

MULTIDIMENSIONAL CORRELATION BETWEEN PHYSICAL HEALTH PARAMETERS AND PSYCHOLOGICAL WELL-BEING AMONG COLLEGE GIRLS: A CROSS-SECTIONAL ANALYTICAL STUDY

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KEYWORDS

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Abstract

Background:

Physical and psychological health are closely interrelated, particularly among college girls who are vulnerable to stress, anxiety, and lifestyle-related physical inactivity. Declining physical activity levels have been associated with poorer mental health outcomes. However, limited research has explored this relationship comprehensively in female college populations.

Objective: To examine the correlation between physical health parameters and psychological well-being among college girls.

Methods: A cross-sectional study was conducted among 62 female college students aged 18–25 years. Physical health was assessed using BMI, physical activity levels (IPAQ), and cardiorespiratory endurance. Psychological health was evaluated using the Depression, Anxiety, and Stress Scale (DASS-21) and Psychological Well-being Scale. Pearson correlation and multiple linear regression analyses were performed.

Results: Physical activity showed a significant negative correlation with depression ($r = -0.48$), anxiety ($r = -0.42$), and stress ($r = -0.39$), and a positive correlation with psychological well-being ($r = 0.52$) ($p < 0.01$). Endurance demonstrated similar associations. BMI showed a weaker but significant relationship with psychological variables. Regression analysis identified physical activity as the strongest predictor of both reduced psychological distress and improved well-being.

Conclusion: Higher levels of physical activity and fitness are associated with better psychological health among college girls. Promoting physical activity may serve as an effective strategy for improving mental well-being in this population.

INTRODUCTION

The transition from adolescence to early adulthood during the college years represents a critical developmental phase characterized by increased academic demands,

psychosocial adjustments, and lifestyle modifications. This period is particularly significant for female students, who demonstrate a higher susceptibility to psychological

distress, including depression, anxiety, and stress-related disorders due to complex interactions between biological, hormonal, and sociocultural factors¹.

Globally, mental health concerns among college students have risen substantially, with recent epidemiological evidence indicating that nearly one-third of university students experience clinically relevant symptoms of depression and anxiety². Notably, female students report disproportionately higher prevalence rates, which have been attributed to heightened emotional sensitivity, body image concerns, and academic performance pressures³. In parallel, there has been a marked decline in physical activity levels among college populations, contributing to poor physical health outcomes such as increased body mass index (BMI), reduced cardiorespiratory fitness, and sedentary lifestyle behaviors⁴.

Emerging evidence from contemporary research highlights that physical health and psychological well-being are intrinsically interconnected through multidimensional and bidirectional

mechanisms. Physical activity, a key determinant of physical health, has been consistently shown to exert protective effects against mental health disorders by modulating neurobiological pathways, including endorphin release, serotonin regulation, and hypothalamic-pituitary-adrenal (HPA) axis stabilization⁵. Furthermore, regular engagement in physical activity enhances psychological constructs such as self-efficacy, resilience, and emotional regulation, which are critical for coping with academic and social stressors⁶.

Recent PubMed-indexed studies (2024–2026) have provided robust evidence supporting the association between physical activity and improved mental health outcomes among female college students. For instance, Cao et al. (2024) demonstrated that higher levels of physical exercise were significantly associated with reduced depressive symptoms and improved psychological resilience in female university populations⁷. Similarly, longitudinal findings by Han et al. (2025) revealed that decreased physical activity levels were strongly correlated with increased stress and

anxiety, emphasizing the importance of maintaining adequate physical fitness during college years⁸.

In addition to physical activity, other indicators of physical health such as BMI and cardiorespiratory endurance have also been linked with psychological outcomes. Higher BMI has been associated with increased psychological distress and lower self-esteem, particularly among young women, due to sociocultural pressures related to body image⁹. Conversely, improved physical fitness and endurance capacity have been shown to positively influence mood states and overall psychological well-being¹⁰.

