

Relationship between anxiety, depression, stress and physical inactivity among university students of Quetta

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Abstract

Objective: To find the frequency of depression, anxiety and stress among university students, and to ascertain the condition's association with physical inactivity.

Method: The cross-sectional, analytical study was conducted from November 2023 to May 2024 at the Quetta Institute of Medical Sciences, Quetta, Pakistan, and comprised students belonging to three universities. Data was collected using a predesigned questionnaire that also included the International Physical Activity Questionnaire to check physical inactivity and the Depression Anxiety Stress Scale to assess depression, anxiety and stress levels. Data was analysed using SPSS 25.

Results: Of the 400 participants, with a mean age of 22 ± 3.89 years, 233 (58.25%) were male, 167 (41.75%) were female, 286 (71.5%) were studying medicine, and 114 (28.5%) were enrolled in non-medical degrees. Physical inactivity was significantly associated with anxiety, depression and stress ($p=0.001$). Female students reported lower activity and higher rates of anxiety, depression and stress. Nuclear families tended to have better mental health, while joint families showed more extreme cases of anxiety and depression. The nature of the degree in which a student was enrolled had no significant association. A similar result was observed for residence (rural or urban).

Conclusion: Physical inactivity was found to be significantly associated with anxiety, depression and stress, indicating the need for a prompt targeted intervention.

Key Words: Anxiety, Depression, Stress, Sedentary behaviour, Exercise.

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Introduction

As defined by the World Health Organisation (WHO), health is not merely the absence of disease or infirmity, but the state of complete physical, mental and social wellbeing. The WHO definition of mental health describes it as the state of well-being in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.¹ Physical inactivity is one of the leading contributors to global mortality, associated with approximately 7% of deaths globally.² Physical activity decreases the risk of breast cancer in physically active women by 23%.³ Despite all this, effective strategies designed to promote physical activity in the population are sparse. A systematic review showed that there is a lack of interventions at the community level, with scalability being a major problem.⁴

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A significant volume of research has established that physical activity is related to mental health.⁵ Consistent evidence suggests that physical activity has an improving effect on the mental health of a person. However, one limitation common to most studies in this domain is that of a small sample size.⁶

In Pakistan, mental health problems among university students are now being considered a public health concern. Previous studies have reported high levels of anxiety, depression and stress among Pakistani students, with lifestyle factors, such as physical inactivity, contributing to psychological distress.^{7,8} However, limited evidence exists regarding the combined relationship between physical activity and mental health outcomes in this population.

Mental health issues are responsible for more >4% of the total disease burden of Pakistan.⁹ Anxiety, depression and stress are prevalent mental health conditions among university students, negatively impacting their interactions with society, performance in studies, and overall experience of life. Understanding the relationship between physical inactivity and mental well-being issues is essential for developing effective interventions and improving the health of university students.

Many recent studies suggest the presence of a strong relationship between regular physical exercise and improved mental well-being. These studies have summarised that being active regularly can decrease symptoms of illnesses like depression, anxiety and stress, and it may also play a role in stopping such conditions from developing.¹⁰⁻¹⁴

Despite extensive research, there remains a gap, to our knowledge, in understanding the relationship between physical inactivity and mental disorders, specifically among university students in Pakistan. The current study was planned to fill the gap in the literature by determining the frequency of anxiety, depression and stress among university students, and to ascertain the association of physical inactivity with mental well-being.

Subjects and Methods

The cross-sectional, analytical study was conducted from November 2023 to May 2024 at the Quetta Institute of Medical Sciences (QIMS), Quetta, Pakistan, and comprised students belonging to QIMS, the Balochistan University of Information Technology, Engineering and Management Sciences (BUIITEMS), and the Bolan Medical College (BMC). The three educational institutes were chosen randomly to raise the sample through Pinkylam website.¹⁵ After approval from the QIMS ethics review committee, the sample size was calculated using the Fischer's formula¹⁶: $N = (Z^2 \cdot p(1-p)) / d^2$ with 50% probability. The sample size was adjusted to account for 10% non-responders. The sample was raised using systematic random sampling. The total number of samples to be collected was divided among the three institutions. The sampling interval value for QIMS and BMC was 5, and it was 10 for BUIITEMS. The students were seated in lecture halls, and the first individual was picked at random between the 1 and nth value. After that, every nth individual in the lecture hall was chosen as a study participant.

