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Association Between Exam-Related Anxiety and Neck Pain Among University Students

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ABSTRACT

Background: *Neck pain is a common musculoskeletal complaint among university students and is increasingly understood within a biopsychosocial framework. Examination periods represent high-stress academic intervals during which psychological strain may contribute to cervical muscle tension and functional impairment. However, limited evidence has specifically examined the association between exam-related anxiety and neck disability using condition-specific instruments.* ***Objective:*** *To determine the association between exam-related anxiety and neck disability among university students during the examination period.* ***Methods:*** *A cross-sectional observational study was conducted among 110 university students aged 18–30 years. Exam-related anxiety was measured using the Westside Test Anxiety Scale (WTAS), and neck disability was assessed using the Neck Disability Index (NDI). Normality was evaluated using the Shapiro–Wilk test. Due to non-normal distribution of WTAS scores ($p = 0.032$), Spearman's rank-order correlation was used to assess association between variables.* ***Results:*** *The mean age of participants was 22.97 ± 2.43 years. The mean WTAS score was 4.12 ± 0.49, and the mean neck disability score was 62.63 ± 10.69. A statistically significant weak positive correlation was observed between exam-related anxiety and neck disability ($\rho = 0.251$, $p = 0.008$), with an approximate shared variance of 6.3%.* ***Conclusion:*** *Higher levels of exam-related anxiety were associated with modest increases in neck disability among university students. These findings support the integration of psychological and ergonomic interventions during examination periods to enhance student well-being.*

Keywords: *Exam anxiety, Neck disability, University students, Musculoskeletal pain, Psychological stress*

INTRODUCTION

Neck pain is a highly prevalent musculoskeletal complaint and a major contributor to years lived with disability worldwide, with substantial functional, psychosocial, and economic consequences for affected individuals (1). In young adults, neck pain frequently presents as activity-related discomfort accompanied by functional limitations that can interfere with study, sleep, and daily tasks, and its persistence is increasingly understood through a biopsychosocial framework rather than a purely mechanical model (2). Within this framework, psychological distress—including anxiety and depressive symptoms—can influence pain perception, amplify symptom severity, and contribute to prolonged disability by altering attentional focus, muscle tension, coping behaviors, and recovery trajectories (2). Empirical work consistently demonstrates that individuals with persistent neck pain exhibit higher levels of anxiety and stress-related symptomatology, supporting a clinically relevant association between psychological burden and neck-related disability (3,4).

Anxiety disorders are among the most common mental health conditions globally and often begin in early life, making them especially relevant to university-aged populations exposed to ongoing academic demands (5). A distinct and situational form of anxiety is examination-related anxiety, characterized by heightened apprehension, autonomic arousal, and cognitive

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interference before and during evaluative situations, which may impair performance and increase maladaptive behaviors such as prolonged static postures, excessive study duration, reduced restorative sleep, and compensatory stimulant use (6,7). Physiologically, acute academic stress activates sympathetic-adrenomedullary and hypothalamic–pituitary–adrenal pathways, increasing catecholamine output and cortisol secretion, which may contribute to heightened somatic vigilance, altered pain modulation, and sustained cervical muscle activation during periods of intensive study (8). These neuroendocrine and behavioral responses provide plausible pathways through which exam-related anxiety may be linked with musculoskeletal symptoms, particularly in body regions vulnerable to sustained postural load such as the cervical spine (8).

University students report musculoskeletal discomfort more frequently during periods of elevated academic engagement, and exam periods represent an identifiable high-stress window in which both psychological strain and sedentary, head-forward postures may increase (9). Contemporary evidence indicates that neck pain in students is associated with emotional distress and high stress levels, as well as sustained head-down posture during studying and device use, underscoring the interdependence of psychosocial and ergonomic drivers in this population (10). Several studies have examined test anxiety prevalence and coping strategies among university students, demonstrating that moderate-to-high exam anxiety is common and that coping behaviors vary widely, with potential implications for both mental and physical health (11,12). Additionally, investigations conducted in student populations have reported associations between neck pain and psychological variables such as stress and depressive symptoms, and some have identified anxiety as a potential predictor of neck-related disability alongside factors like sleep quality and quality of life (13,14). However, much of the available literature either addresses general psychological distress rather than exam-specific anxiety, evaluates mixed musculoskeletal outcomes rather than a neck-specific disability endpoint, or focuses on specific contexts such as online learning periods, limiting generalizability to routine university exam environments (13–15).

