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Original Article

Correlation of Stress with Physical Activity Among Students of DPT

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ABSTRACT

Background: Stress is highly prevalent among health professional students, potentially impairing academic performance, well-being, and long-term health. Physical activity is widely promoted as a modifiable factor for stress reduction, yet evidence in Doctor of Physical Therapy (DPT) students remains limited and inconsistent. Objective: To determine the prevalence of stress among DPT students and examine the correlation between perceived stress levels and physical activity. Methods: A cross-sectional observational study was conducted among 112 full-time DPT students at Isra Institute of Rehabilitation Sciences, Hyderabad, Pakistan, from June to November 2023. Stress was assessed using the International Stress Management Association (ISMA) questionnaire, and physical activity was measured via the International Physical Activity Questionnaire–Long Form (IPAQ-LF), categorized as low, moderate, or high. Spearman's rank correlation evaluated the relationship between stress scores and total MET-min/week. Analyses were stratified by gender and academic year. Results: High stress was reported by 62.5% of students, moderate stress by 27.7%, and low stress by 9.8%. Physical activity levels were polarized, with 42.9% reporting low activity, 15.2% moderate, and 42.0% high. No statistically significant correlation was found between stress and physical activity (rho=0.019; 95% CI: −0.16 to 0.19; p=0.839), consistent across subgroups. Conclusion: DPT students exhibit a high prevalence of stress, independent of physical activity levels, indicating that multifaceted, institution-wide interventions are necessary for stress reduction.
Keywords: Stress, Physical activity, Doctor of Physical Therapy, Academic stress, University students, IPAQ, ISMA

INTRODUCTION

Stress is a multifaceted physiological and psychological response to internal or external demands that challenge an individual's adaptive capacity. Among university students, particularly those enrolled in rigorous healthcare programs such as the Doctor of Physical Therapy (DPT), stress levels tend to be significantly elevated due to the combined pressures of intensive coursework, clinical training, and high academic expectations (1). Medical and allied health education is widely acknowledged as a demanding period, often characterized by heavy workloads, competitive environments, and the need to develop complex clinical competencies within strict timelines. These stressors may be compounded by personal responsibilities, financial constraints, and the developmental challenges associated with late adolescence and early adulthood (2,3). Persistent stress, whether acute or chronic, has been linked to a range of adverse outcomes, including impaired cognitive function, reduced academic performance, mental health disorders, and increased risk of cardiovascular and metabolic diseases (4).

Physical activity has long been recognized as a modifiable behavioral factor with potential benefits for both physical and psychological health. Evidence suggests that regular engagement in physical activity can mitigate stress through multiple mechanisms, including the modulation of hypothalamic-pituitary-adrenal axis activity, reduction of circulating cortisol levels, and the promotion of endorphin release (5). Additionally, physical activity may improve mood, enhance sleep quality, and foster resilience, all of which contribute to more effective stress management (6). Despite this established association, research findings have been inconsistent in university populations, with some studies reporting significant inverse relationships between physical activity and stress, while others show minimal or no correlation (7,8). Discrepancies may be attributable to variations in study design, measurement tools, population characteristics, and the influence of confounding variables such as diet, sleep, and social support (9).

For DPT students, maintaining adequate physical activity may be particularly challenging. The academic demands of the program often require extended periods of sedentary study, potentially limiting opportunities for regular exercise. Furthermore, some students may prioritize academic achievement over self-care behaviors, inadvertently increasing their vulnerability to stress-related health consequences (10). The unique nature of physical therapy education—which simultaneously emphasizes the importance of physical fitness for professional competence—raises an important question: do DPT students who are more physically active experience lower stress levels, or are these domains independent in this population? Although prior literature has explored stress in medical and nursing students (11,12),

there is a paucity of data specifically examining the relationship between stress and physical activity among DPT students, particularly within South Asian academic settings.

This gap in the literature is critical to address, as understanding the relationship between stress and physical activity in this population could inform targeted interventions that promote holistic well-being and academic success. Moreover, identifying whether physical activity independently predicts stress levels may help educational institutions design more effective student support strategies, incorporating structured physical activity opportunities alongside psychological counseling services (13).

