

Sources of Stress and Psychological Disturbance Among Dental Students in the West Indies

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Abstract: The aim of this study was to investigate sources of stress and psychological disturbance in dental students across the five years of undergraduate study at a dental school in Trinidad. Eighty-three percent of students completed a modified version of the Dental Environment Stress questionnaire (DES) and the Brief Symptom Inventory (BSI). On a scale ranging from 0 (not stressful) to 5 (highly stressful), overall mean DES scores for each of the five years of study were 1.58, 1.83, 2.65, 2.39, and 2.61 respectively, suggesting that levels of stress increase over the five years with a noticeable spike at the transition between the preclinical and clinical phases. Significant differences were found between specific stressors across the five years of study. Seven specific stressors and the stressor domains of *Academic work* and *Clinical factors* were more stressful for female students (t -test $p < 0.05$). The Global Severity Index of the BSI indicated that 54.8 percent of males and 44.2 percent of females were in the clinical range indicating significant psychological disturbance. Psychological disturbance was significantly associated with stress levels for male students (Spearman's rank correlation $r = 0.56$; $p < 0.001$), but not generally for female students. Further development is needed of dental educational programs that enhance students' psychosocial well-being.

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The high level of occupational stress in dentistry has been widely reported.¹⁻³ Stressors identified in dental practice include: time and scheduling pressures, managing nervous patients, financial and business issues, patients' unfavorable perception of dentists, staff and equipment problems, and the extremely fine and exacting nature of the work.^{1,3} Other members of the dental team, such as dental surgery assistants and reception staff, also find dentistry stressful.^{4,5} This resulting stress can lead to depression, anxiety, substance misuse, absenteeism, diminished work efficiency, and burnout.^{2,6,7}

The roots of this occupational stress may have their origin in the educational process as dental students experience high levels of stress during training.^{6,8-10} Studies on dental student stress conducted in several different countries (for example, the U.K., the United States, Jordan, Singapore, and Australia)

report generally consistent findings. Specific stressors reported in these studies include many factors relating to the practice of clinical dentistry and patient management; the need to meet academic and clinical requirements; interaction with student colleagues, clinical teachers, and support staff; and relationships with partners, friends, and family.^{6,8,10-12} Gender differences have also been reported, with female students experiencing more stress than males.^{6,8} Issues relating to confidence, acquiring clinical skills, and meeting academic requirements were frequently found to be more stressful for female students.^{6,8}

To obtain a comprehensive understanding of dental student stress, investigators to date have primarily focused on the following questions: 1) what are the highest ranking stressors within each year of study? 2) what is the intensity of specific stressors across each year of study? and 3) what is the overall

stress level across each year of study? Overall, the highest ranked stressors reported for dental students were examinations, fear of failing or falling behind, and completing course requirements.^{6,8,10-12} These consistent findings appear to be independent of location or culture, the length of the dental program, or the student's specific year of study. Studies have also reported significant differences in the intensity of specific stressors across the four (or five) years of the program. For example, in the United States, students in the first and second year rated "amount of assigned classwork," "examinations and grades," and "completing graduation requirements" as more stressful than students in the clinical years.⁸ Finally, the literature remains unclear as to whether overall stress levels increase as the student advances in his or her dental program. Some studies suggest that overall student stress levels remain relatively constant during the four- or five-year programs,^{8,12} but others report a slight increase in overall stress levels as the students progress towards graduation.^{6,11}

High levels of stress can result in declining student performance.¹³⁻¹⁵ Levels of depression, anxiety, and hostility in dental students in the United States have been reported as close to the norms for psychiatric outpatients.¹³ However, apart from one study where the psychological effects of stress such as depression and anxiety were reported,¹³ there is a paucity of research establishing the relationship between stress and psychological symptoms in dental students.

One aim of the current study was to further explore the relationship between dental student stress (as measured by perceived stress) and psychological disturbance (as measured by the number and intensity of psychosocial symptoms). It would also be useful for dental educators to understand how levels of stress and psychological disturbance may change over the time in which the student is engaged in the educational process. Such empirical data might allow for programmatic changes designed to enhance student psychosocial well-being and academic performance.

