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A CROSS-SECTIONAL STUDY ON DEPRESSION, ANXIETY, AND STRESS AMONG THE STUDENTS IN A MEDICAL COLLEGE OF WEST BENGAL: AN INSIGHT WITH THE HELP OF MACHINE LEARNING

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Abstract

Introduction: Mental morbidities like depression, anxiety, and stress are increasing and responsible for significant DALYs. Young age groups are at risk, but literature suggests medical undergraduates are at higher risk even in this age group.

The current study hence aimed to estimate the prevalence of depression, anxiety, and stress among the students at a medical college in a west-central district of West Bengal, and to find out its determinants among the study population.

Methodology: A cross-sectional study was conducted in a medical college in a west-central district of West Bengal, among 212 undergraduate medical students following eligibility criteria. A standardised questionnaire DASS 21 had been used to assess depression, anxiety, and stress. Descriptive analyses were done using MS Excel followed by inferential analyses in Jupyter Notebook (python 3.11).

Results: The study found that 34% of participants had stress, 48% had depression, and 65% had anxiety. It was also found that about 30% of the participants had all three morbidities. Age, academic year, per capita family income, parental education as well as occupation, and current residence were found to be the statistically significant factors associated with either depression, anxiety, or stress in the Random Forest Classification model.

Conclusion:

The high prevalence of depression, anxiety, and stress among undergraduate medical students as identified by this study demands the attention of the policymakers and concerned stakeholders, and assurance of a friendly educational environment along with targeted counselling sessions to cope with these problems.

Key Words: Depression, Anxiety, Stress, Eastern India, Medical scholar, Mental health, Survey, Medical Student, Machine Learning.

Introduction

The World Health Organization's (WHO) definition of health recognizes mental well-being as an integral component of health and it is not merely the absence of mental illness.[1] The WHO has stated mental health as a state of well-being in which an individual realizes his or her abilities, can cope with the normal stresses of life, can work productively, and contribute to his or her community. Mental health is fundamental to the collective and individual ability of humans to think, emote, interact with each other, earn a living, and enjoy life.[1] Mental health has several determinants from socioeconomic to biological, and environmental factors; and cost-effective public health intervention, intersectoral strategies, political wills, etc. are there and needed to protect, promote, and restore this often-missed health aspect.[2]

Mental health issues, including depression, anxiety, and stress, are prevalent and significant public health concerns worldwide. These conditions can have a profound impact on individuals, affecting their overall well-being and daily functioning.[3] Depression is a common mental disorder, characterized by persistent sadness and a lack of interest or pleasure in previously rewarding or enjoyable activities, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration.[4,5] Anxiety is an emotion characterized by feelings of tension, worried thoughts, and physical changes like increased blood pressure.[6] Hans Selye in 1936 defined stress as "the non-specific response of the body to any demand for change".[7]

Global Burden of Disease (GBD) 2019, Institute for Health Metrics and Evaluation (IHME) database has reported one among eight people globally to suffer from mental disorders. It is found to be responsible for about 22483823.42 (30164888.21-16031594.55) DALYs globally and 4124789.01 (5502201.97-2963806.72) DALYs in India among 20-29 years age group as per GBD 2019.(8) In recent years, there has been growing recognition of the global burden of these mental disorders, with the COVID-19 pandemic exacerbating their prevalence and impact.[9] According to sources women and young people are at higher risk especially for anxiety and depressive disorders due to COVID.(9) In India, the prevalence of anxiety disorders in 2017 was 3189.9 per 100,000 population, equivalent to 44.9 million people. The prevalence of depressive disorder in 2017 was 2311.8 per 100,000 population, equivalent to 32.7 million people. [8] The states with the highest prevalence of anxiety disorders were Kerala, Karnataka, Telangana, Tamil Nadu, Himachal Pradesh, Maharashtra, Andhra Pradesh, Manipur, and West Bengal.[10,11]

Several studies have found that medical students are at higher risk of mental morbidities worldwide.[12,13]. A systematic review in India found that the pooled prevalence rate of depression varied from 29.0 - 49.5%. Similarly, the pooled prevalence rate of anxiety varied from 10.1 – 58.9%, and the pooled prevalence rate of stress varied from 42.8 – 59.8%. Female students had higher rates of depression and stress as compared to males.[14]

The scenario of West Bengal is also similar, a majority of the medical students suffer from mental morbidities like depression, anxiety, and stress. [11,15–17] Studies found in the literature review were conducted during the COVID-19 pandemic era. Similar studies are needed for the hour after the major waves of the stated pandemic. With this background the current study aimed to estimate the prevalence of depression, anxiety, and stress and find out its determinants among medical undergraduate students in a district of west-central West Bengal.