Those included were university students from co-education universities in Quetta. Students with a clinical pre-diagnosis of depression were excluded. The participants were asked about it through the questionnaire, and they were excluded once the clinical diagnosis was confirmed by one of the researchers after the self-report.

Data was gathered using a well-structured questionnaire that included an informed consent component. Forms with missing data were excluded. The questionnaire had a section on demographic variables, which included gender, residence, family status, accommodation and socioeconomic status (SES). The second section comprised the International Physical Activity

Questionnaire (IPAQ), a standard international questionnaire designed to monitor the physical activity of individuals, with good reliability.¹⁷ It divided the individuals into three categories: inactive and minimally active. and health-enhancing physical activity (HEPA) active. The third section comprised the 21-item Depression Anxiety Stress Scale (DASS-21), which contained 7 questions each related to depression, anxiety and stress. DASS-21 is highly reliable, and its Cronbach's alpha for the Pakistani population is reported to be excellent.¹⁸ For statistical analysis, the categories were merged into three categories: normal, mild-moderate and severe-extremely severe.¹⁹

Data was analysed using SPSS 25. Data was expressed as frequencies and percentages. Chi-square test was used to ascertain the association of physical activity levels with depression, anxiety and stress. $P < 0.05$ was considered significant.

Results

Of the 450 forms distributed, 400(88.9%) were included. There were 233(58.25%) males and 167(41.75%) females. The overall mean age was 22 ± 3.89 years. There were 286(71.5%) subjects studying medicine, while 114(28.5%) were enrolled in non-medical degrees (Table 1).

IPAQ scores suggested 115(28.75%) students were physically inactive, 125(31.25%) were minimally active, and 160(40%) were HEPA active (Figure 1).

DASS-21 scores suggested that more than half of the students had normal stress, while approximately one-quarter had mild to moderate stress, and about one-sixth had severe to extremely severe stress. For anxiety, over one-third of the students were in the normal range, approximately one-fifth had mild to moderate anxiety, and just over two-fifths experienced severe to extremely severe anxiety. Regarding depression, slightly more than half of the students were normal, nearly one-third had mild to moderate depression, and about one-fifth had severe to extremely severe depression (Table 2).

Physical activity level had a strong and significant association with anxiety, stress and depression (Figure 4), with HEPA active students showing asymptotic significance for all three study variables (Figures 2-4). Chi – square test shows a very high association between physical inactivity and mental health outcomes (Table 3).

A greater proportion of male students were within the normal range of stress, anxiety and depression compared to female students. Likewise, comparatively lower levels of physical inactivity were observed among males. Female students demonstrated higher proportions of

Table-1: Demographic characteristics of the participants (n=400).

Variable	Categories	Number of Participants	Percentage (%)
Gender	Female	167	41.75%
	Male	233	58.25%
	Physically Inactive females	57	34.13% (of females)
	Physically Inactive Males	58	24.89% (of males)
Study Field	Medical	286	71.5%
	Non-medical	114	28.5%
	Inactive Medical students	94	32.86% (of medical students)
	Inactive non-medical students	21	18.42% (of non-medical students)
Residence	Urban	346	86.5%
	Rural	54	13.5%
Accommodation	Hostel	164	41%
	Inactive Hostel Students	30	18.29% (of hostelites)
	Day-scholar	236	59%
	Inactive Day-scholar Students	85	36.01% (of day-scholar)
Family Type	Joint Family	162	40.5%
	Nuclear Family	212	53%
	Single Parent/ Split Family	26	6.5%

Table-2: Distribution of Stress, Anxiety and Depression among study subjects

Condition		Normal	Mild- Moderate	Severe-Extremely Severe
Stress		227 (56.75%)	107 (26.75%)	66 (16.50%)
Anxiety		149 (37.25%)	84 (21.00%)	167 (41.75%)
Depression		205 (51.25%)	121 (30.25%)	74 (18.50%)
Stress	Male	62.7%	20.1%	17.2%
	Female	48.5%	36.5%	15.0%
Anxiety	Male	42.1%	21.5%	36.5%
	Female	30.5%	21.6%	47.9%
Depression	Male	56.2%	21.0%	22.8%
	Female	44.3%	42.5%	13.2%
Condition	Family Structure	Normal	Mild-Moderate	Severe-Extremely Severe
Stress	Joint	36.41%	39.50%	24.07%
	Nuclear	73.11%	16.50%	10.37%
	Single parent	50.00%	30.76%	19.23%
Anxiety	Joint	20.30%	18.00%	61.70%
	Nuclear	50.94%	21.22%	37.83%
	Single parent	30.76%	38.46%	30.76%
Depression	Joint	28.39%	41.97%	29.62%
	Nuclear	69.33%	19.81%	10.84%

Table-3: Association of physical activity with mental health outcomes.

