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Exploring the Interplay between Academic Procrastination and Self-Generated Stress among Medical Students. A Multi-Institutional Cross-Sectional Study from KPK, Pakistan

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ABSTRACT

Academic procrastination is the deliberate postponement of assignments even when one is aware of the possible drawbacks. It is a common problem among students, especially in demanding professions like medicine, where procrastination is exacerbated by stress and a heavy workload. **Objective:** To investigate the connection between medical students' self-generated stress and academic procrastination. **Methods:** In KPK, Pakistan, 382 undergraduate medical students participated in a cross-sectional study. The Self-Generated Stress Scale, the Academic Procrastination Scale-Short Form, and a sociodemographic part were all included in the questionnaire. Using SPSS (version 27.0), descriptive and inferential statistical analysis, such as regression and correlation analyses, were carried out. P-values less than 0.05 were regarded as statistically significant. **Results:** Procrastination and stress exhibited a weak but significant positive correlation. A bidirectional relationship was observed, where procrastination predicted stress and vice versa, each explaining 3.4% of the variance. No significant differences in procrastination and stress were found across gender or academic years. **Conclusions:** Stress and procrastination among MBBS students in KPK were shown to be weakly but significantly correlated in this study, indicating that they have an impact on one another. The results highlight the necessity of techniques like time management training and cognitive-behavioral treatments to lessen stress from procrastination, notwithstanding the tiny effect size. Longitudinal studies should be used in future study to gain a deeper understanding of causality and other affecting factors.

INTRODUCTION

According to psychology, a human being is an entity whose nature is expressed in behavior that is impacted by emotional and psychological variables as well as habits and customs [1]. Academic procrastination is a common tendency in the educational setting. It refers to the tendency to consistently and unjustifiably delay academic tasks to avoid unpleasant feelings [2]. Procrastination is widespread among people of different nationalities, socioeconomic statuses, and educational backgrounds [3-5]. Academic procrastination, one of the many types of procrastination, is the widespread inclination to put off beginning or completing necessary academic assignments, even if doing so might have detrimental effects. A recent poll found that almost 55% of university-based medical students put off doing their assignments. According to a study by Kim and Seo (2015), procrastination is one of the most common bad habits that needs to be modified, with almost 80% of college students engaging in it, as it is the primary cause of academic failure [6]. According to a study that compared the prevalence of procrastination among university students in Malaysia (MY) and Pakistan (PK), 21% of Malaysian students and 19% of

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Pakistani students, respectively, showed mild procrastination. Moderate procrastination was exhibited by 70% of Pakistani students and 67% of Malaysian students, whilst severe procrastination was exhibited by 11% of Pakistani students and 12% of Malaysian students. Studies have demonstrated that a variety of factors have been associated with procrastination, including environmental, family-related, and personal matters [7, 8]. Other research has demonstrated it as a constant personality trait that is impacted by both internal and external influences such as emotional, cognitive, and personal issues [9]. Additionally, it is influenced by things like stress, environmental and social pressures, perfectionism, poor time management, and a lack of motivation [10]. Current studies are actively exploring the psychological factors driving this behavior. While some studies identify fear of failure as a central trigger, others link it to the lack of self-regulation skills [11, 12]. The term "self-generated stress" describes stress that results from a person's internal emotional, behavioral, or cognitive processes as opposed to external events. Self-imposed demands resulting from things like rumination, perfectionism, unreasonable expectations, or unhealthy coping mechanisms are what define it. Often unrelated to actual stresses, this kind of stress stems from how people interpret circumstances (e.g., perceiving neutral events as dangerous) or act in ways (e.g., procrastinating) that increase perceived demands [13-15]. The body's stress reaction is brought on by stress that is self-generated. The hypothalamic-pituitary-adrenal axis controls the release of cortisol, the stress hormone, as a result. One's physical and mental health may suffer as a result of these elevated cortisol levels [16]. Chronic stress was eventually brought on by this protracted self-generated tension. Stress is more common among medical students than in the general population [17]. According to different studies, its prevalence ranges from 20.9% to 94.5% [18-20]. Thus, the purpose of this study was to investigate how procrastination and stress interact among medical students, with an emphasis on the reciprocal link between these two factors.

