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Prevalence and Determinants of Stress among University Students in Bangladesh: Insights from a Study at Gopalganj Science and Technology University

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Abstract

Stress is a significant mental health concern among university students globally, yet research in Bangladesh often addresses it alongside other mental health issues, leaving stress-specific insights underexplored. This study focuses on stress as an independent factor, examining its prevalence and the associated determinants among students at a Bangladeshi university. A cross-sectional survey was conducted among 384 students from Gopalganj Science and Technology University, Gopalganj, Bangladesh, using the BDASS-21 scale to measure stress levels. To ensure a representative sample, the researchers employed a stratified random sampling technique. Chi-square and two-sample t-tests were employed to assess the relationship between stress levels and independent variables. A logistic regression model identified significant predictors of stress, with a 5% level of significance applied to determine statistical relevance. The prevalence of stress was 62.50% among the surveyed students. Logistic regression analysis revealed several significant predictors of stress. Students from joint families were found to be four times more likely to experience stress (OR = 4.05, 95% CI: 1.43–11.42, p = 0.01) compared to those from nuclear families. Engagement in a relationship (OR = 3.91, 95% CI: 1.28–11.99, p = 0.02) and smoking habits (OR = 4.51, 95% CI: 1.46–13.92, p = 0.01) were also associated with elevated stress levels. Additionally, lack of physical exercise and dissatisfaction with social life were significant contributors to stress. Over half of the university students in this study reported experiencing stress, with higher risks observed among those engaged in relationships, from joint families, and with smoking habits. Targeted interventions addressing these high-risk groups, including promoting healthy lifestyles and social support, are recommended for policymakers and university authorities to mitigate stress and improve student well-being.

Keywords: Stress, BDASS-21, Mental Health, University Students, Cross Sectional.

AMS Classification: 62P15, 62P25.

1. Introduction

Mental health disorders, identified by the World Health Organization (WHO) as significant contributors to global disability, account for three of the top ten causes of disability among

individuals aged 15 to 44. Other leading causes often exhibit connections to mental health conditions, underscoring the pervasive impact of mental health on overall global disability trends (1,2).

In 2019, global estimates indicated that 301 million individuals, including 58 million children and adolescents, grappled with anxiety disorders. These disorders, characterized by heightened levels of fear and worry, often resulting in notable distress or functional impairment. Various forms of anxiety disorders, such as generalized anxiety disorder, panic disorder, and social anxiety disorder, have been identified. Effective psychological interventions are available, with medication considered based on factors such as age and severity. The World Health Organization's Comprehensive Mental Health Action Plan (2013 – 2030) prioritizes several key objectives: strengthening leadership structures, providing integrated mental health services, implementing strategies for mental health promotion and prevention, and enhancing information systems and research to advance universal mental health (2).

Stress encompasses any factor that poses a challenge or potential harm to well-being. It is described as a phenomenon in which environmental demands exceed an organism's adaptive capabilities, triggering psychological and biological changes that may expose individuals to health risks (3). An individual experiences stress because of a myriad of factors within the complex fabric of human existence, spanning occupational, personal, community, socioeconomic, and ideological realms (4). Stress can manifest as an unconscious, persistent concern or a conscious, urgent state, often representing an emotionally unstable condition that disrupts an individual’s ability to focus and function effectively in daily life. This heightened state diminishes work efficiency and productivity, posing an increasingly significant challenge in today’s competitive environment (5). The fast-paced nature of modern life, combined with the demands of a skill-driven economy that prioritizes rapid action, intensifies the burden of stress, particularly among middle-aged individuals in the middle class. Often equated with mental tension, agitation, and irritability, stress underscores its multifaceted impact on individual well-being (6).

Throughout their university life, students must navigate both the academic and social demands inherent in their studies, a period crucial for their professional development. This phase facilitates the acquisition of not only professional knowledge but also transferable skills and evidence-based attitudes, preparing them for their future careers (7–9). The 2014 report from the American College Health Association further underscores the prevalence of stress, with approximately half of the students reporting above average or tremendous stress in the past 12 months (10). Recognizing the significance of mental health in achieving Sustainable Development Goal (SDG) 3, which aims to enhance well-being by 2030, it becomes imperative to expand mental health services. This initiative aligns with SDG 3's objective to reduce premature mortality from non-communicable diseases by one-third through prevention and treatment, while also promoting mental health and overall well-being (11).