OutcomeVariable	X ² values	Degree of freedom	p-value
Anxiety	101.49	4	<0.001
Stress	102.00	4	<0.001
Depression	80.10	4	<0.001

mild to moderate stress and depression compared to their male counterparts, but males showed a slightly higher proportion of severe cases. Severe to extremely severe stress was marginally more common among males than females. Similarly, severe to extremely severe depression was more frequent among males. In contrast,

anxiety levels were generally higher among females in all categories, with a greater proportion experiencing both mild to moderate anxiety and severe to extremely severe anxiety compared to male students.

Depression, anxiety and stress levels showed significant variations in the students' family structure. Among students from joint families, approximately one-third were within the normal range of stress, a similar proportion had mild to moderate stress, and about one-quarter had experienced severe to extreme stress levels. In contrast, students from nuclear families predominantly

fell within the normal range, with a relatively small proportion experiencing mild to moderate and severe to extreme stress. Half of single-parent families fell in the normal range, approximately one-third experienced mild to moderate stress levels, and nearly one-fifth had experienced severe to extreme stress levels.

A similar pattern was observed for anxiety. Nuclear families showed about half of the distribution within the normal range, slightly above one-fifth had experienced mild to moderate anxiety levels, and approximately two-fifths had experienced severe to extremely severe stress.

Single-parent families had a balanced distribution across all categories.

For depression, joint families showed a relatively even distribution across severity levels. At the same time, nuclear families had a distribution of nearly two-thirds in the normal range, approximately one-fifth fell in the mild to moderate stress category and about one-tenth experienced severe to extremely severe stress. Single-parent families had a relatively moderate distribution across normal, mild-moderate and severe categories (Table 2).

No significant association was found for the nature of the academic degree and area of residence with depression, anxiety and stress levels ($p>0.05$).

Discussion

The current study assessed the relationship of

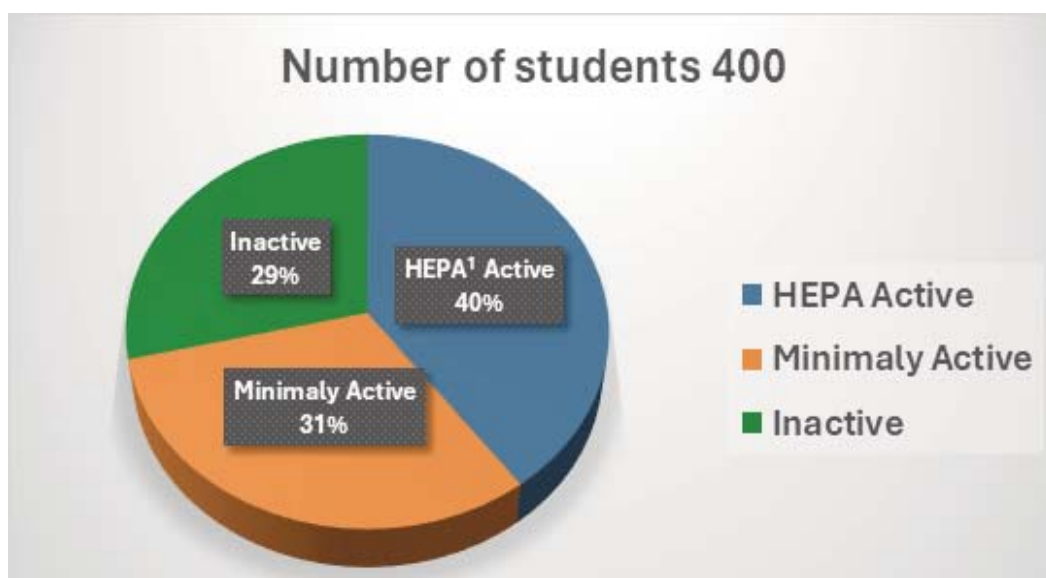


Figure 1: Distribution of active and inactive students.
HEPA: Health-enhancing physical activity.

