

Physical activity and sleep quality in association to mental health among physical therapy students in different universities of Karachi: A cross sectional survey

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ABSTRACT

Background: Quality sleep is vital for mental function, with its deprivation reducing alertness and impairing concentration. Similarly, a lack of physical activity leads to problematic living and mental health issues such as depression and anxiety. Therefore, the main reason of this study was to solely focus on physiotherapy students and the effect of sleep and physical activity on their mental health.

Objective: The research project aimed to observed physical activity and sleep quality in association to mental health among physical therapy students in different universities of Karachi

Methods: A cross-sectional study on 360 DPT students in various. Karachi universities was conducted after obtaining approval from the Institute of Physical Medicine and Rehabilitation. The participants, DPT undergraduates aged 18-28 years, were selected through convenient sampling. Exclusion criteria included diagnosed systemic diseases or psychological conditions. The study utilized PSQI, DASS-21, and IPAQ short-form tools. Fisher's exact test was employed to analyse variable associations.

Result: The sample's mean age was 21.75 years, Range= 18-28 years. Most (80.60%) were females. Almost all were single (94.90%), and 97.5% were poor sleepers. However, no association was found between sleep quality and depression, anxiety, or stress levels (p values = 0.117, 0.181, 0.293).

Conclusion: The study revealed no association was found between poor sleep and physical activity levels with depression, anxiety, and stress in physiotherapy students, even though many face poor sleep. Students with poor sleep quality had higher physical activity levels than those with good sleep quality.

Keywords: Exercise, Mental health, Psychological adaptation, Rest, Sedentary behaviors, Sleep hygiene.

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Introduction:

Sleep quality is described as a person's fulfillment with their sleep experience which incorporates factors like sleep inception, sleep executives, sleep amount and alertness. Lack of sleep significantly impacts mental function, reducing overall alertness, impairing concentration, and delaying cognitive processing. Recommended sleep for adults is 7 hours or more each night, yet 70-76% of physical therapy students were identified as poor sleepers based on the Pittsburgh Sleep Quality Index (PSQI) in conducted studies using

available research scales.(1) The University of Warwick Medical School conducted a multinational study across eight countries in Asia and Africa, revealing that sleep disorders impact approximately 150 million people worldwide, with 17% of individuals in developed countries affected. Notably, in Spain, 38.2% of the population experienced poor sleep quality. In South Africa, sleep problems were reported by 31.3% of females and 27.2% of males.(2,3) In Asia and Africa, 17% people face sleep issues. In China, 19% of medical students reported poor sleep quality. Over 90% experienced extreme sleepiness in class, more so among males. Hong Kong's clinical students had a high daytime sleepiness rate of about 70%.(4)

Positive mental health, according to the World Health Organization, is a state of full mental well-being in which an individual understands his own potentials, copes with life's challenges, and meets everyday demands while keeping his overall wellbeing in check, and does his job well in the society.(2) Students are the most frequent victims of anxiety and depression. They are unique individuals who are confronted with many

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obstacles, threats, and social developmental transitions day to day life.(5) Furthermore, this demographic had a high incidence of low sleep quality. Inadequate sleep has been associated to poor mental health, life satisfaction, and academic success and progress.(6) Physical activity is defined as energy-expenditure activities involving skeletal muscles, includes playing, serving, active transportation, house chores, and outdoor tasks. Insufficient activity and sleep may lead to gastrointestinal, cardiac issues, as well as stroke.(7)

Sleep and mental well-being are closely associated, influencing individuals and society. Addressing sleep issues in medical students is crucial for their quality of life and overall health, highlighting the need for effective remedies further.(8) Physical therapy students current and future work performance as practitioners may be impacted by poor sleep quality and Excessive Daytime Sleepiness (EDS).(9) As a result, the health-care system might be affected as well. Students and teachers are often unaware that sleep habits might have an impact on academic achievement.(10)

