

Assessing Stress among Undergraduate Pharmacy Students in University of Malaya

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ABSTRACT

Health care students, particularly pharmacy students, are believed to experience a higher level of stress as compared to their age-matched peers. This cross-sectional study determined the sources and predictors of stress among 273 undergraduate pharmacy students at a Malaysian public university using the Derogatis Stress Profile instrument. The response rate was 100%. Pearson's correlation was used to examine the association between Grade Point Average (GPA) and stress levels. Paired and Independent t-tests as well as ANOVAs were used to compare the mean stress scores on various variables. Our findings showed that these students did not demonstrate significantly higher levels of stress than the general population, even though their perceived stress levels were significantly higher (mean = 53.55 ± 7.87 ; $p < 0.001$). The most frequently reported stress was related to academic matters. Additionally, there was a weak, statistically significant negative correlation between stress level and GPA ($r = -0.159$, $p = 0.009$) indicating that as stress levels increases, students' GPA decreases. Second year students were found to be the most stressed although stress levels were not statistically different among students across the various academic years. Thus, targeted interventions such as redesigning the curricula may be an effective way of alleviating stress to provide a favourable learning environment for pharmacy students.

Keywords: Derogatis Stress Profile, perceived stress, pharmacy undergraduates, stress levels, healthcare.

Key Messages: Pharmacy students' perceived stress levels were significantly higher than the general population. The most frequently reported stress was related to academic matters. There was a weak, negative correlation between stress level and grade point average. Curriculum review could be performed to provide a favourable learning environment for pharmacy students.

INTRODUCTION

Healthcare students are known to experience a higher level of stress than their university peers.¹⁻³ The intensity of a pharmacy programme causes stress in students as it is highly demanding and requires their utmost dedication in order to keep pace with learning in the ever-changing healthcare field.⁴

The sources of stress identified amongst university students include academic-related matters, environmental factors and personal events,^{5,6} with academic-related stress being the most frequently reported source of stress.⁷ There is a growing body of evidence showing that stress may lead to devastating effects such as anxiety, depression, and most commonly, a decline in academic performance.^{8,9} Nevertheless, it is important to

note that the perception of stress is dependent on one's ability to appraise and cope with stress.⁶

Many studies have examined the sources of stress among medical, dentistry and nursing students.¹⁰ However, a review of the literature has identified only a few studies that assessed stress among pharmacy students.¹¹ Measuring stress is difficult as it is not easy to quantify stress. Various tools have been developed and used to assess stress but no tool has been established specifically to measure stress among pharmacy students.¹² One instrument, the Derogatis Stress Profile (DSP), measures psychological stress based on an interactional stress theory model, which correlates environ-

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mental events, personality characteristics and emotional responses to stress.¹³ It has been proven to be a valid and reliable tool to measure stress among different populations¹⁴ including pharmacy students.⁴

Several studies have documented the levels and sources of stress in other healthcare students.^{1,15} One study¹⁶ which compared the stress level between three groups of healthcare students, namely medical, dental and pharmacy students, found pharmacy students to be the most stressed. Yet, little is known about the prevalence or perceived levels of stress among pharmacy students in Malaysia even though the country has 19 universities offering pharmacy programmes that produce about 1000 pharmacy graduates yearly. Thus, this study aimed to examine stress levels and predictors of stress among pharmacy undergraduate students. In addition, this study explored the correlation between students' academic performance and stress and also differences in stress levels for the same students on two different occasions. We believed the findings of this study would provide a useful foundation for future studies as well as to guide decisions on handling stress among pharmacy students.

METHODS

Study design

Undergraduate pharmacy education in all Malaysian public universities is a four-year study programme. All students in the four classes (273 students) in the University of Malaya were invited to complete the questionnaire. The University Medical Research Committee gave approval to conduct this cross-sectional study. Data were collected from all participants on two different occasions 12 weeks apart (Time₁, Time₂), where Time₁ was in the middle of the semester 1 while Time₂ was at the beginning of semester 2 of the same academic year. One week prior to the first administration of the questionnaire, participants were briefed about the purpose of the study and their consent was obtained. Responses to the self-completed questionnaire were anonymous and confidentiality was strictly maintained.

Instrument

The survey questionnaire consisted of two sections: the first section collected socio-demographic data, such as ethnicity, current place of stay, students' grade point average (GPA) as well as their sources of stress.

