PERSONALITY TRAITS AND STRESS LEVELS AMONG SENIOR DENTAL STUDENTS: EVIDENCE FROM MALAYSIA AND SINGAPORE

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Abstract. This study aimed to evaluate the association between dental students' personality traits and stress levels in relation to dental education programs among senior dental students in University Malaya (UM) in Malaysia and National University of Singapore (NUS). A cross-sectional survey using a self-administered questionnaire was conducted on UM and NUS senior dental students. The questionnaire comprised items on demographic background, the Big Five Inventory Personality Traits (BFIPT) test and a modified Dental Environment Stress (DES) scale. Rasch analysis was used to convert raw data to interval scores. Analyses were done by *t*-test, Pearson correlation, and Hierarchical regression statistics. The response rate was 100% (UM=132, NUS=76). Personality trait Agreeableness (mean=0.30) was significantly more prevalent among UM than NUS students (mean=0.15, p=0.016). In NUS, Neuroticism (mean=0.36) was significantly more prevalent than in UM (mean=0.14, p=0.002). The DES mean score was higher among NUS (mean=0.23) than UM students (mean=0.07). In UM, Neuroticism was significantly correlated with stress levels (r=0.338, p<0.001). In NUS, these were Neuroticism (r=0.278, p=0.015), Agreeableness (r=0.250, p=0.029) and Conscientiousness (r=-0.242, p=0.035) personality traits. The correlation was strongest for personality trait Neuroticism in both schools. Hierarchical regression analysis showed that gender and Neuroticism were significant predictors for students' stress levels (p<0.05) with the latter exerting a bigger effect size (R^2=0.18) than gender (R^2=004). This study showed that gender and Neuroticism personality trait were significant predictors for stress levels among selected groups of dental students in Southeast Asia. Information on students' personality may be useful in new students' intake, stress management counseling and future program reviews.

Keywords: Big Five Inventory Personality Traits, Dental Environment Stress, dental students, dentistry, personality traits, stress, Malaysia, Singapore

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INTRODUCTION

Stress is defined as the perceived pressure upon an individual (Richards, 1989; Hornby *et al*, 2010). It encompasses a three-way association of demands on

the individuals, how they feel about the demands, and their capacity to deal with such demands (Richards, 1989). Undergraduate dental education is perceived to be a very stressful environment, with reported stress prevalence of as high as 100% among dental students across the world (Yap *et al*, 1996; Sanders and Lushington, 1999; Rajab, 2001; Naidu *et al*, 2002; Acharya, 2003; Rosli *et al*, 2005; Sugiura *et al*, 2005; Sofola and Jeboda, 2006; Gorter *et al*, 2008; Abu-Ghazaleh *et al*, 2011; Ahmad *et al*, 2011; Elani *et al*, 2014; Babar *et al*, 2015; Wilson *et al*, 2015).

The impacts of stress on dental students' mental and physical wellbeing are well known. These include physical sickness, lost of appetite, depression, anxiety, mood disturbances, frustrations, decreased concentration, sleeplessness, fatigue, dizziness, tachycardia, gastrointestinal system distress, somatic symptoms, and decreased immune function (Ahmad *et al*, 2011; Alzahem *et al*, 2011; Elani *et al*, 2014). Suicide intent due to excessive stress was also reported in one study (Bathla *et al*, 2015). Long-term stress may lead to burn out. Significant signs of burnout including emotional exhaustion, lack of accomplishment, and depersonalization have been reported (Humphris *et al*, 2002; Gorter *et al*, 2008). Long-term stress also results in reduced scholastic performance, poor clinical efficacy, and high risk for depressive illness (Garbee *et al*, 1980; Gorter *et al*, 2008; Alzahem *et al*, 2011; Elani *et al*, 2014).

