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Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 8, 1922-1933

Factors Causing Stress To In-Campus Indian Maritime Students

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ABSTRACT
Stress is a serious type of condition that needs an immediate attention in order to prevent its negative effects in the academic life of the students. The objective of this study is to identify the factors which cause academic stress amongst Indian in-campus maritime students. Extensive literature review indicates that this apparently is the first focused study of Indian maritime university in-campus students. Data was collected online through structured questionnaire from students of Mumbai and Chennai campuses of Indian Maritime University. A total of 208 responses were received which were first analysed employing Exploratory Factor Analysis(EFA) using jamovi 2.3.13. EFA reduced 15 variables to 4 factors which were named Personal, Academic, Family and Fear factors, based on the common features of the variables aligned to each of the factors. The outcome of EFA was then subjected to Confirmatory Factor Analysis(CFA) which confirmed that the model was a good fit with Comparative Fit Index (CFI) value of 0.968, Tucker-Lewis Index(TLI) value of 0.960 and Root mean square error of approximation(RMSEA) value of 0.0434. This study is very significant as these findings would help the maritime institutes to take steps to mitigate the stress of the students. It will also help the students to handle academic stress in a better way, once they know what causes it. In addition, the parents should be made aware about the courses so that they have realistic expectations from their children.

Keywords: Academic stress, Maritime, EFA, CFA, CFI, TLI, RMSEA.

INTRODUCTION
For better health-related quality of life [HRQOL] 80% nutrition, 20% workout and 100% attitude is a prerequisite and it should be ameliorated with community support. However, any factor which causes stress is an impediment to the HRQOL. Stress is a natural phenomenon of emotional or physical tension due to a demand or challenge, which can come from a variety of different events or thoughts often leading to sadness, frustrations, and nervousness. Unfortunately, at every stage of life we face some or the other stress, and student life is no exception to it. Many studies have been conducted to find out the factors which cause stress amongst students. However, we couldn't find any study exploring the factors causing stress amongst maritime students. This study is a step in that direction.

There are many variables which causes academic stress among students. Evaluation of those variables is done by way of exploratory factor analysis(EFA) and confirmatory factor analysis(CFA). EFA explore the factors from the variables which are then confirmed by CFA.

The main objectives of this paper are as follows:

- To list the variables which cause academic stress amongst Indian maritime students.
- To identify the factors which cause academic stress amongst Indian maritime students

Indian Maritime University is a Central University offering courses in maritime management, marine engineering & technology, nautical studies, and naval architecture & ocean engineering. It is the only university of its kind in India. Through a structured questionnaire(Appendix I), consisting of 7 demographic and 15 ordinal variables, responses

were collected online from in-campus students at Indian Maritime University's Mumbai and Chennai campuses. Total 208 responses were received which were analysed using jamovi 2.3.13, which is an open-source data analysis package, and Microsoft Excel. The data was tested for reliability and sample adequacy tests. Results were found to be good, so the data was subjected to Exploratory Factor Analysis(EFA).The results of EFA led to 4 factors to which all the variables got aligned. Based on the features of the variables under each of the factors, they were named as Personal, Academic, Family and Fear factors. It was followed by Confirmatory Factor Analysis(CFA) which is a multivariate statistical procedure used to test how well the factors arrived at from EFA represent the constructs. The results of the analysis were examined to determine the degree of fit of the model. The values of the various tests are Chi square (χ^2) = 117, df = 84, p = 0. 010, χ^2/df = 1.3929indicating that the data fits the model. The value of Comparative Fit Index (CFI) is 0.961, Tucker-Lewis Index(TLI) is 0.952 and the Root mean square error of approximation(RMSEA) is 0.0435. All these are indicating good model fits as the values of CFI and TLI are above the recommended value of0.9 and that of RMSEA is below the acceptable limit of 0.08. All these criteria uniformly show the overall adequacy of factor solutions.

LITERATURE REVIEW

Education is the process of acquiring information, developing one's capacities, discovering the potentials of students, and preparing them to become a successful member the society. In broader sense, education is defined as a process designed to inculcate the knowledge, skills, and attitudes necessary to enable individuals to cope effectively with their environment. Its primary purpose is to foster and promote fullest individual self-realization for all people(Verma, 1990).