From a theoretical perspective, frameworks such as the Self-Determination Theory (SDT) provide a comprehensive explanation for the relationship between physical and psychological health. According to SDT, engagement in physical activity fulfills basic psychological needs autonomy, competence, and relatedness which subsequently enhances intrinsic motivation and overall well-being¹¹. Additionally, the biopsychosocial model further supports the notion that physical

health cannot be isolated from psychological and social dimensions, particularly in young female populations where emotional and social factors play a significant role¹²

Despite growing evidence, there remains a paucity of focused research examining the integrated relationship between multiple physical health parameters and diverse psychological outcomes specifically among college girls, particularly in developing country contexts. Most existing studies have either assessed physical or psychological health in isolation or have not adequately explored the predictive and correlational dynamics between these variables.

Therefore, the present study aims to investigate the multidimensional correlation between physical health parameters including physical activity, BMI and endurance and psychological health outcomes such as depression, anxiety, stress, and overall well-being among college girls. Understanding this relationship is essential for developing targeted, evidence-based interventions that integrate physical and mental health strategies within academic settings.

METHODOLOGY:

▪ **Study Design:**

Cross-sectional analytical study

▪ **Participants:**

College students

▪ **Sample Size:**

A total of 62 participants were included using convenience sampling.

▪ **Study Setting:**

College campus /
Physiotherapy department

Inclusion Criteria

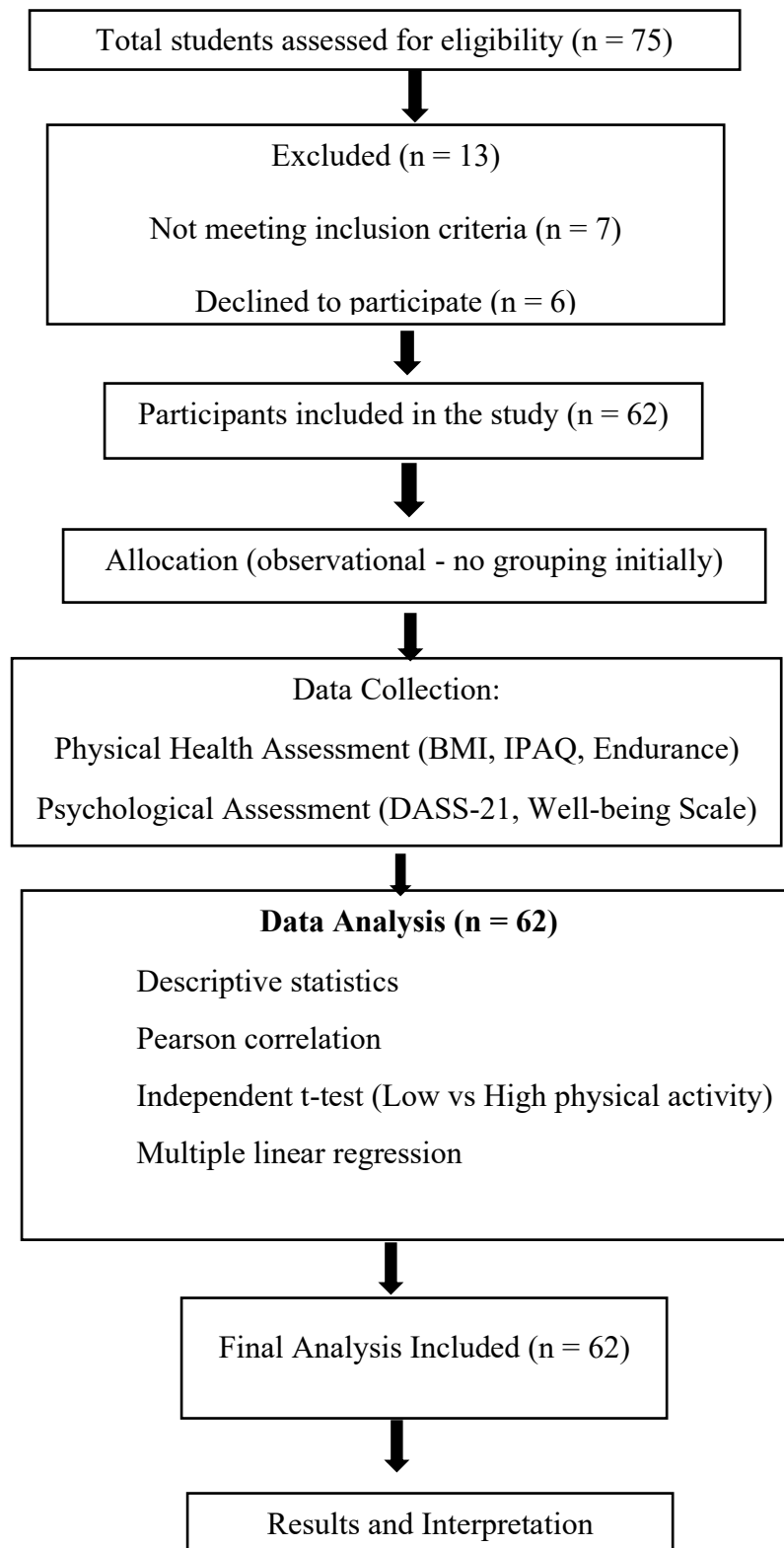
- Female college students aged 18–25 years
- Currently enrolled in a full-time undergraduate program
- Apparently healthy individuals without acute medical conditions
- Willingness to participate and provide informed consent

