Original Article

Validating the Medical Students’ Stressor Questionnaire (MSSQ) from a Sri Lankan medical faculty

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The Medical Students’ Stressor Questionnaire (MSSQ) is a specific tool to assess the degree of stress in medical students. However, this tool has not been validated in Sri Lanka. Therefore, this study contextually adapted the MSSQ and investigated its validity in the local context.

Methods: A total of 603 medical students, in various phases of their undergraduate training, from the Faculty of Medicine at the University of Colombo, participated in the study. Students who have completed their studies in the faculty for at least six months were included. The self-administered questionnaire was contextually adapted to the local setting and was approved by subject and language experts. Responses were analysed for construct validity (including exploratory factor analysis to estimate factor structure of the scale), sample adequacy, and internal consistency. Data were analysed using the SPSS statistical package.

Results: The mean age of the study cohort was 23.3 ± 2.0 years, while 258 (42.8%) were males. The MSSQ scale was validated in Sri Lanka. Therefore, this study contextually adapted the MSSQ and investigated its validity in the local context.

Abstract

Objectives: The Medical Students’ Stressor Questionnaire (MSSQ) is a specific tool to assess the degree of stress in medical students. However, this tool has not been validated in Sri Lanka. Therefore, this study contextually adapted the MSSQ and investigated its validity in the local context.

Methods: A total of 603 medical students, in various phases of their undergraduate training, from the Faculty of Medicine at the University of Colombo, participated in the study. Students who have completed their studies in the faculty for at least six months were included. The self-administered questionnaire was contextually adapted to the local setting and was approved by subject and language experts. Responses were analysed for construct validity (including exploratory factor analysis to estimate factor structure of the scale), sample adequacy, and internal consistency. Data were analysed using the SPSS statistical package.

Results: The mean age of the study cohort was 23.3 ± SD 2.0 years, while 258 (42.8%) were males. The MSSQ scale significantly correlated with the General Health Questionnaire (p<0.001), indicating a strong concurrent validity. The exploratory factor analysis showed that items were loaded appropriately on five new factors, and the Kaiser-Meyer-Olkin measure (0.954) and Bartlett’s test of sphericity (p<0.001) showed excellent sample adequacy.
Introduction

Stress levels are known to be high among medical students during their training and has a negative impact on the academic performance and wellbeing of medical students. Students perceive that their psychological well-being is affected by the workload in medical school. Furthermore, stress has been associated with negative effects such as poor relationships with colleagues, poor decision making, sleep disturbances, substance abuse, and suicidal ideations.

Previous studies in Sri Lanka have used non-specific tools such as the 12-item General Health Questionnaire (GHQ-12) and Perceived Stress scale to assess stress among medical students. Different scales measuring psychiatric morbidity have been validated to the Sri Lankan population previously. The Depression, Anxiety and Stress Scale has been translated into Sinhala and validated among University students. GHQ-12 has been validated in Sri Lanka as a screening tool to detect minor and non-psychotic psychiatric conditions.

In previous studies, various tools have been used to assess stress levels among medical students. The Perceived Stress Scale-14 has been used in previous studies and has been shown to have acceptable composite reliability (greater than 0.80). Furthermore, all standardised factor loadings were statistically significant, ranging from .514 to .806. The Copenhagen Burnout Inventory is another tool which has been used previously and showed good test–retest reliability (>90%) and internal consistency (Cronbach’s alpha: 0.92) among medical students.

The Medical Student Stressor Questionnaire (MSSQ) was first developed in Malaysia, and includes 40 aspects which are specific to medical students. It has been validated in countries such as Malaysia, the Netherlands, Romania, Nepal and India. This questionnaire has also been translated to the Romanian language, and it was stated in the systematic review performed by Yusoff et al that the instrument has probably been translated into other languages as well. However, the relevant data is inaccessible to be referenced as the investigators have failed to disseminate the findings.

The internal consistency of the MSSQ overall (α = 0.95), and each of the new factors: (α > 0.82 for the first four factors and α = 0.54 for the fifth) were satisfactory. The test-retest reliability was high (Pearson’s r = 0.918, p<0.001).

Conclusions: The contextually adapted MSSQ is a valid and reliable instrument that can be used in the assessment of stress among medical students.