In Bangladesh, there is a shortage of studies focusing only on stress among university students. However, some research conducted during the COVID-19 pandemic examined stress in this group, considering factors such as E-learning (12) and lockdowns (13). Another study at Jahangirnagar University explored socio-demographic and other variables related to stress, finding that concerns about the future were by far the largest contributors to stress among students at the university (14). In almost all of the above studies, at least half of the students reported experiencing moderate to severe levels of stress in their academic life.

Previous research (15,16) has often examined stress alongside other mental health conditions, such as depression and anxiety. Few studies have focused specifically on the prevalence of stress as a standalone issue. Stress can serve as a critical indicator of more serious mental health problems. This study aims to address this research gap by isolating stress and estimating its prevalence among university students at Gopalganj Science and Technology University (GSTU).

2. Methodology

2.1 Source of the Data & Design of the Study

In this cross-sectional study, 384 primary data were collected from students at Gopalganj Science and Technology University (GSTU), Gopalganj, Bangladesh encompassing various academic years and 34 departments. Data were collected from 5 November, 2023 to 25 December, 2023. The participants were between the ages of 20 and 27. To ensure a representative sample for the study, a stratified random sampling technique was adopted. The population was divided into 34 strata, with each stratum corresponding to a department at Gopalganj Science and Technology University (GSTU). The sample size for each stratum was determined using the probability proportional to size (PPS) method, ensuring that departments with larger populations contributed proportionally more participants to the sample. Once the sample sizes for each stratum were established, simple random sampling (SRS) was employed within each stratum to select the required number of participants. This two-stage sampling approach was designed to minimize sampling bias and ensure that the sample accurately represented the diverse academic disciplines and population distribution within the university.

The following formula to compute the minimal sample size for this study because one of the aims is to determine the prevalence (proportion) of stress among the students.

$n = \frac{\boldsymbol{p(1-p)z^2_{\alpha/2}}}{\boldsymbol{d^2}} \approx 384$ where, n is the required sample size, $z_{\alpha/2}$ is the two-sided normal variate value at 95% confidence interval (1.96), p is the indicator percentage (0.5 for unknown cases) and d is the margin of error (which is 5%).

Participants in the study volunteered willingly after being assured of the confidentiality of their information. Following the receipt of consent, data collection commenced under the close supervision of a research student and principal investigator. A team of five trained graduate students, guided by a pre-established training session on data collection procedures, is responsible for gathering primary data. The data were acquired through a self-administered questionnaire consisting of two sections. The initial section focuses on socio-demographic, socioeconomic, and behavioral traits, while the second section employs the BDASS-21 tool to capture specific dimensions relevant to the study (include in appendix). In the final analysis, students from the Agriculture and Law departments were combined into a single group due to their low frequency in order to address this limitation.

2.2 Socio-demographic Measures

The study gathered a comprehensive set of socio-demographic data to enrich the understanding of the participants' backgrounds. Information was collected on various factors including age, gender, year of study, faculty of study, CGPA in honours, religion, academic performance, accommodation type (hall, mess/home), permanent residence (urban or rural), family living systems, socioeconomic status (categorized as upper, middle, and lower class), relationship status (i.e., single, in a relationship, or married), and details regarding parents' educational and occupational backgrounds. It is noteworthy that Gopalganj Science and Technology University

(GSTU) comprises three Institutes and eight Faculties, encompassing 34 Departments such as Engineering, Science, Biological Science, Social Science, Humanities, Business Studies, Agriculture, and Law. It is pertinent to mention that for data collection, all faculties were included, excluding the institutes, as these do not admit undergraduate students.

2.3 Behavioral Factors

In this study, a set of lifestyle-related inquiries was incorporated to gain insights into participants' habits and behaviors. Firstly, participants were asked to disclose their smoking habits, responding with either "Yes" or "No." Subsequently, participants were queried about their engagement in daily physical activities, specifically whether they exercised for a minimum of 20 minutes per day, encompassing activities such as walking, playing sports, games, cycling, swimming, or any other form of physical engagement. Participants were also prompted to categorize their daily average sleep duration as normal (6-7 hours), short (<6 hours), or long (>7 hours), in accordance with established classifications. Additionally, participants were probed about their internet usage patterns, gauging the nature and extent of their online activities. Finally, the study delved into participants' study habits, specifically the number of hours dedicated to studying each week.

2.4 Bangla Depression Anxiety Stress Scale (BDASS- 21)

To assess the levels of depression, anxiety, and stress, researchers commonly utilize the Depression Anxiety Stress Scale (DASS) (17). This 42-item scale allows participants to self-report their experiences with depression, anxiety, and stress. For this study, the Bangla version of the short-form Depression Anxiety Stress Scale (BDASS-21), a validated and culturally adapted 21-item version, was selected due to its proven reliability and suitability for non-clinical settings in Bangladesh (15,16,18). Specifically, in this investigation, evaluated the degree of stress by utilizing seven out of the twenty-one questions from the BDASS-21 that were specifically related to stress.