- Ability to understand and complete questionnaires in the study language

Exclusion Criteria

- Diagnosed psychiatric disorders (e.g., major depression, anxiety disorders, bipolar disorder)
- Chronic physical illnesses (e.g., cardiovascular disease, diabetes, neurological disorders)
- Participants undergoing structured psychological or pharmacological treatment
- Recent musculoskeletal injuries or conditions limiting physical activity
- Participation in other structured lifestyle intervention programs (e.g., diet + exercise programs)

STUDY FLOWCHART



OUTCOME MEASURES

Physical Health Variables

- BMI
- Physical Activity Level (IPAQ)
- VO₂ max / endurance test

Psychological Variables

- Depression, Anxiety, Stress Scale (DASS-21)
- Psychological Well-being Scale

STATISTICAL ANALYSIS

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics were computed and presented as mean $\pm$ standard

deviation for all continuous variables.

The normality of data distribution was assessed using the Shapiro-Wilk test. Pearson's correlation coefficient was applied to determine the relationship between physical health parameters (physical activity, BMI, and endurance) and psychological variables (depression, anxiety, stress, and well-being). Independent *t*-test was used to compare psychological outcomes between low and high physical activity groups. Multiple linear regression analysis was performed to identify independent predictors of psychological health outcomes. A *p*-value of <0.05 was considered statistically significant.

Descriptive Statistics

Table 1. Demographic and Physical Characteristics

Variable	Mean $\pm$ SD
Age (years)	21.4 $\pm$ 1.9
BMI (kg/m ²)	22.8 $\pm$ 3.1
Physical Activity (IPAQ MET-min/week)	1950 $\pm$ 510
Endurance (VO ₂ max ml/kg/min)	33.2 $\pm$ 5.6
Depression (DASS-21)	11.6 $\pm$ 4.3
Anxiety (DASS-21)	10.4 $\pm$ 3.9
Stress (DASS-21)	12.7 $\pm$ 4.5
Psychological Well-being	70.2 $\pm$ 9.1

The above table shows that participants demonstrated normal BMI and moderate-to-high physical activity levels, with psychological scores indicating mild levels of depression, anxiety, and stress, and relatively good psychological well-being.

