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Impact of yoga and breathing techniques on intimidating situational stress amongst high school students in India

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Abstract

University examinations have always been associated with huge amounts of stress in young high school students. Yoga and breathing techniques have also been considered effective tools to achieve physical and psychological health among students. Most research on yoga in relation to stress has been conducted in stable conditions and with no immediate intimidation. At the end of 2021, high school students in India were suddenly made subject to a mandatory university entrance examination - the Common University Entrance Test (CUET). This research has been undertaken with an objective to investigate the impact of practicing yoga and breathing exercises on the stress level of high school students aspiring for university admissions in an intimidating situation i.e. CUET. Findings show that practicing yoga and breathing techniques has a significant negative correlation with and impact on CUET-induced intimidating stress in high school students. Gender and class are also found significant in correlation and multiple regression analysis. The results would help the academic institutions, researchers and practitioners in designing yoga interventions to combat stress in students.

Keywords: Yoga, breathing techniques, stress, CUET, high school students

1. Introduction

Yoga is an ancient technique devised by Indian sages such as Rishi Patanjali and others for the perfect alignment of body, mind, and soul to reach enlightenment in human life. The most common perception of yoga is as a physical exercise regime including Postures (Asanas) and Breathing Techniques (pranayama). Yoga is practiced in many forms such as raja-yoga, upa-yoga, hatha-yoga, and has many more components to it. In whatever way it's being practiced, it has an effective result of reducing stress and anxiety, and improving relaxation, mindfulness, attention, and memory (Jain, 2021; Nanthakumar, 2018, Rocha *et al.*, 2012) ^[8, 19, 25]. Stress is a negative emotional, cognitive, behavioral and physiological process occurring when a person tries to adjust to or deals with a stressor (Bernstein *et al.*, 2008) ^[3]. Any environmental, psychological, biological, and social factors might trigger stress which may be positive or negative depending upon the nature and intensity of the reaction of an individual (Rana, Gulati & Wadhwa, 2019) ^[24]. Stress in students may be caused by any situation such as teachers, papers and projects, competition with peers, financial problems, fear of academic failure, pressure to perform well in examination, or any other security, financial, personal, and academic issues (Cherian and Cherian, 1998; Kolko, 1980; Ross *et al.*, 1999) ^[4, 13, 26]. Student life in general is subject to stress in general due to various pressures (Abouserie, 1994; Wills and Shiffman, 1985) ^[1, 33], which becomes manifold during their high school stage of schooling, particularly due to the high stakes depending on their performance in this crucial stage. Not only these adolescents are facing many academic, parental, personal, social, financial and other stressful issues (Pereira, 1997) ^[22], they also have to go through the highly competitive process of university admissions, which is highly associated with the stress among the high school students (Liu *et al.*, 2020; Peleg and Klingman, 2002) ^[15, 21]. As stress is a process of perceiving and coping with environmental threats and challenges by an individual (Myers, 2005) ^[18], it can result in many unwarranted or worrisome physical, emotional, cognitive or behavioral outcomes for a student that might last for longer durations than desired