Materials and methods:

A cross-sectional study was conducted from February- July 2023 among undergraduate medical students in a medical college in a district of west-central West Bengal. Ethical clearance had been obtained from the Institutional Ethics Committee. Informed written consent had been taken from every participant. All the students enrolled in undergraduate medical courses at the particular medical college were included by the complete enumeration method. The students who did not give consent or were absent during the days' surveys of that batch were excluded.

A standardized questionnaire DASS-21 was used to assess the level of depression, anxiety, and stress. The original questionnaire had a part of questions related to sociodemographic characteristics as well.

For easy facilitation of collection of the data to avoid erroneous data entry by the investigator and provide more privacy to the participants Google Form was used in the presence of the investigator and a faculty after explaining the study and its objectives to them.
Data thus collected was analysed in MS Excel followed by Jupyter notebook (python 3.11). Descriptive followed by inferential statistics had been performed. Random Forest Classification model was used to find out the determinants of depression, anxiety, and stress. A cut-off value of the feature ≥0.05 had been considered to have a significant interaction with the outcome.

Results:
A total of 212 participants responded. The highest participation was from 2nd (26.4%) and 4th (26.4%) year students.

Table 1: Participant Profile

Variables	***groups/responses***	***Frequency***	***Percent***
Professional Year	1st prof. year	49	23.1
	2nd prof. year	56	26.4
	3rd prof. year	51	24.1
	4th prof. year	56	26.4
Religion	Hinduism	179	84.4
	Islam	33	15.6
Caste	General	97	45.8
	SC	44	20.8
	ST	7	3.3
	OBC	64	30.2
Gender	Male	127	59.9
	Female	85	40.1
