

## Development of Medical Students Stressor Questionnaire

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### Abstract

#### Objective

To develop a questionnaire to measure stressors among first year MBBS students of Government Medical Colleges in Kerala

#### Study Design and Setting

Cross-Sectional study using both qualitative and quantitative methods.

#### Results

A 27-item screening instrument named as Medical Students Stressor Questionnaire (MSSQ) was developed for assessing the stressor experience of first year MBBS students. The Cronbach's Alpha for Internal Consistency Reliability was 0.82 with 95% CI 0.77-0.87 and test-retest reliability coefficient was  $r = 0.91$  with 95% CI 0.86-0.95 Construct Validity was established by Factor Analysis which yielded nine factors with Eigen values more than one. The factors were explaining 60% of the total variance. The MSSQ has significant correlation with Perceived Stress Scale and General Health Questionnaire establishing Convergent Validity. The total score ranges between 0 and 108. A score of 54 is no stressor experience, a score between 55 and 81 indicates mild to moderate stressor experience and a score between 82 and 108 denotes severe stressor experience.

#### Conclusion

The MSSQ having acceptable reliability and validity is meant for screening in first year MBBS students of Government Medical Colleges in Kerala.

*Key words:-* Questionnaire, Stressor, Reliability, Construct Validity, Convergent Validity, Factor Analysis.

#### What's New?

- Developed a new screening instrument "Medical Students Stressor Questionnaire" to measure stressors of first year MBBS students
- The instrument helps to identify the stressors and measure the proportion of students with different levels of stressors experienced
- There is no available existing instrument to measure stressors of MBBS students especially first years
- This will enable the Medical College administrators and teachers in executing appropriate intervention strategies at the academic level to reduce the magnitude of stressors
- An ongoing counseling program and provision of an in-built support system is necessary while planning and implementing appropriate interventions at preventive and curative levels for the at risk population

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## Introduction

Stress and its psychological manifestations are inherent in human life and are a major source of concern in modern day society [1]. Stress is a state involving demand on physical or mental energy which may disturb the normal physical or mental health of an individual.

The first year in college poses many new challenging and potentially threatening situational demands for the incoming student, requiring major adjustments to novel and distinctive experiences. Psychological stress has long been regarded as having influence on learning and performance. The evidence of psychological distress in medical students spans more than thirty years, yet the authors of a systematic review were unable to make firm conclusions regarding its causes or consequences [2]. As per World Health Organization, a stressor is any stimulus which evokes a stress response. Stressors may be real or imagined, internal or external. The overall impact of a stressor will depend on its characteristics and the characteristics of those who have been affected. The perceived more than the absolute qualities of a stressor determine its potential impact. Two conditions are necessary for a potential stressor to become an actual stressor: there must be uncertainty over the impact and the outcome must be important to that individual.

Medical school has long been recognized as involving numerous stressors that can affect the wellbeing of students. In addition to coping with stressors of everyday life, medical students must deal with stressors specific to medical school like information and input overload, financial problems, lack of leisure time, pressures of work, work relationships and career choices [3]. There is evidence that mental distress during medical school predicts later problems in physicians, which in addition to the personal suffering of the individual doctor might negatively affect patient care [4,5].

Stress has been measured in three aspects: stressors, stress responses and individual characteristics (personal resources, behavior patterns and coping styles). These varying aspects of stress measures

are important in planning treatments and evaluating the effects of treatments [6]. This work originated from the concern about the non-availability of a valid and reliable instrument for assessment of stressors among first year MBBS students. The objective of the study was to develop a questionnaire to measure stressors among first year MBBS students of Government Medical Colleges in Kerala, India.

## 2. Methodology

2.1 Study Design:- Cross-Sectional Study using both qualitative and quantitative methods

2.2 Study Setting:- Government Medical Colleges in Kerala

2.3 Target Population:- First year MBBS students of Government Medical Colleges in Kerala

2.4 Study Sample:- All first year MBBS students admitted in September 2007 in the two randomly selected Government Medical Colleges – Thiruvananthapuram and Thrissur (350).

2.5 Exclusion Criteria:- Those who did not give consent

2.6 Study Period and Ethical considerations:- April 2008 to August 2008. Obtained informed written consent and clearance from Institutional Review Board

2.7 Data collection Tools:- Perceived Stress Scale (PSS-10) – ten items with scores 0 to 40, higher the score higher the stress [7]. General Health Questionnaire (GHQ-12) – with scores  $\leq 3$  normal and  $> 3$  mental distress [8].

