

Relación entre el Nivel de Actividad Física y el Estrés Académico en Estudiantes Universitarios: Un Estudio Transversal

The Relationship Between Physical Activity Levels and Academic Stress in University Students: A Cross-Sectional Study

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Resumen

Introducción: El estrés académico es un problema prevalente en la educación superior que afecta negativamente la salud mental y el rendimiento estudiantil. La actividad física se considera un factor protector clave, pero existe un vacío de conocimiento sobre esta relación en el contexto específico de las universidades colombianas. Este estudio busca llenar ese vacío.

Objetivo: Analizar la relación entre el nivel de actividad física y la percepción de estrés académico en estudiantes de pregrado de la Corporación Universitaria Latinoamericana (CUL).

Metodología: Se realizó un estudio cuantitativo, descriptivo-correlacional y de corte transversal. Se aplicó una encuesta digital a una muestra por conveniencia de 50 estudiantes, utilizando preguntas adaptadas de los instrumentos validados IPAQ y SISCO para medir la actividad física y el estrés, respectivamente.

Resultados: Se encontró una alta prevalencia de sedentarismo (44% de la muestra). El análisis de varianza (ANOVA) reveló una relación inversa y estadísticamente significativa ($p = 0.005$) entre las variables: el grupo de estudiantes sedentarios reportó el mayor nivel de estrés promedio ($M=3.48$), mientras que el grupo más activo reportó el menor ($M=2.19$).

Conclusiones: mayor nivel de actividad física, menor es la percepción de estrés académico en la muestra estudiada. Se concluye que la actividad física es un factor protector significativo para el bienestar estudiantil, y se recomienda su integración como un componente estratégico en las políticas universitarias de salud mental.

Palabras clave: Estrés académico; actividad física; estudiantes universitarios; bienestar; salud mental; sedentarismo.

Abstract

Introduction: Academic stress is a prevalent issue in higher education that negatively affects students' mental health and performance. Physical activity is considered a key protective factor, but there is a knowledge gap regarding this relationship in the specific context of Colombian universities. This study aims to fill that gap.

Objective: To analyze the relationship between the level of physical activity and the perception of academic stress in undergraduate students at Corporación Universitaria Latinoamericana (CUL).

Method: A quantitative, descriptive-correlational, cross-sectional study was conducted. A digital survey was administered to a convenience sample of 50 students, using adapted questions from the validated IPAQ and SISCO instruments to measure physical activity and stress, respectively.

Results: A high prevalence of sedentary behavior was found (44% of the sample). Analysis of variance (ANOVA) revealed a significant inverse relationship ($p = 0.005$) between the variables: the sedentary student group reported the highest average stress level ($M=3.48$), while the most active group reported the lowest ($M=2.19$).

Conclusions: The higher the level of physical activity, the lower the perception of academic stress in the studied sample. It is concluded that physical activity is a significant protective factor for student well-being, and its integration as a strategic component in university mental health policies is recommended.

Keywords: Academic stress; physical activity; university students; well-being; mental health; sedentary behavior.



INTRODUCTION

Academic stress (AS) represents a widespread concern and an inherent challenge within higher education [1], [2], [3]. The transition to university life is characterized by high academic demands, content overload, and limited time exposes students to stressful circumstances that can adversely affect their overall well-being [4]. Chronic stress associated with these academic pressures has been linked to disorders such as anxiety, depression, and burnout, directly contributing to the decline in academic performance.

In response to this issue, physical activity (PA) has emerged as a promising and accessible strategy for stress management and the promotion of mental health. Regular engagement in PA produces favorable psycho-emotional effects by reducing levels of anxiety and stress, and it is consistently associated with lower perceptions of academic stress. Cross-sectional evidence supports an inverse relationship between increased levels of physical activity, of moderate to vigorous intensity and decreased perceived stress among university students [5], [6], [7], [8].

Despite the well-documented protective role of physical activity, university environments often promote lifestyles that result in insufficient levels of physical activity (PA) and a high prevalence of sedentary behavior [9]. Sedentarism and physical inactivity are increasingly recognized as major public health concerns. Moreover, during periods of high academic demand or examination periods, levels of physical activity tend to decline significantly.