The University of the West Indies (UWI) School of Dentistry in Trinidad (the most southerly of the Caribbean chain of islands) is the only dental school in the English-speaking Caribbean and accepts students both from within the region and internationally. Most students enter straight from high school, having undertaken a UK-type "A" level system of education. The dental school, which is part of the medical faculty, graduated its first dentists in 1994. This setting provides a unique opportunity to

study dental student stress within a developing country in a region not previously represented in the international literature and to present findings regarding the levels of student stress and psychological disturbance from a relatively new dental program.

The aims of this study were:

1. To identify sources of stress in dental students.
2. To investigate whether specific stressors were related to year of study and gender.
3. To establish the prevalence of psychological disturbance in dental students.
4. To investigate relationships between stress and psychological disturbance.
5. To compare the findings with those reported by other more established institutions.

Methods

Questionnaires were given to all dental students in the five undergraduate years at the University of the West Indies, along with an explanation as to the purpose of the study. Participation was voluntary, and all participants remained anonymous. Approximately fifteen minutes were required to complete the questionnaires. Demographic information was obtained regarding gender, age, year of undergraduate study, ethnicity, and type of living accommodation. Ethnicity groupings were based on those used previously in Trinidad.¹⁶ Data collection took place in February 2001. Ethical approval for the study was obtained from the University of the West Indies, Ethics Committee of the Faculty of Medical Sciences.

To investigate sources of stress, a modified version⁶ of the self-administered Dental Environment Stress (DES)⁸ questionnaire was used. This questionnaire consists of thirty-nine items relating to possible sources of stress. Students were asked to rate these items on a scale of 0 (not stressful) to 5 (highly stressful). The modified version of the DES is more applicable to a younger student population as it has fewer questions relating to children and spouses and includes other items such as moving away from home, relationships with members of the opposite sex, and having reduced holidays.⁶

For clarity in presentation, these items were also grouped into five "stressor domains": *Living accommodation* (items 1 to 4), *Personal factors* (item 5 to 17), *Educational environment* (items 18 to 22), *Academic work* (23 to 30), and *Clinical factors* (31 to 39). Scores for the *Clinical factors* were only computed for the clinical students (that is, Years 3 through

5). The thirty-nine stressors listed on the questionnaire are presented in Table 1.

Psychological disturbance was assessed using the Brief Symptom Inventory (BSI),¹⁷ which is an abbreviated version of the SCL-90-R.¹⁸ The BSI is a fifty-three-item, self-reported inventory designed to assess psychological symptom status over the preceding seven days. Respondents rate the severity of distress experienced for each of the symptoms on a 5-point scale ranging from 0 (“not at all”) to 4 (“extremely”). This standardized instrument has been used extensively with clinical and nonclinical populations, has established norms (for males and females, respectively) based on 974 non-patient adults,¹⁹ and is reported to have excellent psychometric properties.¹⁸

In the present study, only the Global Severity Index (GSI) was used in the data analysis. The GSI is one of three summary scales available for the BSI. The GSI combines information on both the number of symptoms endorsed and the intensity of distress associated with each symptom. This scale has been referred to as the single best indicator of current distress levels.²⁰

Data analysis was performed using SPSS and consisted of ANOVA (using Tukey post-hoc comparisons), students t-test, Chi-square, and Spearman’s rank correlation.

Results

The modified DES questionnaire and the BSI both had very good reliability, with a Cronbach’s Alpha of 0.95 and 0.96 respectively.

Ninety-four of the 112 enrolled dental undergraduates participated in the survey. This was an overall response rate of 83 percent. The response rates for Years 1 to 5 were 81, 86, 67, 100, and 93 percent respectively. The mean age of respondents was twenty-two years, with a range of eighteen to twenty-eight years. Seventy-three percent were under twenty-three years. Forty-five percent of the respondents were male, and 55 percent were women. The largest ethnic groups were East Indian (56 percent) followed by African (21 percent) and Mixed (14 percent). Forty-three percent of respondents lived in their parental home, 30 percent in rented accommodation, 22 percent in halls of residence, and 5 percent in their own home.

Table 1 shows mean scores for each of the thirty-nine stressors across each of the five years of study. Questionnaire items relating to clinical train-

ing are not reported for Years 1 and 2 as these items mainly relate to treatment of dental patients, which currently starts in the third year.