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(Vlisides, Eddy and Mozie, 1994) ^[32]. There might be some desirable outcomes of stress too that are beneficial to the students such as improved performance, enhanced creativity, better achievements, improved adaptation of situation provided it can be controlled or is moderate (Sadda, 2018) ^[27]. Studies show that more than 60% of Indian students face moderate to high stress due to academic and other pressures in this crucial phase of their lives (Deb, Strodl and Sun, 2015, Meher & Meher, 2021) ^[6, 17] Using yoga, breathing, and relaxation techniques are often recommended among other measures to reduce the examination stress in students and improve their performance (Schachter, 2007, Porwal and Kumar, 2014) ^[29, 23] and practiced by the students as a coping mechanism (Mann, Tiwari and Mishra, 2021) ^[16]. Saini, Singh, and Rathore (2021) ^[28] investigated the effect of Yoga on the perceived stress level of college students in a pre-test and post-test experimental design. Their findings indicate the positive impact of practicing yoga by the students on their stress levels. Kumar and Tiwary (2014) ^[13] examined the impact of yoga intervention on academic anxiety in students and reported a reduction in anxiety among the students as a result of the intervention. A study by Tripathi, Kumari, and Ganpat (2018) ^[31] found positive effects of yoga on the psychophysiological levels of college students leading to reduced amounts of stress and suggested a yoga-based therapy for students as an intervention. Kauts and Sharma (2009) ^[9] studied the effect of yoga on academic performance in relation to stress. After administering a yoga module to students for seven weeks, they found that students practicing yoga had less stress and better performance in studies. Yoga effectively works as a management and preventive measure for stress (Kirkwood *et al.*, 2005; Pael, 2018) ^[11, 20]. Review of research on scopus, research gate, and google scholar shows that there is a good amount of research on the impact of yoga or yoga intervention particularly in stationery conditions on the stress of students in general. However, no work is done when the situation is suddenly becoming stressful for a student, particularly for students in their last year when they have to face highly competitive high stake entrance examinations. Senior high schools in India are currently undergoing an unprecedented and highly stressful situation where they are all of a sudden exposed to the highly competitive compulsory Common University Entrance Test (CUET) from the academic year 2022-23 for the first time. The announcement was just a few months prior to the end of their term. Taking a lead from the review of the research that yoga results in better mental and emotional health and positive cognitive processes, this paper presents the results of an empirical study conducted on 363 high school students in Delhi, India to explore the impact of practicing yoga regularly on the perceived stress levels of these school students in the current situation of imposing sudden methodological change their life-altering event and how can affect different groups of students on the basis of their class, stream or other demographics. It also aims to identify the demographic variables that may require the yoga interventions for managing the entrance exam induced stress levels in students.

2 Research Methodology

2.1 Research objectives

The objectives of the study are (1) to explore the level of perceived stress caused by CUET among senior high school students, (2) to examine the significant relationships between the perceived level of stress and other variables such as

demographics (class, stream, type of school, gender & family income), frequency of yoga, and perception about the de-stressing effect of yoga, (3) to find out significant differences among groups of students on stress levels, frequency of yoga, and perception about the de-stressing effect of yoga, and (4) to assess the effect of yoga and breathing exercises on the perceived stress level of the senior high school students.

2.2 Study Design

The study applied the cross-sectional design for research. After the declaration about the mandated university entrance examination by the Ministry of Education, Government of India, a self-reported questionnaire was prepared on stress and the frequency of practicing yoga and breathing exercises by the students. The questionnaire was administered through an online survey to the students via google link during the months of April and May 2022. Frequency of practicing yoga and breathing techniques is taken as an independent variable and the stress caused by CUET is examined as the dependent variable. Other demographic variables such as class, type of school, stream, and gender of the student have been the additional independent variables studied.

2.3 Sample

The participating students belonged to various schools from the public and private sector. The data had been collected by posting the google link for the questionnaire on various online platforms. The aim of the study and instructions to fill the questionnaire were explained to the participants through a cover letter attached with the link. All students belonged to class 12th and participated in the study voluntarily.

2.4 Materials and Method

The study assessed the perceived stress of the students through a single-item scale where the participants were asked to rank their perceived level of stress after getting informed about the mandate of the university entrance examination. The single-item scales are often used in the studies relating to personality, job satisfaction, anxiety, and stress. Such scales are found as effective as multi-item questionnaires and are far more time efficient (Littman, 2006; Schmidt, 2018) ^[14, 30]. For yoga and breathing exercises practiced by the students, two questions were asked on Likert-type scale. The respondents were asked to rank the frequency of practicing yoga or breathing techniques to manage their mental and emotional health on a scale of one to four, where one represents never and four represents daily. Another question is related to the effectiveness of yoga and breathing techniques as perceived by the students in managing their stress on a scale of 1 to 5, where 1 represents Not at all helpful and 5 shows Extremely helpful. The rest of the questionnaire consisted of personal and demographic information such as class, stream, type of school, gender, as family income.