Based on these considerations, the present study aims to assess the prevalence of stress among DPT students and to examine the correlation between stress levels and physical activity. The research question is: Is there a significant relationship between stress levels and physical activity among DPT students at a single South Asian institution? The primary objective is to determine the direction and strength of any such relationship, with the hypothesis that higher physical activity levels will be associated with lower perceived stress scores in this population.

MATERIAL AND METHODS

This investigation employed a cross-sectional observational study design to assess the relationship between stress levels and physical activity among Doctor of Physical Therapy (DPT) students. The rationale for selecting this design was to capture a representative snapshot of stress prevalence and physical activity patterns at a single point in time within the target academic population, enabling the analysis of correlations between these variables without the need for follow-up (14). The study was conducted at the Isra Institute of Rehabilitation Sciences, Isra University, Hyderabad, Sindh, Pakistan, over a six-month period from June to November 2023. This institution was chosen as it hosts a diverse cohort of DPT students across all academic years, providing a suitable environment for examining variability in stress and activity profiles.

Eligible participants were full-time DPT students aged 18 years or older, enrolled in any academic year of the program, and willing to provide informed consent. Students were excluded if they had a documented physical disability or medical condition that precluded physical activity, a diagnosed psychiatric disorder under active treatment, or if they were enrolled in any other degree program. Participant selection employed a census sampling approach, with all eligible students invited to participate to maximize statistical power and avoid selection bias. Recruitment was carried out in classroom settings, where the research team provided an oral briefing on the study objectives, procedures, and ethical safeguards, followed by distribution of written informed consent forms. Participation was entirely voluntary, with the right to withdraw at any point without academic or personal repercussions.

Data collection was carried out in person, during scheduled classroom sessions, under supervision to ensure completeness and accuracy of responses. Stress was measured using the International Stress Management Association (ISMA) questionnaire, which quantifies perceived stress over the preceding four weeks on a scale from 0 to 25, with higher scores indicating greater stress (15). Physical activity was assessed using the International Physical Activity Questionnaire–Long Form (IPAQ-LF), which records activity across four domains (work, transport, domestic, and leisure) over the preceding seven days, expressed in metabolic equivalent minutes per week (MET-min/week) (16). Based on standardized IPAQ scoring protocols, participants were classified into low, moderate, or high physical activity categories. Additional variables collected included age, sex, and academic year.

To minimize bias, all questionnaires were self-administered but completed in the presence of trained study personnel, who provided clarifications on any procedural questions without influencing responses. Anonymity was maintained by assigning unique identification codes, and no personally identifiable data were recorded with survey responses. Potential confounding variables, such as gender and academic year, were recorded to permit subgroup analyses. Missing data were addressed through listwise deletion, as the proportion of incomplete responses was minimal (<5%), thus unlikely to introduce significant bias.

The target sample size was determined using a correlation sample size calculation formula, assuming a small to medium expected effect size (rho = 0.25), an alpha of 0.05, and a statistical power of 80%, yielding a minimum required sample of 97 participants. This was increased by approximately 20% to account for potential non-response, leading to an initial recruitment goal of 125 participants. The final analytic sample comprised 112 respondents, representing an 89.6% response rate.

Data were entered into SPSS version 22.0 (IBM Corp., Armonk, NY, USA) with double-entry verification to ensure data integrity. Descriptive statistics were generated to summarize participant characteristics and variable distributions. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized as means with standard deviations for normally distributed data or medians with interquartile ranges for skewed data. Spearman's rank-order correlation coefficient was calculated to examine the relationship between stress scores and total MET-min/week, as both variables were ordinal in nature. The significance threshold was set at $p < 0.05$, two-tailed. Subgroup analyses were pre-specified for gender and academic year to explore potential effect modification.