Occupation of participant's father	Unemployed	8	3.8
	Govt. Service	63	29.7
	Pvt. Service	43	20.3
	Daily basis wage earner	4	1.9
	Business	45	21.2
	Self-employed	14	6.6
	Agriculture (own/leased in land)	31	14.6
	PSU	1	0.5
	Not divulged	1	0.5
Occupation of participant's mother	Unemployed	32	15.1
	Govt. Service	26	12.3
	Pvt. Service	26	12.3
	Business	3	1.4
	Self-employed	5	2.4
	Agriculture (own/leased in land)	3	1.4
	Homemaker	115	54.2
	Not divulged	2	0.9
Highest level of education of participants' father	Primary (Till Class 5)	11	5.2
	Upper Primary (Till Class 8)	11	5.2
	Secondary (Till Class 10)	19	9

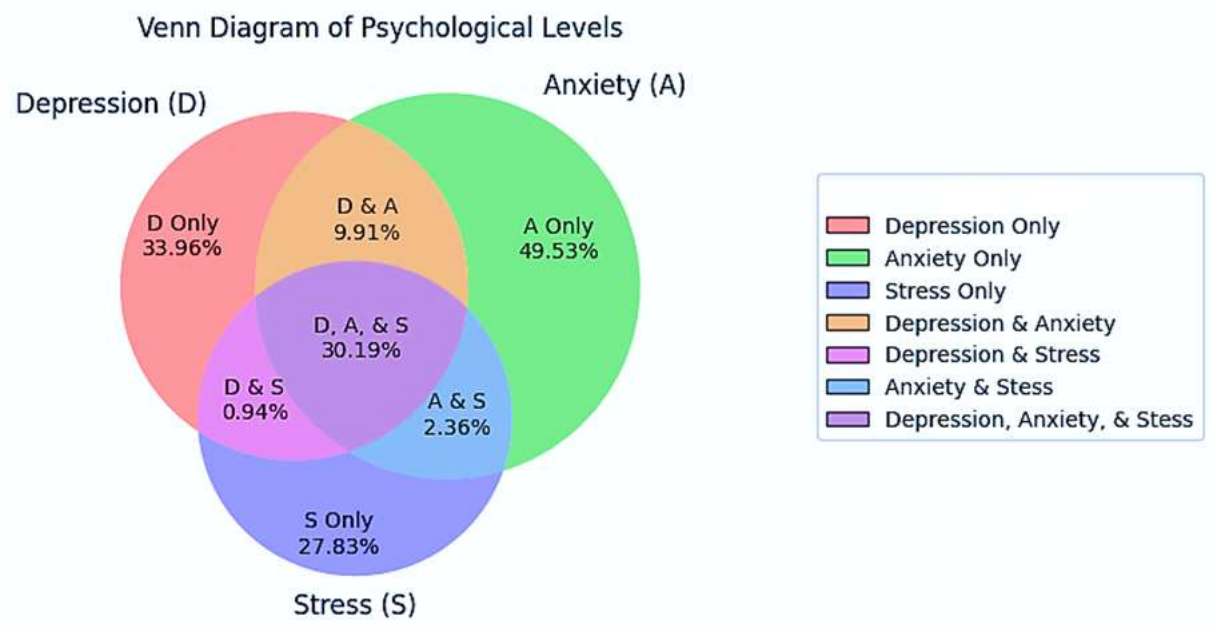
	Higher Secondary (Till Class 12)	40	18.9
	Graduate	101	47.6
	Post-graduate and above	30	14.2
Highest level of education of participants' mother	Illiterate	8	3.8
	Primary (Till Class 5)	21	9.9
	Upper Primary (Till Class 8)	15	7.1
	Secondary (Till Class 10)	16	7.5
	Higher Secondary (Till Class 12)	48	22.6
	Graduate	94	44.3
	Post-graduate and above	10	4.7
Participants' parents' living status	Both parents alive and staying together	202	95.3
	Mother expired	5	2.4
	Father expired	4	1.9
	Both parents expired	1	0.5
Place of residence	Urban	95	44.8
	Semi-urban	60	28.3
	Rural	57	26.9
Current residence of the participants	Hostel	115	54.2
	Paying guests or mess	36	17
	Home	59	27.8
	Not willing to divulge	1	0.5
	Rented apartment	1	0.5
Source of fund for study	Family income	187	88.2
	Scholarships or grants etc.	24	11.3
	Own earnings	1	0.5
Victim of Child Sexual Abuse (CSA)	No	202	95.3
	Yes	5	2.4
	May be	5	2.4
Victim of Bullying	No	170	80.2
	Yes	24	11.3
	May be	18	8.5
Victim of Ragging	No	175	82.5
	Yes	11	5.2
	May be	26	12.3
Witnessed/Experienced Domestic Violence	No	198	93.4
	Yes	13	6.1
	May be	1	0.5
Family Member Having Psychiatric Illness	No	175	82.5
	Yes	35	16.5
	May be	2	0.9
Family Member Having Anti-Psychiatric Medication	No	181	85.4
	Yes	31	14.6

