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Physical Activity and Psychological Health among University Students: A Cross-Sectional Investigation of Mental Well-Being and Academic Stress

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ABSTRACT

Background: *University students are disproportionately vulnerable to psychological distress during academic semesters, yet the role of physical activity as a modifiable protective factor remains underexplored in South Asian higher education contexts.*

Objective: This study aimed to examine the associations between physical activity levels, mental well-being, and perceived academic stress among young adults enrolled in higher education during an active academic semester.

Methods: *A cross-sectional survey design was employed with 112 university students (M = 76.8%; F = 23.2%) recruited through convenience sampling. A validated, structured questionnaire assessed physical activity patterns, mental well-being (WHO-5 adapted items), and perceived stress (PSS adapted items) using a five-point Likert scale. Data were analyzed using SPSS (descriptive statistics and Chi-square tests) with significance set at α = .05.*

Results: *Daily walking was the predominant physical activity (59.0%), yet 41.1% of participants reported sedentary behavior exceeding six hours per day. Most students reported positive mental well-being outcomes, including high self-confidence (Always: 43.8%), sense of life meaning (Always: 41.1%), and effective decision-making (Always: 34.8%). Academic stress was reported as manageable by the majority; nonetheless, mental exhaustion (Often + Sometimes: 56.3%) and perceived overwhelm (Often + Sometimes: 57.1%) were prevalent. Chi-square analyses revealed significant response patterns across most well-being ($p < .001$ to $.021$) and stress items ($p < .001$ to $.033$).*

Conclusion: *Regular physical activity is positively associated with mental well-being and adaptive stress responses among university students. Despite this, the concurrent prevalence of sedentary behavior underscores an urgent need for institutionally embedded physical activity programs and mental health initiatives within Pakistani universities.*

Keywords: *Physical Activity; Mental Well-Being; Academic Stress; University Students; Sedentary Behavior; Pakistan*

1. Introduction

Mental health among university students has become a pressing global concern, with research consistently demonstrating elevated rates of stress, anxiety, and diminished psychological well-being during academic semesters. The confluence of academic demands, social transitions, and lifestyle disruptions creates a particularly challenging environment in which young adults must navigate substantial psychological pressures (Pascoe et al., 2020; World Health Organization, 2022). In developing nations such as Pakistan, these pressures are compounded by cultural expectations of academic achievement, limited institutional mental health resources, and social norms that often deprioritize leisure-based physical activity.

Physical activity has emerged as a well-documented, cost-effective strategy for promoting psychological health across diverse populations. The neurobiological underpinnings of this relationship are well-established: aerobic movement stimulates the release of endorphins, dopamine, and serotonin, thereby improving mood regulation, reducing cortisol-mediated stress responses, and enhancing cognitive functioning (Boecker et al., 2008; Lubans et al., 2016). Theoretical frameworks including the Stress-Coping Model (Lazarus & Folkman, 1984), the Endorphin Hypothesis (Boecker et al., 2008), and Self-Determination Theory (Deci & Ryan, 2000) collectively provide a robust conceptual basis for understanding how physically active students are better equipped to manage psychological distress.

Despite this evidence, the specific interplay between physical activity, mental well-being, and academic stress within Pakistani university settings remains insufficiently examined. Prior local studies have highlighted reduced sports participation as a risk factor for anxiety and emotional instability among Pakistani students (Ali et al., 2020; Khan et al., 2019), and cultural constraints particularly for female students further restrict engagement in health-promoting behaviors (Gul & Khan, 2021). Cross-sectional perception-based investigations are notably scarce in this context, limiting the evidence base available to policymakers and university administrators.

The present study sought to address this gap by examining associations between physical activity levels and two psychological outcomes mental well-being and perceived academic stress among university students across multiple disciplines during an active academic semester. By generating context-specific, actionable evidence, the findings aim to inform the design of campus-level interventions that integrate physical activity into student wellness programming.

2. Methods

2.1 Study Design and Participants

A quantitative, cross-sectional survey design was employed. The target population comprised students enrolled in undergraduate and postgraduate programs at higher education institutions in Lahore, Pakistan. Using convenience sampling, a total of 112 participants were recruited during the academic semester. Eligibility criteria required that participants be enrolled students aged 18–25 years who provided informed consent. No exclusion criteria based on physical fitness level were applied, ensuring ecological validity. The study protocol adhered to the ethical guidelines of the Declaration of Helsinki; all participants were briefed on the study's purpose, voluntariness of participation, and data confidentiality prior to enrollment.