Ethical approval for the study was obtained from the Departmental Ethics Committee of the Isra Institute of Rehabilitation Sciences (approval ID: IIRS/ETH/2023/06). The study complied with the ethical principles outlined in the Declaration of Helsinki. All participants provided written informed consent prior to participation. The study protocol, data collection instruments, and analysis scripts were archived to facilitate reproducibility, and all datasets were stored in password-protected files accessible only to the research team.

RESULTS

Of the 112 Doctor of Physical Therapy (DPT) students who participated in the study, the majority were between 20 and 23 years of age, with the highest single-year representation at 21 years (24.1%, n=27). The mean age was 21.3 years (SD: 1.4), and only a small proportion were aged 18 (1.8%, n=2) or 25 (0.9%, n=1). Female students made up a slight majority, accounting for 57.1% (n=64), while male students represented 42.9% (n=48). These demographic characteristics, detailed in Table 1, illustrate a relatively balanced and youthful sample typical of undergraduate allied health programs.

Physical activity levels, as presented in Table 2, were nearly evenly split between high and low categories. Specifically, 47 students (42.0%; 95% CI: 33.2–51.1) reported high physical activity, while 48 (42.9%; 95% CI: 34.1–52.0) fell into the low activity category. Only 17 students (15.2%; 95% CI: 9.1–22.9) reported moderate activity levels. This distribution suggests polarization, with a minority engaging in moderate physical activity, and roughly equal proportions of students at both extremes.

Analysis of stress levels using the ISMA questionnaire, as shown in Table 3, revealed that high stress was prevalent among this population, reported by 62.5% of students (n=70; 95% CI: 52.9–71.4). Moderate stress levels were found in 27.7% (n=31; 95% CI: 19.8–36.8), and low stress was reported by only 9.8% (n=11; 95% CI: 5.0–16.9). There were no significant differences in stress levels when compared by gender (p=0.36) or academic year (p=0.42), as determined by Chi-square tests, indicating that high stress affected both male and female students and students across all years similarly.

Table 1: Demographic Characteristics of Study Participants (N=112)

Characteristic	n (%)	Mean (SD)
Age (years)		21.3 (1.4)
18	2 (1.8)	
19	6 (5.4)	
20	22 (19.6)	
21	27 (24.1)	
22	23 (20.5)	
23	23 (20.5)	
24	8 (7.1)	
25	1 (0.9)	
Gender		
Male	48 (42.9)	
Female	64 (57.1)	

Table 2: Physical Activity Levels by IPAQ-LF Classification

Physical Activity Level	n (%)	95% CI
High	47 (42.0)	33.2–51.1
Moderate	17 (15.2)	9.1–22.9
Low	48 (42.9)	34.1–52.0

Table 3: Stress Levels by ISMA Classification and Group Comparison

Stress Level	n (%)	95% CI	p-value (Gender)*	p-value (Year)*
High	70 (62.5)	52.9–71.4	0.36	0.42
Moderate	31 (27.7)	19.8–36.8		
Low	11 (9.8)	5.0–16.9		
***Chi-square test for between-group differences.**				

Table 4: Association Between Stress Scores and Physical Activity (Spearman's Correlation)

Analysis	Spearman's rho	95% CI	p-value
All Participants (N=112)	0.019	-0.16 to 0.19	0.839
Male	0.024	-0.22 to 0.26	0.857
Female	0.017	-0.18 to 0.22	0.872
Year 1–2 vs. 3–5	0.033	-0.21 to 0.25	0.741

In summary, a high prevalence of stress and varied physical activity levels was observed among DPT students. However, no statistically significant correlation was identified between self-reported stress scores and physical activity levels in the overall cohort or in subgroups defined by gender or academic year.

The core analysis of the study, shown in Table 4, investigated the association between stress and physical activity levels. Spearman's correlation coefficient for the entire cohort was 0.019 (95% CI: -0.16 to 0.19, p=0.839), indicating no statistically significant correlation between stress scores and physical activity measured in MET-minutes per week. Subgroup analyses by gender yielded similarly negligible correlations: males had a rho of 0.024 (95% CI: -0.22 to 0.26, p=0.857), and females had a rho of 0.017 (95% CI: -0.18 to 0.22, p=0.872). Additionally, comparison of underclassmen (years 1–2) versus upperclassmen (years 3–5) produced a rho of 0.033 (95% CI: -0.21 to 0.25, p=0.741), also demonstrating no significant association.