Accordingly, an important knowledge gap remains regarding whether exam-specific anxiety, measured using a dedicated instrument, is associated with neck-related disability within a typical university setting. Clarifying this relationship is clinically relevant because it supports an integrated approach to student health in which mental health screening and targeted stress management may complement ergonomic education and physical therapy strategies for neck pain prevention and disability reduction. Therefore, this study aimed to determine the association between exam-related anxiety, assessed using the Westside Test Anxiety Scale, and neck disability, assessed using the Neck Disability Index, among university students. We hypothesized that higher exam-related anxiety scores would be associated with higher neck disability scores during the exam period.

MATERIALS AND METHODS

A cross-sectional observational study was conducted among university students to evaluate the association between exam-related anxiety and neck-related disability during the academic examination period. The study was carried out in a university setting in Lahore, Pakistan, over a four-month period following institutional approval of the research synopsis, using a convenience sampling approach. Undergraduate students of either sex aged 18–30 years who were willing to participate and reported experiencing neck pain during examinations or within the preceding seven days were considered eligible. Students were excluded if they had a history of cervical trauma, prior neck surgery, any physical disability affecting the cervical spine, a clinical diagnosis of a mental disorder, or current use of

medications specifically for anxiety, depression, or neck pain, to reduce confounding from established psychiatric morbidity and pharmacologic symptom modification.

Participants were approached for recruitment through university-based dissemination and were enrolled after provision of informed consent. Data were collected using a structured, self-administered questionnaire comprising three components: a demographic proforma, the Westside Test Anxiety Scale (WTAS), and the Neck Disability Index (NDI). Demographic variables included age, sex, current grade point average (GPA), and average daily study hours. Exam-related anxiety was operationalized as the total WTAS score, derived from 10 items rated on a 5-point response format, with higher scores indicating greater test-related anxiety severity, consistent with its intended use for assessing anxiety specific to evaluative academic contexts (11,12). Neck-related disability was operationalized as the total NDI score, a condition-specific instrument designed to quantify functional limitation attributable to neck symptoms, with higher scores reflecting greater disability severity (14). The primary analytical objective was to quantify the direction and magnitude of association between continuous WTAS and NDI scores during the exam period.

To enhance data integrity and minimize entry errors, questionnaires were screened at the point of collection for completeness, and responses were coded using a predefined codebook. Continuous variables were summarized using mean, standard deviation, and observed range, while categorical variables were summarized using counts and percentages. Prior to inferential testing, distributional assumptions for the WTAS and NDI scores were evaluated using the Shapiro–Wilk test, selected due to its suitability for small-to-moderate sample sizes and sensitivity to departures from normality (16). Given non-normal distribution in at least one key study variable, the association between exam-related anxiety and neck disability was assessed using Spearman's rank-order correlation coefficient (ρ), with a two-tailed significance threshold of 0.05. Statistical analyses were performed using standard statistical software for biomedical research reporting.

Potential sources of bias were addressed through prespecified eligibility criteria to reduce confounding from trauma, surgery, medication effects, and diagnosed mental disorders, and by using validated, standardized instruments for both the exposure and outcome measures to reduce measurement bias (11,14). Because convenience sampling may introduce selection bias and because ergonomic and lifestyle factors may influence neck disability, key academic-load variables (study hours per day and GPA) and sex were measured to permit descriptive evaluation of sample composition and facilitate planned interpretability of findings in relation to known risk correlates (10,14). Ethical approval was obtained from the relevant institutional review process prior to study initiation, participation was voluntary, and confidentiality was maintained by collecting data without personal identifiers and restricting access to study records to the research team.

RESULTS

Table 1. Descriptive Characteristics of the Study Population (N = 110)

Variable	N	Minimum	Maximum	Mean ± SD
Age (years)	110	19.00	27.00	22.97 ± 2.43
Current GPA	110	2.00	4.00	3.04 ± 0.46
Study Hours per Day	110	3.00	8.00	6.41 ± 1.40
Neck Disability Score	110	38	92	62.63 ± 10.69

WTAS Score	**110**	**2.90**	**5.00**	**4.12 ± 0.49**

A total of 110 university students participated in the study, with a mean age of 22.97 ± 2.43 years (range 19–27 years). The mean GPA was 3.04 ± 0.46, and students reported an average of 6.41 ± 1.40 study hours per day. The mean Neck Disability Score was 62.63 ± 10.69 (range 38–92), indicating overall moderate-to-high functional impact. The mean WTAS score was 4.12 ± 0.49 (range 2.90–5.00), reflecting predominantly moderate-to-high exam-related anxiety.