Keywords: Construct validity; General health questionnaire; Medical students; MSSQ; Stressor questionnaire; Validity

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stressors (TLRS), social related stressors (SRS), drive and
desire related stressors (DRS), and group activities related
stressors (GARS). The original MSSQ is scored by obtaining
the mean values for each of the six categories and the scores
are rated as mild (0.00–1.00), moderate (1.01–2.00), high
(2.01–3.00) and severe (3.01–4.00).
The MSSQ was contextually adapted by two independent
investigators and the following modifications were made. In
the original questionnaire, ‘quota system in examinations’
was changed to ‘ranking system based on merit’ and ‘conflict
with personnel(s)’ to ‘conflict with faculty staff(s)’ to suit the
local setting. Face validity of the modified questionnaire was
assessed by a panel of two subject experts and two language
experts. Concurrent validity was assessed using the GHQ.
The GHQ is a screening instrument used in primary care,
general medical practice, and community surveys to detect
minor psychiatric conditions and stress and has been valid-
dated for Sri Lanka.26,27

Statistical analysis was done using SPSS version 20.0 and
SPSS-AMOS programs.

Confirmatory factor analysis (CFA) was performed to
assess the validity of the factor structure based on the
original construct of the instrument. Goodness of fit of
CFA was measured by the following indices: Root Mean
Square Error of Approximation (RMSEA) smaller than
0.05, Comparative Fit Index (CFI) greater than 0.90,
Tucker–Lewis coefficient (TLI) greater than 0.90, and ratio
of the Chi-square value to its degrees of freedom (Chi²/df)
of less than 2.5. An exploratory factor analysis was planned
in case of poor fit.

Exploratory factor analysis was conducted using the
principal component analysis with Varimax rotation.
The Kaiser-Meyer-Olkin (KMO) test and Bartlett’s test of
sphericity were used to determine the sampling adequacy.
The sample was considered adequate when the KMO value
was more than 0.5 and the Bartlett’s test was significant.
Internal consistency of the modified questionnaire was
measured using Cronbach’s alpha. The Pearson’s coeffi-
cient was used to assess the correlation between the MSSQ
and GHQ. A p-value of less than 0.05 was considered
statistically significant. The Pearson’s coefficient was used
to assess the test-retest reliability using a small group of
students who were administered the questionnaire two
weeks apart.

Results

The mean age of the sample was 23.3±SD 2.0 years and
258 (42.8%) were males. The majority were Sinhalese
(n = 509, 84.4%), there were 53 Tamils (8.8%), 26 Muslims
(4.3%), and others (2.5%, n = 15).

Background and demographic details of participants are
summarised in Table 1.

Construct validity

Confirmatory factor analysis was conducted on the total
sample of 603. The CFA’s goodness of fit was evaluated by
the following indices, as described in the methodology: Root
Mean Square Error of Approximation (RMSEA) was 0.078,
Comparative Fit Index (CFI) was 0.78, Tucker–Lewis
coefficient (TLI) was 0.764 and ratio of the Chi-square value
and its degrees of freedom (chi²/df) was 4.630. Therefore, this
CFA showed poor fit indicating that the original construct of
a six-factor scale of the MSSQ did not fit with the study
population.

Therefore, exploratory factor analysis was performed to
determine the construct validity of the MSSQ. The Kaiser-
Meyer-Olkin test (KMO), which is a measure of sampling
adequacy, was 0.954 which indicated an adequate sample
size, and Bartlett’s test of sphericity was highly significant
(p<0.001). The total number of components were extracted
using Principal component analysis and Varimax rotation.
The items were loaded into five new factors based on the
scree plot (Figure 1) that explained a cumulative variance of
53.8%. The loading of each item to the new factors was based
on the factor loadings and the theoretical construct. The
construct was similar to the Italian MSSQ validation study28
and therefore, a similar factor construct was adapted. Factor structure and internal consistency of the
MSSQ is given in Table 2.

The MSSQ’s total scale correlated highly with the GHQ
(r = 0.632, p<0.001) as well as the 5 individual subscales
(ARS: r = 0.628, p<0.001; SRS: r = 0.481, p<0.001;
DRS: r = 0.583, p<0.001; TLRS: r = 0.580, p<0.001;
PRS: r = 0.254 p<0.001) indicating good concurrent
validity.

Reliability

The MSSQ showed high internal consistency with a
Cronbach’s alpha of 0.95. Cronbach’s alpha values of the
subcales ranged from 0.54 to 0.90 showing acceptable in-
ternal consistency. When individual items were removed, the
Cronbach’s alpha ranged from 0.917 to 0.919 showing that all
items contributed to the scale adequately.