2.8 Statistical Analysis

**Sample Size and Sampling:-** For qualitative methods Focus Group Discussions (FGD) and In-Depth Interviews, sample size was decided based on the redundancy of data. Four FGDs with forty students and fifteen In-Depth Interviews with ten preclinical teachers and five parents were done. Pilot study was conducted in thirty students. For quantitative methods we used 280 students for Internal Consistency Reliability and Construct Validity even though the sample size needed for an Alpha 0.82 was 240 and for 27 item questionnaire, it was

270. We selected 280 students after excluding the 70 students who participated in the qualitative study from the whole 350 sample. Test-Retest reliability assessment was done in thirty students. Convergent Validity was assessed in 150 students (for 27 items questionnaire, to get correlation coefficient as significant we need only 115 students).

**Data Analysis:-** Data were entered in excel worksheets and analyzed using SPSS version 11. Internal Consistency Reliability was estimated by Cronbach's Alpha. Test-Retest Reliability was estimated by Intra Class Correlation Coefficient. Construct Validity was established by Exploratory Factor Analysis using Varimax rotation. Convergent Validity was established by correlating the scores of new instrument with similar construct instruments.

#### 2.9 Steps in the Development of Instrument:-

The questionnaire was designed to have the following general properties:-

- A discriminative instrument to distinguish subjects who may have different levels of experience of stressors.
- Must capture the important stressors experienced by first year MBBS students
- Should have acceptable levels of reliability and validity
- Should be relatively short, less time consuming and self administered

The various steps involved were the following:- Conceptualization, item generation, item selection, item wording, item sequencing, response scale formatting, pre-testing, piloting, item reduction, reliability and validity assessments. Relevant literature review threw light on conceptualization of stressors. Accordingly the stressors operate at different levels: some were academic factors (work load, time pressure, failure in exams, transition from school to college, difficulty to adapt with new people and environment, poor teacher student relationship, inadequate learning resources etc.), some were individual factors (intimate relationships, procrastination etc.), others were social, cultural, physical, emotional and financial factors.

#### Item Analysis:-

A pool of 139 items were generated from sources like research findings from literature and qualitative studies like Focus Group Discussions and In-Depth Interviews. From this pool we selected 74 items according to prioritization by the respondents. By frequency of endorsement by expert and peer reviews, the items were then reduced to 49. Experts included psychiatrists, psychologists, epidemiologists, social scientists and preclinical teachers. The 49 items were then worded considering the reading level of the respondents avoiding ambiguity and jargons. They were then sequenced in such a manner so as to maintain the flow. A five point Likert Scale was chosen as it is the most commonly used scale for opinions, attitudes and attributes in social sciences. The options were "strongly disagree", "disagree", "neutral", "agree" and "strongly agree". The response strongly disagree had assigned a value of zero and strongly agree the highest score four.

Further reduction of items from this 49 to 27 was done by a series of pre-tests mainly among experts, students and preclinical teachers from Medical Colleges other than Thiruvananthapuram and Thrissur. These procedures established the Face Validity and Content Validity. The 27 item list was then administered to a sample of thirty students for the pilot study. Cognitive interviewing was done with five students to know whether the questions were understood the way they were intended. They gave details regarding the clarity of items, time taken for completion, suggestions about modifications and accordingly some were refined. The questionnaire was then administered in 280 students and analyzed its psychometric properties.

There were two items disagreed by one psychiatrist for being included in the questionnaire (one year portions being covered within 9-10 months and problems in memorizing topics). Since they were rated as important stressors by the study population, they were retained in the questionnaire. Not only in later analysis found that their removal considerably reduce the Cronbach's Alpha and the total variance explained by the instrument. Figure 1 shows the flow chart of steps in the development.