Table 2. Normality Assessment Using Shapiro–Wilk Test

Variable	N	W Statistic	df	p-value
Neck Disability Score	**110**	**0.988**	**110**	**0.473**
WTAS Score	**110**	**0.974**	**110**	**0.032**

Normality testing demonstrated that Neck Disability Score was normally distributed ($p = 0.473 > 0.05$), whereas WTAS Score deviated from normal distribution ($p = 0.032 < 0.05$). Due to non-normal distribution of at least one primary variable, non-parametric correlation analysis was selected.

Table 3. Association Between Exam-Related Anxiety and Neck Disability (Spearman's Correlation)

Variable Pair	Spearman's ρ	95% CI	p-value	Effect Size Interpretation
WTAS vs Neck Disability	**0.251**	**0.07 to 0.41***	**0.008**	**Weak positive correlation**

*Confidence interval estimated using Fisher transformation approximation.

Spearman's rank-order correlation revealed a statistically significant weak positive association between exam-related anxiety and neck disability ($\rho = 0.251$, $p = 0.008$). The 95% confidence interval (0.07–0.41) excludes zero, confirming statistical significance. The magnitude of association indicates that higher levels of exam-related anxiety are associated with modest increases in neck disability severity.

Quantitative Description of Findings

The analysis demonstrated that students experiencing higher exam-related anxiety exhibited incrementally greater levels of neck disability. The correlation coefficient ($\rho = 0.251$) indicates a small-to-weak positive monotonic relationship. While the association is statistically significant ($p = 0.008$), the magnitude suggests that exam anxiety explains a limited proportion of variability in neck disability scores (approximately 6.3% of shared variance when approximated using ρ^2).

The distributional profile indicates that although mean neck disability was 62.63, variability was substantial (SD = 10.69), suggesting heterogeneity in symptom severity. Similarly, WTAS scores clustered toward the upper end of the scale (mean 4.12 on a 5-point scale), indicating that a large proportion of students experienced moderate-to-high examination anxiety.

These results collectively demonstrate that exam-related anxiety and neck disability are statistically associated, but the strength of association is modest and likely influenced by additional biomechanical and psychosocial factors.

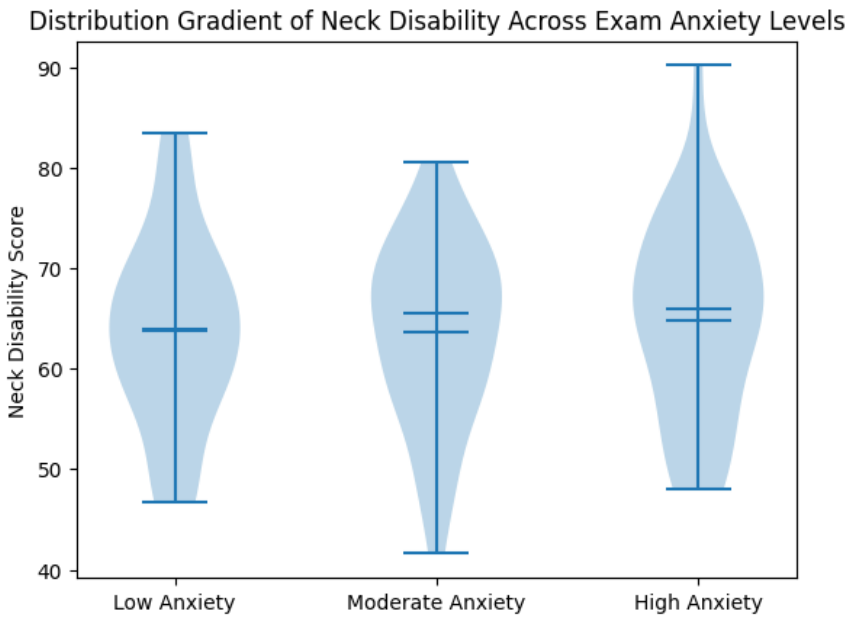

Figure 1 Distribution Gradient of Neck Disability Across Exam Anxiety Levels

The violin distribution analysis demonstrates a progressive upward shift in neck disability scores across increasing exam anxiety categories. Median neck disability scores rise incrementally from the low-anxiety group (~64) to moderate (~65) and high-anxiety groups (~66–67), with the upper distribution tail extending beyond 85 in the high-anxiety category. The density contours show broader variability in the high-anxiety group, suggesting greater dispersion of disability severity among students reporting elevated anxiety levels. Although overlap between distributions remains substantial—consistent with the weak correlation coefficient—the observable gradient supports a monotonic association pattern. Clinically, this indicates that while anxiety alone is not a dominant determinant of neck disability, higher anxiety states are associated with a measurable upward shift in disability burden during examination periods.