Despite high stress prevalence, levels of perceived impact among dental students were not homogeneous. Based on recent studies including a systematic review on stress among dental students, stress impacts were found to be varied between individuals, between first and final year students, between early and end of year, between nonclinical and clinical phases, and are dependent upon individual's stress coping ability (Divaris *et al*, 2013; Elani *et al*, 2014). Some of the coping mechanisms include relaxing exercises, for example, undertaking progressive muscular relaxation (Naidu *et al*, 2002), listening to music, watching movies (Piazza-Waggoner *et al*, 2003; Sugiura *et al*, 2005; Alzahem *et al*, 2011), praying, and performing spiritual-based activities (Bormann *et al*, 2005; Ahmad *et al*, 2011).

According to the Big Five Inventory Personality Traits, personality is an individual's distinguishing characteristics and is modeled into five broad dimensions, that is, 'Extraversion' (sociability), 'Conscientiousness' (level of self-discipline or organization), 'Openness' (proactiveness or appreciation of new experiences), 'Agreeableness' (tendency along a continuum of compassion, or cooperativeness-to-antagonism) and 'Neuroticism' (emotional stability) (Norman, 1963; Chamberlain *et al*, 2005). This model has been accepted as one of the essential models which encapsulate the relationships between numerous personality traits (Digman, 1990; Goldberg, 1993; Fruyt *et al*, 2004).

Several studies on personality factors of dental students and dentists to predict their clinical and academic performance and professional behavior have been carried out (Reeve and Watson, 1985; Chamberlain *et al*, 2005; Poole *et al*, 2007). These studies indicate that personality traits Conscientiousness, Neuroticism and to a lesser degree Agreeableness were significant factors to predict dental students' educational achievement and professional conduct. Previous studies have also shown that high levels of stress accompanied the attainment of high clinical and academic success among dental

students (Garbee *et al*, 1980; Westerman *et al*, 1986, Westerman *et al*, 1993; Sanders and Lushington, 1999; Piazza-Waggoner *et al*, 2003). Therefore, by extension, it can be reasonably argued that certain personality factors that predict success may also lead to high stress levels in relation to dental education program. However, no studies have examined the link between personality factors and stress levels.

This gap of knowledge has been acknowledged in a recent systematic review on stress amongst dental students (Alzahem *et al*, 2011). Hence the purpose of this study was to assess the impact of personality traits on stress levels among senior dental students from two universities in Southeast Asia, that is, University of Malaya (UM) in Malaysia and National University of Singapore (NUS). The null hypothesis tested was that there were no associations between dental students' personality traits and stress levels. The results of the study may be useful in early identification of students who are prone to stress for stress management counseling and for future improvement of the dental program.

MATERIALS AND METHODS

This is a cross sectional study involving populations of UM (n=132) and NUS (n=76) senior dental students who were in their last two years of undergraduate dental program. In UM, dentistry is a five-year program, while in NUS, it is a four-year program. As such, fourth- and fifth-year UM students and third- and fourth-year NUS students were included in the study.

The data for this study were obtained using a self-administered questionnaire. The questionnaire comprised items on student's demographic background, the Big Five Inventory Personality Traits (BFIPT) test (John *et al*, 1991), and a modified version (41-item) of the Dental Environment Stress (DES) scale (Garbee *et al*, 1980). The BFIPT 44 items would classify student's personality traits into five comprehensible domains, that is, Extraversion, Conscientiousness, Openness, Agreeableness, and Neuroticism and were rated on a five-point Likert scale from 'Disagree Strongly' to 'Agree Strongly.'

Prior to the study, a focus group discussion was conducted among a group of dental students at UM who were not part of the study participants. The objective of this exercise was to ensure that the items of both the BFIPT test and the DES scales were applicable and relevant to the students in their local contexts. At the end of the focus group discussion, no changes were made to the BFIPT scale. As for the DES scale, items related to marriage, having children, and doing a dual role as dental student were omitted, as they were not relevant to all groups. Slight adjustments were made to the wordings of a few items. The modified DES scale items were rated on a 4-point Likert scale with four score options: 1 ('Not Stressful') to 4 ('Severely Stressful').