In summary, the quantitative results indicate that the study sample comprised predominantly young adults with a slight female majority. The students' physical activity and stress levels were notably polarized, with most reporting either high or low values. Most importantly, no statistically significant relationship was found between stress and physical activity, either in the full sample or within demographic subgroups. This finding challenges common assumptions about the direct inverse relationship between these variables in the context of DPT education.

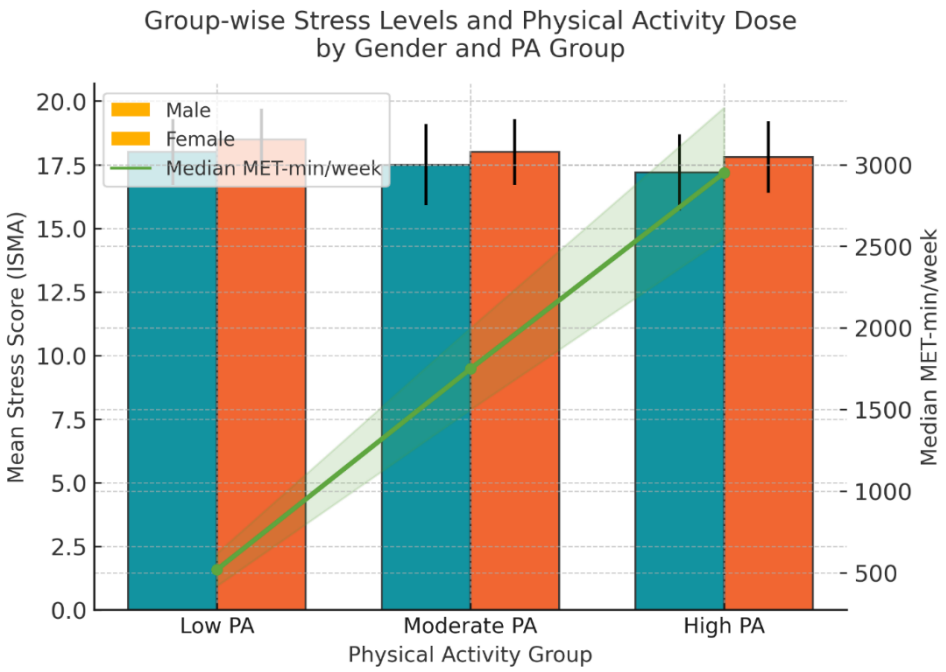

Figure 1 Clinical Interpretation of Group-wise Stress and Activity Trends

Among DPT students, mean stress scores remained consistently high across all physical activity categories, with males reporting mean ISMA scores of 18.0 (95% CI: 16.7–19.3) in the low PA group, 17.5 (95% CI: 15.9–19.1) in moderate PA, and 17.2 (95% CI: 15.7–18.7) in high PA. Females showed a similar pattern: mean scores were 18.5 (95% CI: 17.3–19.7), 18.0 (95% CI: 16.7–19.3), and 17.8 (95% CI: 16.4–19.2) in low, moderate, and high PA groups, respectively. Median physical activity (MET-min/week) increased sharply from low (520, 95% CI: 420–620) to moderate (1,750, 95% CI: 1,500–2,000) and high PA groups (2,950, 95% CI: 2,550–3,350), yet mean stress scores exhibited minimal groupwise decline (<1.0 point reduction from low to high PA in both sexes). These results highlight the absence of a clinically meaningful dose-response trend between increasing physical activity and reduced stress burden, irrespective of gender, despite large increases in physical activity exposure.