The second section assessed stress with the Derogatis Stress Profile (DSP) instrument. DSP is a validated 77-item self-administered questionnaire measuring psychological stress based on the theory of Lazarus.¹⁷ This self-report instrument took around 15 minutes to com-

plete and individuals were required to rate each item on a 5-point Likert scale where 0=not at all true of me, 1=slightly true of me, 2=moderately true of me, 3=very true of me, and 4=extremely true of me.¹³

Consent to use the instrument was obtained from the instrument's developer (Associate Professor Dr. Leonard R. Derogatis) and the questionnaires were purchased from the distributor, Clinical Psychometric Research, United States of America (USA).

Statistical analysis

Data collected were analyzed with the Statistical Package for Social Sciences (SPSS) version 20.0. Pearson's correlation was used to examine the association between GPA and stress levels. Stress level was assessed by the DSP instrument that provides two total scores: the Total Stress Score (TSS) and the Subjective Stress Score (SSS).¹⁷ The TSS is a continuous variable that reflects the stress level while SSS "provides an estimate of the respondent's conscious appreciation of his/her current stress level".¹³ For the purpose of this study SSS was referred to as perceived stress score. Paired and Independent t-tests as well as ANOVAs were used to compare the mean stress scores on various variables where appropriate. Multiple regression analysis was conducted to predict factors that influence students' stress level.

RESULTS

All 273 students completed the questionnaire at two-time points (Time₁ and Time₂). The students mean age was 20.72 ± 1.26 and their ages ranged from 19 to 24 years. (Table 1) shows slightly more than three quarters of the respondents were female and half of the students were on a scholarship. The majority of the students walked to classes.

Sources of stress

Figure 1 shows the percentage of stress from various sources. In the questionnaire students were allowed to indicate more than one source of their stress. The most frequently reported source of stress was related to academic followed by personal life issues, environmental factors and financial issues. The results also showed that 2.2% of the reported sources of stress was related to other out of class activities such as residential and politics. Sources of stress were similar between Time₁ and Time₂.

Students stress level compared to the general population

One sample t-test conducted to compare the TSS and SSS of the students with the normalized mean of the general population (50 as reported by Derogatis and

Table 1: Demographic profile of pharmacy students		
Variables	Frequency (%)	
Gender		
Male	63	(23.1)
Female	210	(76.9)
Year of study		
First year	73	(26.7)
Second year	68	(24.9)
Third year	70	(25.7)
Fourth year	62	(22.7)
Ethnicity		
Malay	133	(48.7)
Chinese	128	(46.9)
Indian	6	(2.2)
Others	6	(2.2)
Current place of stay		
In-campus	160	(58.6)
Off-campus	113	(41.4)
Transport used to come to class		
By car	21	(7.7)
On foot	230	(84.2)
By public transport	5	(1.8)
Others	17	(6.2)
Financial sources		
Loan	4	(1.5)
Scholarship	141	(51.6)
Parents	5	(1.8)
Multiple sources ^a	123	(45.1)
Parents' monthly income^b		
Less than RM 700	23	(8.4)
RM 701 - RM 1500	72	(26.4)
RM 1501 - RM 5000	123	(45.1)
RM 5001 - RM 10000	42	(15.4)
More than RM 10000	13	(4.8)

^a Includes combinations such as scholarship and parents; scholarship, parents and part-time jobs; loan and parents ^b \$1 = RM3.2

Fleming¹⁴) showed that the students' SSS were higher than the population at both Time₁ and Time₂ (Table 2). However, only the SSS at Time₁ was found to be significantly higher (M=53.55, SD=7.87; *t*(272)=7.444, *p*< 0.001). As for TSS, the values at both Time₁ and Time₂ were significantly lower compared to the population mean.

Changes of stress scores with time

A paired-samples t-test was conducted to evaluate the changes in stress levels with time. (Table 2) shows that there was a significant decrease in SSS scores from Time₁ to Time₂ (M=2.79, SD=9.38, *t*(272)=4.902, *p*< 0.001). A similar significant decrease was observed for TSS scores (M=0.64, SD=4.26, *t*(272)=4.147, *p*< 0.001) although the reduction was small. There was also a significant difference observed between SSS and TSS at Time₁ (M=4.29, SD=7.39, *t*(272)=9.592, *p*< 0.001) and at Time₂ (M=2.14, SD=8.53, *t*(272)=4.147, *p*< 0.001).