Participant Diagnosed with Psychiatric Illness	No Yes	207 5	97.6 2.4
Participant Having Anti-Psychiatric Medication	No Yes	208 4	98.1 1.9

Source: Authors' original work

Regarding socio-demographic and personal characteristics, the majority of the participants were Hindu (84.4%), general (45.8%) by caste, male (59.9%), fathers working in the government sector (29.7%) and graduate (47.6%), mothers being a homemaker (54.2%) and graduate (44.3%), from urban area (44.8%) by original residence, currently residing in a hostel (54.2%). Regarding the parents' living status only 8 participants had experienced either of parents' death or one had experienced death of both. Family income was found to be the main source of funding for most of the participants (88.2%). Only 5 participants mentioned to experience childhood sexual abuse, and only 24 participants to had ever experienced bullying while only 11 participants mentioned to have ever experienced ragging. Only 13 participants had ever experienced or witnessed domestic violence, only 16.5% participants were found to have family history of psychiatric illness, while 14.6% participants were found to have family members taking medication for psychiatric illness. Only 2.4 % of participants had ever been diagnosed with psychiatric illness, and only 4 participants were found to take medication for psychiatric illness.

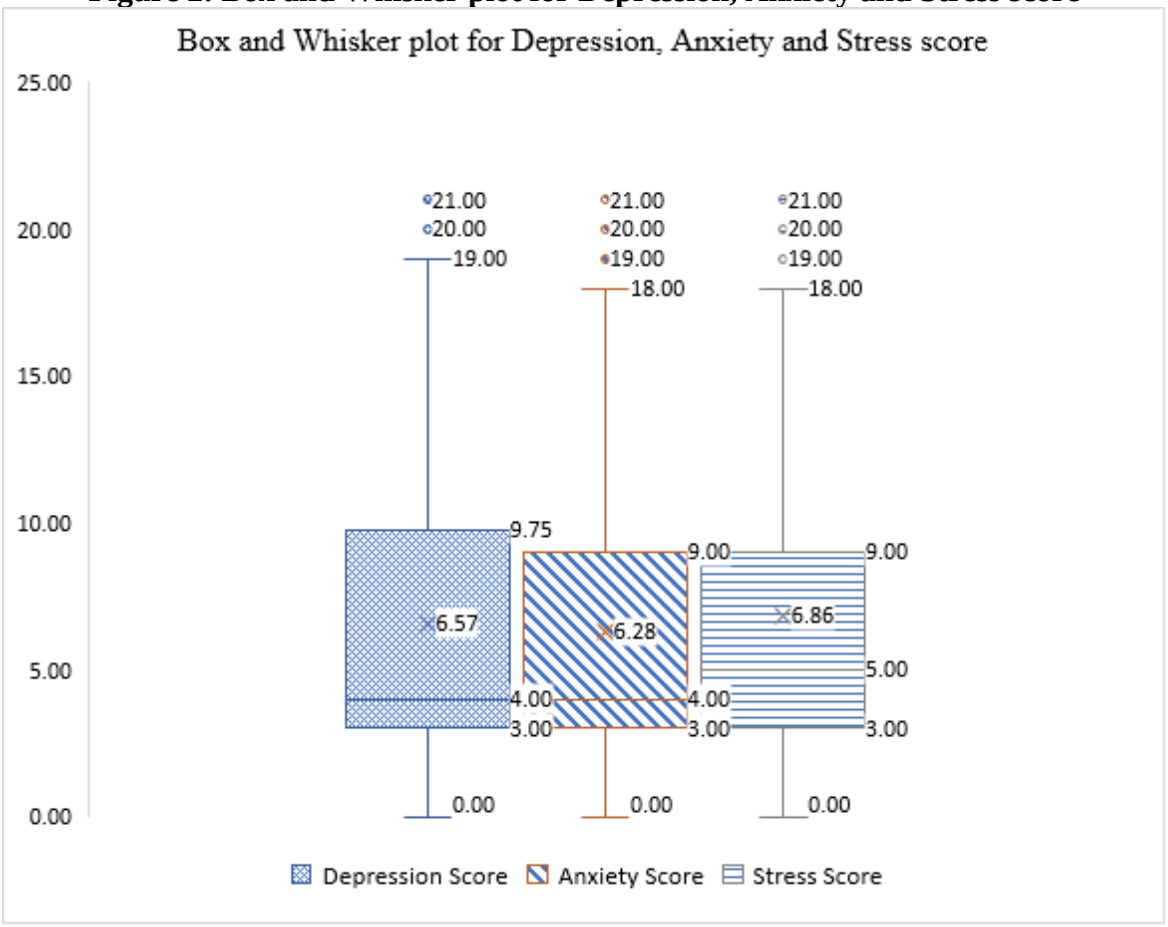
Figure 1: Venn Diagram showing the distribution of depression, anxiety, and stress



Source: Authors' original work

Nearly half of the study participants were suffering from anxiety (49.53%) alone, while 33.96% were suffering from depression alone and 27.83% were having stress. But a significant proportion (30.19%) were suffering from all of the three morbidities i.e. depression, anxiety, and stress.

Figure 2: Box and Whisker plot for Depression, Anxiety and Stress score



Source: Authors' original work

Table 2: Descriptive statistics of selected variables

Variables		Depression Score	Anxiety Score	Stress Score
Mean		6.5660	6.2830	6.8632
Std. Error of Mean		.38348	.36480	.38618
Median		4.0000	4.0000	5.0000
Mode		3.00	4.00	4.00
Std. Deviation		5.58352	5.31162	5.62283
Variance		31.176	28.213	31.616
Range		21.00	21.00	21.00
Minimum		.00	.00	.00
Maximum		21.00	21.00	21.00
Percentiles	25	3.0000	3.0000	3.0000
	50	4.0000	4.0000	5.0000
	75	9.7500	9.0000	9.0000

Source: Authors' original work

The participants' depression scores range from 0 to 21, with a mean score of 6.5660 (5.58) indicating that on average, the participants were experiencing a moderate level of depression. The participants' anxiety scores range from 0 to 21, with a mean score of 6.2830 (5.31) suggesting again that, on average, the participants were experiencing a moderate level of anxiety. Lastly, the participants' stress scores range from 0 to 21, with a mean score of 6.8632 (5.62) which also indicated experiencing a moderate level of stress by the participants.

Random Forest Classification (RFC) machine learning model[18] was used to understand the importance of features in the current study (Table 3).

Table 3: Feature importance as found using the Random Forest Classification Machine Learning model