Table 1: Participants’ background information.

| Variables         | Frequency | Percentage |
|-------------------|-----------|------------|
| Sex               |           |            |
| Female            | 345       | 57.2%      |
| Male              | 258       | 42.8%      |
| Ethnicity         |           |            |
| Sinhalese         | 509       | 84.4%      |
| Tamil             | 53        | 8.8%       |
| Muslim            | 26        | 4.3%       |
| Bhutanese         | 11        | 1.8%       |
| Burger            | 4         | 0.7%       |
| Religion          |           |            |
| Buddhism          | 486       | 80.6%      |
| Hinduism          | 48        | 8.0%       |
| Christianity      | 40        | 6.6%       |
| Islam             | 23        | 3.8%       |
| Other             | 6         | 1.0%       |
| Year of Medical school |     |            |
| 1st year          | 95        | 15.8%      |
| 2nd year          | 95        | 15.8%      |
| 3rd year          | 200       | 33.2%      |
| 4th year          | 103       | 17.1%      |
| Final/5th year    | 110       | 18.2%      |
Figure 1: Scree plot.

Table 2: Factor structure and internal consistency of the MSSQ.

| Factor loadings | Cronbach’s Alpha if Item Deleted |
|-----------------|---------------------------------|
| Academic Related Stressor (ARS) | |
| 1. Tests/Examinations | .486 | .919 |
| 4. Merit ranking system in finals | .467 | .918 |
| 7. Need to do well (self-expectation) | .480 | .918 |
| 10. Heavy workload | .626 | .918 |
| 12. Falling behind in reading schedule | .551 | .918 |
| 17. Not enough medical skill practice | .481 | .918 |
| 18. Lack of time for family and friends | .444 | .918 |
| 19. Highly competitive learning context | .621 | .918 |
| 23. Having difficulty understanding the context | .491 | .918 |
| 25. Getting poor marks | .618 | .918 |
| 26. Poor motivation to learn | .526 | .918 |
| 27. Lack of time to review what has been learnt | .624 | .918 |
| 30. Inability to answer the question from the teachers | .520 | .918 |
| 31. Conflict with teacher(s) | .698 | .918 |
| 28. Verbal or physical abuse by teacher(s) | .667 | .918 |
| 29. Frequent interruption of my work by others | .486 | .918 |
| 31. Conflict with teacher(s) | .698 | .918 |
| 35. Not enough feedback from teacher(s) | .583 | .918 |
| 38. Working with computers | .350 | .919 |
| Intrapersonal and Expectations Related Stressors (IERS) | |
| 6. Parental wish for you to study medicine | .342 | .919 |
| 15. Feeling of incompetence | .593 | .917 |
| 16. Uncertainty of what is expected of me | .570 | .918 |
| 32. Unwillingness to study medicine | .426 | .918 |
| 34. Need to do well (imposed by others) | .528 | .918 |
| 40. Family responsibility | .326 | .918 |
| Teaching and Learning Related Stressors (TLRS) | |
| 11. Participation in class discussion | .630 | .918 |
| 13. Participation in class presentation | .575 | .919 |
| 20. Teacher- lack of teaching skills | .548 | .918 |
| 22. Inappropriate assignments | .486 | .918 |
| 37. Lack of recognition for work done | .566 | .917 |
| 38. Working with computers | .350 | .919 |
| Patients Related Stressors (PRS) | |
| 2. Talking to patients about personal problems | .415 | .919 |
| 21. Unable to answer questions from patients | .494 | .918 |
| 24. Facing illness or death of the patients | .458 | .919 |
Table 3: Factor Correlation Matrix.

| Stressor Groups          | Number of Items | Cronbach’s alpha |
|--------------------------|-----------------|------------------|
| Academic Related Stressors (ARS) | 15              | .900             |
| Staff and Student Related Stressors (SSRS) | 10              | .834             |
| Intrapersonal and Expectation Related Stressors (IERS) | 6               | .823             |
| Teaching and Learning Related Stressors (TLRS) | 6               | .832             |
| Patient Related Stressors (PRS) | 3               | .540             |

Table 4: Internal Consistency of new subscales of the MSSQ.

| Stressor Groups          | Number of Items | Cronbach’s alpha |
|--------------------------|-----------------|------------------|
| Academic Related Stressors (ARS) | 15              | .900             |
| Staff and Student Related Stressors (SSRS) | 10              | .834             |
| Intrapersonal and Expectation Related Stressors (IERS) | 6               | .823             |
| Teaching and Learning Related Stressors (TLRS) | 6               | .832             |
| Patient Related Stressors (PRS) | 3               | .540             |

Table 3 shows the inter-factor correlation which indicates the discriminant ability of an item. Inter-factor correlations showed that Academic Related Stressors- Factor I (ARS), Staff and Student Related Stressors-Factor II (TLRS), Intrapersonal and Expectation Related Stressors- Factor III (IERS) and Teaching and Learning Related Stressors- Factor VI (TLRS) had a higher discriminant ability. Patient Related Stressors- Factor V (PRS) had lower correlation with other items indicating lesser discriminant ability.