Association between demographic variables with stress scores

Independent t-tests were conducted to compare the stress scores for males and females as well as for the variable staying on-campus and off-campus. (Table 3 shows that only SSS at Time₂ for female students was significantly higher than that of male students. At Time₁ students who lived off-campus showed significantly higher TSS compared to those living on-campus whereas at Time₂, SSS of students' staying off-campus was significantly higher (Table 3).

Significant differences were observed with the effect of ethnicity on TSS at both Time₁ and Time₂. Post Hoc comparisons with Tamhane's T2 tests revealed TSS was significantly higher in Malay students compared to Chinese students.

The ANOVA test revealed that there was no significant relationship between stress scores and classes of study.

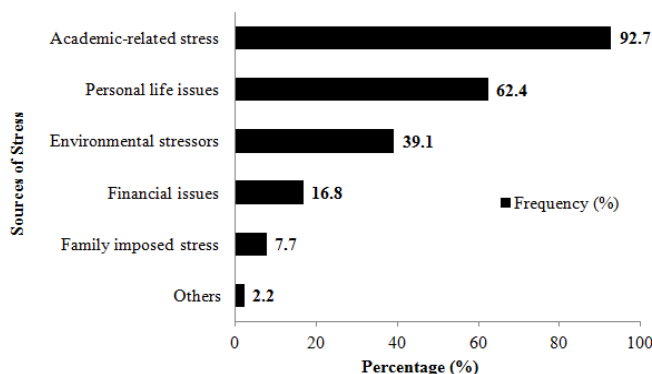


Figure 1: Sources of stress of pharmacy students

Table 2: Subjective stress score and total stress score for pharmacy students at Time₁ and Time₂

	Range	Mean (SD)	Median
Time₁			
Subjective Stress Score (SSS)	36 – 77	53.55 (7.87)*	54
Total Stress Score (TSS)	20 – 73	49.26 (6.13)**	50
Time₂			
Subjective Stress Score (SSS)	25 – 78	50.76 (9.09)	51
Total Stress Score (TSS)	29 – 67	48.62 (6.10)*	50

* p < 0.001; ** p = 0.046 as compared to the normalized mean of 50; SD = standard deviation.

Table 3: Demographic variables and mean t-scores of global stress scores at Time₁ and Time₂

	Time ₁		Time ₂	
	Subjective stress score (SSS) Mean t-scores (SD)	Total stress score (TSS) Mean t-scores (SD)	Subjective stress score (SSS) Mean t-scores (SD)	Total stress score (TSS) Mean t-scores (SD)
Gender				
Male	52.29 (8.03)	49.24 (6.57)	48.46 (8.80)*	48.37 (6.57)
Female	53.92 (7.80)	49.26 (6.00)	51.45 (9.08)*	48.70 (5.97)
Year of study				
First year	54.18 (7.35)	49.32 (6.16)	50.89 (9.03)	48.75 (6.59)
Second year	53.13 (8.50)	50.29 (5.40)	51.26 (9.27)	49.56 (5.41)
Third year	53.66 (8.35)	48.64 (7.40)	49.31 (9.21)	47.99 (6.24)
Fourth year	53.13 (7.30)	48.74 (6.13)	51.69 (8.84)	48.16 (6.09)
Ethnicity				
Malay	53.80 (8.41)	50.30 (5.41)*	51.23 (9.76)	49.79 (5.23)*
Chinese	53.59 (7.40)	48.11 (6.82)*	50.34 (8.48)	47.48 (6.82)*
Indian	49.67 (7.03)	49.33 (4.18)	50.00 (9.03)	47.00 (6.51)
Others	51.00 (5.97)	50.50 (2.95)	50.33 (7.69)	48.83 (2.56)
Place of residence				
In-campus	52.84 (7.28)	48.53 (6.33)*	49.83 (8.91)*	48.26 (6.38)
Off-campus	54.55 (8.58)	50.28 (5.70)*	52.09 (9.21)*	49.13 (5.68)
Transport used to come to class				
By car	51.62 (4.47)	50.10 (5.50)	51.24 (6.60)	48.95 (5.55)
On foot	53.76 (7.99)	49.09 (6.22)	50.82 (9.25)	49.52 (6.17)
By public transport	48.60 (3.91)	50.60 (4.16)	51.80 (3.11)	50.60 (1.67)
Others	54.53 (9.84)	50.12 (6.31)	49.06 (10.97)	49.06 (6.87)