Stress is "the nonspecific response of the body to any demand made upon it" All living beings are constantly under stress and anything, pleasant or unpleasant, that speeds up the intensity of life, causes a temporary increase in stress, the wear and tear exerted upon the body(Selye, 1976).It is found to have universal impact and maritime students are no exception to it-but the variance in factors exist because of regimental nature of training and with more emphasis on physical fitness for passing competency based examination system by stratified means of examining bodies(Pompilus& Pompilus, 2021).

It is also observed that for health-related quality of life [HRQOL] 80% nutrition,20%workout and 100% attitude is a prerequisite and it should be ameliorated with community support.

Students continue to face various stresses such as the demand of academic of success and achievement, fear of unexpected, fear of becoming a member of the society system, fear of being accepted into social, fear of dealing with economical and emotional problems of family members, which all can potentially impact their learning or abilities to have a successful academic career(Chew-Graham et al., 2003). Some of the main reasons for the stress on students are academic stress due to fear of failure, lack of time management, financial difficulties, lack of interactions with teachers, fear of failure of personal goals and objectives, lack of social life, unable to adapt to school climate, and inability to form networks and partnerships with either peers or educators(Wilks, 2008).

Pandemic further created disruptions in academic pursuits to all grades of curriculum and stress level was observed to be of unfathomable proportion in students due to some sections of syllabus which could not be effectively conducted, like practical/skill-based competency course learning and assessments.

Stress has generally been found to have a negative influence on academic performance and on staying enrolled(Zajacova et al., 2005).Though there are many personal and social factors that lead to stress among students, the main source of stress for the students is the inadequacy of right support(Jain & Singhai, 2017).If academic stress was severe or delayed, it decreases student's academic performance; hinders his ability to study efficiently and better time management(Khan et al., 2013).Academic stress is at a moderate level dominated by cognitive stress indicators. Coping with the academic stress is at a moderate level dominated by active emotional coping. Different demographic factors have a significant effect on academic stress and coping(Basith et al., 2021).

College students are faced with a unique set of stressors that may alter the ability to cope with a situation. Formal efforts are important for short-term assistance to help students cope with stress encountered during the course of their

studies(Dzleglelewskl et al., 2004). At any given time there will be 10 to 20% of student population suffering from psychological problems like stress, anxiety and depression(Kumaraswamy, 2013).

First year undergraduate students are stressful when they miss out on lectures and classroom activities(Ahmed, 2022). Higher levels of academic stress lead to lower performances. The highest degree of academic stress is found among first-year students and the top factor of stress is work overload(Herath, 2019). Master students felt academic stress a few times but with medium-high intensity. Gender, civil state, attending masters and institutional support of the attending masters, act as modulators in academic stress(Barraza Macias, 2008).

Female students experience a greater degree of stress than their male peers due to the increased class work overload, pressure, and financial difficulties, having many hours of studies, fighting with their friend(s), lack of university support, missing some lectures etc. (Ahmed, 2022).Females experienced more negative academic self-concept overall than males. In career-oriented students, academic stress levels were the highest. But if the reason was cognitive interest, academic self-concept was positive and the students were most satisfied(Michie et al., 2001).Parental expectations is one of the factor which is responsible for female students' underachievement and low performance (Haider, 2022).

Medical students undergo tremendous stress because of environment itself in an all prevailing pressure situation, providing an authoritarian and rigid system, that encourages competition rather than cooperation between learners(Haider SI, 2017).During pandemic it was reported that screen time for attending online classes caused for medical issues and for maritime students' eyesight of 6/6 vision standards is a statutory requirement—students felt stressed out of these and it sounded as a psychosocial factor.

The most common stress management strategy used by the students is self-motivation, while talking with teachers is found to be the least effective strategy. To develop a healthy body and mind and to enhance the students' academic achievements, Universities need to provide an understanding of stress and stress management strategies(Herath, 2019).

We observed that though there were many articles for stress related impacts on general academic campuses, there was none about Indian maritime students. It is this research gap which this paper has tried to fill.

