

# Association of physical activity on the academic performance of undergraduate physiotherapy students at Sindh Institute of Physical Medicine and Rehabilitation.

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## Research Article

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# Abstract

## Background:

Despite the health and wellness outlook of physical activity, the number of studies that associate physical activity, and academic performance has been increased. Modern research has described the involvement of physical activity on academic performance of students at primary, secondary, and university levels which may be influenced by upgrading in attention, administrative functions, and work memory because of increased blood circulation and neurogenesis by performing physical activity. This study aimed to evaluate the association of physical activity on the academic performance of undergraduate physiotherapy students at Sindh Institute of Physical Medicine and Rehabilitation.

## Methods:

This was an observational, cross-sectional study conducted in June 2021 at Sindh Institute of Physical and Medicine Rehabilitation. Undergraduate DPT students from the second year till the fifth year enrolled in Sindh Institute of Physical Medicine and Rehabilitation were taken in the study. Data collection was done by using non-probability purposive sampling for the sample size of 365 DPT students. A self-administered web-based survey questionnaire was used to collect data. Data were analysed on SPSS program Version 20. By using descriptive statistic age, gender, and study year was analysed. The mean difference of the scores derived from IPAQ with gender and study year were assessed through parametric tests. The relationship of physical activity with academic performance was investigated through the non-parametric test of Chi-square.

## Results:

The mean difference of IPAQ scores did not show much difference between the two genders to have a better physical activity level than the other (p-value: 0.772). There was no significant difference between study years with total physical activity scores (p-value: 0.158). According to cross-tabulation, 50% of students who had a GPA around the 2.1-3.0 range and 51.70% who had a GPA around the 3.1-4.0 range were classified in low activity level. Therefore, we conclude that a non-significant association between physical activity and academic performance was found among undergraduate physiotherapy students in SIPMR.

## Conclusion:

The deduction to our research is that there was no link between physical activity with academic performance. Along with that, there was no evidence found in the current study about either gender being

more physically active than others. Students from all the years in SIPMR had the same level of activity level and there was no significant difference found.

## Introduction

Physical activity is important for everyone not only because of the health and wellness perspective but also due to its influence on the nervous system and cognitive capabilities. It has advantages that have a clear relation with health in children and adolescents (1). Physical Activity can be described as a practice that prompts alterations not only concerning the nervous system but also plays a part in increasing the level of oxygen and blood circulation through an elevated level of metabolic rate, ultimately it results in improved neurological wellbeing (2, 3). Whilst, routine physical movements decline obesity, type II diabetes, hypertension, gall bladder disease, cardiovascular problems, colon and breast cancers, osteoporosis risk, and anxiety and depression, lack of physical activity in adolescent age can produce the incidence of these conditions in later ages (4, 5). Multiple studies have worked on how Physical Activity is interrelated to intellectual and psychological interests. Hillman et al., concluded a study to understand the effect that Physical Activity has on perceptive skills (6). The study got no proof at all for detrimental results because of the increased level of Physical Activity on academic performance (7). Around the past few years, people have observed critical outcomes in response to the absence of physical activity among the students (7). Physical activity has a lot of advantages with fitness, furthermore, it also affects the academic performance of undergraduates (8). Moreover, physical activities that are done correctly are essential for handling knowledge, mainly in adults (9).

Students always try their best to achieve success and make a reputation in society, therefore they are keen to perform well on an academic platform. Due to high competition, they forget to work on their health and neglect the part of physical activity in their daily living. Previously, it was considered that extracurricular activities have a deleterious effect on academic performance (10). A lot of previous research has focused on how physical activity has a relation with academic achievement in school and college-going students. In recent times, the link between academic performance and physical activity is questioned through numerous perspectives, for instance assessing the undergraduate's involvement in physical activities considering that these activities have an association with academic performance (11, 12). The undergraduate students who start to plan about their careers try to study for long hours which could be a reason for the decrease in their normal bodily movement. It has become an extremely important aspect that students who are repeatedly exposed to screens and are bound to the latest technologies should take some time out not only for a physical purpose but also for their mental health.