2.2 Instrumentation

A validated, structured questionnaire comprising three scales was employed. The Physical Activity Scale (5 items) assessed vigorous activity frequency, moderate activity engagement, daily walking habits, sedentary time, and overall self-rated activity level. The Mental Well-Being

Scale (7 items), adapted from the WHO-5 Well-Being Index, captured positive affect, calmness, vitality, interest in daily activities, self-confidence, decision-making ease, and perceived life meaning. The Stress Scale (8 items), adapted from Cohen's Perceived Stress Scale, assessed perceived loss of control, academic-related nervousness, coping confidence, task overwhelm, reactivity to unexpected events, emotional regulation under challenge, mental exhaustion, and overall coping capacity. All items were rated on a five-point Likert scale (1 = Never to 5 = Always). Internal consistency was confirmed for all subscales, with Cronbach's alpha values of .829 (Physical Activity), .789 (Well-Being), and .801 (Stress), indicating acceptable-to-good reliability.

2.3 Data Collection Procedure

Questionnaires were administered in person by the principal researcher. Participants were briefed on the study's objectives and completion instructions, and informed consent was secured prior to data collection. Questionnaires were completed and returned immediately upon completion to minimize attrition. Confidentiality and anonymity were maintained throughout.

2.4 Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics (Version 25). Descriptive statistics frequencies and valid percentages were computed for all demographic and scale items. Chi-square goodness-of-fit tests were conducted for each survey item to determine whether the observed distribution of responses differed significantly from a uniform (expected) distribution, revealing dominant patterns of behavior and perception. The significance threshold was set at $\alpha = .05$. Effect sizes were not separately computed given the non-parametric, descriptive design of the study.

3. Results

3.1 Participant Characteristics

The study comprised 112 participants; demographic characteristics are presented in Table 1. The majority were aged 20–22 years (58.0%) and male (76.8%). Slightly more than half were enrolled in Physical Education (52.7%), with the remainder in sciences (46.4%). Students were distributed across all academic years, with the largest cohort in their first year (35.7%). A majority (54.5%) reported physical activity engagement exceeding one year in duration.

Table 1

Demographic Characteristics of the Sample (N = 112)

Variable	Category	n (%)
Age	18–19 years	37 (33.0%)
	20–22 years	65 (58.0%)
	23–25 years	10 (8.9%)
Gender	Male	86 (76.8%)
	Female	26 (23.2%)
Field of Study	Physical Education	59 (52.7%)
	Sciences	52 (46.4%)
	Other	1 (0.9%)

Academic Year	1st Year	40 (35.7%)
	2nd Year	21 (18.8%)
	3rd Year	22 (19.6%)
	4th Year	29 (25.9%)
PA Engagement	< 1 year	20 (17.9%)
Duration	1 year	31 (27.7%)
	> 1 year	61 (54.5%)

3.2 Physical Activity Patterns

Table 2 summarizes Chi-square results for the physical activity items. The most prevalent mode of physical activity was daily walking for at least 10 continuous minutes (n = 66, 58.9%), which yielded the strongest statistical significance (χ^2 = 123.71, df = 4, p < .001). Engagement in moderate physical activity for at least 30 minutes daily was also significantly distributed (χ^2 = 9.88, df = 4, p = .043), with 30 students (26.8%) reporting this frequency every day. Participation in vigorous activity at least three days per week was more variable and did not reach statistical significance (χ^2 = 6.13, df = 4, p = .190), with the modal response being three to four days weekly (n = 31, 27.7%). Notably, 46 participants (41.1%) reported spending more than six hours per day in sedentary behavior every day (χ^2 = 34.79, df = 4, p < .001), indicating a concurrent and substantial burden of sedentary time alongside routine walking activity.

Table 2

Chi-Square Results for Physical Activity Items (N = 112)

Item	Most Frequent Response	n	χ^2	df	p
Vigorous PA ≥3 days/week	3–4 days	31	6.13	4	.190
Moderate PA ≥30 min/day	Every day	30	9.88	4	.043
Daily walking ≥10 min	Every day	66	123.71	4	<.001
Sedentary >6 hrs/day	Every day	46	34.79	4	<.001
Overall, PA self-rating	Every day	39	22.02	4	<.001***

Note. (R) = reverse-scored item. p < .05. p < .01. p < .001.