SIGNIFICANCE OF THE STUDY

The purpose of this research is to understand the factors which cause academic stress especially among the in-campus maritime students in India. The findings would help the maritime institutes to take steps to mitigate it. It would also help the students to handle academic stress in a better way, once they know what causes it.

OBJECTIVES OF THE STUDY

The main objective of this study is to explore the factors which cause academic stress to in-campus Indian maritime students.

RESEARCH METHODOLOGY

To achieve the objectives of this research, which is an exploratory research based on primary data, data was collected through questionnaire-based survey. The data so collected was then subjected to factor analysis to identify the factors which cause academic stress to in-campus Indian maritime students, and to confirm whether it fits the model CFA was conducted. Following are the methods used and their respective results.

Data Collection and Analysis

The questionnaire consisted of two parts- thee first part asked participants to record their demographic details, viz., Course they are pursuing, Batch, Gender, age, height, weight, and the awareness of their parents about maritime studies. Based on their height and weight, Body mass index(BMI) was calculated to find out whether they are normal, overweight, or obese. The second part included a list of 15 possible reasons for causing stress to them. The questionnaire was based on a five-point Likert scale, and respondents were asked to indicate their perception about 15 listed variables on this five-point Likert scale. On this scale, 1 corresponds to 'strongly disagree' and 5 to 'strongly agree', with 2,3 and 4 corresponding to disagree, neutral and agree respectively.

Data was collected online through Google Forms, from in-campus students of Indian Maritime University's Mumbai and Chennai campuses. Albert Einstein once said, "Not everything that can be counted counts, and not everything that counts can be counted". Sample data is important but more essential is correct data. It is therefore important to glean and clean the data from counted samples which is critical for evaluation and interpretation. A total of

208 responses received were found to be valid and fit for further analyses.

The demographic characteristics of the students are as follows:

Table 1: Parents' awareness level before the students joined the programme

Parents' awareness before the students joined the programme	Count	Percent
Little aware	104	50.00%
Not aware at all	40	19.23%
Well aware	64	30.77%
Total	**208**	**100.00%**

Source: Research data

Table 1 shows that almost 70% of the parents of maritime students are not fully aware about the programme, its regimental nature, and fitness requirements. It is a matter of great concern because it adds to the stress of students. It is not the case in other programmes/courses.

Table 2: Programme wise Gender split of students

Programme	Female	Male	Total
B. Sc. (Nautical Science)	14	134	148
B.Tech. (Marine Engineering)	3	6	9
Diploma in Nautical Science(DNS)	1	31	32
Post Graduate Diploma in Marine Engineering(PGDME)	0	19	19
Grand Total	**18**	**190**	**208**

Source: Research data

Maritime courses have typically been dominated by male students. However, Table 2 indicates that now female students are also joining it and in B.Tech. (Marine Engineering) programme, female students are one-third of the total students.

Table 3: Obesity level among the students

Body Mass Index(BMI)	Female	Male	Total	Percent
Normal	9	26	35	16.83%
Overweight	8	96	104	50.00%
Obese	1	68	69	33.17%
Grand Total	**18**	**190**	**208**	**100.00%**

Source: Research data

Table 3 shows that just 16.83% of the total students are normal (BMI less than 25). Poor BMI indicates that the students don't care much about physical fitness and healthy lifestyle.

Factor Analysis

We often measure things that cannot be measured directly, e.g., Satisfaction, Stress, Happiness which are psychological or behavioral aspects. We cannot measure these aspects directly, which has many facets. However, we can measure different aspects of stress, known as manifest variables.

Factor analysis is a statistical method used to find out whether a number of variables of interest are linearly related to a smaller number of unobserved or latent variables called Factors (also termed as Constructs or Components). This is done by grouping variables based on inter-correlations among set of variables. The technique is called "dimension reduction". There are many techniques for dimension reduction, but the most common is Principal Component Analysis.