The data collected from the respondents was analyzed using statistical software SPSS. Primarily, the mean, standard deviation, correlations, t-test, eta², one-way ANOVA, and Stepwise multiple regression analysis were used to find out the desired associations and regression impacts.

3. Results

Descriptive statistics run for explaining the data included mean and standard deviation, results of which are presented in Table 1.

Table 1: Descriptive Statistics

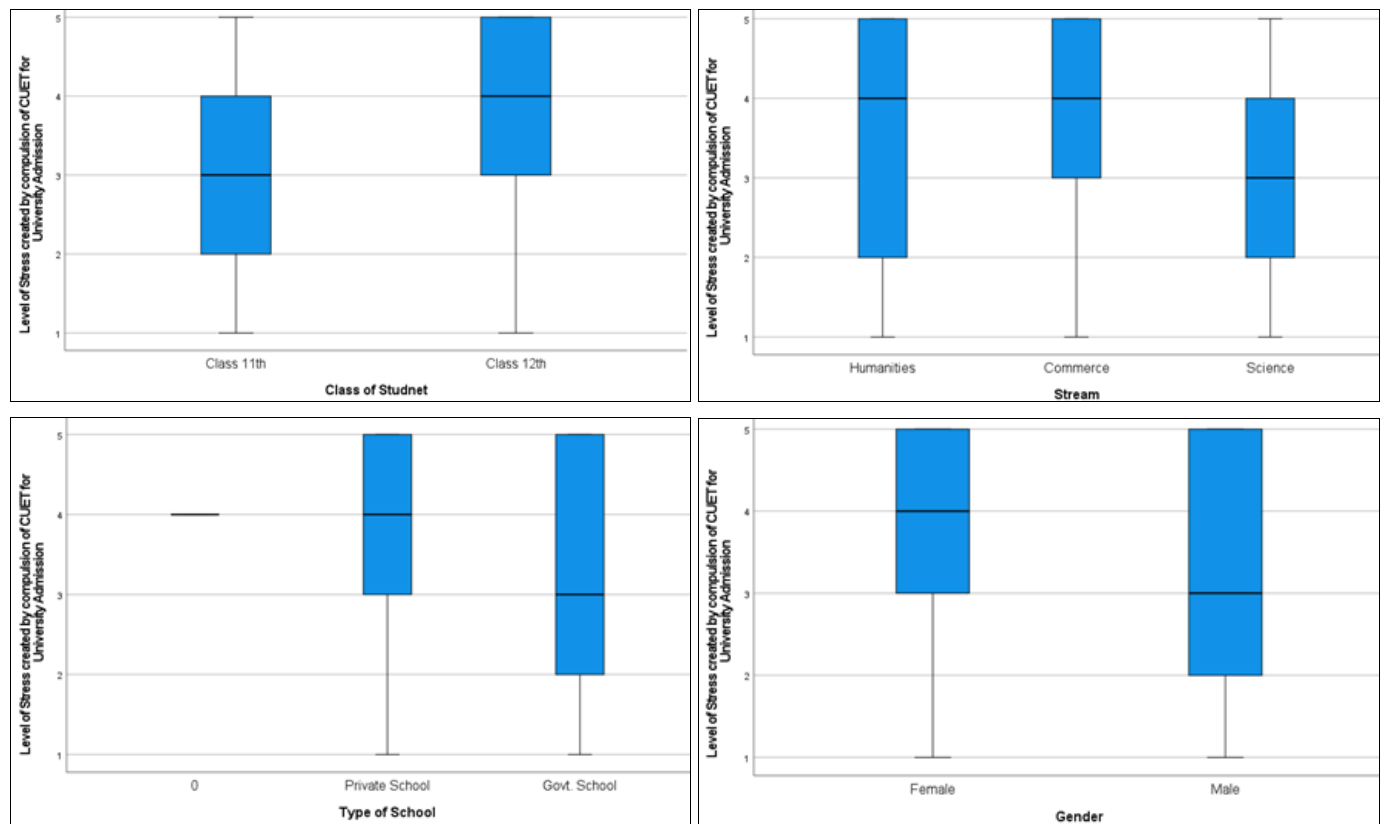
Variable	Mean	Standard Error	Standard Deviation	Variance
Class	.84	.019	.369	.136
Stream	1.96	.038	.729	.531
Type of school	1.18	.020	.389	.151
Gender	.38	.026	.486	.236
Family income	3.54	.071	1.344	1.807
Frequency of Practicing Yoga and Breathing Techniques	2.18	.051	1.421	.958
Perception about De-stressing effect of Yoga and Breathing Techniques	3.15	.073	1.398	1.956
Level of Stress	3.45	.071	1.352	1.829

