**ORIGINAL ARTICLE**

# THE DEVELOPMENT AND VALIDITY OF THE MEDICAL STUDENT STRESSOR QUESTIONNAIRE (MSSQ)

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## Abstract

***Objective:*** **To determine the construct validity and the internal consistency of the Medical Student Stressor Questionnaire (MSSQ) among medical students hence in the future it could be used as a valid and reliable instrument to identify stressors among medical students.** ***Methods:*** **The blueprint for the development of MSSQ was developed after a review of literature on the subject and a discussion with experts in the field. It comprised of 40 items with six hypothetical groups. The face validity of the questionnaire was established through discussion with 141 final year medical students whereas content validity was established through discussion with experts from field of Medical Education and Psychiatry. It was administered to a total of 761 medical students. Data was analysed using Statistical Package Social Sciences (SPSS) version 12. Factor analysis was applied to test construct validity of the MSSQ. Reliability analysis (Cronbach's alpha and item total correlation) was applied to test internal consistency of the MSSQ.** ***Results:*** **The total Cronbach's alpha value of the MSSQ was 0.95. All the preliminary 40 items were included in the MSSQ as the items had item total correlation value of more than 0.3. The items were loaded nicely into the six pre-determined hypothetical groups as their factor loading values were more than 0.3.** ***Conclusion:*** **This study showed that MSSQ had good psychometric value. It is a valid and reliable instrument in identifying stressors among medical students.** ***ASEAN Journal of Psychiatry, Vol.11 (1): Jan – June 2010: XX XX*****.**

***Keywords:*** **Validity, reliability, medical students, stressors, factor analysis.**

## Introduction

Tertiary education environment has always been regarded as a stressful environment to students. Medical training further adds to the problem. The associated negative consequences of chronic exposure to excessive stress to the mental and physical health of medical students have been described in many studies [1-10]. Some studies have described and revealed the sources of stress among medical students [3,

7, 8], however, none of them described the validity and reliability of the questionnaires used in identifying stressors of medical students. This article described a newly developed questionnaire, known as Medical Student Stressor Questionnaire (MSSQ), to identify sources of stress in medical students. It described the validity and reliability of the MSSQ in identifying medical students' stressors.

*Stress in medical students*

Stress is defined as the body's nonspecific response or reaction to demands made on it, or to disturbing events in the environment [11, 12]. It is not just a stimulus or a response but it is a process by which we perceive and cope with environmental threats and challenges [13]. Personal and environmental events that cause stress are known as stressors [14]. In short, stress is emotional disturbance or change caused by stressors. Some stress in medical school training is needed for learning [15]. Stress which can promote and facilitate learning is called 'favourable stress' and stress which can inhibit and suppress learning is called 'unfavourable stress'[15]. The same stressors may be perceived differently by different medical students, depending on their cultural background, personal traits, experience and coping skills.

One model that is useful in understanding stress among students is the person-environment model. This model argued that stress consists of three processes. Primary appraisal, the first process, is the process of perceiving a threat or challenge to oneself. Secondary appraisal is the process of bringing to mind a potential response to the threat or challenge. Coping, the last process is the process of executing that response. These processes are not static but constantly change as a result of the continual interplay between the person and the environment [14]. According to one elaboration of this model, stressful events are appraised by an individual as 'challenging' or 'threatening'. When students appraise their education as a challenge, stress can bring them a sense of competence and an increased capacity to learn. When education is seen as a threat, however, stress can elicit feelings of helplessness and a foreboding sense of loss. A critical issue concerning stress among students is its effect on learning. Individuals under low stress learn least and that those under moderate stress learn most. However, excessive stress is harmful to students' performance and achievement. Mechanisms that explain why students perform badly under stress include 'hypervigilance' (excessive alertness to a stressful situation resulting in panic – for example over studying for an exam) and 'premature closure' (quickly choosing a solution to end a stressful situation – for example, rushing through an exam) [16].

Studies have revealed high prevalence of stress in medical students, ranging from 30% to 50% [1, 3, 5, 9, 10, 17]. Its pattern depends on many factors and there seem to be some predictors of stress such as year of study [4]. Studies have revealed an association of unfavourable stress level with lowered medical students' self-esteem [15,18], anxiety and depression [19, 20], difficulties in solving interpersonal conflicts [21], sleeping disorders [22], increased alcohol and drug consumption [23-25],

cynicism, decreased attention, reduced concentration and academic dishonesty [7]. Unfavourable stress was also associated with inhibition of students' academic achievement and personal growth development [15]. As a result, medical students may feel inadequate and unsatisfied with their career as a medical practitioner in the future [8]. Therefore many researchers have stated the importance of early diagnosis as well as effective psychological services, which can prevent possible future illnesses among medical students [1, 9, 3].