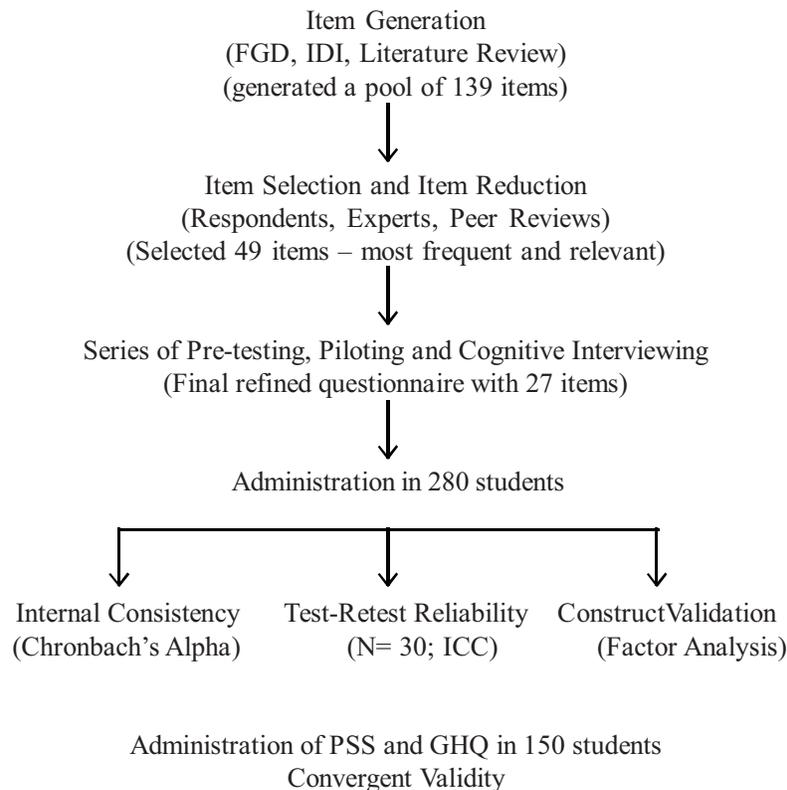


Figure 1:- Flow chart of steps in the study

3.1 Subject Characteristics:- The age of the 350 students ranged between 18 and 21 years. 41% of them were hostellers and 59% were day scholars. 53% were males and 47% were females. 4% were non-Keralites. The monthly income of their families (median) was rupees 20000.

### 3.2 Psychometric Properties

#### 3.2.1 Reliability Assessments:-

The Internal Consistency Reliability was estimated after a single administration of the 27 items questionnaire. The Cronbach's Alpha was found to be 0.82. It was estimated to know how well the items that reflect the same construct were correlated with each other. Cronbach's Alpha is mathematically equivalent to the average of all possible Split Half Reliability estimates. Ideal Alpha is more than 0.8 Test-Retest Reliability for stability was done in a sample of thirty students by administering the

questionnaire twice at an interval of two weeks, assuming that there was no change in the underlying conditions. Reliability of the two separate measurements was done using Intra Class Correlation Coefficient. The ICC 'r' of the total items was found to be 0.91 with 95% Confidence Interval 0.86-0.95 The item-wise ICC 'r' ranged between 0.93 and 1.0 with 95% CI 0.86-0.96 and 1.0-1.0

#### 3.2.2 Validity Assessments:-

Face Validity and Content Validity were established by expert reviews.

Construct Validity was established by conducting Factor Analysis on 27 items. The appropriateness of Factor Analysis with the data obtained whether it was suitable for Factor Analysis was tested using Bartlett's Test and Kaiser-Mayer-Olkin (KMO) statistic. Significant value of Bartlett's test and KMO value of 0.78 indicated that the data was factorizable.

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Principal Component Analysis yielded nine components with Eigen Values more than one (Table1).

Component	Eigen Value	% of Variance	Cumulative %
1	5.012	18.561	18.561
2	2.218	8.215	26.776
3	1.773	6.568	33.344
4	1.431	5.302	38.646
5	1.313	4.862	43.508
6	1.219	4.513	48.021
7	1.105	4.094	52.115
8	1.074	3.979	56.094
9	1.046	3.874	59.968

Table 1 :- Eigen Values zand percentage of variance explained

The factors explained 60% of the variance. Eigen Value gives the amount of variance in the data explained by that factor. Scree test also yielded nine factors. Communalities to measure the proportion of variance a variable has in common with the remaining variables in the dataset were found to be acceptable. Varimax rotation was done to make the factor loading matrix more understandable and meaningful. Factor Rotation maximizes the variance explained by each factor. Factor loading gave correlation of each item with each factor. Factor loadings less than 0.35 were discarded [9]. In case of those items with a factor loading more than 0.35 on multiple factors, the items to which it maximally loaded was selected. Since all the 27 items got factor loading more than 0.35 with 60% explanation of total variance, we could not do item reduction by Factor Analysis. Each factor had minimum two items loaded under them with Kaiser Criterion more than one Eigen Value. So we retained all the 27 items in the questionnaire. Discarding of items also would have resulted in reduction in the total variance explained by the questionnaire and Alpha.