Table 1 also reveals that there was a trend of an increasing overall mean DES score for each of the five years with a spike for Year 3. (This mean score was calculated on thirty nonclinical items for Year 1 and 2 students, and for the complete thirty-nine items for the clinical students in Years 3, 4, and 5.) An ANOVA comparing the overall mean DES scores across the five respective years was statistically significant ($F=5.41$; $p<.001$). The first-year students reported significantly less stress than those students in Years 3, 4, and 5 (Tukey post-hoc comparisons; $p<0.05$).

Table 2 presents the six stressors with the highest mean scores for each year of study. As shown in the table, the highest ranking stressor was different across each year, with the exception that *Fear of failing* was the top stressor for both Years 1 and 5. Also, *Fear of failing* and *Examinations* were the only two stressors that appear in the table across all five years. *Uncertainty about a dental career* and *Fear of being able to catch up if falling behind* were highly ranked stressors only within years 1 and 2, while *Expectation versus reality of dental school* and *Completing clinical requirements* were highly ranked stressors only within Years 3 and 4. *Shortage of allocated clinical time* and *Differences in opinion between clinical staff* were highly ranked stressors only within Years 4 and 5. Finally, there were some specific stressors that appear in the table for only one respective year. For example, the stressors of *Competition for grades*, *Patient management*, and *Concern about treatment grades awarded* only appear in the table for the Year 5 students, and *Lack of time for relaxation* and *Moving away from home* were some of the highest stressors only for first-year students.

For each of the thirty-nine items on the DES, a one-way ANOVA was performed comparing the level of stress across each of the five years. As shown in Table 3, there were some statistically significant differences between the level of stress for specific stressors across the five years of study. *Expectation versus the reality of dental school* was significantly more stressful for the clinical years (Years 3, 4, and 5) than for the two preclinical years (Years 1 and 2). *The approachability of staff* and *Rules and regulations of the dental school* were also more stressful for all the clinical years compared to students in both preclinical years. Compared to Year 1, students in all three clinical years rated *Lack of input in the decision making processes of the school* to be significantly

Table 1. Sources of stress mean scores and overall mean DES scores by year of study