*Stressors of medical students*

A stressor is defined as a personal or environmental event that causes stress [14]. Stressors of medical students generally were grouped into six categories; academic related stressors (ARS), intrapersonal and interpersonal related stressors (IRS), teaching and learning-related stressors (TLRS), social related stressors (SRS), drive

and desire related stressors (DRS), and group activities related stressors (GARS). Studies have revealed that the stressors affecting medical students wellbeing seems to be related to the medical training [1, 5, 8, 26, 27]. Curriculum differences in medical schools may not necessarily cause differences in the overall pattern of stressors (i.e. most of the top stressors are related to academic matters), although frequency (rank) of some stressors may be significantly different [26, 27].

*Academic related stressors (ARS)*

A study reported that top stressors were tests and examinations, time pressure and getting behind in work as well as conflicting demands, not getting work done within time planned and heavy workload [26]. Another study reported that students who are perfectionists (high self-expectations) are at greater risk for psychological distress [28]. It is perhaps due to high self-expectation to do well in examinations [8]. All of these stressors were related to the academic matter [1, 5, 8, 26, 27].

*Intrapersonal and interpersonal related stressors (IRS)*

Intrapersonal conflict, interpersonal interaction and relationship were reported as stressors for medical students, such as poor motivation to learn, conflict with other students, teachers and personnel [1, 8, 26, 27]. These stressors were basically related to intrapersonal and interpersonal relationship matters.

*Teaching and learning related stressors (TLRS)*

Dissatisfaction with quality of education, with lectures, with guidance and feedback from teachers, and with recognition of work done as well as uncertainty of what is expected from the students were also perceived as stressors [1, 3, 8, 26]. All of these stressors were generally related to the teaching and learning process.

*Social related stressors (SRS)*

Aktekin et al. (2001) [1] reported that the level of dissatisfaction in social activities was associated with psychological distress among medical students. Sherina et al.(2003) [9] reported that there was significant relationship between emotional

disorder and medical students' relationship with their family and friends. A study reported that facing illness or death of patients and unable to provide appropriate answer to patients were sources of stress for medical students [8, 29]. Dissatisfaction with social activities was associated with emotional disorder [1, 9]. These stressors were generally related to the social relationship between the students with other people such as family and patients.

*Drive and desire related stressors (DRS)*

Political and family pressures as well as fear of wrong career choice and unwilling to study medicine were recognized as stressors in medical students [1, 26]. All the stressors were related to the motivation of the students to learn medicine.

*Group activities related stressors (GARS)*

The group learning environment, including tutor performance, and interactions with peers and patients caused little stress [29]. Feeling of need to do well (imposed by others) in learning activities was also reported as one of the stressors [8, 26]. These stressors were related to the group activities during their study.

## Methods

*Development of the MSSQ*

The items were framed by referring to the authors cited in the forgoing pages, few statements through review of literature on the subject and also by discussion with experts in the field. These sources have provided the blueprint for the development of the MSSQ. Before constructing the tool, theoretical constructs were formed consisting of the hypothetical groups. In the MSSQ, there were six hypothetical groups; Academic Related Stressors (ARS), Intrapersonal and Interpersonal Related Stressors (IRS), Teaching and Learning Related Stressors (TLRS), Social Related Stressors (SRS), Drive and Desire Related Stressors (DRS), and Group Activities Related Stressors (GARS). An item conveying the idea most clearly was retained, and the language of the item was made simple and suitable to express the concept implied. This process of scrutiny and evaluation yielded 40 statements for the MSSQ. The theoretical constructs of the MSSQ were shown in the table 1.

*Expert evaluation of the items*

In order to establish the content validity of the MSSQ, the items were subjected to Jury technique. The experts were drawn from the field of Medical Education and Psychiatry. The item of MSSQ were rated under 5 categories of responses (causing no stress at all, causing mild stress, causing moderate stress, causing high stress, causing severe stress) to indicate intensity of stress caused by the items.