* p < 0.05 between groups

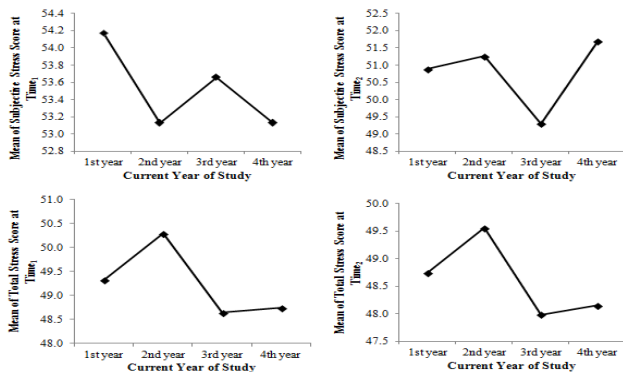


Figure 2: Mean of subjective stress score and total stress score against current year of study at Time₁ and Time₂

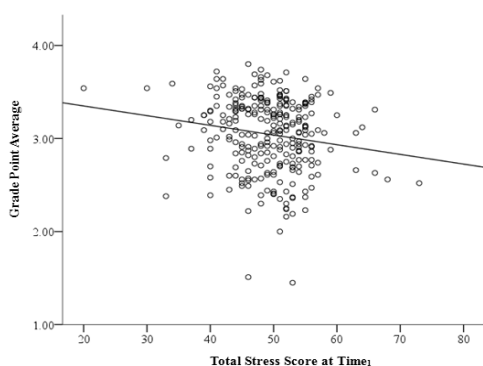


Figure 3: Association between Grade Point Average and Total Stress Score at Time₁

Even though there was no significant difference between the stress score, Figure 2 shows a consistent pattern for TSS at Time₁ and Time₂ in which TSS increases from the first year to second year and then decreases by the third year of the programme. However, SSS did not show a similar pattern. First year students perceived their stress levels as highest during Time₁ whereas the fourth year students perceived their stress levels as highest during Time₂ as seen in Figure 2.

For the other two demographic variables, mode of transport to come to class, and parents' monthly income, no significant differences were found for SSS and TSS at Time₁ and Time₂.

Grade point average and total stress score

Grade point average (GPA) is a measure of student's academic achievement. The GPA of students at Time₁ ranged from 1.45 to 3.80, with a mean of 3.05 ± 0.40 . Pearson's correlation test was used to assess the relationship between students' GPA and TSS at Time₁. Figure 3 shows that there was a significant weak negative correlation between stress and grade GPA ($r = -0.159$, $p = 0.009$) indicating that as stress levels increases, students' GPA decreases.

DISCUSSIONS

The most common source of stress among the pharmacy students was academic-related stress. The findings are in agreement with other studies that examine stress in pharmacy students¹¹ and medical students.¹⁸ The students also frequently reported personal life issues such as inadequate time for rest and recreational activities, lack of time for family and friends, interpersonal conflicts and environmental events as their sources of stress. These findings are similar to those reported by other authors.^{6,10,19,20} This is not surprising as pharmacy training is a rigorous and strenuous endeavour which takes place in a competitive vocational environment.

It is worth noting that various instruments have been used in different studies to assess stress, thus it is difficult to compare stress levels between studies based on the stress scores obtained. As for the stress scores using the DSP, evidence has shown that healthcare students experience higher levels of stress compared to the general population and their peers from other disciplines.²¹⁻²³ Several other DSP studies have shown that, compared to medical and dental students, pharmacy students have higher stress levels.^{11,16,24} When we compared stress levels with another study involving pharmacy students⁴, our students' stress levels were lower whereas they were higher when compared to veterinary students.²⁵

The mean total stress scores for our study were significantly lower than the normalized mean of 50.¹⁴ However, our students' perceived level of stress (SSS) was significantly higher compared to the general population; suggesting that pharmacy students perceive themselves to be more stressful than they actually were.

Our findings also add to the body of evidence that pharmacy students' stress levels differ with time.^{26,27} Many studies addressed the difference in stress levels across academic years but few longitudinal studies examined the variation of stress levels with time.²⁷ Students' stress levels were significantly higher during Time₁ as compared to Time₂. As Time₁ was during the period where students needed to complete assignments, laboratory reports and also facing end of semester exams, stress levels were expected to be higher compared to Time₂, which was at the beginning of a semester. This suggests those students' stress levels were not constant throughout the year but that students experienced higher stress at the time where assignments and examinations are near.²⁸

The association between stress and gender in the literature are contradictory. Several studies do not find the relationship^{1,15} while other studies show significant association between the two variables.^{26,29} For example, Fang *et al*²⁹ suggests that female students are more vulnerable to certain stress and thus more prone to suffer from stress-related depression. This is similar to another study, which involved pharmacy students.⁴ Our results also showed no significant association between stress levels and gender, even though the perceived stress level for females was observed to be higher than males at Time₂. Therefore, stress level differences between males and females merits further investigation.