Although a body of evidence links physical inactivity to higher levels of academic stress (AS), the precise and nuanced relationship between specific levels of physical activity (low, moderate, high) and the perception of academic stress remains insufficiently established across different contexts [9]. It is therefore essential to generate context-specific evidence at local and institutional levels, as methodological heterogeneity and population variability hinder the generalization of findings. Investigating this knowledge gap is justified by the pressing need to understand the local impact of these variables to design tailored and effective interventions that mitigate academic stress and promote healthy lifestyles among university students [10], [11], [12], [13].

Accordingly, the objective of the present study was to analyze the relationship between the level of physical activity (low, moderate, high) and the perception of academic stress in a selected sample of university students. This research aims to provide valuable insights for decision-making in university wellness programs, facilitating the development of preventive strategies focused on enhancing students' overall health and well-being. The research question guiding this study was: "What is the relationship between the level of physical activity and the perception of academic stress in this population?"

LITERATURE REVIEW

Academic stress (AS) is defined as the emotional, physiological, and behavioral response experienced by students when facing the demands and pressures of the educational environment [2], [3], [4], [8], [14]. It is a prevalent phenomenon among university populations, with reported rates frequently exceeding 60%, and arises when perceived demands surpass an individual's adaptive capacity [2], [3], [8], [15]. The primary academic stressors include task and workload overload, pressure to achieve high performance, examinations, and limited time to meet academic responsibilities. Chronic academic stress has detrimental consequences, being associated with symptoms such as anxiety, fatigue, sleep disturbances, depression, and burnout, which negatively impact physical health, overall well-being, and academic performance.

Physical activity (PA) has been established as a protective factor and an accessible, promising strategy for stress management and the improvement of mental health. The mechanisms through which physical exercise mitigate stress are both physiological and psychological in nature [2], [3], [8]. At the physiological level, regular PA produces favorable psycho-emotional effects by increasing the release of neurotransmitters such as dopamine, endorphins, and endocannabinoids, and by modulating serotonin and gamma-aminobutyric acid (GABA) levels, which act as natural antidepressant agents. Psychologically, PA contributes to enhanced cognitive functioning, including improved attention, memory, and executive functions.

Moreover, regular exercise has been shown to strengthen key psychological mediators such as self-efficacy and resilience resources that are essential for effectively coping with academic demands.

Scientific evidence consistently supports a strong and inverse relationship between engagement in physical activity (PA) and the perception of academic stress (AS) among university students [2], [3], [8], [16]. Multiple studies have demonstrated that higher levels of physical activity particularly moderate-to-vigorous physical activity (MVPA)—are associated with lower levels of perceived academic stress [8], [10], [16]. This inverse trend is so consistent that PA is frequently perceived and utilized by students as a primary coping mechanism for stress management [17], [18], [19]. Conversely, low levels of PA and increased sedentary behavior, particularly during examination periods, are positively correlated with higher levels of academic stress. Longitudinal studies further confirm the protective role of PA in stress reduction, even highlighting a complex bidirectional relationship: elevated academic stress predicts subsequent reductions in PA, whereas higher PA levels predict subsequent decreases in stress [20], [21], [22].

In summary, while global literature clearly establishes the protective role of physical activity against academic stress and emphasizes the importance of psychological mediators such as self-efficacy and resilience, it is crucial to recognize that the manifestation of this relationship is moderated by specific contextual and demographic factors, such as gender and academic discipline [2], [3], [23]. Therefore, generating locally validated evidence within specific institutional contexts, as proposed in the present study, is essential. Such contextual validation is necessary to understand the design dynamics of each student population and, consequently, to design personalized, integrated, and highly effective well-being interventions aimed at mitigating the impact of academic stress.

METHODOLOGY

Study Design

A quantitative, non-experimental study with a descriptive–correlational and cross-sectional design was conducted. The study was designed and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Participants and Context

The target population comprised undergraduate students from three faculties—Economic Sciences, Social Sciences, and Engineering—at the Corporación Universitaria Latinoamericana (CUL) in Barranquilla, Colombia. Data collection was carried out during the final week of September 2025. A non-probability convenience sampling method was employed, distributing a link to a digital survey through student communication channels. The inclusion criteria required participants to enroll undergraduate students aged 18 years or older. After data cleaning to exclude respondents who did not meet the age criteria, the final sample consisted of N = 50 students.