*Preliminary try-out*

The items were arranged as shown in table 1, and administered to a sample of 141 final year medical students of 2007/2008 academic session to check their applicability and face validity during face-to-face session. The students were encouraged to express their doubts freely. Necessary modifications were made with the experience gained through this preliminary try-out.

Table 1: The theoretical constructs, reliability analysis and factor analysis of MSSQ.

| No | Items | Hypothetical groups* | [a]Corrected Item-Total Correlation | [a]Cronbach's Alpha if Item Deleted | [b]Factor loading | [b]Factor |
|---|---|---|---|---|---|---|
| 1 | Tests/examinations | **ARS** | 0.560 | 0.951 | 0.737 | **I** |
| 2 | Falling behind in reading schedule | **ARS** | 0.592 | 0.951 | 0.691 | **I** |
| 3 | Large amount of content to be learnt | **ARS** | 0.611 | 0.951 | 0.793 | **I** |
| 4 | Having difficulty understanding the content | **ARS** | 0.600 | 0.951 | 0.700 | **I** |
| 5 | Getting poor marks | **ARS** | 0.584 | 0.951 | 0.664 | **I** |
| 6 | Quota system in examinations | **ARS** | 0.558 | 0.951 | 0.569 | **I** |
| 7 | Lack of time to review what have been learnt | **ARS** | 0.652 | 0.950 | 0.732 | **I** |
| 8 | Need to do well (self-expectation) | **ARS** | 0.586 | 0.950 | 0.644 | **I** |
| 9 | Learning context – full of competition | **ARS** | 0.646 | 0.950 | 0.570 | **I** |
| 10 | Unable to answer the questions from the teachers | **ARS** | 0.631 | 0.950 | 0.581 | **I** |
| 11 | Heavy workload | **ARS** | 0.629 | 0.950 | 0.564 | **I** |
| 12 | Participation in class discussion | **GARS** | 0.563 | 0.951 | 0.793 | **IV** |
| 13 | Participation in class presentation | **GARS** | 0.568 | 0.951 | 0.789 | **IV** |
| 14 | Need to do well (imposed by others) | **GARS** | 0.624 | 0.950 | 0.567 | **IV** |
| 15 | Feeling of incompetence | **GARS** | 0.652 | 0.950 | 0.494 | **IV** |
| 16 | Unjustified grading process | **ARS** | 0.612 | 0.951 | 0.363 | **I** |
| 17 | Not enough medical skill practice | **ARS** | 0.627 | 0.950 | 0.485 | **I** |
| 18 | Lack of time for family and friends | **SRS** | 0.509 | 0.951 | 0.438 | **V** |
| 19 | Teacher – lack of teaching skills | **TLRS** | 0.528 | 0.951 | 0.630 | **III** |
| 20 | Not enough study material | **TLRS** | 0.592 | 0.951 | 0.520 | **III** |
| 21 | Unable to answer questions from patients | **SRS** | 0.608 | 0.951 | 0.437 | **V** |
| 22 | Inappropriate assignments | **TLRS** | 0.563 | 0.951 | 0.426 | **III** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 23 | Talking to patients about personal problems | **SRS** | 0.397 | 0.952 | 0.600 | **V** |
| 24 | Facing illness or death of the patients | **SRS** | 0.403 | 0.952 | 0.446 | **V** |
| 25 | Conflicts with other students | **IRS** | 0.563 | 0.951 | 0.582 | **II** |
| 26 | Poor motivation to learn | **IRS** | 0.618 | 0.951 | 0.337 | **II** |
| 27 | Verbal or physical abuse by other student(s) | **IRS** | 0.545 | 0.951 | 0.816 | **II** |
| 28 | Verbal or physical abuse by teacher(s) | **IRS** | 0.528 | 0.951 | 0.820 | **II** |
| 29 | Verbal or physical abuse by personnel(s) | **IRS** | 0.527 | 0.951 | 0.868 | **II** |
| 30 | Conflict with personnel(s) | **IRS** | 0.547 | 0.951 | 0.766 | **II** |
| 31 | Conflict with teacher(s) | **IRS** | 0.517 | 0.951 | 0.812 | **II** |
| 32 | Unwillingness to study medicine | **DRS** | 0.464 | 0.951 | 0.734 | **VI** |
| 33 | Parental wish for you to study medicine | **DRS** | 0.449 | 0.952 | 0.783 | **VI** |
| 34 | Lack of guidance from teacher (s) | **TLRS** | 0.583 | 0.951 | 0.743 | **III** |
| 35 | Not enough feedback from teacher (s) | **TLRS** | 0.575 | 0.951 | 0.767 | **III** |
| 36 | Uncertainty of what is expected of me | **TLRS** | 0.602 | 0.951 | 0.516 | **III** |
| 37 | Lack of recognition for work done | **TLRS** | 0.671 | 0.950 | 0.503 | **III** |
| 38 | Working with computers | **SRS** | 0.427 | 0.952 | 0.587 | **V** |
| 39 | Frequent interruption of my work by others | **SRS** | 0.549 | 0.951 | 0.467 | **V** |
| 40 | Family responsibilities | **DRS** | 0.472 | 0.951 | 0.428 | **VI** |