This questionnaire was then validated for face validity and pretested on 10 dental students who were not part of the study.

Statistical analysis

Data from the study were entered and analyzed using Statistical Program for Social Science (SPSS®) (version 17.0.1; SPSS: Chicago, IL). WINSTEPS® (version 3.80.1) was used to convert raw categorical data into equal interval unit logits (log-odds probability units) by Rasch analysis (Bond and Fox, 2007). In the Rasch analysis, the person measure was an estimate of an indi-

vidual student's underlying performance (or ability) based on his or her scores on the set of items that they rated; that is, BFIPT domains and DES scale items. The *t*-test was used to compare the BFIPT and DES scales between students from UM and NUS. The level of significance was set at $p<0.05$. A hierarchical regression analysis was carried out to test the effects of personality traits on students' stress levels independent of the influence of students' demographic characteristics.

Ethical considerations

Participant information sheet and consent form were attached with the questionnaire. The participants were assured of the confidentiality of their response and that their participation was on a voluntary basis. The questionnaires were destroyed after 2 years. The Medical Ethics Committee of UM Dental Faculty [Ref Nº DF CO0901/0001(U); 2009 Mar 10] and The Institutional Review Board of NUS (NUS-IRB Ref Code: 09-118E) granted permission to conduct this study.

RESULTS

Demographic characteristics

The overall response rate was 100%. Table 1 shows the demographic characteristics of the students. The female enrolment predominated at both UM (74.8%) and NUS (60.5%). The majority of UM students were Malays (52.7%), as compared to Chinese (89.5%) at NUS. More than half of UM (56.8%) and NUS (64.5%) students reported dentistry as their first career choice. While the majority of NUS students (84.2%) lived with their parents, almost 90% of the UM students stayed in the university premises or rented houses.

Personality traits of dental students

Overall, the three most dominant personality traits were Agreeableness (mean=0.242, SD=0.443), Neuroticism (mean=0.223, SD=0.492) and Openness (mean=0.221, SD=0.469) (Table 2). However, there were variations between UM and NUS dental students' personality traits. The personality trait for Agreeableness was significantly higher among UM students (95% CI: 0.028, 0.277; $p=0.016$). On the other hand, the personality trait Neuroticism was significantly higher among NUS students (95% CI: -0.355, -0.081, $p=0.002$). No significant differences were observed in the other personality traits.

Stress perceptions among UM and NUS senior dental students

The overall mean DES score for UM and NUS students was 0.126 (SD=0.916). The DES mean score for NUS students was higher than those of UM students but the difference was not statistically significant (95% CI: -0.420, 0.099, $p=0.224$) (Table 3).

Association between personality traits and stress experience among dental students

Overall, personality traits Neuroticism ($r=0.326$, $p<0.001$) and Agreeableness ($r=0.169$, $p=0.015$) showed moderate and weak statistically significant positive correlation with perceived stress, respectively (Table 4). Different correlation trends were observed in the respective groups. In UM, Neuroticism had a moderate statistically significant positive correlation with perceived stress ($r=0.338$, $p<0.001$). In NUS, Neuroticism ($r=0.278$; $p=0.015$) and Agreeableness ($r=0.250$, $p=0.029$) had a weak statistically significant positive correlation with perceived stress, respectively. However, a weak statistically significant negative correlation was observed between the personality trait Conscientiousness and Perceived Stress ($r=-0.242$, $p=0.035$) in NUS students.

Table 1
Demographic characteristics of UM and NUS senior dental students (N=208).