Variables and Measurement Instrument

An ad hoc questionnaire was designed using the Google Forms platform, consisting of four sections:

- **Sociodemographic Variables:** Data were collected on faculty, gender, academic cycle, and age. The continuous variable age was subsequently categorized into ranges (“18–25 years,” “26–35 years,” “Over 35 years”) for descriptive analysis to facilitate interpretation.
- **Independent Variable (Exposure):** The main variable was the Level of Physical Activity. It was measured through a categorical self-assessment question adapted from the International Physical Activity Questionnaire (IPAQ) criteria, which classifies participants into three ordered levels: Low/Sedentary, Moderate/Sufficiently Active, and High/Active.
- **Dependent Variable (Outcome):** The outcome variable was the Perception of Academic Stress. It was measured using six items selected from the “Stressors” and “Symptoms” dimensions of the SISCO Inventory of Academic Stress, a previously validated instrument. Responses were recorded on a five-point Likert scale ranging from 1 (Never) to 5 (Always).

Based on these responses, a continuous variable titled Average Stress Score was computed for each participant.

Statistical Analysis

Data analysis was performed using R software (version 4.5.1) through the RStudio interface (version 2025.09.0-387), employing the tidyverse package for data manipulation and gtsummary for table generation.

For descriptive objectives (sample characterization, activity levels, and stress levels), descriptive statistics were computed, including frequencies, percentages, means, and standard deviations (SD). To address the main objective of analyzing the relationship between variables, a one-way Analysis of Variance (ANOVA) was conducted to compare mean Average Stress Scores across the three physical activity groups. An alpha level of 0.05 was established for all inferential tests. No missing data was observed in the final sample analyzed.

Ethical Considerations and Bias Control

Participation in the study was voluntary and anonymous, and informed consent was obtained from participants at the beginning of the questionnaire. To minimize response bias, data confidentiality was ensured. A potential selection bias was acknowledged due to the use of convenience sampling. To ensure compliance with ethical standards, data from participants under 18 years of age were excluded from the final analysis.

RESULTS

Study Participants

The study was conducted during the final week of September 2025. An open invitation to participate was distributed to the undergraduate student population of the Corporación Universitaria Latinoamericana (CUL). A total of 54 responses were received through the digital questionnaire. Eligibility was restricted to participants aged 18 years or older. After screening, four participants who did not meet the age criteria were excluded. Consequently, the final sample for statistical analysis consisted of $N = 50$ students. Participation was voluntary, and no participants withdrew once the questionnaire had been initiated.

Descriptive Data

The sociodemographic characteristics and key study variables are presented in Table 1. Most participants were enrolled in the Faculty of Economic Sciences (60.0%), identified as female (58.0%), and were relatively evenly distributed across the three academic cycles. The predominant age range was 18–25 years (60.0%).

A notable descriptive finding concerned the distribution of physical activity levels. A high prevalence of sedentary behavior was observed, with 44.0% ($n = 22$) of students classified as Low/Sedentary. In contrast, only 18.0% ($n = 9$) were categorized as High/Active.

The overall mean academic stress score for the sample was $M = 3.11$ ($SD = 1.05$) on a 5-point scale. Regarding institutional support priorities, the most valued initiative among students was “Improving and expanding sports facilities,” selected by 26.0% ($n = 13$) of respondents. No missing data was reported for the analyzed variables in the final sample.

TABLE 1. DESCRIPTIVE ANALYSIS OF THE SAMPLE ($N = 50$)

Characteristic	N = 50
Faculty	
Faculty of Economic Sciences (Financial Administration, Occupational Health and Safety Risk Management, Public Accounting, Technologies)	30 (60%)
Faculty of Social Sciences (bachelor’s degree in early childhood education, bachelor’s degree in physical education)	9 (18%)
Faculty of Engineering (Industrial Engineering, Systems and Computer Engineering)	11 (22%)
Gender	
Female	29 (58%)
Male	21 (42%)
Academic Cycle	
Initial Cycle (1st–3rd semester)	15 (30%)