2.5 Response Variable

In the original BDASS-21, the stress scales exhibited high internal consistency with Cronbach's alphas of 0.96. However, a subsequent study reported slightly lower Cronbach's alphas for these scales, measuring at 0.83. According to established classifications for stress severity, the scores are categorized as follows normal (0–14), mild (15–18), moderate (19–25), severe (26–33), and extremely severe (34+). It was further categorized into binary groups. Normal was converted to “No Stress” and was recoded as 0. On the other hand, the remaining categories were converted to “Has Stress” and was recoded as 1.

2.6 Explanatory Variables

To understand the variation of stress of the participants, the study used various socio-demographic and behavioral variables. The socio-demographic variables were included to understand the background characteristics of the participant. On the other hand, behavioral variables were utilized to understand the lifestyle and habits of the students. Together, the variables draw a complete picture of the factors that could cause stress.

2.7 Statistical Analysis

To test the association between the set of categorical independent variables and dependent variables, chi-square test was conducted with 5% level of significance. Similarly for continuous independent variables, two-sample t-test was employed to assess the association with dependent

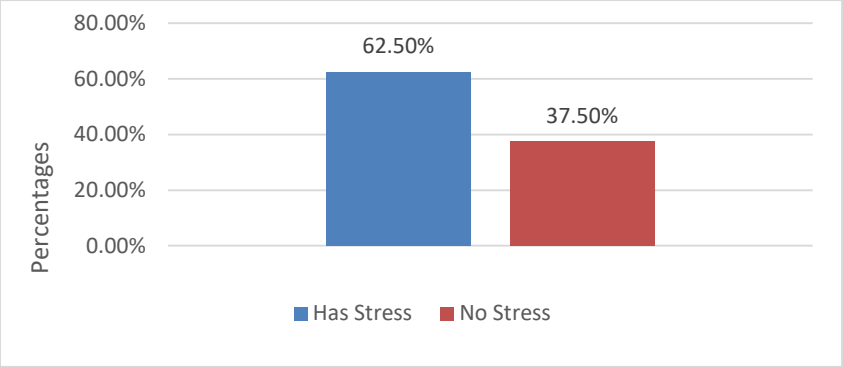
variables. Variables with p-values less than 0.20 were selected for final analysis. Logistic regression was fitted to estimate the effects of the different independent variables on the dependent variable. STATA 15 was used for all analyses.

3. Results

3.1 Descriptive Statistics

The results revealed that among the 384 students surveyed, 37.50% reported no stress, 18.50% experienced mild stress, 17.40% faced moderate stress, 21.10% reported severe stress, and 5.50% experienced extremely severe stress. That means overall, 62.50% of the participants reported stress during their university life **[Figure 1]**.

Figure 1: Distribution of Level of Stress among University Students at GSTU



In **Table 1**, presents a comprehensive overview of the distribution of stress levels among respondents across various socio-demographic variables.

The table further reveals that stress levels do not vary significantly across genders, with 62.90% of males and 62.10% of females reporting stress. First-year students exhibit a balanced stress distribution (51.00% no stress, 49.00% stress). In contrast, stress levels increase among second (48.10%), third (72.80%), and fourth-year (59.40%) students, with the highest stress reported by master's students (72.90%). Students from different faculties experience varying stress levels. Notably, Business Studies (53.30%) and Humanities (53.80%) students report lower stress compared to Engineering (73.50%) students. Stress levels correlate with CGPA categories, with those having CGPA above 3.25 reporting lower stress (65.40%) compared to those below 2.25 (75.00%). Religion appears to have a marginal impact on stress levels, with Muslims reporting slightly lower stress (62.00%) compared to Hindu/Others (64.40%). Individuals living in Halls/Mess experience higher stress (64.50%) than those at home (44.70%). Higher monthly family income correlates with lower stress, as seen in the Upper Class (> 20000) category, where 51.60% report stress. Studying more than thirty hours (52.50%) is associated with lower stress levels than those with less study hours. Singles report slightly lower stress (61.50%) compared to engaged individuals (71.00%).