Variable	Overall	UM			NUS		
	n (%)	4th Year *n* (%)	5th Year *n* (%)	Total *n* (%)	3rd Year *n* (%)	4th Year *n* (%)	Total *n* (%)
Gender[a]							
Male	63 (30.4)	11 (33.3)	22 (66.7)	33 (25.2)	16 (38.1)	14 (41.2)	30 (39.5)
Female	144 (69.6)	51 (66.7)	47 (33.3)	98 (74.8)	26 (61.9)	20 (58.8)	46 (60.5)
Ethnicity[a]							
Malay	72 (34.8)	38 (61.3)	31 (44.9)	69 (52.7)	1 (2.4)	2 (5.9)	3 (3.9)
Chinese	122 (58.9)	21 (33.9)	33 (47.9)	54 (41.2)	40 (95.2)	28 (82.4)	68 (89.5)
Indian	6 (2.9)	3 (4.8)	1 (1.4)	4 (3.1)	1 (2.4)	1 (2.9)	2 (2.6)
Others	7 (3.4)	0	4 (5.8)	4 (3.1)	0	3 (8.8)	3 (3.9)
Dentistry as career choice[a]							
1st Choice	124 (59.9)	45 (71.4)	30 (43.5)	75 (56.8)	29 (69.0)	20 (58.9)	49 (64.5)
2nd Choice	46 (22.2)	2 (3.2)	26 (37.7)	28 (21.2)	6 (14.3)	12 (35.3)	18 (23.7)
Not my choice	13 (6.3)	10 (16.1)	2 (2.9)	12 (9.1)	1 (2.4)	0	1 (1.3)
Others	24 (11.6)	5 (8.1)	11 (15.9)	16 (12.1)	6 (14.3)	2 (5.9)	8 (10.5)
Place of stay[a]							
Parents	76 (36.7)	9 (14.5)	3 (4.3)	12 (9.1)	38 (90.5)	26 (76.5)	64 (84.2)
University college	58 (28.0)	31 (73.8)	23 (33.3)	54 (40.9)	0	4 (11.8)	4 (5.3)
Renting a house	69 (33.3)	21 (33.9)	42 (60.9)	63 (47.7)	3 (7.1)	3 (8.8)	6 (7.9)
Other	4 (1.9)	1 (2.4)	1 (1.4)	2 (1.5)	1 (2.4)	1 (2.9)	2 (2.6)
Total	208 (100)	63 (47.7)	69 (52.3)	132 (100)	42 (55.3)	34 (44.7)	76 (100)

[a]N=207 due to missing data; one student answered parts of the questionnaire.

Table 2
Rasch person measure values (logits) of the Big Five Inventory personality traits among dental students in UM and NUS.

BFI personality trait	Dental school						*t*-test between UM and NUS			
	Overall		UM		NUS		Mean difference	*p*-value	95% CI	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
Extraversion	-0.141	0.556	-0.159	0.505	-0.110	0.637	-0.049	0.570	-0.217	0.120
Agreeableness	0.242	0.443	0.298	0.410	0.145	0.484	0.153	0.016[a]	0.028	0.277
Conscientiousness	0.125	0.324	0.113	0.318	0.147	0.335	-0.034	0.468	-0.126	0.058
Neuroticism	0.223	0.492	0.143	0.476	0.361	0.493	-0.218	0.002[a]	-0.355	-0.081
Openness	0.221	0.469	0.225	0.464	0.214	0.479	0.011	0.875	-0.123	0.144

SD, standard deviation. [a]$p<0.05$.

Table 3
Rasch person measure values (logits) of stress experience among dental students in UM and NUS.

Stress experience	Dental school						*t*-test between UM and NUS			
	Overall		UM		NUS		Mean difference	*p*-value	95% CI	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
Perceived dental environment stress (DES) level	0.126	0.916	0.068	0.985	0.228	0.776	-0.160	0.224	-0.420	0.099

SD, standard deviation.

Table 4
Association of personality traits and stress experience of dental students at UM and NUS.