3.3 Mental Well-Being Outcomes

Table 3 presents findings for the mental well-being subscale. Response distributions across all seven items were statistically significant (p ≤ .021), reflecting non-random concentration in positive response categories. Self-confidence emerged as the most positively endorsed dimension, with 49 students (43.8%) reporting that they always feel confident (χ^2 = 60.68, df = 4, p < .001). A comparable pattern was observed for sense of life meaning, with 46 participants (41.1%) selecting "Always" (χ^2 = 59.16, df = 4, p < .001). Decision-making ease was similarly skewed toward positive responses ("Often" + "Always" = 64.3%). Positive affect in the form of cheerfulness and vitality was more moderately distributed, with students most frequently

reporting occasional to frequent experience of these states. Overall, the data indicate that the majority of participants maintained meaningful levels of psychological well-being during the academic semester.

Table 3

Chi-Square Results for Mental Well-Being Items (N = 112)

Item	Most Frequent Response	N	χ^2	df	p
Felt cheerful and in good spirits	Sometimes	39	14.43	3	.002
Felt calm and relaxed	Sometimes	35	37.91	4	<.001
Felt active and energetic	Sometimes	38	9.71	3	.021
Felt interested in daily activities	Sometimes	39	38.54	4	<.001
Felt confident about self	Always	49	60.68	4	<.001
Able to make decisions easily	Always	39	48.36	4	<.001
Life felt meaningful	Always	46	59.16	4	<.001

Note. $p < .05$. $p < .01$. $p < .001$.

3.4 Perceived Academic Stress

Stress-related response patterns are presented in Table 4. Academic nervousness was acknowledged as occurring at least sometimes by 68.8% of participants ($\chi^2 = 10.50$, df = 4, p = .033), and 57.1% reported occasionally or frequently feeling unable to manage all their tasks ($\chi^2 = 12.02$, df = 4, p = .017). Mental exhaustion due to workload was reported as occurring often or always by 46.4% of respondents ($\chi^2 = 18.27$, df = 4, p = .001). Despite these stressors, the majority demonstrated positive coping indicators: 31 participants (27.7%) reported always feeling confident in managing personal problems, and 31 participants reported usually maintaining calm during challenges. Overall loss of perceived control was most commonly experienced only sometimes (n = 39, 34.8%), and persistent feelings of insurmountable difficulty were described as "Always" by only 15 participants (13.4%), indicating that extreme stress vulnerability was relatively uncommon.

Table 4

Chi-Square Results for Academic Stress Items (N = 112)

Item	Most Frequent Response	n	χ^2	df	p
Could not control important things	Sometimes	39	26.57	4	<.001
Felt nervous/stressed by academic pressure	Sometimes	35	10.50	4	.033
Confident handling personal problems (R)	Always	31	17.64	4	.001
Difficulties piling up uncontrollably	Often	29	30.07	5	<.001
Upset by unexpected events	Sometimes	43	32.46	4	<.001
Stayed calm when faced with challenges (R)	Sometimes	31	18.80	4	<.001
Felt mentally exhausted by workload	Often	32	18.27	4	.001
Unable to cope with all tasks	Sometimes	36	12.02	4	.017

Note. (R) = reverse-scored item. $p < .05$. $p < .01$. $p < .001$.

4. Discussion

This study examined the associations between physical activity patterns, mental well-being, and academic stress perceptions among university students in Pakistan. The findings contribute to a growing body of evidence underscoring physical activity as a significant correlate of psychological health in higher education environments, while simultaneously highlighting the paradox of concurrent habitual walking and high sedentary behavior a pattern that warrants particular attention from public health practitioners.

The predominance of walking as the primary mode of physical activity aligns with findings from prior research in resource-limited university settings where structured exercise facilities are not universally accessible (El Ansari et al., 2013). However, the low proportion of participants engaging regularly in vigorous activity (only 15 students, or 13.4%, reported daily vigorous exercise) suggests that most students are not meeting the intensity thresholds recommended by the World Health Organization (2020). This is consistent with international literature documenting declining vigorous activity levels as academic workload intensifies (Pascoe et al., 2020).