Feature name	Importance score for Depression(D)	Importance score for Anxiety(A)	Importance score for Stress(S)	Importance score for DAS
Depression level	N/A*	**0.118789**	**0.235377**	N/A*
Stress level	**0.151502**	**0.126237**	N/A*	N/A*
Anxiety level	**0.140478**	N/A*	**0.159776**	N/A*
Age	**0.110287**	**0.113083**	**0.096462**	**0.151042**
Per capita (family) income (per month)	**0.090943**	**0.083132**	**0.072517**	**0.119923**
Academic year	**0.050313**	**0.05368**	**0.060454**	**0.082142**
Father's education	**0.050184**	0.044647	0.044238	**0.059655**
Father's occupation	**0.050001**	0.046647	0.039974	**0.068564**
Mother's education	0.04216	**0.050457**	0.041983	**0.059562**
Mother's occupation	0.039918	0.04482	0.036237	**0.0663**
caste	0.029856	0.036207	0.025688	0.042488
residence	0.028129	0.038356	0.025734	0.041603
Current residence	0.027758	0.044257	0.024303	**0.051847**
Academic issue	0.024047	0.017859	0.010782	0.023648
gender	0.023986	0.022328	0.009401	0.023773
Family issue	0.017597	0.019536	0.010871	0.026951
Personal issue	0.017187	0.02746	0.012239	0.029277
Funding for study	0.01699	0.011771	0.012707	0.015786
ragging	0.01325	0.018142	0.010629	0.021585
bullying	0.012314	0.021254	0.01508	0.026095
religion	0.011157	0.015102	0.006452	0.012856
Family history of psychiatric illness(es)	0.010801	0.012109	0.011822	0.018181
Domestic violence witnessed	0.010152	0.011113	0.006184	0.012022
Family member having psychiatric medicine	0.008349	0.008497	0.004933	0.01308
Regarding parents (alive/dead/separated)	0.008085	0.004008	0.008109	0.013622
History of psychiatric illness	0.005561	0.003169	0.006264	0.006294
Child sexual abuse (CSA)	0.004566	0.005119	0.007338	0.010207
History of having psychiatric medicine	0.004426	0.002223	0.004446	0.003495

*** N/A: not applicable**

Source: Authors' original work

Random Forest Classification model found that age, per capita family income, academic year, parental education as well as occupation, and current residence were statistically significantly associated with the outcome i.e. presence of any of the three most common mental health-related morbidity (depression, anxiety, or stress). We also found a similar association in correlation and odds ratio analyses (see supplement).

Discussion:

The study participants belonged to one of the most vulnerable age groups (23.09±3.78 years) for developing mental morbidities. [3,18] The majority of the participants were found to suffer from the mental morbidities under study, the highest being anxiety (29% mild, 6% moderate, 7% severe, 23% extremely severe, and overall about 65%), followed by depression (mild 14%, moderate 14%, severe 5%, extremely severe 15%, overall 48%) and then stress (mild 10%, moderate 6%, severe 7%, extremely severe 11%, overall 34%), and nearly 30% were found to suffer from all the three morbidities. This high prevalence had been found in earlier studies as well though with a varied range. Studies done in other parts of India and West Bengal also reported high prevalence. [14-16, 19-21]

Random Forest Classifier feature importance analysis had shown the greater role of age, academic year, per capita income, current residence, parental education as well as occupation in experiencing any of the mental morbidities. It was also found that the presence of one morbidity increased the chance of the presence of another. Those suffering already from stress and anxiety were like to suffer from depression. Again, those suffering from depression and anxiety were likely to experience stress too. Similarly, those suffering from depression and stress were likely to experience anxiety in their daily life. Previous studies have found an association between parenting, academic factors, family issues, etc. with mental morbidities.(20–22)

Regarding coping mechanisms, for most of the participants music was found to be the commonest activity to relax, but not being exclusive many were found to seek parental support to pray to Almighty and even substance abuse. These indicated that for coping role of not only parents but also academicians, society peers, etc. was of similar importance to create a healthier environment that not only supports education but nurtures the future of the society. Though health and mental health and their deviations are complex phenomena, simple initiatives can reduce the burden of morbidities as WHO suggests.[3]

Due to time and circumstantial constraints, this study focused on medical students only but a broader study on the all-health sciences students (medical, para-medical, allied health sciences) might put more light on the mental health issues. There is also a lack of literature on students of a general stream or other professional stream e.g., engineering, computer science, etc. regarding this issue; studying their mental health and comparisons can elaborate the understanding as well.

Again, this study had been conducted using Google Forms; full privacy, anonymity, ease of understanding (participants might have not felt comfortable asking their doubts), etc. might have not been fully ensured at least from the participants' view. Some even anonymously asked the reason and expressed their discomfort with certain questions though not all. Proper rapport building along with maintenance of audio-visual privacy protection faced challenges due to limited time for data collection though studies like this where mental health had been studied, stated these as a requirement for better output. [22]

The current study findings though had matched with many studies and showed many factors associated with mental ill-health but were not able to find out the role or background of those factors and how they were influencing these mental morbidities in-depth other than some statistics which did not necessarily explain the whole phenomena. A multicentric study with a qualitative approach is a way forward to address this issue and get a better understanding of this public health issue of mental health.

Conclusion

This study has found a high prevalence of depression, anxiety, and stress among medical students like other studies. Several factors and features are found to be associated with these outcomes from age to academic issues. Issues mentioned by the participants revealed the role of the surrounding environment, peers, family especially motherly/parental care, etc. to influence mental health. From listening to music to praying to the Almighty, sleeping, etc. are found to be the activities done by the participants to release the mental uneasiness or seek relief.