*Theoretical constructs; **ARS** = Academic Related Stressor, **IRS** = Intrapersonal & Interpersonal Related Stressor, **TLRS** = Teaching & Learning Related Stressors, **SRS** = Social Related Stressors, **DRS** = Drive & Desire Related Stressors, **GARS** = Group Activities Related Stressors.

[a] Reliability analysis; Cronbach's alpha
[b] Factor analysis; Principal Component Analysis with rotation of Varimax.

### *Validation study*

The preliminary form used for this study contained 40 items. For this study, all medical students (from first year to fifth year) of 2008/2009 academic session in the School of Medical Sciences, Universiti Sains Malaysia were selected as study subjects. Proper instructions were given before the administration of the scale. The

subjects were asked to respond to all the statements and no time limit was imposed. During the time of administration the investigator gave proper assistance and directions whenever and wherever necessary.

### *Collection of data*

The investigator obtained permission and clearance from the School of Medical Sciences and Human Ethical Committee of Universiti Sains Malaysia. The investigator requested 1065 medical students to fill in the MSSQ. Completion of the questionnaire was voluntary and would not affect the students' progress in the course. A few facet-t-face sessions were held with the students according to the year of study. Data was collected by guided self-administered questionnaire. The time taken by the students for filling in the MSSQ was around 15 minutes. The questionnaires were collected on the same day.

### *Study subjects*

Population of this present study was 1065 medical students from first year to fifth year of 2008/2009 academic session in the School of Medical Sciences, Universiti Sains Malaysia. All of them were selected as study subjects.

### *Reliability analysis*

Reliability analysis was done to determine the reliability of the questionnaire. Internal consistency of the items was measured by using Cronbach's alpha coefficient. For an estimation of reliability, statistical reliability of individual items was done. Items with corrected-item total correlation value of more than 0.3 were selected and items with corrected-item total correlation value of less than 0.3 were deleted. The Cronbach's alpha if item-deleted value could determine which item highly contributed to the reliability of the MSSQ. If the Cronbach's alpha value for those items-deleted decreased, it would indicate that the items highly contributed to alpha value. In contrast, if the Cronbach's alpha value for those items-deleted increased, it would indicate that the items poorly contributed to alpha value. The items of MSSQ were considered to represent a measure of high internal consistency if the total alpha value was more than 0.7 [30].

### *Factor Analysis*

Collected data was analysed using Statistical Packages Social Sciences (SPSS) version 12. Factor Analysis was done to determine the construct validity of the MSSQ. Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity was applied to measure the sampling adequacy [31]. The sample was considered adequate if i) KMO value was more than 0.5 and ii) Bartlett's test was significant (p-value less than 0.05). Principal Component Analysis (PCA) method was

applied in extraction of components. Components with Eigenvalues of over 1 were retained as components. With the assumption of all items were uncorrelated with each other, Varimax rotation was applied in order to optimize the loading factor of each item on the extracted components. Items with loading factor of more than plus or minus 0.3 were considered as an acceptable loading factor.

## Results

A total of 761 (71.5%) out of 1065 medical students responded. 474 (62.3%) were female students. The years of study were almost equally represented; 213 students (28%) from year one, 104 students (13.7%) from year two, 159 students (20.9%) from year three, 139 (18.3%) from year four and 146 (19.2%) from year five. 459 (60.4%) were Malay, 266 (35%) Chinese, 33 (4.3%) Indian and 3 (0.3%) others. A total of 462 (60.7%) were Muslim, 206 (27.1%) Buddhist, 53 (7%) Christian, 29 (3.8%) Hindu and 11 (1.4%) others.