Physical activity is inseparable from physiotherapy training (13). Physiotherapy students are taught about every basic information related to regular body movements, fitness training, and their advantages in daily living. An example of this statement is even though physiotherapy course around the world highlights the part of exercise and physical activity to augment wellness, avoid disease, and the utilization of physical movements as therapeutic techniques, regardless it is still doubtful if the students are anticipated to get involved in physical activity beyond the studying hours as part in their course

outline (14). Nevertheless, participation in physical activity and fitness programs is of utmost importance for students to increase learning and make it easy for them to study during which they develop a vision for upcoming tasks that will come up when applying for well-planned health promotion in practice (4), (15).

Presently, many people in Pakistan are not aware of the pros that are linked with being physically active. University students are somewhat more prone to adopt a sedentary lifestyle as they do not secure a separate time out for staying fit. According to the authors' knowledge very limited research is available analyzing the relationship between physical activity and academic performance on the physiotherapy student population in Karachi, Pakistan. This study will hence provide us with the data of physical activity performance among physical therapy students as they are taught and are aware of its benefits and long-term effects compared to any other medical sciences student. The research question is as follows:

Is there any association of physical activity with the academic performance of undergraduate physiotherapy students at Sindh Institute of Physical Medicine and Rehabilitation, Karachi?

## **Method**

### **STUDY DESIGN**

This was an observational, cross-sectional study conducted in June 2021 at Sindh Institute of Physical and Medicine Rehabilitation. Data was collected using non-probability purposive sampling for the sample size of 365 DPT students calculated through open epi with the hypothesized frequency of 61.29% of participants with moderate to high levels of physical activity. The confidence level was 95%, the margin of error was taken as 5%, and design effect 1 was taken (16).

### **PARTICIPANTS**

Undergraduate DPT students from the second year till the fifth year, enrolled in Sindh Institute of Physical Medicine and Rehabilitation were included in the study. During the research period, first year was not enrolled at SIPMR. According to the exclusion criteria, students with any physical limitation who were unable to perform any physical activity were asked to withdraw from the study.

### **OUTCOME MEASURES**

A self-designed survey questionnaire was made, including agreement, demographic details which included name, gender, age and year of study, and academic performance and questions from Short Form of International Physical Activity Questionnaire (IPAQ-SF). Regarding IPAQ-SF, the test-rest reliability is being tested by Craig et al. which indicates high stability ( $\alpha < 0.80$ ) (17). The physical activity levels were measured using the Short Form of International Physical Activity Questionnaire (IPAQ-SF) which is a standard questionnaire (17). The IPAQ short form is a 7-item self-report used for physical activity measurement. The tool was designed to know about the physical activity prevalence in the population for

people ages 15 to 69 (17). This outcome measure estimates the physical activity types based on their intensity and daily sitting time of people to quantify the total physical activity in MET-min/week (17).

All the participants were provided with the option to skip the question if they feel they do not lie in the above-mentioned category. Duration obtained from minutes, frequency obtained from days, and Metabolic Equivalent (18) value were multiplied, and a score of MET-min/week was achieved. According to the standard protocol as written in guidelines of IPAQ the criteria of categorization is as follows: 8 MET was multiplied by high-level activity; 4 MET was multiplied by medium-level activity and 3.3 MET was multiplied by walking duration (17). Classification of the total score of IPAQ was graded as “high-level activity” for more than 3000 MET-min/week, “moderate level activity” for 600–3000 MET-min/week, and “low-level activity” for less than 600 MET-min/week (17).

The major outcome of the study was students’ last semesters’ GPA representing their academic performance. Three categories were specified for GPA as (a) 1.0–2.0 (b) 2.1-3.0 and (c) 3.1-4.0 and the participants were asked to choose one option.

A self-administered web-based survey questionnaire by way of Google Forms was used to collect data and was circulated through an initial WhatsApp message to all second, third, fourth, and fifth year DPT students. A consent form was also attached outlining the study’s purpose and providing participants the right to freely withdraw from the study at any point. As a follow-up, after one week a reminder participation message was forwarded to the class representatives of the above batches to ensure maximum participation. In addition, academic coordinators were also requested to further circulate the questionnaire among their respected batches. Surveys were labeled with the author’s administered response number and distinguished from participants’ personal information to ensure students’ information remained confidential.

## **DATA ANALYSIS**

Data was examined on SPSS program Version 20. By using descriptive statistics (mean, standard deviation, and percentage) age, gender, and study year were analyzed. The responses that were given in hours regarding exercises were converted into minutes. Cross-tabulation was run to analyze the association of gender and study year with physical activity and GPA. The mean difference of the scores derived from IPAQ with gender and study year were assessed through parametric tests of t-test and one-way Analysis of Variance), according to the variable type (continuous and categorical) respectively. The association of physical activity and academic performance was investigated through the non-parametric test of Chi-square. P-value less than 0.05 was regarded as statistically significant.

