Original Article

A Study of Psychological Distress in Two Cohorts of First-Year Medical Students that Underwent Different Admission Selection Processes

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Abstract

Background: Medical training is often regarded as a stressful period. Studies have previously found that 21.6%–50% of medical students experience significant psychological distress. The present study compared the prevalence and levels of psychological distress between 2 cohorts of first-year medical students that underwent different admission selection processes.

Methods: A comparative cross-sectional study was conducted by comparing 2 cohorts of first-year medical students; 1 group (cohort 1) was selected based purely on academic merit (2008/2009 cohort) and the other group (cohort 2) was selected based on academic merit, psychometric assessment, and interview performance (2009/2010 cohort). Their distress levels were measured by the General Health Questionnaire, and scores higher than 3 were considered indicative of significant psychological distress.

Results: The prevalence (P = 0.003) and levels (P = 0.001) of psychological distress were significantly different between the 2 cohorts. Cohort 1 had 1.2–3.3 times higher risk of developing psychological distress compared to cohort 2 (P = 0.007).

Conclusion: Cohort 2 had better psychological health than cohort 1 and was less likely to develop psychological distress. This study provided evidence of a potential benefit of multimodal student selection based on academic merit, psychometric assessment, and interview performance. This selection process might identify medical students who will maintain better psychological health.

Keywords: medical, psychology, school admission criteria, student

Introduction

The World Health Organization (WHO) has stated that, "*Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.*" (1), and "*mental health can be defined as a state of well-being enabling people to realize their abilities, cope with normal stresses of life, work productively and fruitfully, and make contributions to their communities.*" (2). Mental health is crucial to the overall and individual well-being, directly or indirectly, contributes to the overall well-being of societies and countries (2). In 2003, the WHO reported that mental illness is the fourth leading contributor to the global burden of diseases; approximately 450 million people suffer from a mental or behavioural disorder and nearly 1 million people commit suicide each year (2,3). The WHO projected that in 2020 mental illness will be the second leading contributor to the global burden of diseases (3). These facts could indicate a substantial increase in stress in individuals' daily lives. Medical students and professionals are not immune to this daily stress; in fact, studies found that the prevalence of mental disorder among these populations are higher compared to the general population (5–8).

Previous studies have revealed a rate of psychological distress among medical students ranging from 21.6%–50% (5,6,10–12). Medical students are particularly vulnerable at transitional periods such as their first year of medical school, when they face a period of adjustment to the new environment of

medical training (6,9–14). The prevalence of psychological distress among medical students at the end of their first-year of medical training has been shown to double compared to the prevalence at the beginning of the year (9,10). Studies also reported a high percentage of psychological distress among medical students at other stages of medical training (10–13). Psychological distress among medical students was associated with anxiety and depression (14,15), interpersonal conflict (16), sleeping problems (17), and lower academic and clinical performance (18). Psychological distress also has a negative impact on students' abilities to develop a rapport with patients, to concentrate and focus on their training, and to make decisions, which in turn leads to dissatisfaction during their clinical practice later on (16). Psychological distress was also linked to suicide (19), drug abuse (20,21), and abuse of alcohol (22). The psychological distress that leads to these unwanted consequences has been related to some aspects of medical training (14). Generally, psychological distress hinders the noble ambitions and values of students pursuing medical education.

The aim of medical education is to produce healthy and competent doctors to serve the society. The student selection process, therefore, is essential to medical training because the quality of students admitted to medical schools determines the quality of doctors who graduate (23). Methods of selection are generally grouped into cognitive and non-cognitive methods. Cognitive method focus on previous academic performance, whereas non-cognitive methods focus on less concrete variables using measurement methods such as psychometric assessments and interviews. Most medical schools prefer to select their medical students based on previous academic achievement because it is a better predictor of the student success in medical study (24–26). However, good academic achievement does not necessarily predict a doctor's professional performance (24,27), and the predictive capacity of previous academic achievement for successful medical study diminishes with progression through the course of medical training (24). A 9-year prospective study found that information gained through psychometric test and interview was associated with measured outcomes and that those who performed well during the interview had greater chances of completing their studies at medical school with honours (28).