Characteristic	N = 501
Intermediate Cycle (4th–6th semester)	17 (34%)
Final Cycle (7th semester and beyond)	18 (36%)
Age Range	
18 - 25 years	30 (60%)
26 - 35 years	17 (34%)
Over 35 years	3 (6.0%)
Level of Physical Activity	
Low / Sedentary Level: Generally, I do not meet the minimum weekly physical activity recommendation.	22 (44%)
Moderate / Sufficiently Active Level: I meet the minimum recommendation of engaging in approximately 30 minutes of moderate activity (or its equivalent) at least five days per week.	19 (38%)
High / Active Level: I engage in vigorous physical activity several days per week, or more than one hour of moderate activity almost every day.	9 (18%)
Stress Score (1–5)	
Mean (SD)	3.11 (1.05)
Institutional Support Priorities	
Create more flexible class schedules that facilitate physical activity.	9 (18%)
Implement additional campaigns promoting mental health and physical well-being.	10 (20%)
Improve and expand sports facilities for use by all students.	13 (26%)
Offer a greater variety of low-cost sports and recreational courses.	8 (16%)
Grant academic credits for regular participation in certified sports activities.	10 (20%)
ln (%)	

Main Results

The primary objective was to analyze the relationship between the level of physical activity and the perception of academic stress. [Table 2](#) presents the results of the Analysis of Variance (ANOVA), which compares the mean stress scores among the three defined physical activity groups.

A clear and statistically significant inverse relationship was found. The group classified as Low Level / Sedentary reported the highest mean stress score ($M = 3.48$, $SD = 0.93$). This average decreased for the Moderate Level group ($M = 3.11$, $SD = 1.03$) and was notably lower for the High Level / Active group ($M = 2.19$, $SD = 0.84$).

The ANOVA test confirmed that the difference between these means was statistically significant ($p = 0.005$), allowing for the rejection of the null hypothesis that no differences in stress exist among the groups. Continuous variables such as age were categorized into ranges to facilitate descriptive analysis, as detailed in [Table 1](#).

TABLE 2. ANOVA OF THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND STRESS (N = 50)

Variable	Low / Sedentary Level: N = 22	Moderate / Sufficiently Active Level: N = 19	High / Active Level: N = 9	p-value¹
Average Stress Score (1–5)				0.005
Mean (SD)	3.48 (0.93)	3.11 (1.03)	2.19 (0.84)	
¹ One-way analysis of means				

DISCUSSION

The central finding of this study is an inverse and statistically significant relationship ($p = 0.005$) between the level of physical activity (PA) and the perception of academic stress (AS) is highly consistent with the existing body of evidence [4]. This result supports the notion that greater engagement in PA, particularly of moderate to vigorous intensity, is consistently associated with lower perceived stress among university students [3], [7], [8], [23], [24]. Physical activity thus emerges as a protective factor that mitigates the tension generated by academic demands, a trend documented in multiple cross-sectional studies [8], [18], [25], [26].

The confirmation of this association has direct practical implications for student health. Given that university students are prone to insufficient PA levels and prolonged sedentary behavior averaging up to 11 hours per day physical inactivity and sedentary time are positively correlated with higher AS [8], [13], [27], [28], [29]. Therefore, it is imperative that institutions actively promote regular PA, particularly during periods of high academic demand such as examination seasons, through the design and implementation of integrated and personalized wellness programs.

However, the study presents several key limitations [13], [27], [28], [29]. Its cross-sectional design inherently precludes the establishment of causal relationships between physical activity and academic stress. Additionally, the use of non-probabilistic convenience sampling and the reliance on self-reported measures for PA and stress introduce potential biases [2].

Due to these methodological constraints, especially the non-probabilistic nature of the sample, the findings should be extrapolated with caution and are primarily applicable to the specific population studied [30]. Despite the limitations regarding causal inference, the evidence strongly supports physical activity as a fundamental strategy for promoting well-being and managing academic stress. Consequently, future research should prioritize longitudinal and prospective studies, ideally incorporating objective measures of physical activity (e.g., accelerometers), to overcome current methodological limitations and more rigorously establish the causal role of PA in mitigating academic stress.

CONCLUSIONS

In response to the research question, the results confirm the existence of a significant and inverse relationship between the level of physical activity and the perception of academic stress in the sample studied. The main finding demonstrates that as the level of physical activity increases, perceived stress levels decrease, positioning exercise as a powerful protective factor for student well-being. Consequently, this study advocates for the integration of physical activity not merely as a healthy habit, but as a strategic and indispensable component of educational management and university mental health policies. Promoting movement represents an accessible and highly impactful strategy to strengthen students' resilience, enhance their quality of life, and foster academic success.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest regarding the research, authorship, and/or publication of this article. The submitted work does not present any conflict of interest with the authors, the journal, the publishing institution, or any funding entity.

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