Stressor	Year (n)									
	1 (25)		2 (19)		3 (16)		4 (21)		5 (13)	
	m	sd	m	sd	m	sd	m	sd	m	sd
1 Moving away from home	2.12	2.05	1.68	1.88	2.25	1.77	2.14	1.71	2.01	1.85
2 Environment in which to study	1.24	1.42	1.63	1.67	2.38	1.54	2.14	1.74	1.86	1.60
3 Lack of home atmosphere	1.60	1.87	1.79	1.44	2.81	1.83	1.95	1.53	2.03	1.72
4 Other problems with accommodations	1.80	1.89	1.95	1.77	2.18	1.97	2.19	1.99	2.15	1.92
5 Making friends	1.04	1.24	1.16	1.54	0.50	0.81	0.95	1.47	1.01	1.37
6 Financial responsibilities	1.83	1.83	2.10	1.76	2.56	1.97	3.33	1.71	2.54	1.93
7 Personal physical health	1.40	1.66	1.79	1.65	1.94	1.65	1.76	1.51	1.70	1.60
8 Relationship between members of the opposite sex	1.20	1.50	1.11	1.49	1.19	1.75	1.48	1.57	1.34	1.59
9 Necessity to postpone marriage	0.64	1.41	0.73	1.76	0.50	1.10	1.90	2.00	0.97	1.66
10 Necessity to postpone children	1.28	1.99	0.89	1.88	0.69	1.54	1.33	1.85	1.02	1.78
11 Having multiple roles	0.96	1.57	1.05	1.81	1.00	1.89	0.95	1.53	0.94	1.60
12 Conflict with spouse/mate over career development	0.88	1.53	0.58	1.57	0.56	1.26	1.67	1.96	0.89	1.62
13 Lack of time for relaxation	3.04	1.51	2.53	2.01	3.30	1.49	2.38	1.40	2.91	1.58
14 Having children in the home	0.52	1.36	0.74	1.76	1.13	1.71	0.57	1.12	0.65	1.43
15 Having reduced holidays compared with other students*	1.88	1.79	2.16	1.95	4.06	1.39	3.24	1.67	2.82	1.88
16 Fear of going out due to crime	1.40	1.83	2.42	2.01	2.81	1.83	2.10	1.64	2.22	1.86
17 Dependencies (e.g., drugs, alcohol)	0.44	1.26	0.47	1.43	0.63	1.41	0.38	1.16	0.42	1.20
18 Expectation versus reality of dental school*	1.68	1.73	2.21	1.62	3.94	1.44	3.47	1.57	2.87	1.81
19 Approachability of staff*	0.72	0.98	1.00	0.94	3.06	1.61	2.52	1.20	1.81	1.58
20 Criticism about academic or clinical work	1.56	1.50	2.53	1.43	3.69	1.45	2.43	1.70	2.55	1.64
21 Rules and regulations of the dental school*	0.60	0.91	1.16	1.01	3.44	1.26	2.24	1.22	1.88	1.61
22 Discrimination due to race, nationality, gender, or social class	1.08	1.53	1.26	1.66	1.69	1.96	1.24	1.70	1.77	1.83
23 Amount of assigned coursework	2.04	1.74	1.53	1.12	2.63	1.93	2.24	1.70	3.15	1.34
24 Difficulty of coursework	2.04	1.54	1.89	1.33	3.00	1.86	2.14	1.35	3.23	1.17
25 Fear of being able to catch up if falling behind	2.38	1.79	3.05	1.58	3.56	1.93	3.33	1.50	3.31	1.60
26 Competition for grades*	1.56	1.58	2.74	1.48	3.37	1.70	2.93	1.59	3.92	1.26
27 Fear of failing course or year	3.42	1.61	3.50	1.92	4.13	1.45	3.62	1.75	4.46	0.97
28 Uncertainty about dental career	2.29	1.86	2.58	1.54	3.38	1.92	3.10	1.73	3.15	1.57
29 Examinations	3.20	1.87	3.95	1.54	4.31	1.70	3.71	1.45	3.82	1.54
30 Lack of input in decision making process in dental school*	1.64	1.80	3.00	1.73	3.69	1.78	3.24	1.55	2.81	1.84
31 Concerns about manual dexterity					2.56	1.93	2.14	1.49	2.18	1.73
32 Transition to clinical course					3.44	1.71	2.62	1.66	2.45	1.82
33 Learning precision manual skills					3.50	1.71	2.43	1.60	2.55	1.66
34 Completing clinical requirements					3.81	1.64	3.43	1.57	2.94	1.89
35 Concern about treatment grades awarded					4.63	2.63	3.00	1.45	3.38	1.45
36 Differences in opinion between clinical staff concerning treatments					3.31	1.89	3.76	1.48	3.38	1.33
37 Shortage of allocated clinical time*					3.00	1.79	4.52	0.75	4.08	1.12
38 Patient management					2.69	1.62	2.52	1.50	3.54	0.45
39 Confidence in own clinical decision making					2.63	1.54	2.52	1.66	2.15	1.28
Overall mean DES	1.58	0.90	1.83	0.87	2.65	1.05	2.39	0.87	2.61	0.85

*Significant differences between years; see also Table 3.

more stressful. Third-year students found *Rules and regulations of the dental school* to be significantly more stressful than fourth-year students. The clinically relevant stressors were compared only across Years 3, 4, and 5. Fourth-year students found *Shortage of allocated clinical time* more stressful than the third-year students.

Table 4 shows the mean score on each of the five stressor domains for each year of study. An ANOVA comparing the mean scores for the four stressor domains (*Living, Personal, Education, and Academic*) across the five years of study was statistically significant for the domains of *Educational* ($F = 13.69; p < 0.001$) and *Academic* stressors ($F = 3.80;$

$p < 0.05$). Tukey's post-hoc comparisons revealed that for the *Educational* stressors the Year 1 students reported significantly less stress than the students in Years 3, 4, and 5, while the Year 2 students reported significantly less *Educational* stress than students in Years 3 and 5 ($p < 0.05$). For the domain of *Academic* stressors, Year 3 and 5 students reported significantly more stress than students in Year 1 ($p > 0.05$).

An ANOVA comparing the mean stress scores on the domain of *Clinical* stressors across the clinical years revealed there were no significant differences in these stress levels between the students in Years 3, 4, and 5.