There is a marginal difference in stress levels between smokers (61.10%) and non-smokers (63.00%). Interestingly, those engaging in daily physical exercise report higher stress (65.80%) compared to those who do not (61.70%). Normal sleep duration (6 to 7 hours) is associated with

lower stress (56.40%), while less than normal (68.90%) and more than normal (77.60%) sleep durations show higher stress levels. Higher stress is associated with spending more than 5 hours on the internet, as indicated by 64.30% of respondents in this category. A lower percentage of respondents with excellent academic performance report stress (54.80%) compared to those with poor (57.70%) and average (64.50%) performance. Respondents who are very satisfied with their social life exhibit lower stress (44.70%) compared to those least satisfied (72.30%).

The percentages reveal intriguing patterns: individuals with mothers classified as working women exhibit lower stress levels (47.90%) compared to those with housewife mothers (64.80%). Similarly, respondents with fathers classified as businessmen or engaged in jobs (private/government) report drastically lower stress percentages (61.50% and 60.00%, respectively) compared to those with fathers categorized as farmers or involved in other occupations (65.90%). The education level of parents also plays a role, with respondents whose mothers have attained BA/B.Sc./B.Com. degrees experiencing lower stress (38.90%) than those with mothers who are illiterate or have lower educational qualifications. Likewise, respondents with illiterate father report highest stress (78.80%), while respondents with educated (BA/ B.Sc./ B. Com) fathers report relatively low stress **[Table 1]**.

Table 1: Chi-Square Test of Significance between Level of Stress and Various Socio-demographic Variables (Categorical)

Variables	Categories	No Stress		Has Stress		p-Value
		Frequency	Percentage	Frequency	Percentage	
Gender of Respondent	Male	75	37.10%	127	62.90%	0.87
	Female	69	37.90%	113	62.10%	
Academic Year of Respondent	First Year	26	51.00%	25	49.00%	0.01
	Second Year	14	51.90%	13	48.10%	
	Third Year	22	27.20%	59	72.80%	
	Fourth Year	63	40.60%	92	59.40%	
	Masters	19	27.10%	51	72.90%	
Studying Faculty of Respondent	Engineering	13	26.50%	36	73.50%	0.18
	Science	31	35.60%	56	64.40%	
	Business Studies	21	46.70%	24	53.30%	
	Humanities	37	46.30%	43	53.80%	
	Life Science	19	32.20%	40	67.80%	
	Social Science	23	35.94%	41	64.60%	
CGPA Category of Respondent	Below 2.25	3	25.00%	9	75.00%	0.17
	2.25 to 3.25	51	40.20%	76	59.80%	
	Above 3.25	75	34.60%	142	65.40%	
	Unknown	15	53.60%	13	46.40%	
Religion of Respondent	Muslim	113	38.00%	184	62.00%	0.68
	Hindu / Others	31	35.60%	56	64.40%	
Types of Accommodation	Hall / Mess	123	35.50%	223	64.50%	0.50
	Home	21	55.30%	17	44.70%	
Types of Family of Respondent	Nuclear	112	38.50%	179	61.50%	0.48
	Joint	32	34.40%	61	65.60%	
Permanent Residence of	Urban	44	35.20%	81	64.80%	0.52
	Rural	100	38.60%	159	61.40%	

Respondent						
Monthly Family Income (BDT)	Lower Class (< 10000)	16	23.20%	53	76.80%	< 0.01
	Middle Class (10000 to 20000)	82	37.30%	138	62.70%	
	Upper Class (> 20000)	46	48.40%	49	51.60%	
Weakly Time Spent on Studies (Hours)	Less than 15 hours	70	36.80%	120	63.20%	0.38
	15 to 30 hours	55	35.70%	99	64.30%	
	More than 30 hours	19	47.50%	21	52.50%	
Relational Status of Respondent	Single	116	38.50%	185	61.50%	0.14
	Engaged	20	29.00%	49	71.00%	
Smoking Status of Respondent	No	107	37.00%	182	63.00%	0.74
	Yes	37	38.90%	58	61.10%	
Physical Exercise (Daily)	No	98	38.30%	158	61.70%	0.46
	Yes	38	34.20%	73	65.80%	
Sleeping Status	Less than normal (< 6 Hours)	23	31.10%	51	68.90%	< 0.01
	Normal (6 to 7 Hours)	106	43.60%	137	56.40%	
	More than normal (> 7 Hours)	15	22.40%	52	77.60%	
Internet Using Time of Respondent	Less than 2 hours	22	38.60%	35	61.40%	0.88
	2 to 5 hours	77	38.30%	124	61.70%	
	More than 5 hours	45	35.70%	81	64.30%	
Academic Performance of Respondent	Poor	22	42.30%	30	57.70%	0.36
	Average	103	35.50%	187	64.50%	
	Excellent	19	45.20%	23	54.80%	
Satisfaction Label of the Social Life of Respondent	Satisfied	90	40.20%	134	59.80%	0.01
	Least satisfied	33	27.70%	86	72.30%	
	Very satisfied	21	55.30%	17	44.70%	
Mother's Profession of Respondent	Working women	25	52.10%	23	47.90%	0.02
	Housewife	117	35.20%	215	64.80%	
Mother's Education of Respondent	Illiterate	15	22.10%	53	77.90%	< 0.01
	Primary to SSC	84	38.90%	132	61.10%	
	HSC	18	32.70%	37	67.30%	
	BA / B.Sc. / B.Com.	22	61.10%	14	38.90%	
	Masters	5	55.60%	4	44.40%	