## **Results**

### **FLOW OF THE PARTICIPANTS**

Students completed the questionnaire in approximately ten minutes and the response rate was 100% with 87.4% female and 12.6% male participation. The students of the 3rd year returned the greatest number of survey questionnaires that is 124 (34%). Regarding demographics, the mean (S.D) of the age of students was 2.03 ( $\pm 0.611$ ) with a majority around the age of 21 to 23 years. Students who had GPAs in the range of 3.1-4.0 were prominent (350). Table 1 further elaborates the results regarding academic performance (Grade Point Average) in the last semester, total physical activity levels (categorical variable).

Table 1  
Descriptive Statistics of Baseline  
Characteristics

<b>Basic Characteristics</b>	<b>N = 365 (%)</b>
<b>Gender</b>	
Female	319 (87.4)
Male	46 (12.6)
Mean ± SD	2.13 ± 0.332
<b>Age (years)</b>	
18–20	63 (17.3)
21–23	229 (62.7)
24–26	73 (20)
Mean ± SD	2.03 ± 0.611
Min – Max	18–26
<b>Study year</b>	
2nd year	60 (16.4)
3rd year	124 (34)
4th year	75 (20.5)
5th year	106 (29)
Mean ± SD	3.62 ± 1.077
<b>GPA</b>	
1.0–2.0	1 (0.3)
2.1–3.0	14 (3.8)
3.1–4.0	350 (95.9)
Mean ± SD	2.96 ± 0.218
<b>Physical activity level</b>	
Low-level activity	189 (51.8)
Moderate level activity	133 (36.4)
High-level activity	43 (11.8)
Mean ± SD	1.60 ± 0.691

## DESCRIPTIVE STATISTICS

Participants were asked about the type of exercise performed in response to which 78.9% females and 21.1% males performed moderate exercise while 85.6% females and 14.45% males chose to perform the light exercise. There was a significant association found between males and females with the type of exercise performed. Table 2 gives a detailed review of the association of gender with the type of exercise. Figure 1 displays the percentage of the type of exercise in which students spent more time performing. Results disclosed that 48.99% of students spent more time performing light activity while 24.8% performed vigorous activity. While analyzing the data of GPA and total physical activity (both continuous and categorical variable) based on participants' gender and study year, it was found that only one female in 4th year had GPA in 1.0–2.0 range while all the students studying in 5th year had GPA in 3.1-4.0 range. A greater number of female students were ranked in low activity level in comparison with male students. Table 3 further encapsulates the details regarding these analyses.

Table 2  
Relationship of Gender with the type of exercise

Exercise	Female (N = 319)	Male (N = 46)	Total	P-value <sup>!</sup>
<b>Vigorous</b>				
Yes	131 (77.1%)	39 (22.9%)	195	< 0.001
No	188 (96.4%)	7 (3.6%)	170	
<b>Moderate</b>				
Yes	146 (78.9%)	39 (21.1%)	180	< 0.001
No	173 (96.1%)	7 (3.9%)	185	
<b>Light</b>				
Yes	256 (85.6%)	43 (14.4%)	299	0.017
No	63 (95.5%)	3 (4.5%)	66	
! Chi-square test for association				

Table 3 Relationship of Gender and study year with GPA and physical activity (both continuous and categorical variable)