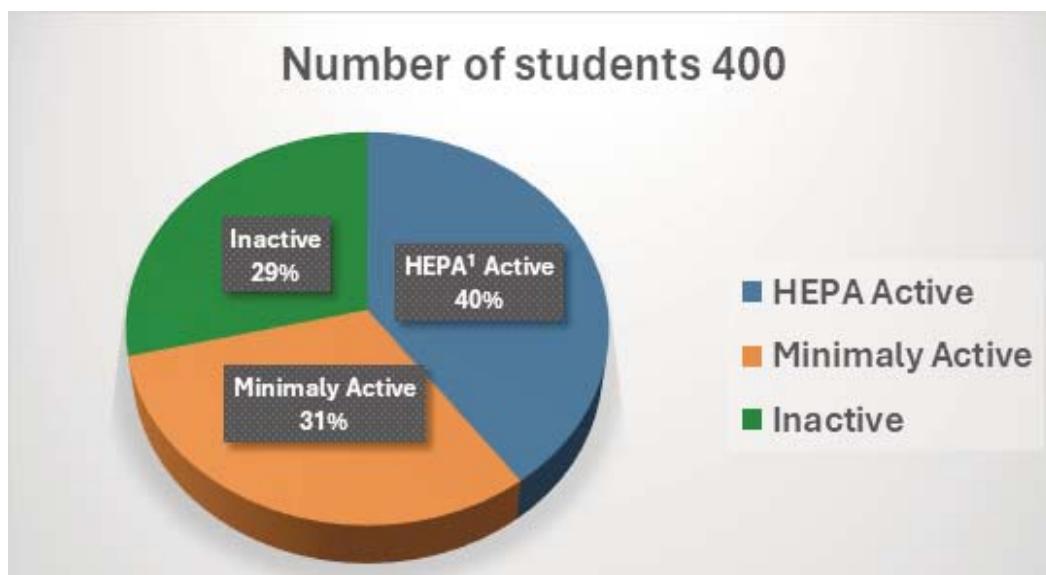


Figure 2: International Physical Activity Questionnaire (IPAQ) score in association with anxiety level.
HEPA: Health-enhancing physical activity.

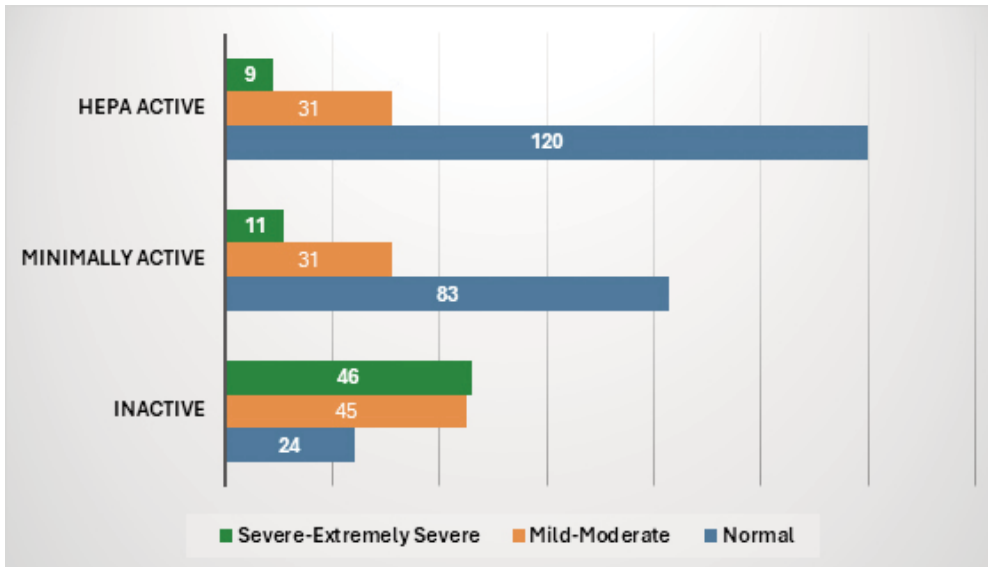


Figure 3: International Physical Activity Questionnaire (IPAQ) score in association with stress levels.
HEPA: Health-enhancing physical activity.