Table 2. The six stressors with the highest mean score for each year of study

Year	Stressor	Mean	sd
1	Fear of failing course/year	3.42	1.61
	Examinations	3.20	1.87
	Lack of time for relaxation	3.04	1.51
	Fear of being able to catch up if falling behind	2.38	1.79
	Uncertainty about dental career	2.29	1.86
	Moving away from home	2.12	2.05
2	Examinations	3.95	1.54
	Fear of failing course/year	3.50	1.92
	Fear of being able to catch up if falling behind	3.05	1.58
	Lack of input in decision making process of dental school	3.00	1.73
	Competition for grades	2.74	1.48
	Uncertainty about dental career	2.58	1.54
3	Treatment grades	4.63	2.63
	Examinations	4.31	1.70
	Fear of failing course/year	4.13	1.45
	Reduced holidays	4.06	1.39
	Expectation versus reality of dental school	3.94	1.44
	Completing clinical requirements	3.81	1.64
4	Shortage of allocated clinical time	4.52	0.75
	Differences in opinion between clinical staff	3.76	1.48
	Examinations	3.71	1.45
	Fear of failing course/year	3.62	1.75
	Expectation versus reality of dental school	3.47	1.57
	Completing clinical requirements	3.43	1.62
5	Fear of failing course/year	4.46	0.97
	Shortage of allocated clinical time	4.08	1.12
	Competition for grades	3.92	1.26
	Examinations	3.82	1.54
	Patient management	3.54	1.45
	Concern about treatment grades awarded*	3.38	1.45
	Differences in opinion between clinical staff*	3.38	1.33

*Equal ranking as sixth highest stressor

Table 3. Significant differences (ANOVA) between stressors by year of study

Stressor	Difference between years
Having reduced holidays	3* > 1, 2
Expectation versus reality of dental school	3**, 4* 5* > 1, 2
Approachability of staff	3**, 4*, 5* > 1, 2
Rules and regulations of the dental school	3**, 4*, 5** > 1, 2. 3* > 4
Competition for grades	3*, 5** > 1. 5* > 4
Lack of input in decision making process of dental school	3*, 4*, 5* > 1
Shortage of allocated clinical time	4* > 3

Tukey post-hoc * $p < 0.05$, ** $p < 0.01$

The ratings of specific stressors that were significantly different for male and female students are shown in Table 5. Female students found the following items more stressful: *Fear of going out due to crime, Fear of being able to catch up if falling behind in coursework, Examinations, Lack of input in decision making process of dental school, Transition to the clinical course, Learning precision laboratory skills, Completing clinical requirements, and Concern about treatment grades awarded* (t-test $p < 0.05$).

Comparisons between males and females on the five stressor domains revealed significant differ-

ences for the domains of *Academic work* and *Clinical factors*. As shown in Table 5, female students rated these two domains as significantly more stressful than did male students (t-test $p < 0.05$).

Based on their respective gender-based norms, 54.8 percent of males and 44.2 percent of the females were above the 90th percentile on the GSI scale. Based on Chi-square analysis, there was no statistical difference between the percentage of males and females in this clinically relevant range that identifies psychological disturbance.

Table 4. Stressor domains and mean score by year of study

Stressor domain	Year (n)	mean	sd
Living accommodations	1 (25)	1.69	1.36
	2 (19)	1.76	1.34
	3 (16)	2.41	1.51
	4 (21)	2.11	1.39
	5 (13)	2.37	1.53
Personal factors	1	1.27	0.97
	2	1.36	0.95
	3	1.61	0.98
	4	1.70	0.87
	5	1.66	0.75
Educational environment	1	1.13	0.86
	2	1.63	0.87
	3	3.16	1.22
	4	2.38	1.00
	5	2.85	1.42
Academic work	1	2.33	1.27
	2	2.73	1.10
	3	3.51	1.48
	4	2.96	1.11
	5	3.66	0.95
Clinical factors	3	3.28	1.27
	4	2.99	1.01
	5	3.02	1.03

Table 5. Stressors with significant differences and stressor domains, by gender

Stressor	Male (n=50) Mean (sd)	Female (n= 62) Mean (sd)
Fear of going out due to crime	1.74 (1.73)	2.61 (1.88)*
Fear of being able to catch up if fall behind	2.67 (1.82)	3.40 (1.55)*
Examinations	3.31 (1.81)	4.23 (1.15)*
Lack of input into decision making process of dental school	2.31 (1.80)	3.21 (1.80)*
Transition to the clinical course	1.86 (1.75)	2.44 (1.75)*
Learning precision manual skills	2.05 (1.62)	3.00 (1.60)*
Completing clinical requirements	2.39 (2.00)	3.39 (1.72)*
Stressor domain		
Living accommodation	1.95 (1.32)	2.07 (1.50)
Personal factors	1.38 (0.93)	1.60 (0.91)
Educational environment	1.82 (1.20)	2.32 (1.31)
Academic work	2.61 (1.43)	3.20 (1.08) *
Clinical factors	2.10 (1.30)	2.76 (1.37) *