There are two types of factor analysis- Exploratory Factor Analysis(EFA) and Confirmatory Factor Analysis(CFA). EFA when applied to a data set, looks relationships(high correlation) between variables to be grouped in order to reduce the number of variables to a smaller set of composite factors(i.e., combination of variables). On the other hand, in CFA we test the hypotheses of exiting theories and concepts. Exploratory and confirmatory factor

analyses are not discrete approaches to analysing data. Instead, they can be viewed along a continuum with exploratory analyses and confirmatory analyses on opposite ends of the continuum(Bollen,1989). Exploratory factor analysis allows the data to ‘‘cluster’’ into factors after imposing certain constraints on the model, including considerations such as the method of rotation and the number of factors allowed. In confirmatory factor analysis, a factor structure is proposed a priori, and the data are tested against the model to ‘‘confirm’’ the model. Under both approaches, adjustments are generally made based on preliminary results, thereby mixing notions of exploratory and confirmatory.

Exploratory Factor Analysis

Before proceeding with exploratory factor analysis, the reliability (sometimes also termed as Unidimensionality, Internal consistency or Convergent validity) of the questionnaire is to be checked. We calculated both Cronbach’s Alpha(which is most widely used by researchers) and McDonald’s omega which aligns with the definition of reliability itself(Goodboy & Martin, 2020). The results are as follows:

Table 4: Scale Reliability Statistics

	Cronbach's α	McDonald's ω
Scale	0.859	0.862

Table 4: shows excellent reliability statistics both in terms of Cronbach’s alpha and McDonald’s omega, as it well over the threshold value of 0.7

We now check the sampling adequacy for the questionnaire using Bartlett’s Test of Sphericity and Kaiser–Meyer–Olkin (KMO)test. Bartlett’s Test of Sphericity is conducted to confirm that the correlation matrix of the variables in the dataset diverges significantly from the identity matrix. A significant value of χ^2 means the data reduction technique is suitable to use. KMO Measure of Sampling Adequacy is conducted to measure the suitability of data for Factor Analysis. The test measures sampling adequacy for each variable in the model and for the complete model. The statistic is a measure of the proportion of variance among variables that might be common variance. KMO returns values between 0 and 1. Stephanie Glen(2016) suggested the following thumb rule for interpreting the KMO statistic:

KMO values between 0.8 and 1: sampling is adequate.

KMO values less than 0.6: sampling is not adequate, and that remedial action should be taken.

KMO values close to 0: there are large partial correlations compared to the sum of correlations.

We got the following results for Bartlett’s Test of Sphericity:

Table 5: Bartlett's Test of Sphericity

χ^2	df	p
925	105	< .001

From Table 5, it is evident that the value of χ^2 is significant ($p < .005$) and thus we can proceed for KMO Measure of Sampling Adequacy. The outcome of our KMO test is as follows:

Table 6: KMO Measure of Sampling Adequacy

	MSA
Overall	0.884
HMS	0.876
CFH	0.894
LSI	0.882
LGB	0.897
HAL	0.900

Table 6: KMO Measure of Sampling Adequacy

	MSA
CWC	0.916
FOE	0.913
INR	0.872
JPA	0.875
INS	0.892
HLI	0.906
HEP	0.837
FOS	0.866
FIN	0.786
TPC	0.866

Table 6: indicates that the overall value of KMO Measure of Sampling Adequacy is 0.884, which means that our sample is adequate for conduction further analysis.

There are different types of methods used to extract the factors from the data set. However, Principal Component Analysis (PCA) is most widely used, and we have also used the same in this paper. Under this method, variables are aligned with the latent factor/s based on factor loadings. Factor loading is basically the correlation coefficient for the variable and factor. It shows the variance explained by the variable on that particular factor. We can set the cutoff loadings and the variables with loading less than cutoff are not considered for further analysis. For this paper, we set the cutoff loading at 0.5. Under PCA, number of The results of our analysis are as follows:

factors can be extracted based on parallel analysis or eigenvalue greater than a fix value or a fixed number of factors can be specified. We have based our paper on Eigenvalue. Eigenvalues shows variance explained by that particular factor out of the total variance. From initial Eigenvalues, we can know how much variance is explained by each factor out of the total variance, first factor being the highest.