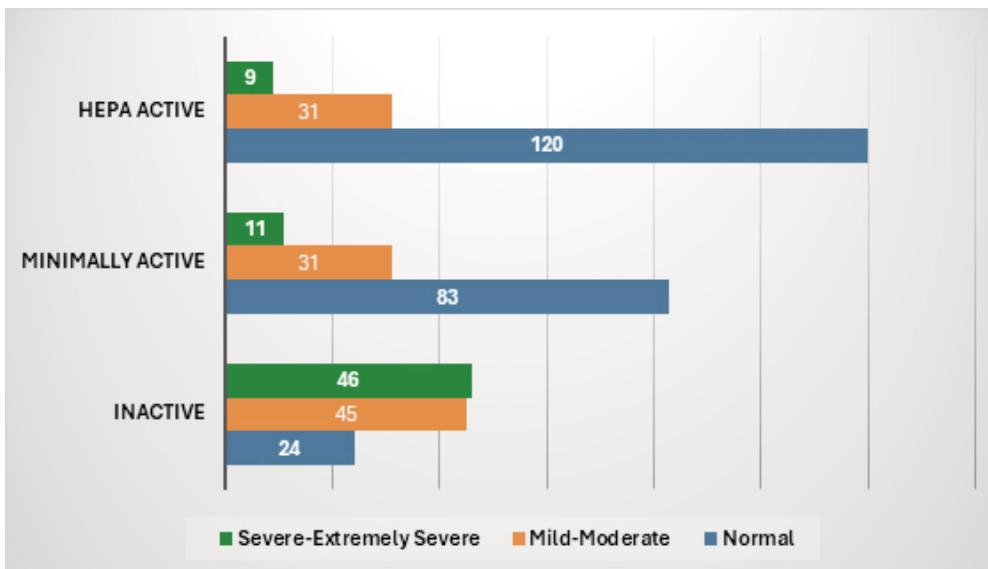


Figure 4: International Physical Activity Questionnaire (IPAQ) score in association with depression levels.
HEPA: Health-enhancing physical activity.

depression, anxiety and stress with physical inactivity among university students of Quetta, and found it to significant relationship. Specifically, physically inactive students had higher levels of depression, anxiety and stress. Students from nuclear families tended to have better mental health outcomes across anxiety, depression and stress scores, while those from joint families showed more extreme cases of anxiety and depression, and single-parent families had more moderate cases of anxiety, but relatively stable depression and stress scores. The consistent scores among single-parent families suggested stable mental health, or this could have been

due to underreporting of severe cases.

A meta-analysis of 15 studies found that doing regular physical exercise three times a week reduced the episodes of depression to one-fourth of the levels seen among inactive individuals. An inverse relationship was established between the incidence of depression and physical activity.²⁰ A 2018 meta-analysis comprising 49 studies showed that adults who reported low levels of depression had high levels of physical activity compared to those who showed little physical activity. Moreover, physical activity was found to have a positive effect in reducing depression among all age groups.²¹

The current results agree with the previous literature. A 2015 study found a significant association between physical activity and mental well-being. It also found that more active people had fewer self-reported days of poor mental health because of stress, anxiety and depression compared to inactive people.²² A

prospective cohort study comprising more than 60,000 people concluded that participants who were inactive had a higher risk of developing anxiety and depression in adults, and when these individuals shifted to an active lifestyle, mental health risks decreased.¹¹ Another cohort study in 2022 concluded that people who were physically active at 16 years of age had a lower risk of depression. The early and middle teenage years are an important time for a person's life, and the promotion of physical activity to reduce anxiety, stress and depression levels resulted in decreased mental stress issues throughout adulthood. The long-term effects persisted till the age of 62.¹² A

Spanish study in 2022 summarised that physical inactivity is related to a higher risk of developing mental disorders. There was an increased risk of the development of anxiety, depression and other mental disorders among young adults who were inactive.¹³ Another study in Syria in 2023 found a lack of physical exercise as one of the reasons for the poor mental health of women.²³ A 2023 study illustrated that exercise had a beneficial effect on mental well-being. There was an improvement in sleep quality with regular exercise. Enough evidence was also found to support the idea that exercise improves depression and anxiety symptoms.²⁴ A German systematic review in 2021 concluded that physical activity had a great beneficial effect on physical and mental stress-related parameters.¹⁴ A study in 2022 supported the idea that an increase in regular physical activity and exercise was important for the promotion of healthy behaviour among emerging adults, such as university students, to buffer the psychological, cognitive and emotional demands of predominantly sedentary activities and mental stress.²⁵ Physical activity and sports are easily accessible, have no adverse effects, and a wide variety of evidence supports their role in improving mental health, making them one of the best options when it comes to combatting mental health issues.²⁶ A Spanish study in 2022 also found a positive relationship between physical activity levels and mental health scores among students.²⁷

Among the local studies, the 2020 research also reported similar findings. Among the studied physiotherapy students, there was a high incidence of mental stress. A strong association was found among different components of mental health and physical activity.²⁸

The current findings were consistent with the literature, suggesting that physical inactivity is linked to significantly higher anxiety, depression and stress levels.