Characteristics	Gender		Study year			
	Male	Female	2nd year	3rd year	4th year	5th year
<b>GPA</b>						
<b>1.0–2.0</b>	0 (.0%)	1 (100%)	0	0	1 (100%)	0
<b>2.1-3.0</b>	1 (7.1%)	13 (92.9%)	2 (14.3%)	1 (7.1%)	11 (78.6%)	0
<b>3.1-4.0</b>	45 (12.9%)	305 (87.1%)	58 (16.6%)	123 (35.1%)	63 (18%)	106 (30.3%)
<b>Total physical activity (MET-min/week)</b>						
<b>0-1000</b>	30 (11.8%)	224 (88.2%)	40 (15.7%)	80 (31.5%)	58 (22.8%)	76 (29.9%)
<b>1001–2000</b>	14 (17.5%)	66 (82.5%)	11 (13.8%)	37 (46.2%)	14 (17.5%)	18 (22.5%)
<b>2001–3000</b>	1 (4.8%)	20 (95.2%)	5 (23.8%)	6 (28.6%)	3 (14.3%)	7 (33.3%)
<b>3001–4000</b>	1 (11.1%)	8 (88.9%)	3 (33.3%)	1 (11.1%)	0	5 (55.6%)
<b>5001–6000</b>	0	1 (100%)	1 (100%)	0	0	0
<b>Physical activity level</b>						
<b>Low</b>	23 (12.2%)	166 (87.8%)	31 (16.4%)	63 (33.3%)	43 (22.8%)	52 (27.5%)
<b>moderate</b>	21 (15.8%)	112 (84.2%)	19 (14.3%)	47 (35.3%)	28 (21.1%)	39 (29.3%)
<b>High</b>	2 (4.7%)	41 (95.3%)	10 (23.3%)	14 (32.6%)	4 (9.3%)	15 (34.9%)

**INFERENCE STATISTICS:** Independent sample t-test was applied to check if there was a significant mean difference between total physical activities scores between genders. The mean difference of IPAQ scores between males (754.26) and females (792.44) was analyzed, which did not show much difference between the two genders to have a better physical activity level than the other (p-value: 0.772). The mean difference of total IPAQ scores with study years was tested through one-way ANOVA. Results were as follows: 2nd year with the mean value of 956.90, 3rd year with the mean value of 784.78, 4th year with the mean value of 630.47, and 5th year with the mean value of 806.35. There was no significant difference between study years with total physical activity scores (p-value: 0.158). According to cross-tabulation, 50% (7) students who had a GPA around the 2.1-3.0 range and 51.70% (181) who had a GPA

around the 3.1-4.0 range were classified in low activity level. Further, a p-value of 0.963 was obtained which is greater than the level of significance taken as 0.05.

## **Association between physical activity and academic performance:**

Therefore, we concluded that there was no significant association between physical activity and academic performance among the students presently studying in SIPMR. Details of results are elucidated in Table 4.

Table 4  
Mean difference of IPAQ\* score with gender and study year

Characteristics		Mean ± SD	P-value %:	Homogeneity of variance	P-value
Gender	Male	754.26 ± 740.145	0.210	Equal variances assumed	0.772
	Female	792.44 ± 847.378			
Study year	2nd year	956.90 ± 1117.01	0.003	Equal variances not assumed	0.158
	3rd year	784.78 ± 712.615			
	4th year	630.47 ± 609.164			
	5th year	806.35 ± 904.507			
<b>Physical activity relationship with GPA</b>					
GPA	Physical activity level				P-value
	Low	Moderate	High	Total	
1.0–2.0	1 (100.00%)	0	0	1	0.963
2.1–3.0	7 (50.00%)	6 (42.90%)	1 (7.10%)	14	
3.1–4.0	181 (51.70%)	127 (36.30%)	42 (12.00%)	350	

## Discussion

This study aimed to evaluate the association of physical activity on the academic performance of undergraduate physiotherapy students at Sindh Institute of Physical Medicine and Rehabilitation. The results indicated that there was no association of PA with academic performance. In congruent with our results, Mull and Tietjen-Smith (19) studied the correlation between PA and GPA and found no relation.

Similarly, research was conducted at Southern Mississippi University on college students, their findings also did not reach the significance level to prove that there is any link between PA and academic performance (20). Another study was carried out at Florida University with no statistically significant correlation among students with the same variables (21). Xu & Sansgiry found no association between total physical activities and grade point average analogous to our results (22). Further, Gonzalez et al (23) failed to find a positive relationship between these two variables among health science graduate students, along with that there was no statistical mean difference found between genders and study year with IPAQ scores (both continuous and categorical variables) with same statistical tests performed. Angin et al (24) assessed the same variables on physiotherapy students and failed to find any association parallel with our results. Previous studies gave a narrative that physiotherapy students were physically more active in comparison with other students (25),(26),(27),(18),(4). The current study's investigations are not aligned with the previously mentioned research. However, Ranasinghe C et al.'s study showed a similar pattern of results of low PA among undergraduate physiotherapy students (28), as seen in current research. When we considered related literature on adult students' population, there were contrasting results and showing positive associations as seen in a study done on medical students in Saudi Arabia (29). One of the reasons for contrary results could be that they took BMI, height, weight, body fat percentage into account which was not done in the present research. Numerous studies displayed varied results when drawing association between PA and academic performance and this to some extent is due to difference in measurement of PA (30).

