daily activity levels set by the World Health Organization. Female students had a lower chance of meeting these standards than males because of brief break periods and a scarcity of recreational areas. Specific measures must be taken to improve access to physical activity and decrease gender inequalities among teenagers in the area.

Martinez et al. (2024) examined how martial arts training affects the self-esteem and discipline of young people using a desk study research design. This technique includes gathering existing information from online platforms like journals and libraries. Studies indicate a favorable correlation between physical activities conducted at school and academic achievement. Frequent physical activity enhances brain function and drive, resulting in enhanced performance in school and on exams. Incorporating physical activity into school curricula is crucial for promoting overall student growth and academic achievement.

These studies indicate that physical activity has a positive effect on the academic achievement of young people and related factors. Specifically, vigorous PA tends to show better academic performance

compared to high, moderate, or low PA. In terms of factors influencing activity levels, gender, age, motivation, and the availability of facilities were found to be relevant determinants: males tend to be more active than females. Such participation in school-based PA, extracurricular activities, and sports that emphasize aerobic and agility components is related to better grades and mental health. The same disparities exist in PA levels due to the limitation of recreational opportunities and certain gender norms in Nepalese society. Barriers to participation are another issue, but incorporating structured PA into curricula could help optimize students' academic performance and other facets of development.

Conclusion

The study explores the impact of physical activity and academic achievement in secondary school students in the Kathmandu district. Results show that individual physical activities like running and walking are associated with better academic performance, while team sports and yoga have mixed results. A significant negative correlation was found between the intensity of physical activities and academic achievement, suggesting that students who excel academically tend to spend less time in high-intensity activities. This suggests that educational policymakers and school administrators should integrate structured and balanced physical activity programs into the curriculum to improve students' cognitive functions, classroom behavior, and overall well-being. Tailored interventions should be implemented considering the intensity, type, and gender-specific preferences of the activities. Addressing infrastructural barriers and societal norms that limit participation in physical activities, especially among female students, is also crucial. The research contributes to the literature on the association between physical activity and academic achievement in Nepal, supporting culturally and contextually relevant educational reforms.

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