The current study has its limitations. Because of its cross-sectional design, the study could not demonstrate causality, leaving the directionality of the observed associations unclear. The study relied on self-reported data, which may have introduced potential biases. Furthermore, in the absence of longitudinal data, the study has a limited ability to observe changes over time. The study comprised students from only three universities in a single city, and the results may not be representative of all university students in Pakistan or other regions with different sociocultural and educational contexts. However, the findings may apply to similar student populations in low- and middle-income settings with comparable lifestyle patterns. Future multicentre studies with larger and more diverse samples are

recommended.

Conclusion

Physical inactivity was found to be significantly associated with anxiety, depression and stress, indicating the need for a prompt targeted intervention. Moreover, joint families hurt students' mental well-being, which could be due to a wide variety of factors, including but not limited to the lack of attention that parents give to their children in the crowded environment of a joint family system.

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References

1. World Health Organization. Mental health: strengthening our response. Geneva: World Health Organization. [Online] [Cited 2024 December 30]. Available from: URL:<https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>
2. Katzmarzyk PT, Friedenreich C, Shiroma EJ, Lee IM. Physical inactivity and non-communicable disease burden in low-, middle- and high-income countries. *Br J Sports Med.* 2022;56:101-6. doi:10.1136/bjsports-2020-103640.
3. Boraka Ö, Klintman M, Rosendahl AH. Physical activity and long-term risk of breast cancer: associations with time in life and body composition in the prospective Malmö Diet and Cancer Study. *Cancers (Basel).* 2022;14:1960. doi:10.3390/cancers14081960.
4. Baker PR, Francis DP, Soares J, Weightman AL, Foster C. Community-wide interventions for increasing physical activity. *Cochrane Database Syst Rev.* 2015;1:CD008366. doi:10.1002/14651858.CD008366.pub3.
5. Stubbs B, Ma R, Schuch FB, Mugisha J, Rosenbaum S, Firth J, et al. Physical activity and mental health: a little less conversation, a lot more action. *J Phys Act Health.* 2024;21:1-2. doi:10.1123/jpah.2024-0404.
6. Bize R, Johnson JA, Plotnikoff RC. Physical activity level and health-related quality of life in the general adult population: a systematic review. *Prev Med.* 2007;45:401-15. doi:10.1016/j.ypmed.2007.07.017.
7. Choudhry FR, Khan N, Munawar K. Barriers and facilitators to mental health care: a systematic review in Pakistan. *Int J Ment Health.* 2021;52:1-39.
8. Haqqani S, Naeem M, Fatima T, Sabahat NU, Yousaf I. Depression, anxiety, stress and wellbeing of young psychology students in Pakistan: a cross-sectional descriptive study. *Migr Lett.* 2024; 21:100-8.