In most studies, poor sleep is a better predictor of future physical inactivity than the reverse, aligning with past research and indicating that insufficient sleep may result in reduced daytime activity.(11) Studies show high sleep difficulties in anxious youth and elevated anxiety in physical therapy students. Some indicate anxiety as a risk for future sleep problems, while others highlight a bidirectional association between anxiety (and depression) and sleep quality.(12) Sleep disturbances were traditionally seen as outcomes of mental health disorders. However, current evidence suggests that sleep problems can also contribute to the development of various mental health issues, influencing societal well-being.(13) Sleep disruptions, particularly in the circadian cycle, are associated to mood swings and depression, creating a cycle that worsens sleep problems and hastens the onset of mental health issues.(2)

The study was carried out to find out the prevalence of the association between sleep quality and physical activity in association to mental health among physiotherapy students. According to the authors, study related solely for this purpose are not conducted in their region.(8) Most of the studies on this topic were either conducted in Europe or America.(5) The study investigated sleep and physical activity's impact on physiotherapy students' mental health. Pandemic-induced disruptions in online classes altered sleep patterns, affecting various aspects, further highlighting

the need for intervention. (2)

College students often experience mental health challenges due to independent living and lifestyle changes, highlighting the critical importance of maintaining optimal mental well-being during this significant transitional period from adolescence to adulthood. (14) Good mental health is not only the non-occurrence of mental disorders but also includes active behaviours such as taking steps to maintain overall health and working well within the community. Limited evidence exists on the extent to which social interaction contributes to the positive effects of physical activity on mental health, particularly among students where literature is scarce.(15) This research project aims to observe physical activity and sleep quality in association with mental health among physical therapy students in different universities of Karachi.

Methods:

A cross-sectional survey was conducted on Doctor of Physical Therapy (DPT) students in different universities of Karachi. The data was collected from a convenient sample of 360 physiotherapy undergraduates which was estimated through open epi. Sampling technique of the study was purposive sampling. Total duration of the study was 6 months. Study setting for data collection was from different universities of Karachi which include Dow university of Health Sciences, Jinnah Sindh Medical University, Baqai Medical University, Ziauddin University and Indus University.

The inclusion criteria of our study was physical therapy students (DPT) (1-5 year) and undergraduates of age between 18-28 years old and exclusion criteria of the study was undergraduates with diagnosed cases of systemic disease (polio, fracture/surgery) or having any expressed psychological condition like (stress, insomnia etc). Written informed consent was taken from participants before data collection after assessing the ethical criteria of the study (Ref# SIPMR/2021/ approval).

The original designed questionnaire was according to three scales; the Pittsburgh Sleep Quality Index (PSQI) in which higher scores (greater than 5) indicated poorer sleep quality, the Depression Anxiety Stress Scales (DASS-21) which summed scores and categorized levels into normal, mild, moderate, severe, or extremely severe for depression, anxiety, and stress and the International Physical Activity Questionnaire-Short Form in which levels of physical activity are

categorized as low, moderate, or high based on calculated MET-minutes per week; for the assessment of active work, emotional well-being and rest quality levels among students.

To analyze the data, we used SPSS programming version 20 for Windows. The significance level was adjusted to 5%. Descriptive statistics, including means and standard deviations for continuous variables and frequencies with percentages for categorical variables, were used to summarize the sample characteristics. Mean and standard deviation were calculated for variables. Fisher's exact test was used for analyzing association between variables.

Results:

The outcomes showed that the sample's mean age was 21.75 years (standard deviation= 2.13, Range= 18-28 years). The predominant demographic comprised of females, with a noteworthy concentration among individuals who identified as single in terms of marital status.