Mental morbidities like depression, anxiety, and stress are global public health challenges. The high prevalence of these mental health issues emphasizes the need for comprehensive strategies to address the challenges faced by students. Though several strategies are being implemented by government bodies, non-government organizations, and academic institutions too; but these are yet to bear desirable fruit. Here beneficiary orientation, participation, and counselling sessions for coping up mechanisms may play an important role other than research.

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Supplements

Table S1: Correlation between outcome variables and selected variables

Outcome Variable	Independent variable	Correlation (Spearman's)	p-value
Depression Score	Age of the participants (N=212)	0.419	0.000
	Per capita income (PCI) (N =209)	-0.261	0.000
	Academic year	0.314	0.000
Anxiety Score	Age of the participants (N=212)	0.447	0.000
	Per capita income (N=209)	-0.256	0.000
	Academic year	0.343	0.000
Stress Score	Age of the participants (N=212)	0.42	0.000
	Per capita income (N=209)	-0.194	0.005
	Academic year	0.373	0.000

Table S2: Association of Outcome variables with selected independent variables

Variables		Depression		Chi-square	Odds Ratio (OR)
Independent variables		Yes	No	Value df p-value	Value (95% Confidence Interval (CI))
Father's occupation	service/business/self-employed	77	89	0.484 1 0.487	0.793 (0.412-1.525)
	others	24	22		

Mother's occupation	others	54	43	4.621 1 **0.032**	**1.818 (1.515 - 3.135)**
	Homemaker	47	68		
Father's education	not graduate	43	38	1.558 1 0.212	1.424 (0.817 - 2.484)
	graduate	58	73		
Mother's education	not graduate	58	50	3.243 1 0.072	1.646 (0.956 - 2.834)
	graduate	43	61		
Residence (urban or not)	urban	42	53	0.812 1 0.367	0.779 (0.452 - 1.341)
	not urban	59	58		
current residence (hostel or not)	hosteller	59	56	1.352 1 0.245	1.38 (0.801 - 2.375)
	non-hosteller	42	55		
source of fund for study	family income	90	97	0.151 1 0.698	1.181 (0.51 - 2.736)
	others	11	14		
age group	> 22 years	63	28	29.792 1 **0.000**	**4.914 (2.73 - 8.846)**
	<= 22 years	38	83		
Socio-economic Status (SES)(as per modified BG Prasad scale January 2022)(34)	not upper class	55	41	6.55 1 **0.01**	**2.041 (1.178 – 3.534)**
	upper class	46	70		
Child Sexual Abuse (CSA) experienced	Yes/Maybe	7	3	2.103 1 0.147	2.681 (0.674 - 10.661)
	No	94	108		
Bullying experienced (victim)	Yes/Maybe	17	25	1.078 1 0.387	0.696 (0.351 - 1.382)
	No	84	86		
Ragging Experienced	Yes/Maybe	20	17	0.125 1 0.863	1.137 (0.558 - 2.315)
	No	89	86		
Domestic Violence Witnessed/Experienced	Yes/Maybe	7	7	0.033 1 0.855	1.106 (0.374 - 3.271)
	No	94	104		
Family history of psychiatric illness	No	89	86	4.157 1 **0.041**	**2.155 (1.019 - 4.566)**
	Yes/Maybe	12	25		
Family member having medication for psychiatric illness	No	92	89	5.041 1 **0.025**	**2.525 (1.104 - 5.780)**
	Yes/Maybe	9	22		
Participants' history of psychiatric illness	Yes	4	1	2.15 1 0.143	4.536 (0.498 - 41.277)
	No	97	110		
Participants having medication for psychiatric illness	Yes	3	1	1.223 1 0.269	3.367 (0.345 - 32.905)
	No	98	110		
	Male	65	62	1.591	1.427

Gender of the Participants	Female	36	49	1 0.207	(0.821 - 2.482)
1st prof year	yes	20	29	1.19 1 0.275	0.698 (0.366 - 1.334)
	no	81	82		
2nd prof year	no	81	75	4.34 1 **0.037**	**1.946 (1.035 - 3.65)**
	yes	20	36		
3rd prof year	no	84	77	5.512 1 **0.019**	**2.183 (1.12 - 4.219)**
	yes	17	34		
4th prof year	yes	44	12	29.187 1 **0.000**	**6.368 (3.110 - 13.040)**
	no	57	99		
		Anxiety			
Father's occupation	service/business/self-employed	107	59	0.009 1 0.924	0.967 (0.488-1.919)
	Others	30	16		
Mother's occupation	Others	70	27	4.449 1 **0.035**	**1.859 (1.042 - 50)**
	Homemaker	67	48		
Father’s education	not graduate	55	26	0.616 1 0.432	1.264 (0.704 - 2.27)
	Graduate	82	49		
Mother's education	not graduate	74	34	1.462 1 0.227	1.416 (0.805 - 2.493)
	Graduate	63	41		
Residence (urban or not)	Urban	63	32	0.216 1 0.642	1.144 (0.648 - 2.018)
	not urban	74	43		
current residence (hostel or not)	Hosteller	74	41	0.008 1 0.927	0.974 (0.553 - 1.714)
	non-hosteller	63	34		
source of fund for study	family income	123	64	0.922 1 0.337	1.51 (0.648 - 3.517)
	others	14	11		
Age group	> 22 years	76	15	24.896 1 **0**	**4.984 (2.58 - 9.628)**
	<=22 years	61	60		
SES	not upper class	69	27	4.036 1 **0.045**	**1.805 (1.012 - 3.215)**
	upper class	68	48		
CSA experienced	Yes/Maybe	9	1	2.956 1 0.086	5.203 (0.646 - 41.887)
	No	128	74		
Bullying experienced (victim)	Yes/Maybe	31	11	1.934 1 0.164	1.702 (0.800 - 3.619)
	No	106	64		
Ragging Experienced	Yes/Maybe	24	13	0.001	1.013

