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A Statistical Study of Anxiety among College Students: A Case Study in Chennai City

Nivethavijayakumar[1], Joshua David[2]

[1]Senior Graduate Student, Department of Statistics, Madras Christian College, Tambaram, Chennai

[2]Assistant Professor, Department of Statistics, Madras Christian College, Tambaram, Chennai

Abstract: ***College life can be very stressful. Sometimes parents, faculty and others tend to idealize their college experience and remember it as that idyllic time when they had few worries or responsibilities. To students currently attending college, however, the process is often stressful and frustrating. The competition for grades, the need to perform, relationships, college stress, external stress, professors stress, psychological stress, parental stress and many other aspects of the college environment cause stress. This study investigates the relationships among stress among college students. The data were collected from primary sources containing 176 respondents from various colleges in Chennai using simple random sampling method. To find the hidden structure and also identify the groups of stress data using Factor analysis and K-means clustering algorithm. In addition, Correspondence analysis results suggested that age group less than 18 belongs to grade A (Low Stress), 18-21 age group belongs to grade B (High Stress) and the age group greater than 21 belongs to grade C contains moderate stress.***

Keywords: Factor Analysis, K-means Clustering and Correspondence analysis.

1. Introduction

College is a stressful time for many students as they go through the Process of adapting to new educational and social environments. College may be even more stressful for students who have the added strain of learning different cultural values and language in addition to academic preparation.

As stressors accumulate, an individual's ability to cope or readjust can be overtaxed, depleting their physical or psychological resources. In turn, there is an increased probability that physical illness or psychological distress will follows. Students experience stress reactions such as anxiety, depression, or both, Gender differences also influence a student's perception and reaction to academic stressors For example, female students more often report letting out their feelings, whereas men more often report controlling their feelings.

In order to investigates the relationships stress among college students. The data were collected from primary sources containing 176 respondents from various colleges in Chennai using simple random sampling method.

1.1 Objective

- To identify the Factors affecting the Stress among the College Students
- Find out the Stress levels among the College students
- To examine the different age group of Students Stress levels.
- To identify the different family types affecting the Students Stress levels.
- To identify the different family life styles affecting the Students Stress.

1.2 Target population and sample

In order to investigates the relationships among stress among college students. The data were collected from primary sources containing 311 respondents from various colleges in Chennai using simple random sampling method

2. Analysis

Pearson's chi-square test is one of a variety of the chi-square tests- statistical procedure whose result is evaluated by reference to the chi-square distribution. Its properties were first investigated by Karl Pearson.

2.1 Gender VS Stress Level Group

Ho: There is no Association between Gender and Stress Level Groups

Gender * Cluster Number of Case Crosstabulation

Count

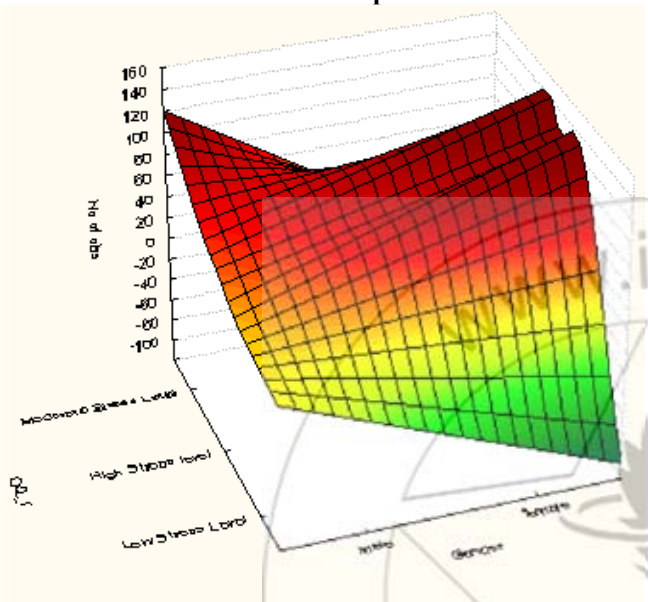
		Cluster Number of Case			
		Low Stress Level	High Stress level	Moderate Stress Level	Total
Gender	male	19	63	78	160
	female	11	91	49	151
Total		30	154	127	311

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.597[a]	2	.001
Likelihood Ratio	13.699	2	.001
Linear-by-Linear Association	2.605	1	.107
N of Valid Cases	311		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.57.