Principal Component Analysis

It starts with finding the component loadings. It is the amount of variance a variable share with all the others being considered and estimates the variance in each variable accounted for by all components or factors. Smaller values indicate variables that do not fit well with the factor solution and should possibly bedropped from the analysis. High values (>0.5) show that the factors extracted explain most of the variance in the variables being analyzed. Low values (<0.5) mean there is considerable variance unexplained by the factors extracted.

Table 7: Component Loadings

	Component				
	1	2	3	4	Uniqueness
LSI	0.737				0.413
CFH	0.671				0.458
HLI	0.648				0.429
LGB	0.631				0.527
HMS	0.626				0.414
CWC	0.572				0.541
INR		0.737			0.377

Table 7: Component Loadings

	Component				
	1	**2**	**3**	**4**	**Uniqueness**
INS		0.727			0.341
JPA		0.709			0.416
HAL		0.691			0.382
FOE		0.641			0.470
FIN			0.808		0.296
HEP			0.758		0.296
TPC				0.779	0.337
FOS				0.523	0.483

Note. 'varimax' rotation was used

From Table 7, we observe that all the variables have loadings more than 0.5, the cutoff set by us. Hence no variable was dropped, and all the variables were retained for further analysis. We also find that it has identified four factors to which all the variables have been aligned.

Number of components can be confirmed by Eigenvalues and Scree plot. Eigenvalues are the variances of the principal components. The first factor will always account for the most variance (and hence have the highest Eigenvalue), and the next component will account for as much of the left-over variance as it can, and so on. Hence, each successive component will account for less and less variance. Kaiser's criterion considers factors with an Eigenvalue greater than one as common factor. A good factor solution is one that explains the most variance with the fewest factors. A minimum of 3 factors accounting for more than 50% variances should be fine.

Table 8: Initial Eigenvalues

Component	**Eigenvalue**	**% Of Variance**	**Cumulative %**
1	5.188	34.59	34.6
2	1.522	10.15	44.7
3	1.079	7.19	51.9
4	1.031	6.87	58.8
5	0.832	5.55	64.4
6	0.811	5.40	69.8
7	0.733	4.89	74.6
8	0.624	4.16	78.8
9	0.538	3.59	82.4
10	0.528	3.52	85.9
11	0.472	3.15	89.1
12	0.459	3.06	92.1

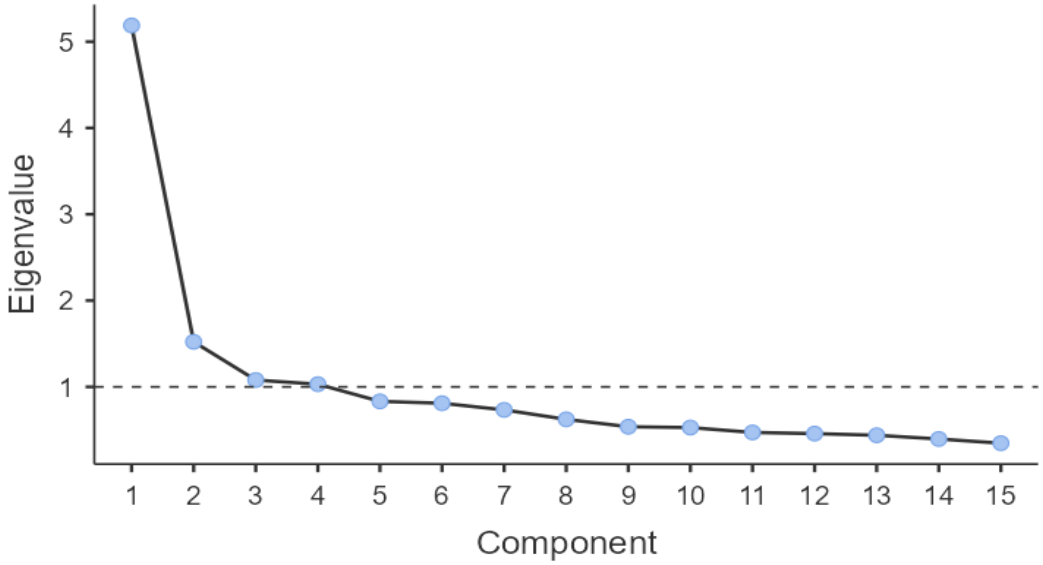
Table 8: Initial Eigenvalues

Component	Eigenvalue	% Of Variance	Cumulative %
13	0.439	2.93	95.0
14	0.396	2.64	97.7
15	0.347	2.32	100.0

From Table 8, we find that four components have Eigenvalue more than one and cumulatively they account for 58.8% of the variances.