	No	113	62	1 0.973	(0.482 - 2.129)
Domestic Violence Witnessed/Experienced	Yes/Maybe	11	3	1.276a 1 0.259	2.095 (0.566 - 7.758)
	No	126	72		
Family history of psychiatric illness	Yes/Maybe	24	13	0.001 1 0.973	1.013 (0.482 - 2.129)
	No	113	62		
Family member having medication for psychiatric illness	Yes/Maybe	20	11	0.001 1 0.989	0.995 (0.449 - 2.205)
	No	117	64		
Participants' history of psychiatric illness	Yes	4	1	0.53 1 0.467	2.226 (0.244 - 20.281)
	No	133	74		
Participants having medication for psychiatric illness	Yes	3	1	0.192 1 0.661	1.657 (0.169 - 16.212)
	No	134	74		
Gender of the Participants	Male	83	44	0.074 1 0.785	1.083 (0.610 - 1.921)
	Female	54	31		
1st prof year	Yes	30	19	0.322 1 0.57	0.826 (0.427 - 1.598)
	No	107	56		
2nd prof year	Yes	31	25	2.858 1 0.091	0.585 (0.313 - 1.093)
	No	106	50		
3rd prof year	Yes	30	21	0.988 1 0.32	0.721 (0.378 - 1.376)
	No	107	54		
4th prof year	Yes	46	10	10.218 1 **0.001**	**3.286 (1.545 - 6.986)**
	No	91	65		
		Stress			
father's occupation	service/business/self-employed	58	108	0.326 1 0.568	1.228 (0.607 - 2.483)
	others	14	32		
mother's occupation	Service/business	46	51	14.446 1 **0**	**3.0864 (1.709-5.587)**
	Homemaker	26	89		
Father’s education	not graduate	29	52	0.198 1 0.656	1.141 (0.637-2.044)
	graduate	43	88		
mother's education	not graduate	39	69	0.453 1 0.501	1.216 (0.688 - 2.15)
	graduate	33	71		
residence (urban or not)	urban	32	63	0.006 1 0.939	0.978 (0.552 - 1.732)
	not urban	40	77		
current residence (hostel or not)	hosteller	49	66	8.378 1	**2.389**
	non-hosteller	23	74		

				0.004	**(1.316 - 4.336)**
source of funds for study	family income	64	123	0.049 1	1.106 (0.453 -
	others	8	17	0.825	2.701)
age group	> 22 years	51	40	34.663 1	**6.07 (3.244 -**
	<= 22 years	21	100	**0**	**11.362)**
SES	not upper class	41	55	5.984 1	**2.045 (1.148 -**
	upper class	31	85	**0.014**	**3.636)**
CSA experienced	Yes/Maybe	7	3	6.077 1	**4.918 (1.232 -**
	No	65	137	**0.014**	**19.633)**
Bullying experienced (victim)	Yes/Maybe	13	29	0.212 1	0.843 (0.408
	No	59	111	0.646	1.744)
Ragging Experienced	Yes/Maybe	8	29	3.044 1	0.478 (0.206 -
	No	64	111	0.081	1.109)
Domestic Violence Witnessed/Experienced	Yes/Maybe	7	7	1.719 1	2.046 (0.689 -
	No	65	133	0.19	6.079)
Family history of psychiatric illness	Yes/Maybe	8	29	3.044 1 0.081	0.478 (0.206 - 1.109)
	No	64	111		
Family member having medication for psychiatric illness	No	67	114	5.149 1	**3.058 (1.120 -**
	Yes/Maybe	5	26	**0.023**	**8.333)**
Participants' history of psychiatric illness	Yes	3	2	1.548 1	3.000 (0.490 -
	No	69	138	0.213	18.375)
Participants having medication for psychiatric illness	Yes	2	2	0.468 1	1.971 (0.272 -
	No	70	138	0.494	14.292)
Gender of the Participants	Male	49	78	3.015 1	1.693 (0.932 -
	Female	23	62	0.082	3.077)
1st prof year	no	64	99	8.838 1	**3.311 (1.460 -**
	yes	8	41	**0.003**	**7.519)**
2nd prof year	yes	14	42	2.725 1	0.563 (0.283 -
	no	58	98	0.099	1.119)
3rd prof year	yes	12	39	3.259 1	0.518 (0.252 -
	no	60	101	0.071	1.066)
4th prof year	yes	38	18	38.983 1	**7.575**
	no	34	122		