2.2 Gender VS Stress Level Group:



Since the Significance value is (.001) which is less than .05. So we reject the null Hypothesis. This shows that there is a strong Association between Gender and the various stress levels. We found that Female are more belongs to High Stress Level because of the Various Factors affected by the female students during the college period.

2.3 Indentifying Stress Pattern Using Factor Analysis

Factor analysis is a statistical data reduction technique used to explain variability among observed random variables in terms of fewer unobserved random variables called factors. The observed variables are modelled as linear combinations of the factors, plus "error" terms. Factor analysis originated in psychometrics, and is used in behavioural sciences, social sciences, marketing, product management, operations research, and other applied sciences that deal with large quantities of data

H_0: The factor analysis under study is invalid. On testing the above hypothesis, we get

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.716
Bartlett's Test of Sphericity	Approx. Chi-Square	9332.725
	Df	1326
	Sig.	.000

Since the table value (0.000) < 0.05, we reject the null hypothesis stating that this factor analysis taken under study is valid and so we move in for further calculations.

2.4 Eigen Values and Percentage of Variance Explained By Factors

Eigen Values and Percentage of Variance explained by Factors

Factor	College stressors		External stressors and professors stressors		Psychological stressors and Parental stressors	
	Eigen value	%variance	Eigen value	%variance	Eigen value	%variance
1	4.244	28.293	5.388	28.360	5.483	32.253
2	1.392	9.278	1.836	9.662	2.247	13.215
3	1.277	8.515	1.661	8.740	1.296	7.622
4	1.158	7.720	1.221	6.427	1.215	7.146
5	1.040	6.930	1.010	5.314	1.023	6.018

Factor		College stressors	External stressors and professors stressors	Psychological stressors and Parental stressors
1	Psychological Factor	Habit, preparing seminars, lack of concentration, exam pressure.	Co-operation, understand, ill-treatment, partiality, marks, syllabus, teach, recreation, guidance, understand.	Dress code, hair style, felt inferior, pimples, looking, health worries.
2	Academic Factor	Poor facility, language problem, preparing notes, time table.	Adjustment, friends, watching TV, misbehavior.	Parent pressure, temper, domestic work, guidance, parents too strict.
3	Domestic Factor	Financial constraints, homework, student & staff relationship.	Misbehavior, tension, dominance, criticism, professors.	Parents too strict, argument mother, argument father.
4	Environment Factor	Exam question, comparison among classmates.	Mobile phones, social networking.	Too slim, attractive facial features.
5	Internal Factor	Sleepy in class, poor guidance.	Dissatisfaction, sufficient guidance.	Too short, too fat.

With reference to various Stress Factors **Physiological Factors** allocated in the First Factor that account for nearly **33%** of the total variation. Then the **Academic Factors** are heavily loaded in the Second Factor accounting for about **14%** of total variation. And the Third Factor comprises of **Domestic Factor** and it has about **8%** of the total variation and the Forth Factor contains **Environmental Factors** and this has about **7%**of the total variation and the Fifth Factor comprises of **Internal Factor** and this contains **6%** of total variation and this has lesser priority compared to other Factors.

We finally conclude that the various variables which are included for study are explained by the Five factors depending on their priority and the amount of variation they have among the total variation. These are the factors that are responsible for the Students feel more Pressure and more Stress levels in their life.

2.5 The K-Means Algorithm

The k-means algorithm is an evolutionary algorithm that gains its name from its method of operation. The algorithm clusters observations int ok groups, where k is provided as an input parameter. The it assigns each observations to clusters based upon the observation's proximity to the mean of the cluster. The cluster's mean is then recomputed and the process begins again. Here's how the algorithm works:

Step1 - The algorithm arbitrarily selects k points as initial cluster centers (means).
Step 2 - Each point in the dataset is assigned to the closed cluster, based upon the EuclideanDistance between each point and each cluster center.
Step 3 - Each cluster center is recomputed as the average of the points in that cluster.
Step 4 - Steps two and three repeat until the clusters converge. Convergence may be defined differently depending upon the implementation, but it normally means that either no observations change clusters when steps two and three are repeated or that the changes do not make a material difference in the definition of the clusters.