Father's Profession of Respondent	Businessman	35	38.50%	56	61.50%	0.56
	Doing job (private/govt.)	46	40.00%	69	60.00%	
	Farmers or others	59	34.10%	114	65.90%	
Father's Education of Respondent	Illiterate	14	21.20%	52	78.80%	0.02
	Primary to SSC	47	36.40%	82	63.60%	
	HSC	32	41.00%	46	59.00%	
	BA / B.Sc. / B.Com.	38	48.70%	40	51.30%	
	Masters	13	39.40%	20	60.60%	

Table 2 presents descriptive statistics for stress levels and several continuous socio-demographic variables. The mean and standard deviation provide insights into the central tendency and variability of these variables among respondents reporting either no stress or experiencing stress.

The mean age for both groups is approximately 23 years, with a standard deviation of 2, indicating a relatively narrow age distribution among respondents reporting different stress levels. Both groups exhibit similar mean SSC results, with a GPA of 4.74. The standard deviation is 0.3 for respondents reporting no stress and 0.33 for those experiencing stress, indicating a relatively consistent performance among individuals irrespective of stress levels during their secondary education. The mean HSC results for both groups are close, with a GPA of 4.56 for respondents reporting no stress and 4.58 for those experiencing stress. The standard deviations, 0.44 and 0.39 respectively, suggest some variability in performance during higher secondary education.

Individuals reporting no stress have a mean CGPA of 2.94, while those experiencing stress have a slightly higher mean CGPA of 3.11. The standard deviations of 1.06 and 0.81 respectively indicate a broader distribution of CGPA scores, suggesting more variability in academic performance at the undergraduate level. The mean monthly family expenditure is higher for respondents reporting no stress (20,720 BDT) compared to those experiencing stress (19,604 BDT). The standard deviations of 11,039 and 9,916 respectively suggest considerable variability in monthly family expenditure within each stress group **[Table 2]**.

Table 2: t-test of Significance between Level of Stress and Various Socio-demographic Variables (Continuous)

Variables	**No Stress**		**Has Stress**		**p-Value**
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	
Age of Respondent	23	2	23	2	0.03
SSC Results of Respondent (GPA in 5 Scale)	4.74	0.3	4.74	0.33	0.99
HSC Results of Respondent (GPA in 5 Scale)	4.56	0.44	4.58	0.39	0.69
Under graduation (B.Sc./ B.Eng. / B. Pharm/ B.SS./ B.A/ BBA/ LLB) Results (CGPA in 4 Scale)	2.94	1.06	3.11	0.81	0.10
Monthly Family Expenditure (BDT)	20720	11039	19604	9916	0.35

3.2 Univariate Analysis

The chi-square test of significance, as reflected in Table 1, was employed to explore the association between stress levels and various socio-demographic variables. Notably, the academic year shows a significant association with stress levels ($p = 0.01$), indicating that the distribution of stress differs significantly across academic years. Similarly, satisfaction with social life ($p = 0.01$), mother's education ($p < 0.01$), monthly family income ($p < 0.01$), and sleeping status ($p < 0.01$) demonstrate statistically significant associations with stress levels. Conversely, variables such as gender, studying faculty, CGPA category, religion, types of accommodation, types of family, permanent residence, time spent on studies, relational status, smoking status, physical exercise, internet usage, academic performance, mother's profession, and father's education exhibit p-values greater than the conventional significance level of 0.05, suggesting no significant association with stress levels **[Table 1]**.

Table 2 employs t-tests to assess the significance of differences in means between stress levels across various continuous socio-demographic variables. Age of the respondent demonstrates a significant difference between the two stress groups ($p = 0.03$), suggesting that individuals reporting stress have a slightly different mean age compared to those reporting no stress. Conversely, SSC results ($p = 0.99$), HSC results ($p = 0.69$), and undergraduate CGPA ($p = 0.10$) do not show statistically significant differences in means between stress levels. This indicates that academic performance, as reflected in these results, does not differ significantly between individuals reporting stress and those reporting no stress. Similarly, monthly family expenditure shows no significant mean difference between the two stress groups ($p = 0.35$) **[Table 2]**.