In terms of mental health, the average stress score was 7, anxiety score was 6, and depression score was 7. These scores ranged from 0 to 21, 0 to 20, and 0 to 21, respectively. The participants reported an average sleep quality score of 13, with scores ranging from 1 to 27. Regarding physical activity, the participants engaged in an average of 1943 minutes per week, with a range from 1017 to 3969 minutes. These parameters provided a concise overview of the key characteristics observed in the study. Upon closer examination of the study outcomes, a striking revelation emerged: a substantial majority, specifically 351 out of the total 360

participants, exhibited poor sleep quality. Intriguingly, only a minor fraction, consisting of a mere 9 individuals, fell outside the category of poor sleepers. (Table 1)

Out of total, 97% of the undergraduates were poor sleepers while 2.5 % of the students were good sleepers. Almost 95% of the students had moderate physical activity levels while 5.3% of the students had high physical activity levels. Out of total, 90% students had normal stress levels while 7.8% and 1.9% had mild to moderate stress levels respectively. Out of total, 63% of the students had normal anxiety levels, 10.6% and 19.7% had mild to moderate anxiety levels while 6.4% and 0.3% had severe to extremely severe anxiety levels respectively. Out of total, 72% students had normal depression level, 11.9% and 15% had mild to moderate depression levels respectively, while only 1.1% students had severe stress levels. (Table 2)

According to the PSQI scale, 351 (97.5%) students out of 360 students were poor sleepers and no association was found between sleep quality and depression, anxiety and stress levels by using the fisher's exact test (p values= 0.117, 0.181, 0.293) respectively. (Table 2) The study revealed nonsignificant associations between subjective sleep quality and DASS-21, indicating no association between levels of physical activity, sleep quality, depression, anxiety, and stress scale. However, it was observed that students experiencing poor sleep quality exhibited higher levels of physical activity. The sample predominantly consisted of female students, constituting approximately 80.60%, while single students made up about 94.90% of the sample. (Table 3)

Table 1: Descriptive statistics on Age, DASS-21, PSQI and Physical Activity (n=360)

Parameters	Mean	Standard Deviation	Minimum	Maximum	Range
Age (years)	21.75	2.13	18	28	10
Stress score	7	5	0	21	21
Anxiety score	6	5	0	20	20
Depression score	7	6	0	21	21
Sleep quality score	13	5	1	27	26
Physical activity (mets/week in min)	1943	564	1017	3969	2952

Table 2: Association of Physical Activity with DASS-21 and PSQI

Parameters (DASS-21 & PSQI)		Physical Activity		p-value
		Moderate (n=341) Frequency (percentage)	High (n=19) Frequency (percentage)	
Stress Level	Normal	306 (89.7%)	19 (100.0%)	0.579
	Mild	28 (8.2%)	0 (0%)	
	Moderate	7 (2.1%)	0 (0%)	
Anxiety Level	Normal	216 (63.3%)	11 (57.9%)	0.911
	Mild	36 (10.6%)	2 (10.5%)	
	Moderate	66 (19.4%)	5 (26.3%)	
	Severe	22 (6.5%)	1 (5.3%)	
	Extremely Severe	1 (0.3%)	0 (0%)	
Depression Level	Normal	247 (72.4%)	12 (63.2%)	0.516
	Mild	39 (11.4%)	4 (21.1%)	
	Moderate	51 (15.0%)	3 (15.8%)	
	Severe	4 (1.2%)	0 (0%)	
Poor Sleep Quality	No	9 (2.6%)	0 (0%)	0.999
	Yes	332 (97.4%)	19 (100.0%)	

Table 3: Association of Sleep Quality with DASS-21

Parameters (DASS-21)		Poor Sleep Quality (PSQI)		P-value
		No (n=9) Frequency (percentage)	Yes (n=351) Frequency (percentage)	
Depression Level	Normal	5 (55.6%)	254 (72.4%)	0.117
	Mild	0 (0%)	43 (12.3%)	
	Moderate	4 (44.4%)	50 (14.2%)	
	Severe	0 (0%)	4 (1.1%)	
Anxiety Level	Normal	4 (44.4%)	223 (63.5%)	0.181
	Mild	1 (11.1%)	37 (10.5%)	
	Moderate	2 (22.2%)	69 (19.7%)	
	Severe	2 (22.2%)	21 (6.0%)	
	Extremely Severe	0 (0%)	1 (0.3%)	
Stress Level	Normal	7 (77.8%)	318 (90.6%)	0.293
	Mild	2 (22.2%)	26 (7.4%)	
	Moderate	0 (0%)	7 (2.0%)	