Academic procrastination and self-generated stress are highly prevalent among medical students, yet their interrelationship remains inadequately explored, particularly in the Pakistani context. Most existing studies examine these constructs independently or focus on limited populations, with little emphasis on their bidirectional association. Furthermore, there is a lack of multi-institutional evidence and limited understanding of how these factors interact across different academic levels and demographics. Therefore, this study aims to examine the relationship between academic procrastination and self-generated stress among undergraduate medical students in Khyber Pakhtunkhwa, assess the strength and direction of this association, and explore whether a reciprocal (bidirectional) relationship exists to inform targeted interventions.

METHODS

A cross-sectional descriptive study design was used in this investigation. The sample size for the present research was 382, calculated using OpenEpi with a 95% confidence interval. The sample consisted of undergraduate medical students from 8 government medical colleges across the province. Between December 22, 2024, and February 22, 2025, a two-month period, the study was carried out. The inclusion criteria included MBBS students from their first year to their final year across the different medical colleges of Khyber Pakhtunkhwa (KPK). Additionally, the study included students who were eager to participate and who filled out the questionnaire completely. The following were the exclusion criteria: 1) Students who failed to give their informed consent; 2) those students who either did not complete the online questionnaire or provided incomplete responses; 3) participants with preexisting psychological, neurological, learning, or other impairments that could interfere with their academic performance to guarantee data fidelity. Of the participants, 43.2% were women and 56.8% were men. Students from various academic years were represented in the following proportions: 13.9% in the first year, 25.4% in the second, 17% in the third, 28.8% in the fourth, and 14.9% in the last year. Following ethical clearance from Khyber Medical College's Institutional Ethical Review Board (IREB) (Reference Number: 178/DME/KMC), Peshawar, data were collected from the representative sample using a standardized, structured, self-administered questionnaire. The data were then entered into the Google Forms, and its link was shared on the researchers' social media pages. To access the study's tools, participants' had to sign the Free and Informed Consent form on the first page, attesting to their voluntary involvement. Personal identifiers were removed from the questionnaire to ensure participants confidentiality and to minimize information bias. An equal number of participants were recruited from each medical college to ensure balanced representation across all the governmental medical colleges across the province and minimize potential selection bias in the required study sample. The sociodemographic questionnaire, the Self-Generated Stress Scale and the Academic Procrastination Scale were used. It took about eight to ten minutes on average to finish the online form. A simple, convenience sampling technique was used to gather the data from the representative sample. To evaluate the characteristics including age, sex,

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and study year, a sociodemographic questionnaire was created specifically for this study. The degree of procrastination among medical students was evaluated using the Academic Procrastination Scale Short Form, which is the abbreviated version of the Academic Procrastination Scale (APS). Five items on a five-point Likert scale (1 being strongly disagree, 2 being agree, 3 being uncertain, 4 being agree, and 5 being highly agree) made up this survey. This scale has a score range of 5 to 25. A higher degree of procrastination is indicated by higher scores on the scale. The Academic Procrastination Scale Short Form (APS-SF) was selected for its conciseness, validated unidimensional structure, and strong psychometric properties. It demonstrates good internal consistency (Cronbach's α 0.80) and convergent validity with other well-known established procrastination scales like the Tuckman Procrastination Scale.

RESULTS

A sample of 382 medical students from eight different government medical colleges throughout the province participated in this cross-sectional survey. The results of this study revealed that 217 (56.8%) of 382 participants were male and 165 (43.2%) were female. The representative sample from different medical colleges ranged from their first year to their final year of the study. The participants' Mean ± SD age was 21.69 ± 1.89. The Mean ± SD score for academic procrastination was 16.92 ± 3.7, with a median of 17. The scores ranged from 5 to 25. Self-generated stress scores varied from 7 to 35, with a median of 23 and a Mean ± SD of 22.5 ± 4.8. Figure 1 presents the gender distribution of study participants through descriptive statistics.