				0.000	**(3.847 - 14.915)**

*****df= degree of freedom

Table S3: Adjusted Odds Ratio (aOR) (multivariable binomial logistic regression for the strength of association) among dependent variables and independent variables

	Depression Nagelkerke R Square = 0.324 Hosmer and Lemeshow Test p-value = 0.887			
Variables entered in the equation	p-value	aOR	95% Confidence Interval	
			Lower	Upper
Father's occupation	.967	.981	.400	2.405
Mother's occupation	.713	.878	.438	1.758
Father's education	.738	1.135	.542	2.376
Mother's education	.772	.904	.455	1.794
residence	.861	.938	.455	1.931
Current residence	.275	1.512	.720	3.179
Source of funds for study	.863	1.098	.382	3.156
Age group	**.006**	**4.559**	**1.531**	**13.578**
caste	.807	1.087	.557	2.121
SES	.249	.655	.320	1.344
CSA	.082	5.986	.794	45.107
Bullying experienced	.056	.815	.859	2.092
Ragging experienced	.155	.581	.175	1.918
Domestic violence witnessed/experienced	.712	1.308	.314	5.446
Family history of psychiatric illness	.956	.932	.079	10.989
Any family members having medication for psychiatric illness	.950	.919	.066	12.723
gender	.151	.580	.276	1.220
1st academic year	.881	.902	.233	3.494
2nd academic year	.306	.515	.145	1.836
4th academic year	**.029**	**3.229**	**1.130**	**9.223**
	Anxiety Nagelkerke R Square= 0.276 Hosmer and Lemeshow Test p-value = 0.710			
Variables in the Equation	**p-value**	**aOR**	**95% C.I.for aOR**	
			Lower	**Upper**

Father's occupation	.751	1.153	.480	2.770
Mother's occupation	.243	.656	.323	1.332
Father's education	.971	.986	.461	2.108
Mother's education	.863	.941	.470	1.883
residence	.080	1.920	.926	3.980
Current residence	.159	.578	.269	1.240
Source of fund for study	.162	2.201	.728	6.656
Age group	**.000**	**14.850**	**3.873**	**56.934**
caste	.974	1.011	.512	1.998
SES	.435	.744	.354	1.564
CSA	.142	6.788	.526	87.628
Bullying experienced	.425	1.517	.545	4.223
Ragging experienced	.772	.861	.312	2.375
Domestic violence witnessed/experienced	.266	2.525	.493	12.917
Family history of psychiatric illness	.661	1.658	.173	15.906
Any family members having medication for psychiatric illness	.850	.794	.073	8.681
gender	.162	.598	.291	1.230
1st academic year	.111	3.611	.743	17.545
2nd academic year	.184	2.802	.612	12.820
4th academic year	.841	.878	.247	3.122
	Stress Nagelkerke R Square = 0.407 Hosmer and Lemeshow Test p-value =0.454			
Variables in the Equation	**Sig.**	**aOR**	**95% C.I. for aOR**	
			Lower	**Upper**
Father's occupation	.967	.981	.400	2.405
Mother's occupation	.713	.878	.438	1.758
Father's education	.738	1.135	.542	2.376
Mother's education	.772	.904	.455	1.794
residence	.861	.938	.455	1.931
Current residence	.275	1.512	.720	3.179
Source of fund for study	.863	1.098	.382	3.156
Age group	**.006**	**4.559**	**1.531**	**13.578**
caste	.807	1.087	.557	2.121
SES	.249	.655	.320	1.344
CSA	.082	5.986	.794	45.107
Bullying experienced	.056	.815	.859	2.092
Ragging experienced	.155	.581	.175	1.918
Domestic violence witnessed/experienced	.712	1.308	.314	5.446
Family history of psychiatric illness	.956	.932	.079	10.989
Any family members having medication for psychiatric illness	.950	.919	.066	12.723
gender	.151	.580	.276	1.220
1st academic year	.881	.902	.233	3.494

2nd academic year	.306	.515	.145	1.836
4th academic year	**.021**	**3.499**	**1.211**	**10.107**