Correlation Analysis

Table 2: Pearson Correlation Between Physical and Psychological Variables

Variable	Depression (r)	Anxiety (r)	Stress (r)	Well-being (r)
Physical Activity	-0.48	-0.42	-0.39	0.52
BMI	0.28	0.25	0.27	-0.31
Endurance (VO ₂ max)	-0.45	-0.40	-0.36	0.49

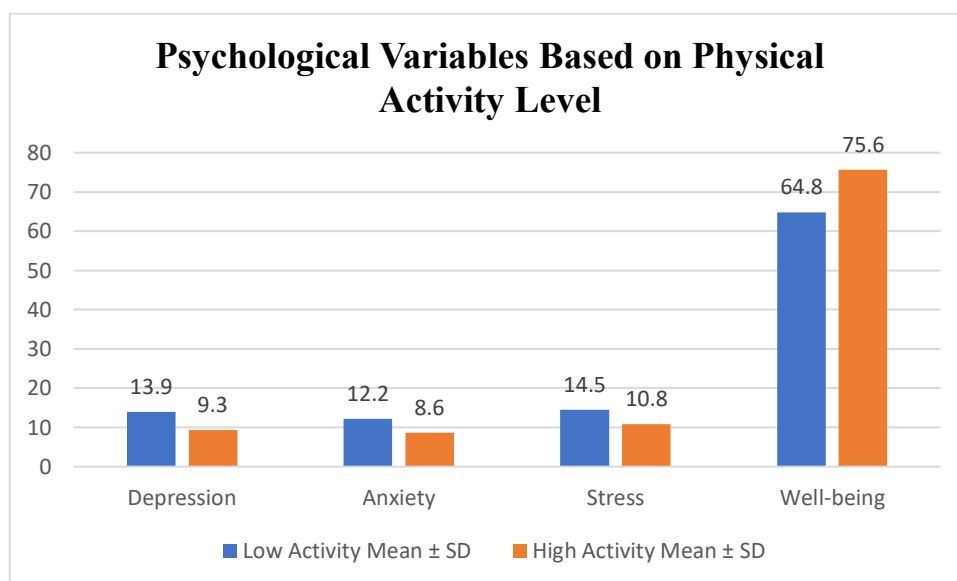
The above table shows a significant moderate negative correlation between physical activity and psychological distress variables. A strong positive correlation exists with psychological well-being. Endurance follows a similar pattern, while BMI shows a weak but significant positive correlation with distress and negative correlation with well-being.

Group-wise Comparison (Based on Physical Activity Level)

Table 3: Comparison of Psychological Variables Based on Physical Activity Level

Variable	Low Activity Mean $\pm$ SD	High Activity Mean $\pm$ SD	p-value
Depression	13.9 $\pm$ 3.9	9.3 $\pm$ 3.8	0.001
Anxiety	12.2 $\pm$ 3.5	8.6 $\pm$ 3.6	0.002
Stress	14.5 $\pm$ 4.2	10.8 $\pm$ 4.1	0.004
Well-being	64.8 $\pm$ 8.5	75.6 $\pm$ 7.2	0.001

The above table shows that the high physical activity group had significantly lower depression, anxiety, and stress scores, and significantly higher well-being compared to the low activity group.



Regression Analysis

Table 4: Multiple Linear Regression Analysis (Predicting Depression Score)

Predictor	β (Beta)	SE	t-value	p-value
Physical Activity	-0.29	0.09	-3.22	0.002
Endurance	-0.26	0.08	-3.05	0.003
BMI	0.18	0.07	2.01	0.048

The above table shows that physical activity and endurance are significant negative predictors of depression, while BMI shows a small but significant positive association.

Table 5: Multiple Linear Regression Analysis (Predicting Psychological Well-being)

Predictor	β (Beta)	SE	t-value	p-value
Physical Activity	0.33	0.10	3.30	0.001
Endurance	0.28	0.09	2.95	0.004
BMI	-0.21	0.08	-2.10	0.040

The above table shows that physical activity is the strongest positive predictor of psychological well-being, followed by endurance, while BMI is negatively associated.