Final Cluster Centers

	Cluster		
	1	2	3
REGR factor score 1 for analysis 1	1.81619	1.45042	-1.79623
REGR factor score 2 for analysis 1	-1.03147	1.74784	.15764
REGR factor score 3 for analysis 1	-1.16248	-1.77044	3.52813
REGR factor score 4 for analysis 1	-.09497	2.14408	-.18811
REGR factor score 5 for analysis 1	3.25693	-1.56948	.58625

Moderate Stress	79.000
Low Stress	75.000
High Stress	154.000

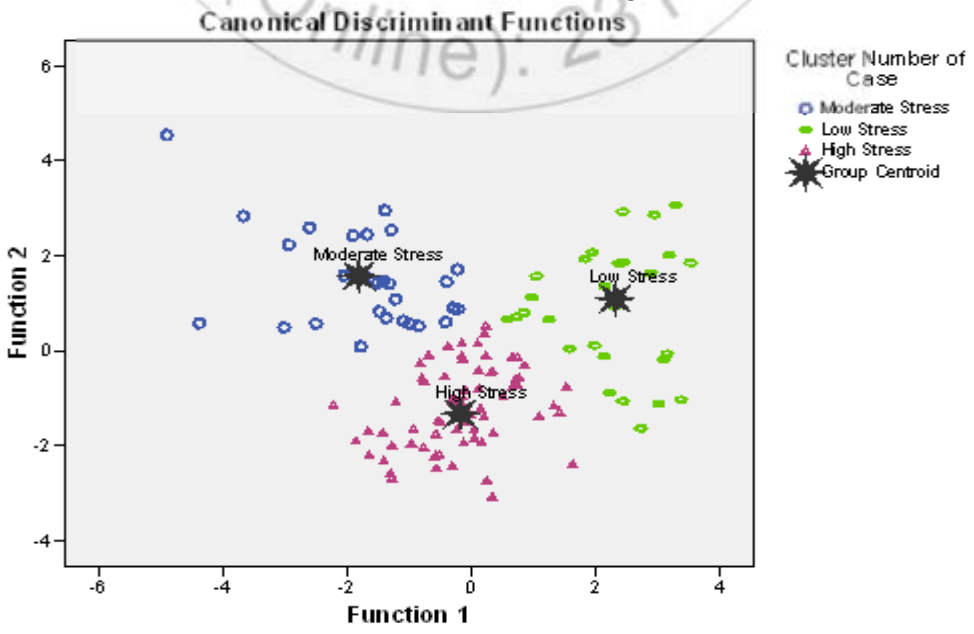
From the above table we identify the Grouping Clusters that indicates that majority of the Students belongs to **High Stress level**. The possible reasons that new educational system and new environment conditions that they are facing in the college and the Family background and their Family size are all affect the students in their Education.

Causes of Stress Level belonging to cluster2 (c2) category are better than those of Cluster1 (c1) and Cluster3 (c3). Similarly the clusters belonging to Cluster1 (c1) categories are Moderate of those of Cluster3 (c3). The member belonging to the cluster3(c3) are at the High level of Stress

2.6 Discriminant Algorithm

A brief algorithm to group the factors and measures to reduce the infant mortality and deaths during the study period based on the respondents observations:

Step 1: K-means analysis partitioned the data set into k-cluster using the normalized data as input matrix.
Step 2: Discriminant analysis is then performed with the original parameters by considering the groups formed by the k-means algorithm.



		Cluster Number of Case	Predicted Group Membership			Total
			Moderate Stress	Low Stress	High Stress	Stress Levels
Original	Count	Moderate Stress	79	0	0	79
		Low Stress	0	75	0	75
		High Stress	0	0	157	157
	%	Moderate Stress	100.0	.0	.0	100.0
		Low Stress	.0	100.0	.0	100.0
		High Stress	.0	.0	100.0	100.0

This section is to explore the possibility of identifying the stress level among college students in Chennai city using unsupervised classification techniques. An attempt is made to analyze the severity of stress to arrive at the three clusters, reviewing the observation scale preferences of 311 respondents. The present analysis shows that only three groups could be meaningfully formed for each category. Further the stresses are classified into Cluster one, Cluster two, Cluster three categories based on the observation scale parameter, on comparing the preferences of these approaches in terms of clustering the stress level respondents.

Causes of Stress belonging to Cluster2 (c2) category are better having Low stress level are better than those of Cluster3 (c3) and Cluster1 (c1). Similarly the cluster s belonging to cluster1 (c1) categories are Moderate to those of cluster3 (c3). The members belonging to the Cluster3 (c3) are at a High level of causes of Stress Level.