Starting from June 2009, the School of Medical Sciences, Universiti Sains Malaysia was given the authority to semi-independently select their own medical students by the Malaysian government. The school began selecting students based on three criterias; previous academic performance, psychometric assessment, and interview performance, whereas previous cohorts had been selected based solely on previous academic achievement. This study aimed to compare the prevalence and levels of psychological distress between 2 cohorts of the first-year medical students selected through 2 different student admission processes. 1 batch was selected based solely on previous scholastic merit (cohort 1), and the other was selected based on academic merit, psychometric assessment, and interview performance (cohort 2). To our knowledge, no reports comparing these types of student selection exist in the literature. It is hoped that this article will contribute to the literature regarding medical student admission and mental health.

Materials and Methods

Design

A comparative cross-sectional study was conducted.

Sample

The study samples were cohort 1 and cohort 2 in the School of Medical Sciences, Universiti Sains Malaysia (USM).

Cohort 1 students were selected based solely on their previous academic merit; specifically, their final Cumulative Grade Point Average of the Science Foundation Course of the Malaysian Ministry of Education, or equivalents, which were the High School Certificate of Malaysia (HSC) or Advanced Level General Certificate of Education (A-Level).

Cohort 2 students were selected based on previous academic merit (similar to cohort 1) in addition to psychometric assessment and interview performance. The Malaysian Universities Selection Yearly Inventory (MUnSYI) was used as the psychometric assessment to assess the suitability of candidates for medical study. Unfortunately, the details of the MUnSYI are not available to the public because it is protected under the Official Secrets Act 1972 (Act 88) of Malaysian Law. A short list of applicants, selected based on their previous academic merits and the psychometric

assessment, were then called for an interview. The main objectives of the interview were as follows: 1) to assess the interest, general knowledge, and expectations of applicants about medical education and a medical career, 2) to assess the personal attributes of the applicants in relation to their suitability for studying medicine at USM, 3) to assess the applicants' adequacy in communicating in both Malay and English languages as basic requirements for a successful medical study, and 4) to observe any physical traits that might hinder the applicants from completing the medical studies or performing clinical functions.

Every enrolled medical students from cohort 1 and cohort 2 were invited to participate. 215 students were enrolled in cohort 1, and 196 students were enrolled in cohort 2. Both cohorts underwent a similar curriculum structure in terms of content, teaching, and learning methods and assessment. Both cohorts also studied in the same physical learning environment.

Researchers obtained permission and clearance from the School of Medical Sciences and the Human Research and Ethics Committee of USM prior to the conduct of the study.

Data collection

The 12-item self-administered General Health Questionnaire (GHQ-12) was used in this study. Demographic data pertaining to sex (male and female), race (Malay, Chinese, Indian, and other), and entry qualifications (matriculation, HSC, or A-Level) were obtained from the participants. Data for both groups were collected within 2 months after enrollment so that researchers could measure the students' baseline distress levels upon entry to medical school. This time point was selected as the baseline because it was considered a non-stressful period for the medical students.

The GHQ-12 is a widely used instrument to measure mental health status (29). It has been validated in many populations, including medical students (29–32). The internal consistency coefficients of the questionnaire have ranged from 0.78–0.95 in various studies (33). The items of GHQ-12 assess 12 manifestations of stress, and respondents are asked to rate the presence of each manifestation in themselves during recent weeks. Respondents choose from four responses: 'not at all', 'no more than usual', 'rather more than usual', and 'much more than usual'. The scoring method is binary; the 2 least symptomatic answers are scored as 0 and the

2 most symptomatic answers are scored as 1; i.e., 0-0-1-1. The minimum and maximum scores of the GHQ-12 are 0 and 12, respectively. Higher GHQ-12 scores indicate poorer mental health status. In previous studies the sensitivity and specificity of the GHQ-12 score at a cut-off point of 4 have been shown to be 81.3% and 75.3%, respectively, with a positive predictive value of 62.9%. Therefore, students who scored 4 or more were considered to have 'distress' (29–32).