Source: Author’s compilation from the SPSS output

Results show that the average respondent in this study is a senior high school, female, commerce student of private school with an average family income of Rs. 50,000 - Rs. 1, 00,000 per month, who practices yoga occasionally but has a perception of positive effect of yoga and meditation techniques about de-stressing. An average student is

moderately to highly stressed about the Common University Entrance Test.

The stress level caused by the CUET in high school students according to their class, stream, school and gender are presented in boxplots in Figure 1 showing apparent differences in the stress levels.



Source: Author’s compilation from the SPSS output

Fig 1: Box plots for Level of Stress caused by CUET according to demographic factors

The boxplots give a fair idea about group wise levels of stress in students. Visibly, class 12th students, private school students, female students, and commerce students are more stressed than their counterparts.

Pearson’s r coefficients have been calculated to find out significant relationships between variables, results of which are presented in table 2.

Table 2: Significant Correlations for the variables

	Level of Stress	Frequency of Yoga and Breathing Techniques	Perception about Destressing Effect of Yoga and Breathing Techniques
Class	.143**	-.177**	-.140**
Stream			
Type of schooling		.205**	.231**
Gender	-.121*	-.171**	
Family income		-.107*	-.135**
Level of Stress		-.112*	-.131*
Frequency of practicing Yoga and Breathing Techniques	-.112*		.644**
Perception about Destressing Effect of Yoga and Breathing Techniques	-.131*	.644**	

** Significant at 99% level of confidence ($p < .01$)

* Significant at 95% level of confidence ($p < .05$)

Source: Author's compilation from the SPSS output

Significant relationships were found between the dependable variable, i.e. Stress and Class ($p < .01$), Gender ($p < .05$), Frequency of practicing Yoga and Breathing Techniques ($p < .05$), and Perception about Destressing effects of Yoga and Breathing Techniques ($p < .05$). Stream, Type of School and family income are not found significantly correlated with the level of CUET caused stress in students. The results re-

emphasize the finding of the t-tests for class, school, gender, and one-way ANOVA for stream and family income.

The statistical differences have also been computed using the t-test shown in table 3, 4, and 5. The eta² showing effect size from .02 to .05 is interpreted as small effect, .05 to .08 as medium effect, and greater than .08 is representing large effect (Cohen, 1988) [5].

Table 3: Comparison of means according to the class of students

Variables	Class 11 th (N = 59)		Class 12 th (N = 304)		t - value	Eta ² (Hedges' g)
	Mean	SD	Mean	SD		
Level of Stress	3.02	1.396	3.54	1.329	-2.740**	1.343
Frequency of Practicing Yoga and Breathing Techniques	2.58	1.102	2.11	.936	3.054**	.967
Perceived effect of Practicing Yoga and Breathing Techniques on Stress	3.59	1.464	3.06	1.371	2.691**	1.389

** Significant at 99% level of confidence ($p < .01$)

* Significant at 95% level of confidence ($p < .05$)

Source: Author's compilation from the SPSS output

Results show that the difference between the mean stress level between class 11th and 12th is statistically significant (($t = -2.740$, $df = 361$, two-tailed $p < .01$) and so is the frequency of

practicing yoga and breathing techniques, and perceived impact of yoga and breathing techniques. The Eta Square values are showing a large effect for all the variables.