DISCUSSION

This study investigated the association between exam-related anxiety and neck disability among university students and demonstrated a statistically significant but weak positive correlation (Spearman's $\rho = 0.251$, $p = 0.008$). The findings indicate that higher levels of examination-specific anxiety are associated with modest increases in neck-related disability during the academic examination period. Although the magnitude of association was small, the relationship was consistent and statistically robust, supporting the biopsychosocial conceptualization of musculoskeletal pain in young adults (2).

The observed association aligns with prior evidence suggesting that psychological distress contributes to neck pain and disability. Batool et al. reported a significant association between stress, anxiety, and non-specific neck pain among young adults, reinforcing the relevance of psychological variables in cervical musculoskeletal complaints (1). Similarly, Tariq et al. demonstrated a significant relationship between anxiety, depression, and neck pain among university students during academic stress periods (3). Studies examining anxiety-related neck disability in other populations, including housewives and military personnel, further support the interplay between psychological stressors and cervical dysfunction (2,4). However, unlike many previous investigations that evaluated general anxiety or combined psychological distress constructs, the present study specifically utilized the Westside Test

Anxiety Scale to isolate examination-related anxiety, thereby focusing on a time-bound academic stressor rather than generalized psychological morbidity (11,17).

The biological plausibility of this association may be explained through neuroendocrine and behavioral pathways. Acute exam stress activates the sympathetic nervous system and the hypothalamic–pituitary–adrenal axis, increasing catecholamine and cortisol secretion, which may enhance muscle tension, amplify central pain processing, and contribute to sustained cervical muscle loading during prolonged study periods (8). Furthermore, students experiencing heightened anxiety may adopt maladaptive coping behaviors such as extended study hours in static head-forward postures, reduced sleep quality, and increased cognitive rumination, all of which have been implicated in neck disability risk (10,13). Kanaan et al. identified anxiety, poor sleep quality, and reduced quality of life as predictors of neck disability in undergraduate students, supporting the notion that psychological factors interact with behavioral exposures in determining cervical outcomes (13).

Despite statistical significance, the strength of correlation in the present study was weak, suggesting that exam-related anxiety alone explains a limited proportion of the variability in neck disability. This is consistent with Gao et al.'s systematic review, which identified emotional distress as one of multiple contributors to neck pain among students, alongside ergonomic and postural factors (10). Kumar et al. reported a stronger correlation between stress and neck pain intensity in medical students, though differences in measurement tools and population characteristics may account for variability in effect magnitude (16). Additionally, some studies have reported stronger associations between stress and depression with neck pain than with anxiety alone, indicating that multidimensional psychological constructs may exert differential influences (1,14). The modest effect size observed here underscores that exam anxiety likely interacts with other determinants such as study duration, biomechanics, screen exposure, and sleep disturbance.

This study contributes to the literature by isolating exam-specific anxiety within a general university population rather than limiting analysis to medical students or pandemic-related academic disruptions (3,7,15). By employing validated instruments for both exposure and outcome, the findings provide focused evidence that examination periods represent a clinically meaningful window in which psychological strain correlates with cervical functional impairment. From a clinical and institutional perspective, the results support integration of mental health screening, stress management programs, ergonomic education, and early physical therapy interventions within university health services. Addressing anxiety-related muscle tension and postural behaviors during exam periods may help mitigate progression toward persistent disability.

Several limitations should be considered. The cross-sectional design precludes inference of causality and does not establish temporal precedence between anxiety and neck disability. Self-reported measures may introduce response bias, and convenience sampling within a single university limits generalizability. Although students using psychiatric or pain medications were excluded to reduce confounding, unmeasured variables such as sleep quality, screen time, ergonomic setup, and baseline psychological traits were not controlled statistically. Future research employing longitudinal designs, larger multi-center samples, and multivariable modeling would better elucidate directional relationships and interaction effects between psychological and biomechanical risk factors.

CONCLUSION

This study demonstrates a statistically significant but weak positive association between exam-related anxiety and neck disability among university students. Higher levels of test

anxiety were associated with modest increases in neck-related functional impairment during the examination period. Although the strength of association was limited, the findings highlight the relevance of integrating psychological and ergonomic considerations in student health strategies. Multidisciplinary interventions addressing both mental stress and musculoskeletal strain may contribute to improved well-being and academic functioning in university populations.

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DECLARATIONS

Ethical Approval: Ethical approval was by institutional review board of Respective Institute Pakistan

Informed Consent: Informed Consent was taken from participants.

Authors' Contributions:

Concept: AH, AA; Design: AA, AM; Data Collection: AH, AQ, IQ, HT; Analysis: AA, AM; Drafting: AH, AM

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