2.7 Acquaintances of Students Stress

Correspondence analysis is a method of factoring categorical variables and displaying them in a property space which maps their association in two or more dimensions (Johnson and Wichern, 1982). It is often used where a tabular approach is less effective due to large tables with many rows and/or columns. Though not limited to that arena, correspondence analysis been popular in marketing research, as to display such variables as customer cooler preference, size preference, and taste preference in relation to preferences for Brands A, B, and C. Correspondence analysis is a special case of **canonical correlation,** where one set of entities (categories rather than variables as in conventional canonical correlation) is related to another set.

2.7.1 Age Group vs Stress Levels

The following table shows the cross-tabulation between the different Age Groups and the Stress Levels of the College Students. It is notice that the age group between **18 – 21** are belongs **High stress level**

Age	Stress Level Group			
	Moderate Stress	Low Stress	High Stress	Active Margin
below 18	8	3	7	18
18-21	50	44	100	194
above 21	21	28	50	99
Active Margin	79	75	157	311

Overview Row Points[a]

age	Mass	Score in Dimension 1	Score in Dimension 2	Inertia	Contribution: Of Point to Inertia of Dimension 1	Contribution: Of Point to Inertia of Dimension 2	Contribution: Of Dimension to Inertia of Point 1	Contribution: Of Dimension to Inertia of Point 2	Contribution: Of Dimension to Inertia of Point Total
below 18	.333	-.224	-.210	.002	.240	.427	.696	.304	1.000
18-21	.333	-.146	.241	.001	.103	.564	.426	.574	1.000
above 21	.333	.370	-.031	.003	.657	.010	.996	.004	1.000
Active Total	1.000			.006	1.00	1.000			

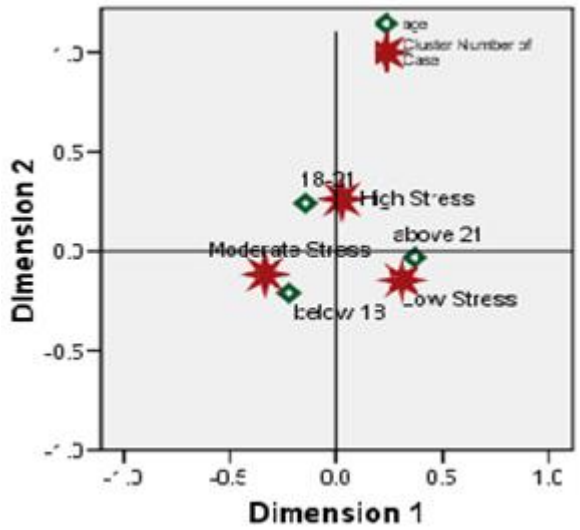
a. Symmetrical normalization

Overview Column Points[a]

Cluster Number of Case	Mass	Score in Dimension 1	Score in Dimension 2	Inertia	Contribution: Of Point to Inertia of Dimension 1	Contribution: Of Point to Inertia of Dimension 2	Contribution: Of Dimension to Inertia of Point 1	Contribution: Of Dimension to Inertia of Point 2	Contribution: Of Dimension to Inertia of Point Total
Moderate Stress	.333	-.334	-.116	.003	.536	.131	.94	.057	1.000
Low Stress	.333	.310	-.146	.002	.462	.205	.90	.099	1.000
High Stress	.333	.024	.262	.001	.003	.664	.02	.983	1.000
Active Total	1.000			.006	1.000	1.000			

a. Symmetrical normalization

Overviews of the Row point the age group 18 – 21 and above 18 are in Dimension 1 and below18 age groups are in dimension 2. Overview of the Column point the High stress level contain in Dimension 2 and Moderate stress level and Low stress level are in Dimension 1.



The above Figure represents that students belong to the Age group **18 – 21** are having **High Stress Level**. Whereas the Students belongs to above **21 age** group are having **Moderate Stress level** and Students belongs to below **18 age** group having **low stress level**.