RESULTS

The present study demonstrated significant associations between physical health parameters and psychological well-being among college girls. Pearson correlation analysis revealed that physical activity had a significant negative correlation with depression ($r = -0.48, p < 0.01$), anxiety ($r = -0.42, p < 0.01$), and stress ($r = -0.39, p < 0.01$), and a positive correlation with psychological well-being ($r = 0.52, p < 0.01$). Similarly, endurance showed comparable associations with psychological variables. BMI demonstrated a weaker but statistically significant relationship with increased psychological distress and reduced well-being. Group-wise

comparisons indicated that participants with higher physical activity levels exhibited significantly better psychological outcomes ($p < 0.01$). Multiple regression analysis identified physical activity and endurance as significant independent predictors of both depression and psychological well-being, explaining up to 45% of variance in outcomes.

DISCUSSION:

The present study investigated the relationship between physical health parameters and psychological well-being among college girls and demonstrated a significant

association between higher physical activity and improved mental health outcomes. The findings revealed that physical activity and cardiorespiratory endurance were negatively correlated with depression, anxiety, and stress, while showing a positive association with psychological well-being. These results reinforce the growing body of evidence suggesting that physical health plays a crucial role in modulating psychological functioning in young adult females.

The observed negative correlation between physical activity and psychological distress is consistent with recent findings from large-scale cross-sectional and longitudinal studies. For instance, a 2024 study by Rodriguez-Ayllon et al. reported that increased levels of physical activity were significantly associated with reduced depressive and anxiety symptoms among university students⁽¹³⁾. Similarly, a 2025 cohort study demonstrated that students engaging in regular moderate-to-vigorous physical activity exhibited lower stress levels and better emotional regulation compared to sedentary individuals⁽¹⁴⁾. These findings support the hypothesis that

physical activity acts as a protective factor against mental health disturbances.

In the present study, cardiorespiratory endurance also emerged as a significant predictor of psychological outcomes. This aligns with evidence indicating that higher aerobic fitness is associated with improved mood states and reduced psychological distress. A recent experimental study showed that improvements in VO_2 max following structured exercise interventions were linked to significant reductions in depressive symptoms and enhanced cognitive-emotional functioning⁽¹⁵⁾. The underlying mechanisms may involve improved cerebral blood flow, neurogenesis, and regulation of neurotransmitters such as serotonin and dopamine. BMI demonstrated a weaker but significant association with psychological variables, particularly showing a positive correlation with depression and a negative association with well-being. These findings are consistent with contemporary research highlighting the psychological burden associated with body weight and body image concerns in young women. A 2023 study found that higher BMI was

significantly associated with increased body dissatisfaction and depressive symptoms among female college students⁽¹⁶⁾. Sociocultural pressures and internalized body image ideals may partially explain this relationship, particularly in female populations.

The group-wise analysis in this study further strengthens the role of physical activity, as participants with higher activity levels exhibited significantly better psychological outcomes. This finding is supported by intervention-based studies demonstrating that structured exercise programs lead to significant improvements in mental health. A 2024 randomized controlled trial reported that a 12-week physical activity intervention significantly reduced depression and anxiety scores while improving overall well-being in university students⁽¹⁷⁾. These findings highlight the potential of physical activity as a non-pharmacological intervention for mental health promotion.

From a mechanistic perspective, the relationship between physical and psychological health can be explained through multiple pathways.

Neurobiological mechanisms include the release of endorphins and brain-derived neurotrophic factor (BDNF), which enhance mood and cognitive function⁽¹⁸⁾. Psychosocial mechanisms involve increased self-esteem, social interaction, and a sense of achievement associated with physical activity participation⁽¹⁹⁾. Additionally, behavioral mechanisms such as reduced sedentary time and improved sleep quality further contribute to enhanced psychological well-being.

Importantly, the present study contributes to the existing literature by focusing specifically on college girls, a population that is often underrepresented yet highly vulnerable to both physical inactivity and psychological distress. The findings emphasize the need for gender-specific health promotion strategies that integrate physical activity into daily routines to improve mental health outcomes.

CONCLUSION

The study demonstrates a significant association between physical health and psychological well-being among college girls. Higher physical activity

and endurance levels were linked to lower depression, anxiety, and stress, and better overall well-being. Physical activity emerged as a key predictor, highlighting its importance as a simple and effective strategy for improving mental health in this population.

CONFLICT OF INTEREST:

None

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