9. World Health Organization. WHO Pakistan celebrates World Mental Health Day [Internet]. Cairo: WHO Regional Office for the Eastern Mediterranean; 2024 [Cited 2024 December 30]. Available from: URL:<https://www.emro.who.int/pak/pakistan-news/who-pakistan-celebrates-world-mental-health-day.html>
10. Schuch FB, Vancampfort D. Physical activity, exercise and mental disorders: it is time to move on. *Trends Psychiatry Psychother.* 2021;43:177-84. doi: 10.47626/2237-6089-2021-0237
11. Kandola AA, Del Pozo Cruz B, Osborn DPJ, Stubbs B, Choi KW, Hayes JF. Impact of replacing sedentary behaviour with other movement behaviours on depression and anxiety symptoms: a prospective cohort study in the UK Biobank. *BMC Med.* 2021;19:133. doi:10.1186/s12916-021-02007-3.
12. Redig L, Feter N, Dumith SC, Domingues MR, Rombaldi AJ. Physical inactivity from childhood to adolescence and incident depression. *Am J Prev Med.* 2022;62:222-9. doi:10.1016/j.amepre.2021.09.001.
13. Denche-Zamorano Á, Franco-García JM, Carlos-Vivas J, Mendoza-Muñoz M, Pereira-Payo D, Pastor-Cisneros R, et al. Increased risks of mental disorders in youth with inactive physical activity. *Healthcare (Basel).* 2022;10:237. doi:10.3390/healthcare10020237.
14. Wunsch K, Fiedler J, Bachert P, Woll A. The tridirectional relationship among physical activity, stress, and academic performance in university students: a systematic review and meta-analysis. *Int J Environ Res Public Health.* 2021;18:739. doi:10.3390/ijerph18020739.
15. Lam P. Random name picker for lucky draw [Online] [Cited 2024 July 3]. Available from: URL: <https://pinkylam.me/playground/random-name-picker/>
16. Kibuacha F. How to determine sample size for a research study. [Online] [Cited 2023 December 7]. Available from: URL:<https://www.geopoll.com/blog/sample-size-research/>
17. Dinger MK, Behrens TK, Han JL. Validity and reliability of the International Physical Activity Questionnaire in college students. *Am J Health Educ.* 2006;37:337-43.
18. Amin F, Iqbal M, Khan MA, et al. The assessment and validation of the Depression, Anxiety and Stress Scale (DASS-21) among frontline doctors in Pakistan during the fifth wave of COVID-19. *Front Public Health.* 2023;11. doi: 10.3389/fpubh.2023.1192733.
19. Nadeem M, Arif MA, Manzoor A, Arslan SA, Zafar MH, Zafar SN. Frequency of stress, anxiety and depression among Pakistani physical therapists and their coping strategies during COVID-19. *J Riphah Coll Rehabil Sci.* 2023;11.
20. Pearce M, Garcia L, Abbas A, Strain T, Schuch FB, Golubic R, et al. Association between physical activity and risk of depression: a systematic review and meta-analysis. *JAMA Psychiatry.* 2022;79:550-9. doi:10.1001/jamapsychiatry.2022.0609.
21. Schuch FB, Vancampfort D, Firth J, Rosenbaum S, Ward PB, Silva ES, et al. Physical activity and incident depression: a meta-analysis of prospective cohort studies. *Am J Psychiatry.* 2018;175:631-48. doi:10.1176/appi.ajp.2018.17111194.
22. Fluetsch N, Levy C, Tallon L. The relationship of physical activity to mental health: a 2015 Behavioral Risk Factor Surveillance System data analysis. *J Affect Disord.* 2019;253:96-101. doi:10.1016/j.jad.2019.04.065.
23. Swed S, Alibrahim H, Bohsas H, Nashwan AJ, Elsayed M, Almoshantaf MB, et al. Mental distress links with physical activities, sedentary lifestyle, social support, and sleep problems: a Syrian population cross-sectional study. *Front Psychiatry.* 2022;13:1013623. doi:10.3389/fpsy.2022.1013623.
24. Mahindru A, Patil P, Agrawal V. Role of physical activity on mental health and well-being: a review. *Cureus.* 2023;15:e33342. doi:10.7759/cureus.33342.
25. Herbert C. Enhancing mental health, well-being and active lifestyles of university students by means of physical activity and exercise research programs. *Front Public Health.* 2022;10:849093. doi:10.3389/fpubh.2022.849093.
26. Li J, Wang L, Pan L, Hu Z, Yin R, Liu JF. Exercise motivation, physical exercise, and mental health among college students: examining the predictive power of five different types of exercise motivation. *Front Psychol.* 2024;15:1208872. doi:10.3389/fpsyg.2024.1208872.
27. Rodríguez-Romo G, Acebes-Sánchez J, García-Merino S, Garrido-Muñoz M, Blanco-García C, Díez-Vega I. Physical activity and mental health in undergraduate students. *Int J Environ Res Public Health.* 2023;20:195. doi:10.3390/ijerph20010195.
28. Masood T. Association among determinants of physical activity and mental health in physiotherapy students. *Pak J Med Health Sci.* 2020;14:1287-90.

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AW: Concept, methodology, software, validation, formal analysis, investigation, data curation, drafting, writing, review, editing, visualisation and project administration.

HJ: Concept, methodology, formal analysis, investigation, data

curation, writing, review, editing and visualisation.

AZ: Methodology, formal analysis, investigation, data curation, writing, review and editing.

MSH: Methodology, investigation, data curation, drafting, writing, review and editing.

MHB & MBI: Methodology, investigation, data curation, writing, review and editing.