2.7.2 Family Size VS Stress Level

The following table shows the cross-tabulation between the different **Family Size** and the **Stress Levels** of the College Students. It is notice that the Students who belongs to **small family Size having High Stress Level.**

Correspondence Table

Family size	Cluster Number of Case			
	Low Stress Level	High Stress level	Moderate Stress Level	Active Margin
Small	13	49	34	96
Medium	3	30	34	67
Large	1	1	6	8
Active Margin	17	80	74	171

Overview Row Points[a]

familysize	Mass	Score in Dimension 1	Score in Dimension 2	Inertia	Contribution Of Point to Inertia of Dimension 1	Contribution Of Point to Inertia of Dimension 2	Contribution Of Dimension to Inertia of Point 1	Contribution Of Dimension to Inertia of Point 2
small	.333	-.625	-.057	.026	.644	.023	.998	.002
medium	.333	.414	-.233	.012	.283	.384	.931	.069
large	.333	.211	.290	.004	.073	.593	.694	.306
Active Total	1.00			.043	1.000	1.000		

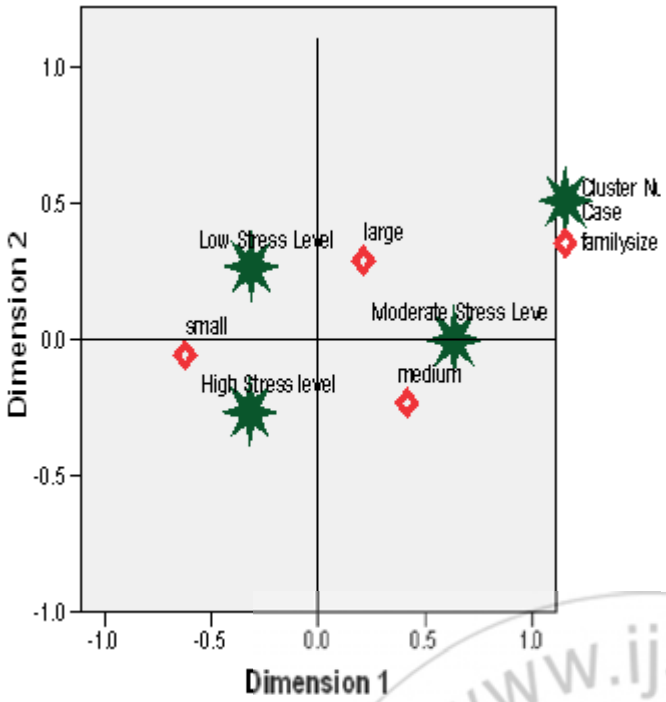
a. Symmetrical normalization

Overview Column Points[a]

Cluster Number of Case	Mass	Score in Dimension 1	Score in Dimension 2	Inertia	Contribution Of Point to Inertia of Dimension 1	Contribution Of Point to Inertia of Dimension 2
Low Stress Level	.333	-.315	.267	.008	.164	.503
High Stress level	.333	-.320	-.265	.008	.169	.497
Moderate Stress Level	.333	.636	-.001	.027	.667	.000
Active Total	1.000			.043	1.000	1.000

a. Symmetrical normalization

Overviews of the Row point Students who belongs to **Small and Medium** family size are in Dimension 1 and Students who belongs to **Large Family Size** are in Dimension 2. Overviews of the Column point the students belongs to **High Stress level**and **LowStressLevel**contain in Dimension 2 and students who having **Moderate Stress level** are contain in Dimension .



The above Figure represents that Students belongs to **Small Family Size** having **High Stress** and the Students belongs **to Medium Family Size havingModerate Stress** and then Students who belongs **Large Family background** having **Low Stress level**.

2.7.3 Monthly Income VS Stress Level

The following table shows the cross-tabulation between the different **Monthly Income of Family** and the Stress Levels of the College Students. It is notice that the Students who belonging to the Family monthly income **< 10000 having High Stress.**

Correspondence Table

Cluster Number of Case	monthlyincome				
	below 10000	10000-30000	30000-50000	above 50000	Active Margin
Moderate Stress	28	39	12	0	79
Low Stress	9	49	17	0	75
High Stress	61	56	33	7	157
Active Margin	98	144	62	7	311

Overview Row Points[a]

Cluster Number of Case	Mass	Score in Dimension		Inertia	Contribution				
		1	2		Of Point to Inertia of Dimension		Of Dimension to Inertia of Point		
					1	2	1	2	Total
Moderate Stress	.254	.083	.580	.010	.006	.740	.049	.951	1.000
Low Stress	.241	.869	-.249	.054	.630	.129	.968	.032	1.000
High Stress	.505	-.457	-.173	.032	.364	.131	.946	.054	1.000
Active Total	1.000			.097	1.000	1.000			