3.4 Final Logistic Regression Model for Stress

Table 3 presents the final logistic model exploring the odds ratios (OR), confidence intervals (CI), and p-values associated with various socio-demographic variables influencing stress levels among university students. Notably, students from joint families were found to be four times more likely to experience stress (OR = 4.05, 95% CI: 1.43 - 11.42, $p = 0.01$) compared to those from nuclear families. Similarly, being engaged in a relationship (OR = 3.91, 95% CI: 1.28 - 11.99, $p = 0.02$) and smoking (OR = 4.51, 95% CI: 1.46 - 13.92, $p = 0.01$) were significantly associated with elevated stress levels. The daily physical exercise demonstrates a trend towards increased odds of stress (OR = 2.15, 95% CI: 0.98 - 4.70, $p = 0.06$). Satisfaction with social life was also a significant factor, with individuals who were least satisfied having nearly three times higher odds of experiencing stress (OR = 2.63, 95% CI: 1.16–5.97, $p = 0.02$). Notably, lower education levels of fathers, specifically BA/B.Sc./B.Com. (OR = 0.13, 95% CI: 0.03 - 0.62, $p = 0.01$), were associated with less likely to experience stress. Additionally, higher HSC exam results (OR = 0.24, 95% CI: 0.09 - 0.63, $p < 0.01$) were linked to lower stress levels, suggesting that academic achievement may have a protective effect against stress.

Table 3: Final Logistic Regression Model of Stress Level among University Students

Variables	Categories	Odds Ratio	Confidence Interval	p-Value
Types of Family of Respondent	Nuclear	**ref.**		
	Joint	4.05	1.43 - 11.42	0.01
Relational Status of Respondent	Single	**ref.**		
	Engaged	3.91	1.28 - 11.99	0.02
Smoking Status of	No	**ref.**		

Respondent	Yes	4.51	1.46 - 13.92	0.01
Physical Exercise (Daily)	No	**ref.**		
	Yes	2.15	0.98 - 4.70	0.06
Satisfaction Label of the Social Life of Respondent	Satisfied	**ref.**		
	Least satisfied	2.63	1.16 - 5.97	0.02
	Very satisfied	0.64	0.23 - 1.76	0.39
Father's Education of Respondent	Illiterate	**ref.**		
	Primary to SSC	0.25	0.05 - 1.15	0.08
	HSC	0.47	0.09 - 2.45	0.37
	BA / B.Sc. / B.Com.	0.13	0.03 - 0.62	0.01
	Masters	0.23	0.04 - 1.32	0.10
SSC Results of Respondent (GPA in 5 Scale)		0.37	0.11 - 1.17	0.09
HSC Results of Respondent (GPA in 5 Scale)		0.24	0.09 - 0.63	< 0.01

4. Discussion

The study looked at the level of stress among university students through several socio-demographic and educational lens and how these variables contribute to stress. The study found a few variables such as father education, satisfaction with social life etc. to associate significantly with stress levels, both in the univariate analysis and in the final logistic models.

More than half of the participant reported stress during their university life. This results eclipses previously measured stress levels in the country. For example, a study conducted in Jahangirnagar University found 18.5% of the students to have some stress while 20% suffering from high levels of stress (14). Another study in the same university found the prevalence to be around 40% (16). A multi-university study across twenty-eight universities found to total prevalence to be 30.7%. Interestingly, Jahangirnagar university still had the highest prevalence of stress at 56.7% (17).

In this study, gender did not play a significant role in the stress levels of university students, as indicated by their percentages and p-value. This is, however, not entirely similar to other studies. Other studies (16,20), conducted in the country and abroad indicates female students having higher stress levels than males.

Academic Year was observed to have a significant p-values, indicating differing stress levels across academic years. The percentages suggest that students typically suffered greater levels of stress during the later stages of their university life. This may, however, be an edge case particular in the type of university and region. This can be deduced by the looking at the study done on students of Dhaka Medical College which do not show this trend (21). Another study conducted on Jahangirnagar University shows no significant difference among stress levels of the students (15).

The fact that the participants of the study are from a science and technology university could explain the discrepancies between the results. It is well known that engineering students typically face higher levels of stress compared to other faculty (22). This is confirmed by the findings that students from Engineering faculties report higher stress than others.