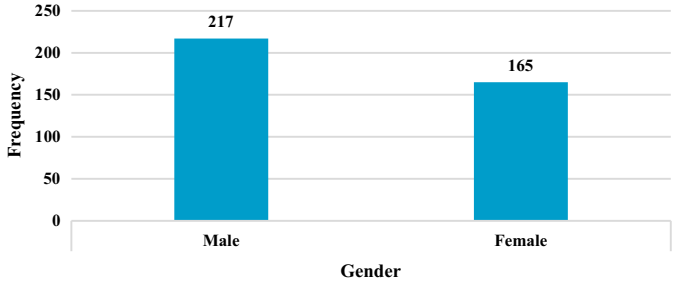

Figure 1: Descriptive Analysis of Participant Gender

Figure 2 presents the age distribution of study participants using descriptive statistics.

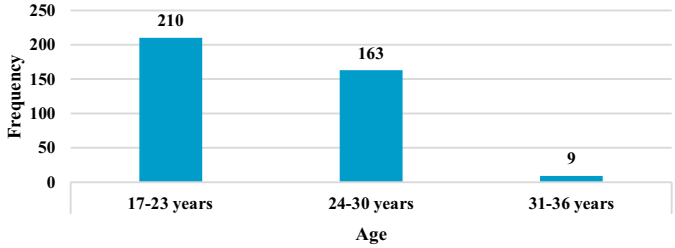

Figure 2: Descriptive Analysis of Participant Age

Figure 3 presents the Body Mass Index (BMI) distribution of participants through descriptive statistical analysis.

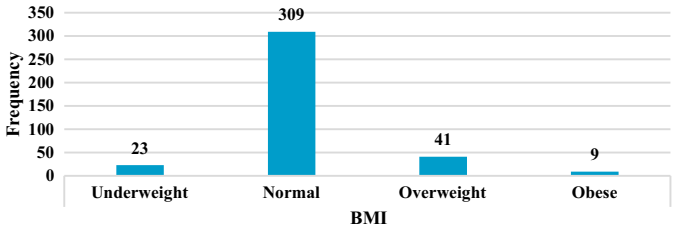

Figure 3: Descriptive Analysis of Participant BMI

Figure 4 presents the distribution of participants according to their year of study using descriptive statistics.

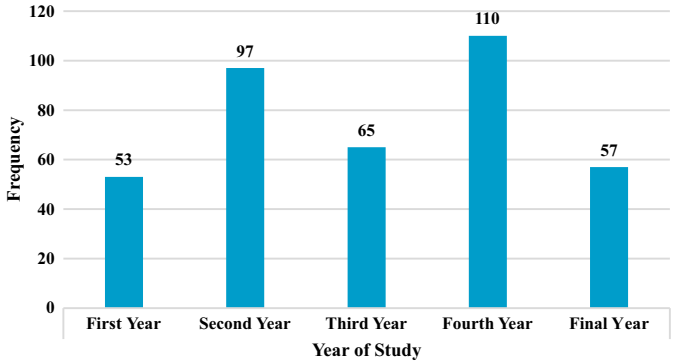

Figure 4: Descriptive Analysis of Participant Year of Study

Figure 5 presents the descriptive statistics of participants' living arrangements.

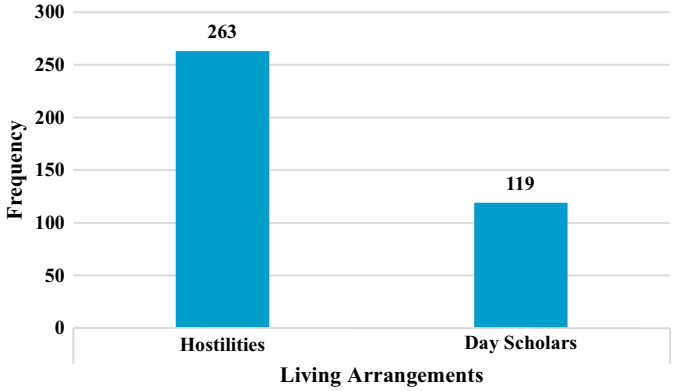

Figure 5: Descriptive Analysis of Participant Living Arrangements

Cronbach's alpha was used to evaluate the internal consistency of the Self-Generated Stress Scale (SGSS) and the Academic Procrastination Scale Short Form (APS-SF). All corrected item-total correlations were more than 0.40, and both scales showed strong reliability with α = 0.871 and α = 0.832 for the Academic Procrastination Scale Short Form and Self-Generated Stress Scale, respectively. The alpha coefficient did not increase when any items were removed from both scales.