Convergent Validity was assessed by administering the questionnaire to 150 students of Government Medical College, Thrissur with Perceived Stress Scale (PSS-10) and General Health Questionnaire

(GHQ-12) which are measures of similar construct. A valid measure should show good convergence with other measures which are intended to tap the same construct. Perceived Stress Scale focuses on a more cognitive appraisal of stress and the respondent's perceived control and coping ability. The aim is to assess the subjective experience of stressful situations. The higher the degree and longer the duration of perceived stress, indicated by a higher score, is considered a risk factor for a clinical psychiatric disorder. Subject's responses are measured on a five point scale:- 0=never, 1=almost never, 2=sometimes, 3=fairly often and 4=very often. PSS-10 has established reliability and validity. The Internal Consistency Alpha=0.85 and Test-Retest reliability  $r=0.85$

The General Health Questionnaire is a standard questionnaire for assessment of non-psychotic morbidity. It consists of 12 questions, having 4 possible responses:- never, not more than usual, more than usual and frequently. The answers were scored as 0 and 1, depending upon the question and the response received, as per guidelines [10].

	SQ	PSS	GHQ
SQ	1	0.48	0.33
		95%CI 0.34-0.62	95%CI 0.18-0.48

Table 2 :- Convergent Validity - correlation is significant at 0.01 level (2-tailed).

Table 2 shows significant correlations between the scores of stressor questionnaire with PSS and GHQ scores, thus establishing Convergent Validity.

### 3.2.3 Scoring pattern of the new questionnaire

The total score of 27 items ranges between 0 and 108. Since the options 1, 2 and 3 do not indicate any stressor experience, score d" 54 means no experience of stressors as perceived by the respondent. A score between 55 and 81 indicates mild to moderate stressor experience and a score between 82 and 108 denotes severe stressor experience.

Distribution of stressor scores as per the study:- There were 8.7% of the students with no stressor experience, 80% with mild to moderate stressor experience and 11.3% with severe stressor experience.

Distribution of important stressors experienced by the students were as follows:-

- Less time for repeated learning 90.7%
- Increased load towards exam 90%
- Tired feeling after tight schedule from 8am to 4pm 82.6%
- Problems in memorizing 81.4%
- Procrastination 80.7%
- Difficulty in covering portions daily 80%

#### 4. Discussion

Medical profession is a popular choice in tertiary education. Usually successful candidates having excellent academic achievement after the stressful competitive entrance examination enter into the course. The first year is particularly exhausting for many students, having to adjust quickly to a fast paced and highly competitive environment and to master a large amount of complex materials. So stressors at the beginning of the course are needed to be identified and measured to find out the individuals who are vulnerable.

This Cross-Sectional study, aimed at developing a screening questionnaire to measure stressors resulted in the development of a reliable and valid instrument. The study was conducted in Government Medical Colleges – Thiruvananthapuram and Thrissur. Of the five Government Medical Colleges in Kerala, two were our settings and of the 850 first MBBS student population, 41.2% participated in our study. The response rate was 100% as all the 350 first year students of both the colleges took part in the study. Cultural appropriateness and content relevance were ensured by the qualitative methods. Item selection and item reduction were done by respondent, peer and expert reviews. Pre-testing, piloting and cognitive interviewing ensured proper wording and sequencing of the items, there by improving the comprehensibility of the questionnaire.

The researcher met the *a priori* criteria of developing a simple self-administered, culturally appropriate, uni-dimensional reliable and valid instrument. It was named as Medical Students Stressor Questionnaire. It takes only few minutes to complete. We used a five point Likert scale as the response category

format. Almost all the factors extracted by Factor Analysis were related to academic setting. So the instrument was presented as a 27 item questionnaire with no subscales. The instrument attained acceptable psychometric properties. Internal Consistency Reliability Cronbach's Alpha is 0.82 with 95% CI 0.77-0.87. If the underlying construct is homogenous and the items specifically address this construct, the internal consistency will be high. The test-retest reliability estimated by ICC is 0.91. It describes the concordance of two ratings performed in two independent sessions in a limited period of time. The item wise test-retest reliability coefficients were also high. The 'r' ranged between 0.93 and 1.0. The exploratory Factor Analysis yielded nine factors by Principal Component Analysis. The Eigen Values ranged between 5.01 and 1.05. The percentage of variance explained ranged between 18.6 and 3.9. Using the Eigen Value for establishing a cut-off is most reliable when the number of variables is between 20 and 50. All the items had factor loadings more than 0.35 which is the ideal minimum prescribed by psychometricians. Another desired property of the instrument is the explanation of 60% variance. All the 27 items were retained as such as the removal of any one item would decrease the Alpha coefficient and the variance explained by the measure leading to loss of information. The sample size calculated was also adequate and acceptable for the 27 items' reliability and validity assessments.

Convergent Validity of the stressor questionnaire showed significant correlations with Perceived Stress Scale and General Health Questionnaire. The correlation with PSS was 0.48 ( $p=0.000$  2-tailed) and GHQ was 0.33 ( $p=0.000$  2-tailed). A significant but not too high correlation is again a positive quality of the instrument. This is because the stressor questionnaire and the other two measures though measuring the same construct, are measuring different aspects of stress. Thus Factor Analysis and testing of convergence established the Construct Validity.