Academic performance was also a good indicator for stress. Although it was not significant in the univariate analysis, it suggests lower stress levels among those with better results. Other studies found similar results, with students implying academic performance to be a major source of their stress levels (23,24). As a result, students who study more had also reported less stress than those who study less. This stress is likely due to exams and their consequences as it is known that students are typically fearful and apprehensive towards exams (25,26).

Another significant variable in univariate analysis is the monthly family income. Upper class families tended to report lower stress than other. This is surprising as low family income has been known as a key indicator for increased stress levels (27,28).

In the final logistic model, the above variables were also found to be significant. Some other interesting variables were also found significant with levels of stress. The type of family was one such variable. It turned out to be a key predictor of stress, with students from joint families 4 times more likely to experience stress than nuclear ones. This could be because large families have a lot of cost to satisfy their basic needs. This could drive up stress levels for the students from these families.

The likelihood of smoking was also observed to be pretty high, with smoking students being 4.51 times more likely to report stress than non-smoking ones. Smoking is known to increase people's blood pressure, sugar levels and decrease overall health levels (29, 30). Therefore, it is unsurprising that smoking also affects depression and elevates stress levels (31).

5. Recommendation

Based on the findings of this study, it is evident that stress is highly prevalent among students. While it's important to note that the DASS is not a diagnostic tool, the substantial prevalence rates of stress in this study underscore the need for attention from healthcare professionals and university administrators. In Bangladesh, mental health issues like stress are gaining awareness and have been acknowledged as a public health concern by policymakers. Given the increasing rates of stress among Bangladeshi university students, it is crucial to implement targeted prevention strategies. This could involve the establishment of student support centers, online interventions, and curriculum-based programs focusing on mental health awareness. Additionally, special attention should be directed towards students from joint families, those who are engaged, and smokers. Efforts should be made to enhance psychological well-being by improving the identification of mental health disorders like stress, encouraging affected individuals to seek treatment, implementing preventive initiatives, and promoting medication compliance.

6. Conclusion

The aim of the study is to estimate the prevalence and factors influencing the level of stress in university students. The results of this study found that the estimated percentage of level of stress among university students at GSTU was 62.50% which is higher than previous studies indicating a rise in stress among students. In logistic regression model, it is found that type of family, relational status, smoking habits, physical exercise among others to contribute significantly to stress. Specifically, engaged students from joint family with habit of smoking were more likely to report

increased level of stress than other students. Policymakers should take special notice of these high-risk groups with proper awareness and counselling campaign. The administrative bodies should isolate this group to understand their needs and act appropriately.

Conflict of Interest
The authors declare no conflict of interest.

Data Availability
The data is available on request to the corresponding author.

Author Contributions
Mohammad Kamal Hossain: Funding acquisition; investigation; project administration; supervision; conceptualization; formal analysis; methodology; visualization; writing original draft; and editing.

Arpita Halder: Data curation; processed the dataset; formal analysis; and prepared the draft of the manuscript. All the authors reviewed the manuscript several times.

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Appendix

THE DEPRESSION ANXIETY STRESS SCALE (DASS 21 BV)

এই গবেষণার লক্ষ্য বিশ্ববিদ্যালয়ের ছাত্র/ছাত্রীদের মানসিক সমস্যা সম্পর্কে ব্যাপক ধারণা পাওয়া। গবেষণা ও নীতির স্তরের হস্তক্ষেপ ব্যতীত এই গবেষণার ফলাফল অন্য কোন উদ্দেশ্যে ব্যবহার করা হবে না। সারা বিশ্লেষণে নৈতিক দিক নির্দেশনা অনুসরণ করা হবে। অংশগ্রহণকারীদের পরিচয় গোপন রাখা হবে।

ছাত্র/ছাত্রীদের জন্য প্রশ্নাবলী

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement. **(অনুগ্রহ করে নিচের প্রতিটি বিবৃতি পড়ুন এবং ০, ১, ২ অথবা ৩ এর মধ্যে গত সপ্তাহ ব্যাপী আপনার জন্য প্রযোজ্য যে কোন একটি সংখ্যায় গোল চিহ্ন দিন। এখানে কোন সঠিক বা ভুল উত্তর নেই। কোন বিবৃতির জন্য বেশী সময় ব্যয় করবেন না।)**

The rating scale is as follows: **মানদন্ডটি (রেটিং স্কেল) নিম্নরূপঃ**

0 = Did not apply to me at all **(আমার জন্য একেবারেই প্রযোজ্য নয়)**

1 = Applied to me to some degree, or some of the time **(আমার জন্য অল্পমাত্রায় বা কখনো কখনো প্রযোজ্য)**