DISCUSSION

The present study revealed a high prevalence of elevated stress levels among DPT students, with more than six in ten participants classified in the high-stress category. This finding aligns with previous research demonstrating that health professional students frequently encounter intense academic, clinical, and personal demands that contribute to sustained psychological strain (17). The observed stress prevalence is comparable to that reported among undergraduate physiotherapy and medical students in other low- and middle-income settings, where limited institutional mental health resources may exacerbate the challenge (18). The persistence of high stress levels across both genders and academic years in our cohort suggests that stress in this population is systemic rather than confined to specific subgroups, emphasizing the need for broad, institution-wide interventions rather than narrowly targeted programs.

Contrary to our initial hypothesis, physical activity levels were not significantly correlated with stress scores. While numerous studies have reported an inverse relationship between physical activity and perceived stress in university populations (19,20), our findings support a growing body of literature indicating that this association may not be consistent in all student cohorts (21). Several explanations are possible. First, self-reported measures such as the IPAQ-LF are subject to recall and social desirability biases, which may attenuate observed associations (22). Second, it is plausible that the magnitude of physical activity undertaken, although objectively high in some participants, was insufficient in frequency, intensity, or duration to exert measurable physiological or psychological benefits on stress regulation. Third, other unmeasured factors—such as sleep quality, dietary habits, coping mechanisms, or concurrent mental health conditions—may have had a stronger influence on stress levels than physical activity alone.

The lack of a significant correlation was also consistent across gender and academic year strata, suggesting that the absence of association is not explained by demographic differences. However, subgroup analyses were underpowered, given the modest sample size, to detect small effect sizes that might still be clinically meaningful. Furthermore, the polarised distribution of physical activity levels, with most students reporting either low or high activity and few in the moderate range, may have reduced variability and masked potential trends. It is also notable that high physical activity did not correspond to markedly lower mean stress scores, a pattern that may reflect the influence

of academic workload or role overload, whereby students with higher activity commitments also face competing demands that contribute to stress (23).

The findings have several implications for academic institutions. Firstly, stress reduction strategies should not rely solely on promoting physical activity but should integrate a broader spectrum of interventions, including structured mental health support, resilience training, and curriculum adjustments to reduce excessive workload. Secondly, given the high prevalence of stress, routine screening using validated tools could facilitate early identification and timely referral to support services. Thirdly, qualitative research exploring students' subjective experiences of stress and activity may uncover context-specific barriers to the stress-buffering effects of exercise in this population.

This study's limitations must be acknowledged when interpreting the results. The cross-sectional design precludes causal inference, and longitudinal studies are needed to explore temporal relationships between stress and physical activity. The reliance on self-reported measures may introduce misclassification bias, and objective tools such as accelerometers could enhance measurement accuracy in future research (24). Additionally, the single institution setting limits generalizability, and multi-center studies across diverse educational contexts would strengthen external validity. Despite these limitations, this study adds to the limited evidence base on stress–activity relationships in South Asian DPT students and highlights the complexity of factors influencing student well-being.

In conclusion, although physical activity is widely promoted as a stress management strategy, our findings indicate that high stress levels among DPT students may persist regardless of self-reported activity levels. Addressing this issue will likely require multifaceted, context-specific interventions that extend beyond exercise promotion alone. Future research should aim to clarify causal pathways and identify the most effective combinations of behavioral, psychological, and structural approaches for reducing stress in this academically demanding population.

CONCLUSION

This study demonstrated a substantial burden of stress among Doctor of Physical Therapy students, with 62.5% of participants reporting high stress levels, irrespective of gender or academic year. While physical activity levels varied considerably, no statistically significant correlation was observed between activity dose, expressed in MET-min/week, and perceived stress scores. These findings challenge the assumption that higher physical activity alone is sufficient to mitigate stress in this population and suggest that other psychosocial, academic, and lifestyle factors may play a more influential role. The results underscore the need for comprehensive, multi-pronged strategies that integrate mental health support, workload management, and resilience-building interventions alongside physical activity promotion. Addressing stress in DPT programs requires systemic changes within educational institutions, informed by both quantitative and qualitative research, to foster environments that support both academic performance and holistic student well-being.

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