Table 4: Comparison of means according to Type of School

Variables	Private (N = 298)		Public (N = 65)		t - value	Eta ² (Hedges' g)
	Mean	SD	Mean	SD		
Level of Stress	3.49	1.333	3.28	1.442	1.158	1.356
Frequency of Practicing Yoga and Breathing Techniques	2.10	.952	2.60	.997	-3.821**	.962
Perceived effect of Practicing Yoga and Breathing Techniques on Stress	3.01	1.369	3.82	1.333	-4.315**	1.366

Source: Author's compilation from the SPSS output

** Significant at 99% level of confidence ($p < .01$)

* Significant at 95% level of confidence ($p < .05$)

Results shown in table 4 clarify that both the private and public school students are equally stressful due to the CUET with no statistically significant difference in their means. Public (government) school students are more regular in their yoga practices and have a higher perception about the

destressing impacts of yoga and breathing techniques as shown by the significant differences between the groups. The effect of the differences is also large as represented by eta square values of higher than 0.8.

Table 5: Comparison of means according to Gender

Variables	Female (N = 225)		Male (N = 138)		t - value	Eta ² (Hedges' g)
	Mean	SD	Mean	SD		
Level of Stress	3.58	1.317	3.25	1.387	2.311*	1.347
Frequency of Practicing Yoga and Breathing Techniques	2.32	.979	1.97	.943	3.301**	.967
Perceived effect of Practicing Yoga and Breathing Techniques on Stress	3.25	1.386	2.99	1.409	1.747	1.397

** Significant at 99% level of confidence ($p < .01$)

* Significant at 95% level of confidence ($p < .05$)

Source: Author's compilation from the SPSS output

The results presented in table 5 clearly show that female students are significantly higher in stress compared to their male counterparts ($t = 1.347$, $df = 361$, two-tailed $p < .05$), and are more regular in practicing yoga and breathing techniques. However, the perceived effect of yoga-related practice is not significantly different among the girl and boy students. Effect

values are large for all variables.

To establish statistically significant differences in the stream wise stress levels of students, one way ANOVA was conducted with Tukey's HSD test and effect of differences, the results of which are presented in table 6.

Table 6: Comparison of Means according to Stream

Variables	Humanities (N = 104)		Commerce (N = 170)		Science (N = 89)		Tukey's HSD test			F- value	eta ²
	Mean	SD	Mean	SD	Mean	SD	H.VS.C.	HVS. Sc.	C.VS. Sc.		
Level of Stress	3.46	1.461	3.62	1.273	3.12	1.321			*	4.061*	.022

* Significant at 95% level of confidence ($p < .05$)

Source: Author's compilation from the SPSS output

Results show that the stress levels faced by humanities, commerce and science students are significantly different ($F = 4.061, df = 2, 360, p < .05$), with commerce students dealing with the highest level of stress. Income wise, the one way ANOVA didn't result in any significant difference in stress associated with the levels of income ($F = 1.412, df = 2, 360, p > .01$).

Multiple regression was conducted to examine if practicing yoga and breathing techniques have an impact on stress caused by the CUET and how much. Independent variables selected for the analysis included class, stream, type of school, gender, and frequency of yoga and breathing practices. Results of the Stepwise Multiple Regression analysis are presented in Table 7.