BFI personality trait	Perceived dental environment stress (DES) level					
	Overall		UM		NUS	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
Extraversion	0.021	0.762	0.022	0.802	0.011	0.963
Agreeableness	0.169	0.015[a]	0.157	0.072	0.250	0.029[a]
Conscientiousness	-0.114	0.102	-0.062	0.483	-0.242	0.035[a]
Neuroticism	0.326	0.000[a]	0.338	0.000[a]	0.278	0.015[a]
Openness	0.018	0.797	0.038	0.668	-0.021	0.857

[a]$p<0.05$.

Gender and Neuroticism personality trait as predictors for stress perception among dental students

Table 5 shows hierarchical regression analyses with two models showing significant predictors for stress levels among UM and NUS dental students. In Model 1, where only demographics factors were considered, gender (Beta=0.268, p=0.002) was found to be a significant predictor for stress levels. Female students (mean=0.229; SD=0.694) had higher mean DES scores than male students did (mean=-0.107; SD=1.268). The overall fit for Model 1 indicates that only 4.0% of the variance in stress levels was explained by gender with small-to-medium effect size. In Model 2 where demographics and personality traits were combined, gender (Beta=0.240, p=0.004) and Neuroticism (Beta=0.284, $p<0.001$) were found to be significant factors for students' stress levels (Table 5).

Demographics alone had a relatively low level of prediction (R=0.202) while both demographics and personality traits increased prediction to a moderate level (R=0.467). The overall fit of Model 2 indicates that 21.8% of the variance in stress levels was explained by gender and the personality trait Neuroticism, with an overall large effect size (Table 6). Between both predictors, personality traits: that is, Neuroticism had a larger effect size (R^2=0.177) to predict stress levels than gender with small-to-medium effect size (R^2=0.041) (Table 6).

DISCUSSION

This was the first study in the literature that evaluated the association between dental students' personality traits as well as demographic characteristics and stress levels in relation to the dental education programs. In terms of the students' personality, it was found that UM and NUS dental students possessed all the five personality traits, with Agreeableness, Neuroticism, and Openness as the three most prevalent personality traits in the whole group combined. However, between-group differences in personality traits existed.

In NUS, personality trait Neuroticism was significantly more prevalent than in UM. On the other hand, the personality trait Agreeableness was significantly more prevalent in UM. The significant differences in these two personality traits between UM and NUS students could be

Table 5
Hierarchical regression of the variables that predicted DES.

Model	Predictors	Standardized coefficient β	*t*	*p*-value	95% Confidence interval	
					Lower bound	Upper bound
Model 1	Dental school	0.126	1.407	0.161	-0.094	0.562
(Demographics alone)	Year	0.062	0.742	0.459	-0.187	0.412
	Gender	0.268	3.213	0.002[c]	0.208	0.871
	Ethnic[a]	-0.060	-0.669	0.504	-0.457	0.226
	Dentistry as career choice[b]	0.069	0.784	0.434	-0.222	0.514
Model 2	Dental school	0.091	1.049	0.296	-0.149	0.487
(Demographics and personality traits)	Year	0.139	1.696	0.092	-0.042	0.544
	Gender	0.240	2.963	0.004[c]	0.160	0.803
	Ethnic[a]	-0.011	-0.121	0.904	-0.362	0.320
	Dentistry as career choice[b]	0.044	0.525	0.601	-0.260	0.449
	Extraversion	0.112	1.448	0.150	-0.067	0.432
	Agreeableness	0.147	1.733	0.085	-0.043	0.661
	Conscientiousness	-0.147	-1.832	0.069	-0.912	0.034
	Neuroticism	0.284	3.687	0.000[c]	0.256	0.846
	Openness	-0.008	-0.098	0.922	-0.322	0.292

[a]Malay and Chinese only; [b]First and second choices only; [c]$p<0.05$.

Table 6
Effect size of gender and personality traits on dental students' stress level.