The present study supports the views of researchers that most of the stressors were academic related [11,12,13]. Dyrbye [14] suggested that stress is related to personal factors as well as curricular factors. As

per our study, there are both academic and personal factors. A survey of ten United States Medical Schools identified the following stressors:- student mistreatment (86.7%), someone taking credit of one's work (53.5%), being threatened with unfair grades (34.8%), threatened with physical harm (26.4%), sexual harassment (55%) and pervasive negative comments about entering a career in medicine (91%) [15]. The most common stressors identified in a study among medical students of Nepal were academic and psychosocial factors [16]. The most important and severe stressors were staying in hostel, high parental expectations, vastness of syllabus, tests/exams, lack of time and lack of facilities for environment. Various studies showed that the first year of medical course is highly stressful [5, 17, 18, 19, 20, 21, 22, 23].

Very few studies have been conducted on stressors in this population and no specific instrument has been developed to measure stressors. Hence a reliable and valid stressor questionnaire developed in this study is a good initiative in this direction. Limitation of the study is that, we could not assess the discriminant validity for want of appropriate measure. Initial qualitative study was limited only to one Medical College, which might have resulted in not capturing a few of the stressors. The questionnaire is needed to be validated in other Medical College settings.

### 5. Conclusions

The newly developed and validated "MEDICAL STUDENTS STRESSOR QUESTIONNAIRE" (MSSQ) is a simple, easy to administer self-reported screening instrument. It has acceptable reliability and validity with ability to explain 60% of the variance. The cut-off scores categorize the respondents to different grades of stressor experience. It is meant for use in first MBBS students of Government Medical Colleges in Kerala.

Implications:- The proportion of students with different levels of stressor experience and the common stressors can be identified by this instrument. As the stressors can lead to stress responses in the form of adverse health consequences, a screening

instrument of this type has more relevance in this setting. This will enable the administrators in executing appropriate intervention strategies at the academic level to reduce the magnitude of stress.

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## Appendix: Medical Students Stress Questionnaire

### Directions

The following is a list of items that are experienced as stressful by students during their first year of MBBS. There are no right or wrong answers. Kindly go through each one of them and encircle the answer that best describes the extent or degree to which you have experienced them in the first semester.

### Options

1-Strongly disagree, 2-Disagree, 3-Neither disagree nor agree (neutral), 4-Agree, 5-Strongly Agree  
(eg: If one item is a strong stressor, answer as strongly agree; if not a stressor, disagree)

1. Vast syllabus .....	1	2	3	4	5
2. Tough topics.....	1	2	3	4	5
3. Covering topics very fast.....	1	2	3	4	5
4. 1 year portions being covered within 9-10 months.....	1	2	3	4	5
5. Difficulty in covering portions daily.....	1	2	3	4	5
6. Increased work load towards exams .....	1	2	3	4	5
7. More self study needed.....	1	2	3	4	5
8. Less time for repeated learning.....	1	2	3	4	5
9. Lack of time management skills.....	1	2	3	4	5
10. Not being given appropriate marks in sessional examination.....	1	2	3	4	5
11. Even after trying best, not getting expected marks.....	1	2	3	4	5
12. Overlapping of short examinations and seminars by different departments.....	1	2	3	4	5
13. Students are supposed to be ready with all the topics & anyone can be asked to present the topic for seminar.....	1	2	3	4	5
14. Not getting enough time for drawing and writing records after completing daily studies.....	1	2	3	4	5
15. Fear of "Late" mark during record correction.....	1	2	3	4	5
16. Not being given proper idea about how to do dissection especially on first day.....	1	2	3	4	5
17. Difficult to follow Cunningham's Manual.....	1	2	3	4	5
18. Not allowing other text books except Cunningham's Manual inside dissection hall.....	1	2	3	4	5
19. Continuous 3 hrs dissection without break .....	1	2	3	4	5
20. Dissection table teaching is inadequate.....	1	2	3	4	5
21. Tired feeling after the tight schedule from 8am to 4 pm.....	1	2	3	4	5
22. Problems in memorizing topics.....	1	2	3	4	5
23. Procrastination (habit of post-poning routine work).....	1	2	3	4	5
24. Fear of ragging or harassment.....	1	2	3	4	5
25. Required to be more responsible.....	1	2	3	4	5
26. Failure in first sessional examination.....	1	2	3	4	5
27. Fear of becoming additional or batch out or repeater.....	1	2	3	4	5

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