Next, we analyze the Scree Plot. On a Scree plot, each factor explains less variance than the preceding factors. It is an imaginary line connecting the markers for successive factors generally runs from top left of the graph to the bottom right. If there is a point below which factors explain relatively little variance and above which they explain substantially more, this usually appears as an ‘‘elbow’’ in the plot. Cattell’s guidelines call for retaining factors above the elbow and rejecting those below it. Generally, factors above the elbow corresponds to the components having Eigenvalue more than one. Following is the Scree Plot plotted for our data:

Figure 1: Scree Plot



Source: Research data

Scree plot in Figure1also throws four components which may be considered for further analysis.

Based on the EFA results, the variables were classified into four factors, and named as in Table 9, based on the variables associated with them.

Table 9: Factors Causing Academic Stress

Factor	Variable
Personal Factor	Homesickness
	Change in Food Habits
	Lack of Social Intimacy
	Language Barrier
	Competition with Classmates

	Health Issues
Academic Factor	High Academic Load
	Fear of Examination
	Inadequate Resources
	Job Prospects Anxiety
	Insufficient Sleep
Family Factor	High Expectations of Parents
	Financial Difficulties
Fear Factor	Fear of Sailing
	Threat of Pandemic in Campus

Of the four factors identified, surprisingly personal factor matters more than the academic factor, which is then followed by family and fear factors. After identifying four clear factors through EFA (principal components analysis), the next stage is to confirm the factor structure.

Confirmatory Factor Analysis

Like EFA, CFA uses the common factor model, that is, it sees the covariance between observed variables as a reflection of the influence of one or more factors. It is used to confirm what is expected on the basic or pre-established theory. CFA assumes that each factor is associated with a specified subset of measured variables. It first finds out whether the association of the indicators(variables) with the corresponding factor is significant.

Table 10: Factor Loadings

Factor	Indicator	Estimate	SE	Z	p	Stand. Estimate
Personal Factor	HMS	0.539	0.0636	8.47	< .001	0.585
	CFH	0.860	0.0857	10.03	< .001	0.671
	LSI	0.823	0.0790	10.42	< .001	0.691
	LGB	0.634	0.0791	8.02	< .001	0.558
	CWC	0.753	0.0922	8.16	< .001	0.567
	HLI	0.754	0.0734	10.29	< .001	0.683
Academic Factor	HAL	0.901	0.0805	11.20	< .001	0.727
	FOE	0.856	0.0824	10.39	< .001	0.686
	INR	0.747	0.0851	8.78	< .001	0.601
	JPA	0.807	0.0878	9.19	< .001	0.622
	INS	0.959	0.0823	11.65	< .001	0.750
Family Factor	HEP	1.115	0.1297	8.60	< .001	0.817
	FIN	0.747	0.1127	6.63	< .001	0.541
Fear Factor	FOS	0.465	0.1007	4.61	< .001	0.566
	TPC	0.304	0.0884	3.44	< .001	0.302

Table 10 confirms that the association of all the indicators(variables) with the corresponding factor is significant.

Next thing to look at is model fit, as it tells us how good a fit our model is to the observed data. There are several ways of assessing model fit. The first is a χ^2-statistic that, if small, indicates that the model is a good fit to the data. The model is treated as fit if the calculated value of χ^2/df is less than 3.00.

Table 11: Test for Exact Fit

χ^2	df	p
117	84	0.010

By putting the corresponding values from Table 11, we get χ^2/df = 117/84 = 1.3929 which is much less than 3 and indicates good fit.