Unlike findings from previous studies,^{10,26,30} we did not find a statistically significant difference in stress levels between students from different classes. However, we observed a consistent pattern in which second year students had the highest stress levels at both Time₁ and Time₂. This could be attributed to curriculum factors as several studies show that curriculum factors contribute to

the difference in stress levels across academic classes.^{26,31} In common with findings from previous studies^{21,32} we found the second year curriculum to be crammed, as a lot of basic knowledge has to be imparted in preparation for the transition into the clinical years. Also consistent with other studies^{33,34} our first year students had the highest perceived stress scores during Time₁ as they were facing the pressure of transition to university and adapting to the new environment.

Malay students had a significantly higher level of stress compared to Chinese students which is in agreement with other Malaysian studies.^{24,35} The difference in stress level could be due to personalities, family background and more importantly the cultural differences between these ethnic groups rather than the stress imposed by the educational environment. In addition, we found that students who lived off-campus had significantly higher stress scores compared to students who lived on-campus. One possible explanation is that students living on-campus usually subscribe to meal plans which are normally cheaper compared to off-campus meals. Additionally off-campus students need to deal with other issues such as relationships with housemates or family members, and other problems related to accommodation.¹⁸ Studies have shown that students with low socio-economic status and therefore low income have higher stress levels.^{28,36} However, we did not find parents' monthly income to be associated with students' stress levels. This was probably due to the fact that most of the students were on scholarships and thus were able to support their living expenses independent of their parents' monthly income.

Students' GPA is commonly used as an indicator of academic performance.³⁷ Previous research on the association of stress with performance has suggested that stress level is inversely correlated with GPA.^{27,38} We found similar results in which higher stress levels in students were associated with lower GPAs. Although a certain amount of stress is necessary to drive better performance, other studies have shown that academic performance may suffer due to high levels of stress.^{27,39} Nevertheless, in agreement with another Malaysian study⁴⁰ we found a weak correlation between stress levels and GPA which could be due to our small sample size. Marshall *et al* on the other hand failed to detect any significant relationship between the two variables. This suggests there is a need for research to investigate the association between stress and academic performance among pharmacy students.

Limitations and strengths of the study

The findings from this study should be interpreted in the context of several limitations. First, our study population was only from one institution with limited

sample size. The findings may not be applicable to student populations from other institutions with different cultures and pharmacy curriculum. Second, the DSP as the instrument of choice in our study is a self-report questionnaire and has not been used to measure stress in our general population. Thus, the validity and reliability of the instrument in the local setting has not been examined. However, the instrument used in our survey has been validated and used in a study which involves pharmacy students.⁴ Finally, the cross-sectional study design only managed to capture the stress levels at two points in time, which is insufficient to address changes in stress over the course of the curriculum.

The strength of this study lies in the fact that there is no bias associated with sampling of the participants as we included all students and the response rate was one hundred per cent. It is also important to note that to our knowledge our study was the first in Malaysia to assess stress among undergraduate pharmacy students using the DSP.

CONCLUSION AND RECOMMENDATIONS

Healthcare students were commonly believed to experience higher stress compared to their peers from other disciplines and the general population. Although the pharmacy students did not experience significant levels of total stress, their perceived stress levels were significantly higher than the general population. Evidently, stress peaks at distinct times over the course of the year, which justifies a longitudinal, multi-institutional study to assess stress more widely among pharmacy students. Comparative studies of pharmacy students across different institutions would be useful to assess the effects of different curriculum structures on stress levels. Curriculum review may be indicated for the pharmacy programme in this public university.

The results from this study show that the major source of perceived stress in the student population studied was academic. While other variables were related to perceived stress, academic factors are, to a degree, under the control of the University and it may be possible to vary these to the benefit of student stress levels. Further detailed research will be necessary to determine if this is possible and/or desirable.

CONFLICTS OF INTEREST

There is no conflict of interest to declare for this study.

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