This study had some limitations. Firstly, it is based on the purposive sampling method and results are derived from self-reported data of PA and academic performance indicating a risk of loss of memory and inaccurate information from the participant's side. Secondly, it was conducted online so some students might have faced issues regarding appropriate comprehension of questions and provision of authentic data as asked. Also, due to limited access to the academic performance assessment results might appear incomplete and biased. Many pieces of research have measured PA through accelerometers to calculate exact and accurate results which the present study lacked. Along with that only past, seven days' PA data was collected which might not be enough to conclude a definite result. Moreover, participation was also limited to only DPT students of SIPMR, Karachi. However, since today's DPT students will be tomorrow's doctor of physiotherapist, it was very important to ensure students live a healthy lifestyle so that in the future they are rightfully equipped to promote PA significance for their patient's wellbeing and improved quality of life. Lastly, despite all the limitations and restrictions, this study did manage to gather the estimated sample data from undergraduate DPT students within a 1-month duration and contributed majorly to the statistics about developing the most authentic association between academic performance and PA from data obtained from Karachi, Pakistan.

## **Conclusion**

There were many compelling reasons for doing this research study as there is always an argument present in which students always try to do better in their academic years at expense of their physical wellbeing. At the start of this research study, the impression was that physiotherapy students spend more

time engaging in all sorts of healthy and energetic activities because of the regular outline that is being taught in their curriculum. But results did not support this supposition as students with high GPA were also in the low PA category. The deduction to our research is that there was no link between physical activity with academic performance. According to the authors' knowledge, they were the lone researchers to have performed an analytical study on undergraduate physiotherapy students with these two variables in Karachi, Pakistan. This study could be a steppingstone for future investigators to further examine these variables and enrich the literature.

## Abbreviations

PA  
Physical Activity  
GPA  
Grade Point Average

## Declarations

### **Ethics approval and consent to participate:**

The current research was approved by the ethics committee of Sindh Institute of Physical Medicine and Rehabilitation (Date: 12/05/2021, decision no: SRC/Ex/2019). All the participants read the instructions and gave consent to participate in this research.

### **Consent for publication:**

Not applicable

### **Availability of data and materials:**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### **Competing interests:**

The authors declare that they have no competing interests.

### **Funding:**

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## Figures

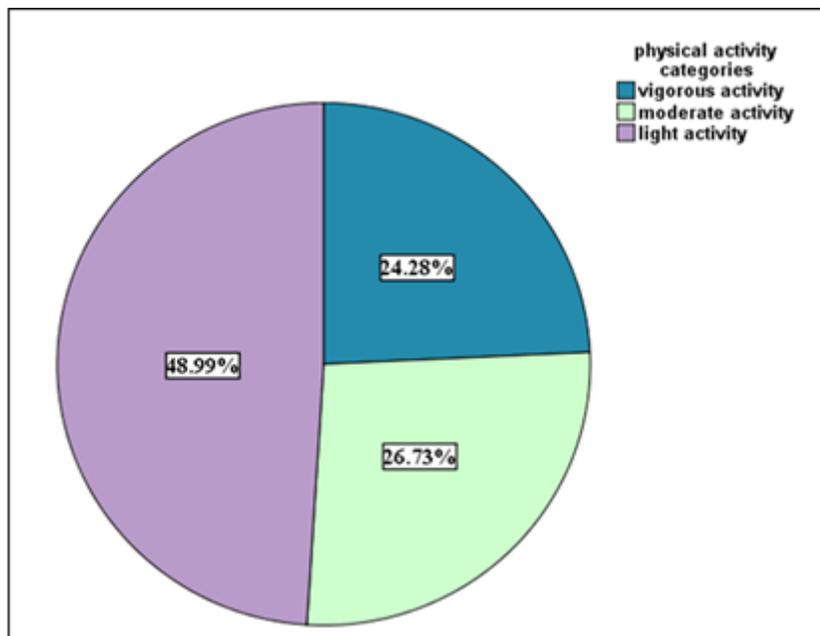


Figure 1

Percentage type of physical activity performed by participants according to minutes per day

## Supplementary Files

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