Model	*R*	R^2	Adjusted R^2	Std error of the estimate	Change statistics				
					R^2 change	F change	*df*1	*df*2	Sig F change
Model 1 (Demographics alone)	0.202	0.041	0.005	0.65165	0.041	1.154	4	109	0.335
Model 2 (Demographics and personality traits)	0.467	0.218	0.150	0.60230	0.177	4.719	5	104	0.001

attributed to differences in genetic make-up, demographic background, cultural upbringing, and not the least, the living environment between UM and NUS dental students.

In term of stress perception, the present study showed that UM and NUS dental students perceived dentistry as stressful. These finding was not unexpected and corroborated similar findings from other related local (Ahmad *et al*, 2011; Rosli *et al*, 2005) and international studies on stress perception among dental students as well as dentists (Atkinson *et al*, 1991; Yap *et al*, 1996; Humphris *et al*, 2002; Fruyt *et al*, 2004; Alzahem *et al*, 2011).

When stress experience between the two groups was compared, no significant difference was found, although NUS students reported a higher mean score than UM students did. This finding indicated that the dental program associated stress in both schools was similar. In NUS, the dental degree takes four years to complete compared to five years in UM. It could be that this relatively shorter time to complete a dental degree in NUS was a factor for the higher stress among NUS students. The personality make-up of a person could also be a contributing factor of how a person responds to a potential stressor. In NUS, the personality trait, Neuroticism, was significantly more prevalent than that in UM. As Neuroticism entails a predilection for high perception of stress, it could be that this factor played a part in the higher stress mean score among NUS students (Fruyt *et al*, 2004).

Neuroticism was found to be the most dominant personality trait associated with stress perceptions in both UM and NUS students. This finding is not surprising as people with neurotic personality often suffer from unhappy feelings. They easily become irritable, anxious, depressed, or feel vulnerable (Barrick and Mount, 1991; Chamberlain *et al*, 2005; Tyssen *et al*, 2007). As such, they are more likely to experience high levels of stress when exposed to potential stressors.

The study also found a significant inverse correlation between personality trait, Conscientiousness, and DES scores among NUS students. This finding implied that dental students who were more conscientious were less likely to develop high stress levels. This finding is supported by evidence from the literature where conscientious students were found to organize their work in a more systematic manner and are able to set and achieve goals (Barrick and Mount, 1991; Lievens *et al*, 2002). They performed better in clinical and academic courses, and received better assessments with respect to professionalism (Chamberlain *et al*, 2005). They also tended to show good work organization and time management (Chowdhury and Amin, 2006).

On the other hand, students who were less conscientious were found to be less careful, less focused, and more likely to be distracted from their task (Chowdhury and Amin, 2006). A related study on a group of patients who demonstrated higher levels of Conscientiousness were associated with lower vulnerability to stress, which suggested that conscientious personality trait might act as a protective factor in stress-related disorder (Christensen and Smith, 1995). Also, personality trait Conscientiousness was correlated most highly with overall job performance and levels of success in most occupational fields (Barrick and Mount, 1991).

In this study, the personality trait, Agreeableness, showed a significantly positive correlation with DES scores

among NUS students. Agreeableness denotes the inclination to be kind and supportive instead of distrustful and antagonist towards people (Chamberlain *et al*, 2005). High agreeableness might be beneficial for a dentist's professional practice as the person with such trait is characterized by having a high level of orientation towards people including good teamwork and interpersonal skills.

In student's life, personality trait Agreeableness was found to be applicable in cases where group assignments, group cooperation and joint learning are needed (Barrick and Mount, 1991). It is possible that due to the need to be agreeable, students may subject themselves to unnecessary stress in order to satisfy their colleagues, patients, or supervisors.

When all the factors were analyzed together to identify significant factors for stress, it was found that gender and Neuroticism were significant factors for stress when all other factors were adjusted. The significant finding on gender was supported by other studies (Uraz *et al*, 2013; Divaris *et al*, 2014). The findings indicate that females with Neuroticism personality trait will most likely to suffer from higher stress levels associated with the dental undergraduate program.