However, the χ^2-statistic used for assessing model fit is pretty sensitive to sample size, meaning that with a large sample a good enough fit between the model and the data almost always produces a large and significant ($p < 0.05$) χ^2-value.So, we need some other ways of assessing model fit. These are the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA) together with the 90% confidence interval for the RMSEA.

Table 12: Fit Measures

			RMSEA 90% CI	
CFI	TLI	RMSEA	Lower	Upper
0.961	0.952	0.0435	0.0220	0.0613

Table 12 shows that Comparative Fit Index (CFI) of our data set is 0.968 and Tucker-Lewis Index(TLI) is 0.960. The values of CFI and TLI are indicating good model fits because these values are above the recommended value of 0.9. The root mean square error of approximation (RMSEA) value of 0.0434 is below the acceptable limit of 0.08 and implies a good model fit.

Thus, the factor structure found from the EFA was confirmed in the CFA.

The model can be represented by a diagram known as Path Diagram which helps us in understanding the CFA model because it is a symbolic one-to-one visualization of the measurement model

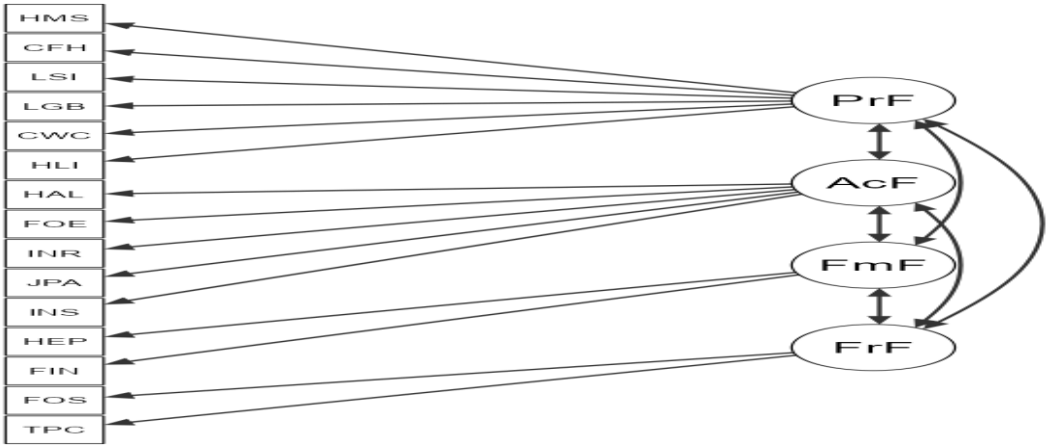


Figure 2: Path Diagram

Source: Research data

FINDINGS AND DISCUSSION

This research has provided an insight into the factors which cause academic stress to Indian maritime students. First EFA was conducted resulting in discovery of four factors, viz. Personal Factor, Academic Factor, Family Factor and Fear Factor which cause academic stress to the Indian maritime students. This was validated by CFA. This research should help the maritime institutes to take steps to mitigate it. It will also help the students to handle academic stress in a better way, once they know what causes it. Also, the parents should have realistic expectations from their children which add to the stress. These expectations sometimes are built on incomplete understanding of the scope of the courses wherein their children enrol. In this research also we find that only just over 30% of the parents were well aware about the maritime courses and its scope.

These are not hygiene factors but a must for healthy atmosphere in the campuses wherein the students can focus on academics and enhancement of their career.

LIMITATIONS OF THE STUDY

This study was conducted on the data collected from students at Indian Maritime University's Mumbai and Chennai campuses who belong to modest income group and come from remote areas of the country, mostly from semiurban and rural backgrounds. It may differ in case of students at private maritime institutions who come with different economic and city backgrounds. This study was conducted on in-campus students. It may again differ in case of day scholars, which is mandatorily not permitted for pre-sea courses under statutory guidelines.

SCOPE FOR FUTURE RESEARCH

Further studies can be undertaken on:

1. Factors causing stress amongst students at private maritime institutes
2. Factors causing stress amongst seafarers
3. Comparison of factors causing stress amongst maritime students and seafarers
4. Maritime students' perception about factors which can mitigate their stress
5. Seafarers' perception about factors which can mitigate their stress

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