Table 7: Model summary: Stepwise selection of variables in the regression model (N = 363)

Steps	Multiple R	R ²	Adjusted R ²	S. E.	R ² change	F change	Sig. F	Variable in
1	.143	.20	.018	1.340	.020	7.510	.006	Class
2	.181	.033	.027	1.334	.012	4.582	.033	Gender
3	.212	.045	.037	1.327	.012	4.586	.033	Frequency of Practicing Yoga and Breathing Techniques

Dependent variable: Stress caused by CUET

Source: Author's compilation from the SPSS output

Grossly, 21.2% variation in CUET-related stress level is caused by the class, gender, and frequency of practicing yoga and breathing practices together. The R square shown in table 7 demonstrates that approximately 4.5% of the variation in stress level of the students is explained by all three variables collectively. The pure effect of an independent variable as given in table 8 by standardized beta in comparison with other

independent variables depicts that yoga practice is equally important as other variables and is responsible for 11.4% variation in stress of students, keeping the effect of other variables in the equation removed, significant at .05 level of confidence (shown by significance of t). The F value of the final stepwise regression model is 5.624 significant at .01 level of significance.

Table 8: Associated statistics for the determinants of Stress (N = 363)

Independent variables	B	Standardized Beta	S. E.	t-value	Sig. t	F of the regression	Tolerance
(Constant)	3.592	-	.274	13.102	.001		
Class	.415	.113	.193	2.150	.032		
Gender	-.368	-.132	.146	-2.514	.012		
Frequency of Practicing Yoga	-.158	-.114	.074	-2.141	.033		
						5.624	.001

Dependent variable: Stress caused by CUET

Source: Author's compilation from the SPSS output

4. Discussion

To the best of the researcher's knowledge, this is the first research study on how yoga helps a student in sudden intimidating situations. The results of this study lead to many significant findings. Descriptive statistics show that the change in the university admission system by implementing CUET 2022 in almost all central and prestigious universities has resulted in high levels of stress in high school students. Class 12th, commerce stream, female, and private school students appear to be the most stressed. Most of these students are practicing yoga and breathing practices but not very regularly but do believe in the de-stressing effects of such practices. This emphasizes on the importance of regularity in practicing yoga and breathing techniques.

Correlations, t-tests, and one-way ANOVA were used to examine the significant relationships among the variables as well as the differences. Senior high school students were found to be more stressed. There may be many reasons for such stress, however as this study examined students' stress only with respect to the CUET 2022, it might be explained by the obvious fact that the class 12th students are facing it directly, suddenly, and most crucially. In the words of well-known educationist Meenakshi Gopinath "the first cohort has navigated unprecedented uncertainties during Covid-19, such as a two-phase class XII board exam, and being informed rather late in the term about the new test" (Gopinath, 2022) [7]. The situation obviously demands more attention to be given to this group of students. Interestingly, the frequency of yoga-related practices has been found inversely related to the class level. This demonstrates that senior students are less engaged in this activity. A possible reason may be the academic

pressures to perform, requiring long hours of study at the cost of physical, mental, and emotional health. This is also an important insight for future planning by schools and other educational organizations. Public or government school students fare better in physical activities involvement with respect to yoga, which shows that private school authorities should divert more attention in this direction. However, the type of school doesn't relate significantly to the stress caused by CUET indicating that all students are affected by the entrance examination alike. Despite being more regular with yoga and breathing activities, female students are found to be more susceptible to stress. The results are in confirmation of many other studies which found that female students are more prone to stress, or that gender-related differences can affect the amount of stress (Arce-Medina and Flores-Allier, 2012; Kim, Park and Park, 2021; Yildirim, Ergene, & Munir 2007) [2, 10, 34]. Stream of students and family income are not found significantly related to the CUET-caused stress level among the students. A significant relationship has been found between the frequency of practicing yoga and the level of stress. Students practicing yoga and breathing exercises regularly face low levels of stress even in sudden stressful situations. This implies that practicing yoga and breathing exercises improves the ability to respond to stressful situations with calmness. Students who perceive yoga as a de-stressing activity are highly regular in their practices. Significant differences between the groups have been investigated statistically to have deeper insights. Senior or 12th class students are significantly higher in their level of stress. Results show that class 11 students are less stressed about the entrance test but at the same time they are also more

regular in their yoga and breathing practices and have a better perception about the impact of such practices in de-stressing themselves. One explanation for this lower stress level could be that they are still one year away from the examination and another could relate it to their higher level of yoga practices and the probable effect of yoga on them. Type of school doesn't make any difference in the level of stress showing students from both types of schools are equally stressed. Female students are significantly more stressed due to the entrance test. Stream wise too, there are significant differences in the students with statistical differences found significant only for science and commerce stream students. In comparison to science students, commerce students are more stressed due to CUET. Science students are usually familiar to the concept of competitive exams such as NEET or JEE for their medical or engineering entrances. Commerce students are exposed to entrance examinations at this level for the first time through CUET, which looks like an obvious cause of their stress levels.