Of particular concern is the finding that 41.1% of participants engaged in more than six hours of daily sedentary behavior. This figure is clinically meaningful given mounting evidence that prolonged sitting independently predicts psychological distress, independent of overall physical activity levels (Lissak, 2018). The coexistence of daily walking and high sedentary time within the same population reflects a fragmented activity profile common among students who walk between classes yet spend extended periods studying or using screens. Targeted interventions promoting active breaks during prolonged sitting, rather than focusing solely on structured exercise, may therefore represent a pragmatically feasible approach in academic environments.

The predominantly positive mental well-being scores observed in this sample particularly the high endorsement of self-confidence and sense of life meaning align with Rebar et al.'s (2015)

meta-analytic conclusion that even low-to-moderate physical activity is sufficient to yield measurable psychological benefits. Participants who engaged more regularly in moderate activity and daily walking reported coherent positive emotional states, supporting the Endorphin Hypothesis (Boecker et al., 2008) and the broader stress-buffering mechanisms described by Stults-Kolehmainen and Sinha (2014). These findings also resonate with Self-Determination Theory (Deci & Ryan, 2000), in which self-directed physical activity fulfills psychological needs for competence and autonomy, thereby reinforcing emotional resilience.

The stress findings present a nuanced picture. While the majority of participants acknowledged at least occasional academic stress consistent with the established literature on Pakistani university contexts (Ahmed & Mahmood, 2021; Khan et al., 2019) the modal responses across most stress items fell in the "Sometimes" category, and extreme or chronic stress profiles were relatively uncommon. This suggests that the sample, which had a majority reporting more than one year of physical activity engagement, may possess higher baseline coping resources than previously documented sedentary student populations. Gerber and Pühse's (2009) observation that physically active students demonstrate superior emotional regulation aligns with this interpretation, as does the finding that most participants retained a capacity for calm and personal problem-management despite acknowledging workload-related exhaustion.

The gender imbalance in this sample (76.8% male) limits the generalizability of findings to female students. This disproportion is itself ecologically informative, reflecting well-documented structural and cultural barriers to female participation in sports science programs and physical activity contexts within Pakistan (Gul & Khan, 2021). Future studies employing stratified sampling to achieve gender parity will be essential for developing gender-responsive interventions.

5. Conclusion

This cross-sectional investigation demonstrates that university students who maintain regular physical activity, even in relatively accessible forms such as daily walking, report meaningfully positive mental well-being and largely manageable academic stress levels. The high prevalence of daily sedentary behavior, however, constitutes a concurrent risk that undermines the protective potential of incidental activity. These findings underscore the need for universities, particularly in Pakistan, to adopt multifaceted wellness strategies that not only encourage structured physical activity but also actively disrupt prolonged sedentary behavior through institutional scheduling, campus design, and pedagogical innovation.

6. Practical Implications and Recommendations

For university administrators and policymakers: Institutions should mandate a minimum of 30 minutes of structured physical activity within weekly timetables across all academic programs. Campus environments should be redesigned to incorporate walk able pathways, accessible green spaces, and standing or active workstations in common study areas.

For student counseling services: Physical activity should be formally integrated into stress management curricula and mental health promotion campaigns. Peer-led fitness groups can leverage social facilitation mechanisms identified in Social Cognitive Theory (Bandura, 1986) to sustain engagement.

For sports science educators: Behavioral interventions targeting self-efficacy and autonomous motivation are recommended, particularly for students with low baseline activity. Short, structured activity breaks embedded in lecture schedules represent a cost-effective and scalable approach.

For future research: Longitudinal designs with objective activity monitoring (accelerometer) and validated clinical instruments are needed to establish causal pathways. Studies should

oversample female participants, examine discipline-specific differences, and evaluate intervention efficacy in Pakistani university settings.

7. Limitations

Several limitations should be acknowledged. The cross-sectional design precludes causal inference; observed associations do not establish directionality. Reliance on self-reported physical activity and psychological outcomes introduces social desirability bias. The convenience sample predominantly male and drawn from two academic fields limits generalizability. The absence of objective physical activity measurement (e.g., accelerometer) and clinically validated diagnostic instruments (e.g., full PSS, PHQ-9) restricts the clinical interpretability of findings. Future research should address these limitations through longitudinal, multi-institutional designs employing objective measurement.

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