Table 1: Reliability Analyses of Academic Procrastination and Self-Generated Stress Scales

Variables	Mean ± SD	Median	Cronbach's Alpha
Academic Procrastination	16.92 ± 3.7	17 (5-25)	0.871

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Self-Generated Stress	22.5 ± 4.8	23 (7–35)	0.832

For the necessary sample size (N=382), descriptive statistics for academic procrastination and self-generated stress were computed. Academic procrastination scores ranged from 20.0 to 100.0 with a Mean ± SD of 67.70 ± 14.79. Self-generated stress scores ranged from 25.71 to 100.0 with a slightly lower Mean ± SD score of 64.27±13.78. These findings show that the representative sample had moderate to high average levels of self-generated stress and academic procrastination, with significant participant heterogeneity.

Table 2: Academic Procrastination and Self-Generated Stress

Variables	N	Minimum	Maximum	Mean ± SD
Academic Procrastination	382	20.00	100.00	67.70 ± 14.79
Self-Generated Stress	382	25.71	100.00	64.27 ± 13.78

Non-parametric tests were used to investigate the association between self-generated stress, academic procrastination, gender, and academic year. While Kruskal-Wallis H tests assessed variations across academic years, Mann-Whitney U tests looked at gender differences in academic stress and procrastination. Additionally, the relationship between stress and procrastination was investigated using Spearman's rank-order correlation. The results of the Mann-Whitney U test showed that males exhibit slightly higher mean ranks in both academic procrastination (200.87 vs 179.17 in females) and stress (200.01 vs 180.31 in females) compared to females. These variations, however, did not reach statistical significance ($p > 0.05$). The effect sizes for both procrastination and stress were small, suggesting minimal practical differences between genders. Likewise, the Kruskal-Wallis test was used to show how academic years relate to academic stress and procrastination. Stress and academic procrastination did not differ statistically significantly between academic years. However, among the different years, students from the 4-year program exhibited the highest mean ranks for both procrastination and stress, indicating a non-significant inclination toward elevated levels in this respective group. The association between academic procrastination and self-generated stress in the representative sample was illustrated in Table 4 using Spearman's rank order correlation.

Table 3: Spearman's Correlation between Academic Procrastination and Self-Generated Stress

Variables	1. Academic Procrastination	2. Self-Generated Stress	N
1. Academic Procrastination	-	.178**	382
2. Self-Generated Stress	.178**	-	382

Where** represents a p-value of less than 0.01;
N = number of all students

Spearman's rank order correlation analysis revealed the following relationships:

Procrastination and stress were found to have a lowly positive Spearman's rank order association that was statistically significant ($r = 0.18$, $p < 0.001$). H1 is therefore supported. This indicates that higher levels of procrastination were associated with elevated stress among medical students.

To clarify how academic procrastination and stress that is created by oneself interact, two linear regression models were conducted. For the first model, self-generated stress was regressed on academic procrastination. Stress was strongly predicted by the regression model's results ($F(1,380) = 13.36$, $p < 0.05$). Additionally, the model explained 3.4% of the variance in stress, according to $R = 0.034$. Stress and procrastination showed a significant positive correlation ($\beta = 0.18$, $t = 3.66$, $p = <0.05$), suggesting that higher levels of procrastination were linked to higher levels of stress. Another regression model was run with procrastination as the dependent variable and stress as the independent variable in order to investigate the link in the opposite direction. The model's findings also showed that procrastination was strongly predicted by stress ($F(1380) = 13.36$, $p < 0.05$). Additionally, the model explained 3.4% of the variance in procrastination, according to $R = 0.034$. Stress exhibited a positive association with procrastination ($\beta = 0.18$, $t = 3.66$, $p < 0.05$), suggesting a bidirectional relationship.