Discussion:

The main aim was to assess sleep quality, physical activity, and their association with mental health among physical therapy students from various Karachi universities. Results revealed a high prevalence of poor sleep quality, with nearly 97.4% of students experiencing this compared to 63.2% in a Saudi Arabian study. Given that a majority in our study had poor sleep, associations weren't observed in our data. Additionally, our goal was to examine the association between sleep quality and physical activity, finding that lack of physical activity significantly impacts sleep quality in 97.4% of students

These findings align with previous studies indicating a bidirectional association between sleep quality and physical activity which was calculated through Fisher's exact test ($p=0.999$). Our analysis, utilizing scales such as PSQI, IPAQ short form, and DASS-21, demonstrates a clear association between poor sleep quality, insufficient physical activity, and mental health issues. Physical therapy students with inadequate physical activity and poor sleep quality exhibit higher scores on depression, anxiety, and stress scales according to the DASS-21. Poor sleepers who also refrain from physical activities (mild, moderate, and vigorous METs) are more likely to score higher on depression, anxiety, and stress scales. Contrary to the total sleep duration, the interplay of sleep quality, physical activity, and mental health is emphasized. Depression, anxiety, and stress among these students were reported at 28.1%, 36.9%, and 9.7%, respectively. These figures are notably lower as compared to a Saudi Arabian study with proportions of 42.1%, 52.6%, and 30.5%, and even lower than other Middle Eastern studies reporting depression, anxiety, and stress at 65%, 73%, and 59.9%, respectively (1). Results indicate that poor sleep is insignificantly associated with the presence of depression ($p=0.117$), anxiety ($p=0.181$), and stress ($p=0.293$). (1)

Physical activity significantly reduces mental health symptoms compared to no treatment or other interventions, such as antidepressant medications. In summary, exercise proves to be more effective than control interventions in alleviating symptoms of depression, anxiety, and stress. (2)

Physical activity enhances mental health by boosting self-esteem, self-efficacy, cognitive function, and reducing distress. Additionally, exercise is

positively associated with improved sleep quality in adults. However, few studies have explored the associations between physical activity, sleep, and mental health. (5) Sensation of psychological well-being issues is accompanied by sleep. It has additionally been found in a few different studies that undergraduate students sleep less than the overall population, which might be because of high pressure and concern for studies and grades. (6)

The study recognizes the use of a relatively small sample size (360 students), especially when considering the larger population of physical therapy students in universities of Karachi. The sampling method chosen, purposive sampling, has the potential to introduce bias, restricting the extent to which the findings can be applied to a broader population. The study's cross-sectional design, capturing a single snapshot in time, limits its ability to establish cause-and-effect associations over a more extended period. Additionally, the exclusion of undergraduates with diagnosed systemic diseases or expressed psychological conditions may narrow the study's scope in representing diverse health conditions

Conducting studies over a longer time helps us understand changes in sleep, mental health, and physical activity. To make our findings relevant to more people, we should include more participants and use different ways to choose them. It would be helpful to add objective health data, like medical records, to get a fuller picture. Trying out specific interventions can show us what works to improve sleep and mental health. Working closely with healthcare professionals is essential to make sure we diagnose accurately and include people with different health conditions in our research.

Conclusion:

The study found that poor sleep and activity levels aren't significantly associated with depression, anxiety, and stress in physiotherapy students, mainly because many of them struggle with sleep. However, those with poor sleep surprisingly engaged in more physical activity. It emphasizes the importance for physical therapy students to understand how sleep and activity impact their mental well-being.

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Author declaration:

Haider MM: Conception of idea, data collection, data analysis, manuscript writing and critical revisions of final article.

Fatima K: Study design, data analysis, data interpretation and results, draft editing with critical revisions until final manuscript.

Ali A: Study design, questionnaire development, data collection and entry, critical revisions

Abbasi M: Study design, data entry, interpretation and drafting of tables, critical revision of the manuscript

Nadeem H: Study design, data entry, interpretation and drafting of tables, critical revision of the manuscript

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