The investigators administered the GHQ-12 to the 215 new first-year medical students of cohort 1 and to the 196 new first-year medical students of cohort 2 at approximately 2 months after enrollment. Completion of the questionnaire was voluntary and did not affect the students progress in the course. Data were collected in two face-to-face sessions with the students in a lecture hall via guided self-administration. Students took less than 10 minutes to complete the questionnaire, and questionnaires were collected immediately after they were completed.

Statistical analysis

Data were analysed using SPSS version 18 (SPSS Inc., US). An α-level of $P < 0.05$ was adopted. Descriptive statistics were conducted for the analysis of demographic data and the prevalence of psychological distress. For the purpose of statistical analysis, race was grouped into either Malay or non-Malay, and entry qualification was grouped into matriculation or non-matriculation. Histograms were constructed and normality tests (Kolmogoroz-Smirnov and Shapiro-Wilk) were performed to test for normality of the distributions of GHQ-12 scores for each cohort. The distribution of GHQ-12 scores in both cohorts were skewed to the left; however, the normality tests were significant ($P < 0.001$); therefore the Mann-Whitney test was used to compare the median GHQ-12 score between the 2 cohorts of medical students. The Chi-square test was used to test for differences in demographic variables (sex, race, and entry qualification) and for differences in the prevalence of psychological distress between the 2 cohorts. Multiple binary logistic regression (stepwise and enter method) was conducted to compare the risk of developing distress between the 2 cohorts.

Results

A total of 215 (99.1% of the class) students from cohort 1 and 196 (100% of the class)

students from cohort 2 participated in this study.

The demographic profile of the participants is shown in Table 1. The distributions of gender and entry qualification did not differ significantly between cohorts ($P > 0.05$). However, the distribution of ethnic groups was significantly different between the 2 cohorts ($P < 0.001$).

Mann-Whitney test analysis showed that there was a significant difference of the median GHQ-12 score between cohort 1 (median = 2, IQR = 4) and cohort 2 (median = 1, IQR = 3) ($Z = -3.2$, $P = 0.001$).

The prevalence of medical students having significant psychological distress (CI 95%; lower limit, upper limit) in cohort 1 and cohort 2 were 26.3% ($n = 56$; 23.6%, 29.0%), and 14.3% ($n = 28$; 12.6%, 16.0%), respectively. A Pearson Chi-square test analysis showed that the prevalence of psychological distress was significantly different between the 2 cohorts (X^2 (df) = 9.02 (1), $P = 0.003$), as shown in Figure 1.

Multiple binary logistic regression showed that cohort 1 had a 2.019 times higher risk of developing distress compared to cohort 2 ($b = 0.704$, $Wald$ (df) = 7.316 (1), $P = 0.007$), as shown in Table 2.

In sum, the results indicated that cohort 2 had better psychological health compared to cohort 1.

Discussion

The prevalence of psychological distress among medical students of cohort 2 (14.3%) was lower compared to the prevalence in cohort

Table 1: Demographic profiles of the 2 student cohorts

Variable		Cohort 1 (n = 213)		Cohort 2 (n = 196)		X^2 statistics (df)	P-value [a]
Sex, n (%)	Male	84	(39.4)	68	(34.7)	0.89	0.321
	Female	129	(60.6)	128	(65.3)	(1)	
Race, n (%)	Malay	140	(65.7)	105	(53.6)	6.28	0.012
	Non-malay	73	(34.3)	91	(46.4)	(1)	
Entry	Matriculation	177	(83.1)	174	(88.8)	2.70	0.100
qualification, n (%)	Non-matriculation	36	(16.9)	22	(11.2)	(1)	