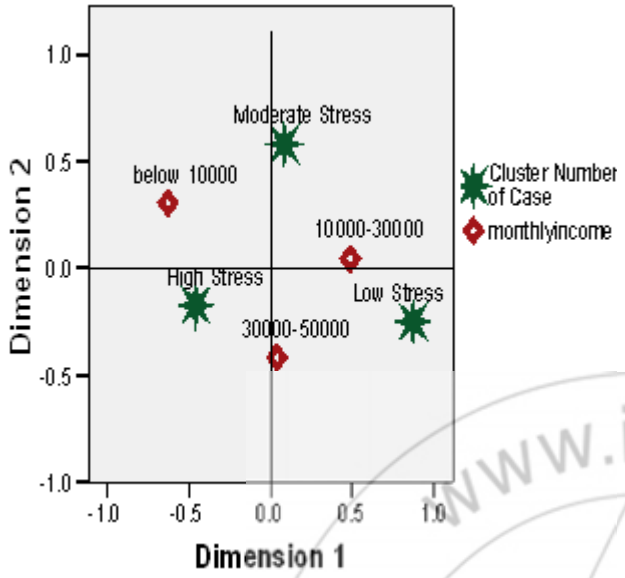
a. Symmetrical normalization

Overview Column Points[a]

monthlyincome	Mass	Score in Dimension		Inertia	Contribution				
		1	2		Of Point to Inertia of Dimension		Of Dimension to Inertia of Point		
					1	2	1	2	Total
below 10000	.315	-.625	.305	.039	.426	.254	.913	.087	1.000
10000-30000	.463	.486	.044	.032	.378	.008	.997	.003	1.000
30000-50000	.199	.039	-.416	.004	.001	.300	.021	.979	1.000
above 50000	.023	-1.58	-1.499	.022	.194	.438	.736	.264	1.000
Active Total	1.000			.097	1.000	1.00			

a. Symmetrical normalization

Overviews of the Column point Students who belongs to <10000 Monthly Income belongs to Dimension 1 and Students belongs to 30000 to above 50000are contain in Dimension 2. Overviews of the Row point Students who having **Low Stress level** and **High stresslevel**belongs to Dimension 1 and Students having **Moderate stress level** belongs to Dimension 1



The above Figure represents that Students belongs to Monthly Income of a Family < **10000 having HighStress** and the Students belongs to Monthly income of family between**10000–30000** having **Moderate Stress** and then Students who belongs Monthly Family income of **30000 to 50000 and >50000 having Low Stress** .

Age is an important factor of stress among the college students during the academic period. Mostly the student who belongs to the age group compare between 18-21 was fell. More stress with compare to other age groups. Family size plays an important role in students academics generally the students who belongs to small family size fell more stress on account of large family size.

Family monthly income is a very important factor plays an highlighted role in students academics in that commonly students who belongs to high family monthly income were fell less stress compare to other students.

3. Conclusion

We find that there is a strong association between gender in that we found that female students are feel more stress in the duration of academic period compare to male stress because of various factor affected by them.

On the account of various analyses, we find that the college students are affected by five factors: psychological factor, academic factor, domestic factors, environment factor and internal factor. In that students are mostly affected by psychological factors.

The discriminant analysis has shown that only three groups could be meaningfully formed for each category, further, the stress level classifies into cluster one, cluster two and cluster three categories based on the observation scale parameters. On comparing the preferences of the approaches in terms of clustering the stresslevels.

Factors of stress becoming to clusters two (c2) category are better than those of cluster one (c1) and cluster three (c3). Similarly, the factors belonging to cluster one (c1) categories are moderate to those of cluster three (c3), the members belong to the cluster three (c3) are at a high stress level.

Age is an important factor of stress among the college students during the academic period. Mostly, these student belong to the age group if 18-21, are more stressed out compared to other age groups. Family size plays an important role in students academic. Generally the students who belong to small family size feel more stress on account of large family size.

Monthly family income is a very important factor that plays a highlighted role in the student's academics. Commonly, students who belong to higher monthly family income were less stressed compared to other students.

The present study has highlights that female students are more stressed compared to males. Importantly, students are mostly affected by the psychological stress, student's age, family size and monthly family income collectively plays a correlated role in college student's stress.

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