The purpose of this study was to check if yoga and breathing techniques can help in managing the stress levels of high school students who have to face CUET as a competitive university entrance examination for the first time. Stepwise multiple regression analysis shows that when examined only for CUET-related stress with the class, stream, type of school, and gender, yoga and breathing practices emerged as a major contributory. Overall 21.2% contribution to the CUET caused stress level of students is affected by Yoga and breathing practices with gender and class of the student, almost in equal proportion by all. This implies that practicing yoga has an almost equal impact on students' stress levels as does the gender and class of the student. The aim of the study to check the impact of yoga and breathing techniques on the stress levels of the students is fully established by the results of regression analysis.

5. Conclusion

Getting admission in college is always an event of high importance and impact in a student's life, and may induce a significant amount of stress in adolescents. Yoga and breathing exercises have been a part of Indian civilization and culture for more than 5000 years, and have been proven to reduce stress and increase physical and emotional fitness. This study is probably the first to measure the university entrance examination, more specifically CUET, related perceived stress in students and relate it to time-tested yoga and breathing techniques. No research study was found on research databases relating yoga with the entrance examination-related stress. The study reemphasizes the impact of yoga and breathing exercises in combatting stress levels in high school students. It found significant correlations between class, stream, gender, and level of stress in students caused by CUET. The key findings of the study include that senior year, commerce stream, and female high school students are more stressful due to CUET and practicing yoga regularly has a significant impact on the level of stress in the students.

The study has successfully identified the groups, variables, and their interlink ages for future references, research, and practices. Special support or preventive programs may be designed focusing on these groups by the experts. The positive perception of students, for example, might be used by the program designers, counselors, and psychologists as an asset to implement yoga programs effectively. Special yoga-based interventions may be designed and implemented in schools primarily focusing on female students, senior high school students, or even specific streams. Though it's not in the scope of this paper, there are many techniques in yoga that are specifically useful for the students in this testing time of

their life that may be included in these programs (Saini, Singh, and Rathore, 2021) ^[28]. Studies have established manifold positive impacts of yoga interventions on students (Jain, 2021; Rocha *et al.* 2012) ^[28, 25]. The findings of this study may be used in designing support systems for high school students to handle their stress and performance, not only in entrance examinations or examinations in general but in their lives. Helping students in tackling the pressure with strategic policies and programs formulated together by schools, teachers, parents, and other involved/interested parties should be one among the top priorities, and designing such programs should take into account the differences and relationships as found in the study to be more effective.

However, the scope of the study centered around only CUET-related stress leaving aside other sources of stress in students in general, such as biological, parental, social, academic, or environmental causes. Future studies may investigate yoga and breathing techniques in the context of their combined or individual impact or even with respect to specific aspects of yoga and these factors. The study administered a single-item questionnaire to measure the perceived stress for its established benefits in stress-related studies. However, it would be wise to repeat the study with a multi-item stress questionnaire, possibly with a larger time period, larger sample, or broader geographical field-based interventions to further corroborate the findings. The cognitive and physiological impacts of yoga in uncertainties and sudden challenging situations have not been in the scope of this paper but might be studied in the future as most of yoga and stress studies are in the domain of stable time frames. More studies in this direction will help in understanding the factors involved and re-establishing the results. CUET is a challenge henceforth for Indian students. Stress studies in relation to specific aspects of CUET or any other entrance exam and exploring the ways in which yoga and breathing exercises can help these highly susceptible students might also be a future area of research.

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