### *Reliability analysis*

Table 1 showed all the questions had corrected-item total correlation of more than 0.3. Thus all the items were selected to be included in the questionnaire. Cronbach's alpha values of the items ranged from 0.950 – 0.952. The total alpha value was 0.952. This analysis suggested that the items of MSSQ were reliable as having high internal consistency.

### *Factor analysis*

The sample was adequate as indicated by i) a KMO value of 0.949 and ii) Bartlett's test of sphericity being significant (p-value < 0.001).

Table 2 showed the total number of components that was extracted using PCA with rotation method of Varimax. Although there were seven components having Eigenvalues more than 1, the extraction was forced into 6 factors. The extraction result was shown in table 1. The factor analysis showed that all the items were constructed according to the hypothetical groups.

**Table 2: Total Variance Explained**

| Component | Initial Eigenvalues | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 14.190 | 35.474 | 35.474 | 6.612 | 16.529 | 16.529 |
| 2 | 3.390 | 8.474 | 43.948 | 4.876 | 12.189 | 28.718 |
| 3 | 1.796 | 4.490 | 48.438 | 3.714 | 9.286 | 38.005 |
| 4 | 1.446 | 3.615 | 52.053 | 3.428 | 8.571 | 46.575 |
| 5 | 1.409 | 3.522 | 55.575 | 2.638 | 6.594 | 53.169 |
| 6 | 1.211 | 3.028 | 58.603 | 2.173 | 5.433 | 58.603 |
| 7 | 1.005 | 2.512 | 61.114 | | | |
| 8 | .964 | 2.409 | 63.523 | | | |
| 9 | .870 | 2.176 | 65.699 | | | |
| 10 | .811 | 2.027 | 67.727 | | | |

Extraction Method: Principal Component Analysis with rotation methods of Varimax.

***Reliability analysis of stressor groups***

Table 3 showed the Cronbach's alpha values of each stressor group. Cronbach's alpha values of the items ranged from 0.646 to 0.921. This analysis suggested that the stressor groups were reliable as having high internal consistency

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**Table 3: Cronbach's Alpha value of stressor groups.**

| Stressor groups | Cronbach's Alpha |
|---|---|
| Academic Related Stressors (ARS) | 0.921 |
| Inter and Intrapersonal Related Stressors (IRS) | 0.895 |
| Teaching and Learning Related stressors (TLRS) | 0.858 |
| Social Related Stressors (SRS) | 0.710 |
| Drive and Desire Related Stressors (DRS) | 0.646 |
| Group Activities Related Stressors (GARS) | 0.728 |

## Discussion

Reliability generally is defined as consistency or reproducibility of measurement over time or occasions, whereas validity is generally defined as to what extent the measurement measures what it should measure [30, 32, 33]. The purpose of this present study is to determine the validity and reliability of a newly developed instrument, the MSSQ, which could be used in identifying stressors among medical students. Cronbach's alpha value is commonly used by researchers in determining the internal consistency of an instrument, whereas factor analysis process is used to determine the construct of an instrument. In this study, the same analyses were applied in order to determine the internal consistency and construct of the MSSQ.

The findings from reliability analysis suggested that all the preliminary 40 items have corrected-item total correlation value of more than 0.3 as shown in table 1, therefore all the items were included in the MSSQ. All the items have shown a measure of high internal consistency as having Cronbach's alpha value of more than 0.7 as shown in table 1, reflecting the reliability of the MSSQ. The findings were evidence to support and suggest that the MSSQ was a reliable instrument that could be used in the future to indentify stressors among medical students.

The factor analysis has shown that the 40 items were loaded into the six hypothetical groups as shown in table 1. All the items fit very well according to the six groups as all the items had loading factor of more than 0.3. It reflected that the MSSQ had a good construct. It was evident that the MSSQ measured what it should measure. The findings were evidence to support and suggest that the MSSQ was a valid instrument to determine stressors among medical students. It is noteworthy that this present study just explored the possible constructs of the MSSQ, thus it is recommended that confirmatory factor analysis should be done in the future study to test and verify the hypothesis that a relationship between the observed variables and their underlying latent constructs exists. The findings from reliability analysis have shown that all the stressor groups of have shown a measure of high internal consistency as having Cronbach's alpha value more than 0.7 except DRS group as shown in table 3. These findings were another evidence to support and suggest that the MSSQ was a reliable instrument to identify stressors among medical students.

### *Conclusion*

This study showed that MSSQ had a good psychometric value. It is a valid and reliable instrument that can be used in the future to identify stressors among medical students.

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