Table 4: Procrastination and Stress Are Positively and Significantly Correlated

Regression Weights	Beta Coefficient	R^2	F-statistic	t-Value	p-Value
Procrastination → Stress	0.184	0.034	13.361	3.655	<0.05
Stress → Procrastination	0.184	0.034	13.361	3.655	<0.05

R^2 = Variance explained

DISCUSSION

Academic procrastination has emerged as a significant concern in higher education, with growing attention on its psychological underpinnings and academic consequences .Díaz-Morales emphasized the multidimensional nature of procrastination and how its measurement tools have evolved to assess both cognitive and behavioral aspects [1].Limone *et al.*, expanded this understanding using the self-regulated learning model, which links procrastination to deficits in time management, motivation, and metacognitive strategies [2]. Lu *et al.*, further contributed through a sociodemographic meta-analysis, establishing associations between procrastination and variables like gender, socioeconomic status, and cultural context [3]. In medical education, Cho and Lee showed that self-oriented perfectionism and fear of failure are key drivers of procrastination among students in rigorous academic programs [4]. Chehrzad *et al.*, supported this by identifying institutional workload and poor self-efficacy as contributing factors among medical students in Iran [5]. Kim and Seo conducted a meta-analysis that confirmed a

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consistent negative relationship between procrastination and academic performance, reinforcing the need to address this behavior early [6].Kosnin and Khan, through a comparative study of Malaysian and Pakistani students, highlighted the role of cultural and academic environments in shaping procrastination tendencies [7].Zakeri *et al.*, introduced a developmental perspective by linking parenting styles—particularly authoritarian and permissive approaches—to higher procrastination in youth [8].Zacks and Hen reviewed academic intervention programs and found that cognitive-behavioral strategies, time management training, and self-regulation workshops can be effective in reducing procrastination [9]. Rahimi *et al.*, offered longitudinal evidence demonstrating that negative emotional cycles can both result from and exacerbate procrastinatory behaviors in students over time [10]. Senécal *et al.*, provided foundational insight into how motivational deficits and low self-regulation drive procrastination [11]. Haghbin *et al.*, built on this by exploring the intricate relationship between fear of failure and emotional regulation, suggesting that avoidance behaviors may be both a symptom and a coping mechanism [12]. Hewitt and Flett introduced a broader personality framework, showing how both self- and socially-prescribed perfectionism correlate strongly with academic procrastination [13].A cross-sectional study exploring the relationship between academic procrastination, self-induced stress, and self-reported bruxism in medical and dental students.[14].Sirois and Pychyl argued that procrastination often serves as a form of short-term mood regulation, prioritizing immediate emotional relief over long-term goals [15].Zimmaro *et al.*, added a positive psychological dimension by demonstrating that mindfulness reduces cortisol levels and improves well-being, which may in turn reduce procrastination [16].Rtbey *et al.*, studied Ethiopian medical students and found high levels of psychological distress, which contributed to avoidance behaviors including procrastination [17]. Chowdhury *et al.*, reported similar findings among Indian students, citing academic pressure and sleep deprivation as major stressors [18].Amr *et al.*, examined Egyptian medical students and highlighted gender differences in stress levels that may influence procrastination patterns [19]. Flett GL *et al.*, introduced and validated the Self-Generated Stress Scale, examining its links with perfectionism, self-criticism, and psychological distress.

The study is limited by its cross-sectional design, which restricts the ability to establish causality, and the use of convenience sampling, which may reduce generalizability. Additionally, reliance on self-reported data may introduce response and reporting bias. Future research should employ longitudinal or experimental designs to better understand causal relationships and include more diverse, randomly selected samples. Intervention-based studies focusing on time management and cognitive-behavioral strategies are also recommended to evaluate effective methods for reducing procrastination and stress among medical students.

CONCLUSIONS

The study's findings indicated a marginally positive relationship between stress and procrastination. According to these findings, procrastination can both cause and exacerbate stress, suggesting a bidirectional relationship between these two variables. These findings suggest that procrastination-focused interventions may reduce the stress generated because of it, which carries significant implications. This study adds an important new understanding of how these variables interact, especially in the context of MBBS undergraduate students in Pakistan.

Authors' Contribution

Conceptualization: SK
Methodology: F
Formal analysis: MS
Writing and Drafting: EUH, KK
Review and Editing: EUH, KK, F, SK, MS

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

The authors declare no conflict of interest.

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