The corrected-item total correlation and the inter item correlation value was more than 0.3 for 39 items. Item 2, ‘Talking to patients about personal problems’ had a corrected-item total correlation of 0.265. However, there was no considerable change in Cronbach’s alpha with the deletion of any item, indicating acceptable reliability. Therefore, all 40 items were included in the questionnaire. Cronbach’s alpha values of each stressor group are shown in Table 4.

Test-retest reliability

The MSSQ was administered to a group of 52 students twice, two weeks apart. Pearson’s correlation coefficient for the overall score was 0.918 (p<0.001), showing a strong test-retest reliability. Similarly, the correlation coefficient for new individual factors were also satisfactory (ARS: r = 0.891, p<0.001; SSRS: r = 0.908, p<0.001; IERS: r = 0.865, p<0.001; TLRS: r = 0.788, p<0.001; PRS: r = 0.862 p<0.001).

Discussion

The contextually adapted version of the MSSQ with a revised factor construct had good internal consistency with an overall Cronbach’s alpha of 0.95 and values ranging from 0.54 to 0.90 for the subscales. Significant correlation with the GHQ suggests good concurrent validity. Factor analysis showed that the items loaded onto five new factors which explained a cumulative variance of 53.8%. The high test-retest reliability suggests that the errors in measurement are less likely to be influenced by changes in the individuals’ responses over time (r = 0.918, p<0.001).

A study done in Kolkata, India in 2013 assessed the validity of the MSSQ among 81 medical students. In that study, the Cronbach’s alpha coefficient was greater than 0.8 for the overall score and the academic-related stressor domain. Other domains such as intrapersonal and interpersonal-related stressors, teaching and learning-related stressors and group activities-related stressors showed a Cronbach’s alpha value ranging from 0.5—0.8. However, the social-related stressor and drive and desire-related stressors were less than 0.5.

In the study done by Dagani et al in Italy, the CFA performed showed poor fit with the original construct of the MSSQ scale, similar to our study (RMSEA = 0.079 (90% CI: 0.020, 0.102); CFI = 0.757 TLI = 0.724; Chi2/df = 7.064; p < 0.001). This variation may be explained by the differences in cultural background and medical curriculum (methods of teaching and evaluation) in different countries.

Studies have shown a relatively high prevalence of stress in medical students, ranging from 30% to 50%. Stress is the body’s nonspecific response or reaction to demands made on it, or to disturbing events in the environment. A critical issue regarding stress among medical students is its effects on learning. Stress can be either facilitating towards learning, which is called ‘favourable stress’, or it can be deleterious towards learning which is called ‘unfavourable stress’. The perceived level of stress may vary among different students depending on their personality, previous experience, coping strategies, and cultural background.

This questionnaire has used a model known as the person-environment model which is useful in understanding stress among students. According to the model, stress in medical students is caused by multifactorial reasons which are interrelated. This questionnaire will be helpful to identify the stressors in separate domains which is useful in determining the source of stressors among medical students. It is valuable not only to researchers, but also to medical students who can self-evaluate their level of stress and the stressors thereby aiding early intervention.

The contextually adapted MSSQ with new factor construct is a reliable instrument that can be used in the local setting to study stressors among medical students.

Limitations of the study

The study was conducted among the students of a single medical faculty. More accurate results could be obtained via multicentre studies involving other medical faculties to
obtain more accurate results in the Sri Lankan context. Further, the study was based on a single measurement. A series of measurements during the undergraduate training period would provide better insight on the validity of the scoring system. Finally, this study was conducted based on the English version of the questionnaire. Future studies may focus on translations to the local languages to obtain a more culturally reliable tool.

Conclusion

This study showed that the contextually adapted MSSQ with new factor construct had acceptable psychometric properties. It is a valid and reliable instrument that can be used in the local setting for assessment of stress among medical students.

Recommendation

The contextually adapted MSSQ has good validity and reliability in terms of internal consistency and test-retest reliability. It will be useful to assess stress among medical students in the Sri Lankan setting.

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Colombo. All participants gave informed written consent before participating in this study.

Consent

All participants gave informed consent to the work. The authors declare that the paper has not been previously published or under review.

Authors’ contribution

UJ, KL, AA, AJ and VD conceived and designed the study. UJ, KL, AA and AJ conducted research, provided research materials, and collected and organised data. UJ, KL, AA, AJ and VD analysed and interpreted the data. UJ, KL, AA and AJ wrote the initial and final drafts of the article and provided logistic support. VD performed the critical revisions in the manuscript. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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