The majority of dental students in this study were females, as has been the trend for many years. As personality traits may not be easily changed; therefore, efforts to reduce students' stress levels by means of curriculum review and restructuring in the delivery of the dental education program is recommended. Such improvement may impact favorably on students' performances (Alzahem *et al*, 2011).

However, the present study was conducted in the cohort of students who were taught under the discipline-based curriculum. A new integrated dental curriculum to replace the discipline-based curriculum was recently introduced at UM, beginning with Year 1 students, and therefore not applicable to the subjects involved in this study.

The new integrated program has four main focuses, that is, academic excellence, clinical competence, interpersonal soft skills, and psychological wellbeing. It is designed to remove unnecessary duplication of thematic learning issues by different disciplines by identifying the outcome expected in terms of cognitive, psychomotor, and affective domains (Outcome-Based Education). The program emphasized more on student-centered collaborative learning and less on formal didactic teaching.

In clinics, the patient management system was redesigned to promote comprehensive and holistic treatment philosophy, which incorporates treatment with prevention and patient education. A central computerized dental patient information system has been developed to identify and allocate patients according to their clinical needs and students' requirements. This removes the stress on students to find suitable patients by subject disciplines. Once a patient has been allocated to a student, he or she will design a holistic treatment plan supervised by lecturers from all disciplines in an integrated general clinical practice polyclinic. This reduces patient's movement, saves time and cost, avoids duplication in treatment planning, and enables fulfillment of student's clinical requirements with less number of patients.

In order to enhance academic excellence, vertical and horizontal integration of all subjects from all disciplines was done so that the teaching and learning activity always remain relevant, timely,

within context, holistic, and appropriately leveled throughout the 5 years. Competency tests are emphasized rather than the actual number of completed clinical schedules before students are allowed to sit for their final examinations. Final year assessments are integrated, while at the same time, allowing for discipline-based excellence through diversified formative assessment tests carried out all year round. It is hoped that the stress levels of dental students can be reduced with these structural changes, which was based on their seniors' feedback.

However, we note that despite efforts to reduce stress, it is unlikely that any dental program will be stress-free altogether. The present study findings also indicated how a personality-traits assessment of prospective students could be used to predict future students' stress levels. As a result, a personality trait measure was recommended in pre-admission interviews into UM dental school. The aim was to identify individuals with high propensity for stress due to their personality make-up and introduce stress management skills, support group and counseling service where appropriate (Piazza-Waggoner *et al*, 2003; Sugiura *et al*, 2005; Muirhead and Locker, 2007; Gorter *et al*, 2008).

From 2014 onwards, entry into UM dental school requires candidates to sit for a dental aptitude test, practical dexterity test, as well as face-to-face interview. It is hoped that a personality test could also be introduced in the near future. Previously, admission requirement to UM dental school was based solely on academic performance.

Due to variations in academic schedules between universities in the Southeast Asian region, this study only included two public dental schools from two countries. Future studies should include as many dental schools as possible within the country or region. The choice of study design imposed some limitations on the results, where only associations between personality traits and stress levels could be assessed. As data collection only involved one time frame, no causal relationship or assessment of the effect of personality traits on stress levels over time could be assessed (Divaris *et al*, 2014). In addition, there could be other factors that may have contributed to students' stress levels apart from dental education, which was outside the scope of this study. The Big Five Personality Traits model is not without limitations. Among these were its inability to predict behavior, provide sufficient account of one's life, postulate causal clarification for human conducts, and dependence on straightforward comparative statements about individuals (Du *et al*, 2010; Uraz *et al*, 2013). However, the BFI index has been widely used because of its ability to summarize various personalities into definite categories.

It is recommended that future studies should be undertaken to evaluate stress levels over time starting with the new cohorts of students in UM. This would provide stronger evidence on the effect of students' personality on stress levels over time. The findings would also inform the curriculum review committee on areas for further improvement.

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