[a] Pearson Chi-square test.
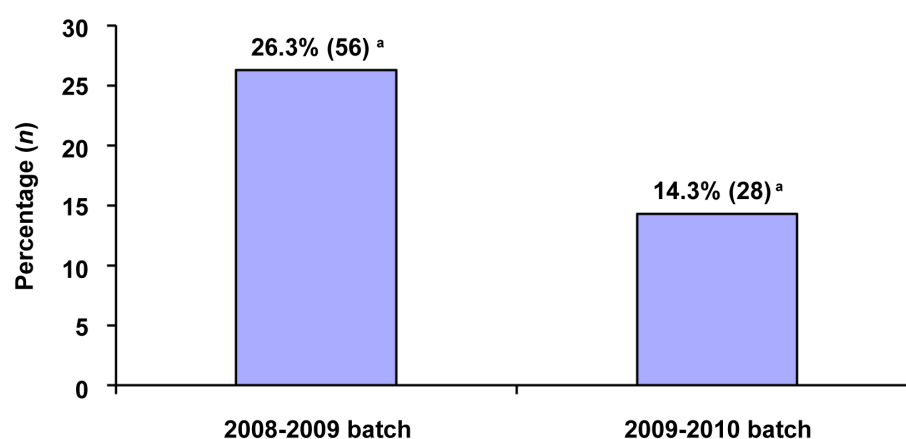
[a] Pearson Chi-square test; X^2 (df) = 9.02 (1), p = 0.003.

Figure 1: Comparison of prevalence of psychological distress in 2 cohorts of first-year medical students at the beginning of their training.

Table 2: Factors related to psychological distress among the 2 student cohorts

Factor		b	Wald	df	P-value [a]	Odds ratio	95% CI for odds ratio	
							Lower	Upper
Cohort	2009/2010				Reference group			
	2008/2009	0.704	7.316	1	0.007	2.019	1.211	3.366
Race	Malay				Reference group			
	Non-malay	-0.238	0.651	1	0.420	0.789	0.443	1.404
Entry qualification	Matriculation				Reference group			
	Non-matriculation	0.628	2.862	1	0.091	1.875	0.905	3.883
Sex	Female				Reference group			
	Male	0.022	0.007	1	0.934	1.022	0.610	1.711
Constant		-1.776	52.898	1	< 0.001	0.170		

[a] Multiple Binary Logistic Regression (stepwise enter method) was applied.
X^2 (df) = 12.06 (4), p = 0.017, -2 Log likelihood = 403.29.

1 (26.3%) and was also lower compared to the prevalence in previously reported samples, which have ranged from 21.6%–50% (5,10,11,34–36). The current study only examined psychological distress at a very early stage of medical training. Because previous studies have indicated that psychological distress can vary at different stages of medical training (10–13), the current samples should be followed during their clinical training years; such follow-up would provide stronger and more constructive evidence to support the current finding.

The significantly lower number of medical students having psychological distress in cohort 2 compared to cohort 1 suggested better psychological health in this cohort. This was further supported by cohort 2, which have significantly lower risk of developing psychological distress compared to cohort 1. These findings indicated that the multimodal selection process based on academic merit, psychometric assessment, and interview performance was able to identify medical students with better psychological health better than the selection process that was based solely on academic merit. To our knowledge, this is the first study to report such a finding. It is important to highlight that previous studies found the prevalence of psychological distress among medical students at the end of the first year of study to be twice as high compared to the beginning of the first year (9,10).

The current results are not enough to confirm the advantage of the expanded student selection process. Such confirmation requires follow-up of these medical students over a longer duration. A prospective study design is necessary to explore the long-term differences between the 2 selection processes. Many researchers proposed that selecting psychologically healthy candidates will buffer the negative effects of some aspects of medical training (5,10–12,14,37). Accordingly, better identification of medical students with good psychological health might eventually produce future doctors who are psychologically healthy. Downie & Chartlon (1992) echoed that the type of medical students recruited at the beginning of training will determine the type of doctors produced at the end (23).

The aim of the student admission process is not to pick candidates for specific jobs, but rather to choose persons of strong potential who are healthy (physically, emotionally, psychologically, and mentally), who will eventually find their interest and niche somewhere in medicine and who will subsequently take the field of medicine to a higher level (38). In accord with that notion, findings from the current study provide initial evidence that multimodal student selection can successfully identify the medical students that are psychologically healthy. This finding is commensurate with recent evidence that cognitive superiority alone does not protect medical students from distress even up to the internship level (39).