2 = Applied to me to a considerable degree, or a good part of time **(আমার জন্য বেশ কিছুমাত্রায় বা বেশখানিকটা সময়ের জন্য প্রযোজ্য)**

3 = Applied to me very much, or most of the time **(আমার জন্য খুব বেশী বা বেশীরভাগ সময়ের জন্য প্রযোজ্য)**

1.	কোন উৎকণ্ঠা বা উত্তেজনামূলক কাজের পর আরামদায়ক অবস্থায় ফিরে আসা আমার জন্য কঠিন ছিল। (I found it hard to wind down)	0	1	2	3
2.	আমি বুঝতে পারতাম যে আমার গলা শুকিয়ে আসছে। (I was aware of dryness of my mouth)	0	1	2	3

3.	ইতিবাচক কোন অনুভূতিই আমার মধ্যে কাজ করত না। (I couldn't seem to experience any positive feeling at all)	0	1	2	3
4.	আমার শ্বাসকষ্টের অনুভূতি হত (যেমন অতিদ্রুত শ্বাসপ্রশ্বাস, শারীরিক পরিশ্রম ছাড়াই নিঃশ্বাস বন্ধ হয়ে আসা) (I experienced breathing difficulty (e.g, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5.	নিজে উদ্যোগী হয়ে কোন কাজ শুরু করা আমার জন্য কঠিন হত। (I found it difficult to work up the initiative to do things)	0	1	2	3
6.	আমার মধ্যে বিভিন্ন পরিস্থিতিতে অতিরিক্ত প্রতিক্রিয়া করার প্রবনতা ছিল। (I tended to over-react to situations)	0	1	2	3
7.	আমার শরীর কাঁপার অভিজ্ঞতা হয়েছিল (যেমন হাত কাঁপা) । (I experienced trembling (eg, in the hands)	0	1	2	3
8.	আমার মনে হতো যে আমি খুব বেশী স্নায়ু চাপে ভুগছি। (I felt that I was using a lot of nervous energy)	0	1	2	3
9.	আমি এমন পরিস্থিতি সম্পর্কে দুশ্চিন্তাগ্রস্ত ছিলাম যেখানে আমি তীব্রভাবে আতঙ্কিত হতে পারি এবং এমন কোন কাজ করতে পারি যাতে অন্যরা আমাকে বোকা মনে করবে। (I was worried about situations in which I might panic and make a fool of myself)	0	1	2	3
10.	আমার মনে হচ্ছিল, ভবিষ্যতে আমার ভালো কিছুরই আশা নাই। (I felt that I had nothing to look forward to)	0	1	2	3
11.	আমি অনুভব করতাম যে আমি খুব অস্থির হয়ে যাচ্ছি। (I found myself getting agitated)	0	1	2	3
12.	আরাম বোধ করা আমার জন্য কঠিন হত। (I found it difficult to relax)	0	1	2	3
13.	আমি মনমরা এবং বিষণ্ন অনুভব করতাম। (I felt down-hearted and blue)	0	1	2	3
14.	আমার কাজে বাধা হয় এমন যে কোন জিনিসই আমার কাছে অসহ্য লাগত। (I was intolerant of anything that kept me from getting on with what I was doing)	0	1	2	3
15.	আমার মনে হত এই বুঝি আমি হঠাৎ তীব্রভাবে আতঙ্কগ্রস্ত হচ্ছি। (I felt I was close to panic)	0	1	2	3
16.	কোন কিছুতেই আমি বেশী আগ্রহী হতে পারতাম না। (I was unable to become enthusiastic about anything)	0	1	2	3
17.	আমি অনুভব করতাম ব্যক্তি হিসেবে আমার বিশেষ কোন মূল্য নেই। (I felt I wasn't worth much as a person)	0	1	2	3
18.	আমি অনুভব করতাম আমি একটুতেই মনে ব্যাথা পাই। (I felt that I was rather touchy)	0	1	2	3
19.	শারীরিক পরিশ্রম না করলেও আমি হৃদপিন্ডের কাজ করা বুঝতে পারতাম (যেমনঃ হৃদস্পন্দন বৃদ্ধির অনুভূতি বা বুক ধড়ফড় করা, হৃদপিন্ডের স্পন্দনে ব্যাঘাত) | (I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat))	0	1	2	3
20.	যথাযথ কারন ছাড়াই আমি ভীত-সন্ত্রস্ত বোধ করতাম। (I felt scared without any good reason)	0	1	2	3
21.	জীবনটা অর্থহীন বলে মনে হত। (I felt that life was meaningless)	0	1	2	3

*Question No. 1, 6, 8, 11, 12, 14 & 18 represent stress related 7 questionnaires out of 21.