This study has several limitations that should be considered in interpreting its findings and in designing future studies. The first is related

to the study design. The cross-sectional design used in this study produces only a snapshot of a particular time; therefore, a longitudinal study design is necessary to explore the advantages of the new student admission process over time. The second limitation concerns other confounding factors such as socio-economic status, parent education level, stress at home, distress level prior to entry of medical training, psychiatric status prior to medical training, personality and family relationships. These factors should be controlled either during sample selection or during data analysis to isolate the effects of the new multimodal student admission process. The third limitation is that data were collected face-to-face, which may not be seen by participants as completely anonymous (even though participants did not provide names on the questionnaire). This data collection procedure might have led to response bias. The fourth limitation is that our single psychological health measurement was unlikely to provide a comprehensive picture of psychological health. Other psychological health measurements should be used during follow up in future studies.

Conclusion

Cohort 2 had better psychological health than cohort 1. Cohort 2 were less vulnerable to develop psychological distress compared to cohort 1. This study provides evidence that multimodal student selection might better identify medical students with good psychological health.

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Authors' Contributions

Conception and design, provision of study materials; collection, assembly, analysis, and interpretation of the data; critical revision and final approval of the article; administrative, technical, or logistic support: MSBY, AFAR, AAB, SBI, ARE
Obtaining of funding: AAB, SBI
Statistical expertise, drafting of the article: MSBY

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Reference

1. World Health Organization (WHO). Definition of health. [Internet]. Geneva (CH): WHO; 1948 [cited 2010 August 28]. Available from: http://www.who.int/about/definition/en/print.html.

2. World Health Organization (WHO). Investing in mental health. [Internet]. Geneva (CH): WHO; 2003 [cited 2010 August 28]. Available from: http://www.who.int/mental_health/en/investing_in_mnh_final.pdf.

3. World Health Organization (WHO). Mental Health: Depression. [Internet]. Geneva (CH): WHO; 2003 [cited 2010 August 28]. Available from: http://www.who.int/mental_health/management/depression/definition/en/index.html.

4. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: A cross-sectional study. *Med Educ.* 2005;**39(6)**:594–604.

5. Guthrie E, Black D, Bagalkote H, Shaw C, Campbell M, Creed F. Psychological stress and burnout in medical students: A five-year prospective longitudinal study. *J R Soc Med.* 1998;**91(5)**:237–243.

6. Yusoff MSB, Rahim AFA, Yaacob MJ. Prevalence and sources of stress among Universiti Sains Malaysia Medical students. *Malaysian J Med Sci.* 2010;**17(1)**:30–37.

7. Yusoff MSB, Rahim AFA. Prevalence & sources of stress among postgraduate medical trainees: Initial findings. *Asean Journal of Psychiatry.* 2010;**11(2)**:1–10.

8. Cooper C, Rout U, Faragher B. Mental health, job satisfaction, and job stress among general practitioners. *Br Med J.* 1989;**298(6670)**:366–370.

9. Vitaliano PP, Maiuro RD, Russo J, Mitchell ES. Medical student distress: A longitudinal study. *J Nerv Ment Dis.* 1989;**177(2)**:70–76.

10. Aktekin M, Karaman T, Senol YY, Erdem S, Erengin H, Akaydin M. Anxiety, depression, and stressful life events among medical students: A prospective study in Antalya, Turkey. *Med Educ.* 2001;**35(1)**:12–17.

11. Firth J. Levels and sources of stress in medical students. *Br Med J (Clin Res Ed).* 1986;**292(6529)**:1177–1180.

12 Guthrie EA, Black D, Shaw CM, Hamilton J, Creed FH, Tomenson B. Embarking upon a medical career: Psychological morbidity in first year medical students. *Med Educ*. 1995;**29(5)**:337–341.

13. Miller PM, Surtees PG. Psychological symptoms and their course in first-year medical students as assessed by the Interval General Health Questionnaire (I-GHQ). *Br J Psychiatry*. 1991;**159(8)**:199–207.

14 Shapiro SL, Shapiro DE, Schwartz GE. Stress management in medical education: A review of the literature. *Acad Med*. 2000;**75(7)**:748–759.

15. Rosal MC, Ockene IS, Ockene JK, Barrett SV, Ma Y, Hebert JR. A longitudinal study of students' depression at one medical school. *Acad Med*. 1997;**72(6)**:542–546.

16. Clark EJ, Rieker PP. Gender differences in relationships and stress of medical and law students. *J Med Educ*. 1986;**61(1)**:32–40.

17. Niemi PM, Vainiomaki PT. Medical students' distress–quality, continuity and gender differences during a six-year medical programme. *Med Teach*. 2006;**28(2)**:136–141.

18. Linn BS, Zeppa R. Stress in junior medical students: relationship to personality and performance. *J Med Educ*. 1984;**59(1)**:7–12.

19. Hays LR, Cheever T, Patel P. Medical student suicide, 1989–1994. *Am J Psychiatry*. 1996;**153(4)**:553–555.

20. Newbury-Birch D, White M, Kamali F. Factors influencing alcohol and illicit drug use amongst medical students. *Drug Alcohol Depend*. 2000; **59(2)**:125–130.

21. Pickard M, Bates L, Dorian M, Greig H, Saint D. Alcohol and drug use in second-year medical students at the University of Leeds. *Med Educ*. 2000;**34(2)**: 148–150.

22. Flaherty JA, Richman JA. Substance use and addiction among medical students, residents, and physicians. *Psychiatr Clin North Am*. 1993;**16(1)**:189–197.

23. Downie RS, Charlton B. *The Making of Doctor: Medical Education in Theory and Practice*. Oxford (US): Oxford University Press; 1992.

24. Tutton P, Price M. Selection of medical student – affirmative action goes beyond the selection process. *Br Med J*. 2002;**324(5)**:1170–1171.

25. Cohen-Schotanus J, Arno MMM, Rreinders JJ, Jessica A, Van Rossum HJM, Van Der Vleuten CPM. The predictive validity of grade point average scores in a partial lottery medical school admission system. *Med Educ*. 2006;**40(10)**:1012–1019.

26. Kulatunga-Moruzi C, Norman GR. Validity of admissions measures in predicting performance outcomes: The contribution of cognitive and non-cognitive dimensions. *Teach Learn Med*. 2002;**14(1)**:34–42.

27. Norman G. Editorial – The morality of medical school admission. *Advances in Health Sciences Education*. 2004;**9(2)**:79–82.

28. Powis DA, Neame RL, Bristow T, Murphy LB. The objective structured interview for medical student selection. *Br Med J (Clin Res Ed)*. 1988;**296(6624)**:765–768.

29. McDowell I. *Measuring health: A guide to rating scales and questionnaires*. 3rd ed. New York (US): Oxford University Press; 2006.

30. Yusoff MSB, Rahim AFA, Yaacob MJ. The sensitivity, specificity and reliability of the Malay version 12-items General Health Questionnaire (GHQ-12) in detecting distressed medical students. *Asean Journal of Psychiatry*. 2010;**11(1)**:1–8.

31. Goldberg D, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O, et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med*. 1997;**27(1)**:191–197.

32. Yusoff MSB. The validity of two Malay versions of the General Health Questionnaire (GHQ) in detecting distressed medical students. *Asean Journal of Psychiatry*. 2010;**11(2)**:1–8.

33. Jackson C. The General Health Questionnaire. *Occupational Medicine*. 2007;**57(1)**:59.

34. Saipanish R. Stress among medical students in a Thai medical school. *Med Teach*. 2003;**25(5)**:502–506.

35. Sherina MS, Lekhraj R, Nadarajan K. Prevalence of emotional disorder among medical students in a Malaysian university. *Asia Pacific Family Medicine*. 2003;**2(4)**:213–217.

36. Zaid ZA, Chan SC, Ho JJ. Emotional disorders among medical students in a Malaysian private medical school. *Singapore Med J*. 2007;**48(10)**:895–899.

37. Yusoff MSB, Rahim AFA. mpact of medical student well-being workshop on the medical students' stress level: A preliminary study. *Asean Journal of Psychiatry*. 2010;**11(1)**:1–8.

38. Richards P, Stockill S. *The New Learning Medicine*. 14th ed. London (GB): BMJ Publishing; 1997.

39. West CP, Shanafelt TD, Cook DA. Lack of association between resident doctors' well-being and medical knowledge. *Med Educ*. 2010;**44(12)**:1224–1231.