*t-test $p < 0.05$

While there was a statistically significant correlation between mean DES and GSI ($r = 0.56$; $p < 0.001$) for male students, this relationship was not significant for female students ($r = 0.20$). Table 6 presents the correlational analysis between psychological disturbance (GSI) and the five stressor domains (*Living, Personal, Education, Academic, and Clinical*). For male students, the stress levels were all significantly associated with psychological disturbance. For the female students, only the stress levels in the *Clinical* domain were significantly associated with psychological disturbance.

Discussion

While the results of this study do indicate many findings consistent with the international literature, some findings may further enhance our understanding of dental student stress. The current results provide some initial indication of high levels of psychological disturbance in these dental students and the relationship between this disturbance and stress. Also, the results indicate a general increase in overall student stress levels as the student progresses in the program, specifically spiking in the transition into clinical

Table 6. Correlational analysis between psychological disturbance and sources of stress using the five stressor domains

	Stressor domain				
	Living accommodation	Personal factors	Educational environment	Academic work	Clinical factors ¹
Male (N=42)	0.313*	0.677**	0.438**	0.484**	0.638**
Female (N=52)	-0.126	0.186	0.267	0.266	0.399*

¹Clinical students only (Male = 23; Female = 27)
Spearman's rank correlation * $p < 0.05$; ** $p < 0.01$

cal training. Overall, the current results from Trinidad are generally consistent with previous research in terms of specific dental student stressors, the highest ranking stressors within each year of study, variations in the intensity of specific stressors across years of study, and gender differences.

Psychological Disturbance

The results indicate a markedly high level of psychological disturbance in these dental students across all five years of their education. Over half of the male students and over a third of female students report such high levels of psychological symptoms that they are identified as in need of clinical intervention. This is notably higher than the 30 percent of dental students in the United States previously reported to be in this clinical range.²¹ It is important to note that the current sample was considerably younger and the students were primarily earning their first degree when compared to the study from the United States. It is possible that these high levels of psychological disturbance may reflect, in part, the consequences of preparing and competing for entrance into dental school, especially within a developing country of limited resources. Understanding possible sources of this psychological disturbance is critical, and it is hoped that future international studies will help to elucidate these current findings.

The current results do indicate a relationship between psychological disturbance and stress levels, but only for males and generally not for females. While the correlational analysis is interesting, it does not allow for causal explanations. Logically, it is reasonable to speculate that the heightened levels of psychological disturbance may lead to a greater vulnerability to stressors, but the opposite rationale is also reasonable—that is, high stress levels may lead to psychological disturbance. A definitive understanding of the current findings is further complicated by the fact that this relationship between stress levels and disturbance levels is different for male and

female students. Except for a significant positive relationship between the “clinical domain” of stressors and psychological disturbance in females, relationships between these variables were not clearly established. Are female students more resilient to stress? Are male students less able to deal with dental student stress, so it affects their psychological well-being? Do dental student stress and psychological disturbance have an effect on performance? These are all important issues for future investigation.

The results clearly indicate that a disturbance in psychosocial functioning is not synonymous with high stress level; this is highlighted by the gender differences. Although female students exhibited significantly more stress on *Academic* and *Clinical* domains of stress, it was only male students who showed related psychological morbidity. Higher levels of female dental student stress have been explained by being related to the social construct of masculinity in which males are less expressive of stress but subsequently more vulnerable to health risks.¹¹ Furthermore, the work by Lazarus²² and Lazarus and Folkman²³ on stress and coping suggests a complex interaction among cognitive appraisal, psychological resources, and response. It has been suggested that the way in which students cope with the overall demands of education, rather than the specific demands per se, may be the primary determinant of their psychological distress.²⁴ Hence, it is not the specific stressor but rather the student’s management and coping strategy that determine the impact or disturbance caused by the stress. The current study may have been enhanced if data on student coping strategies had been part of the questionnaire.

Sources of Stress

The findings of this study do not support the widely held belief that dental students experience high stress levels overall. On the whole, the overall mean DES scores would suggest the contrary, especially for first- and second-year students. While these

students do have important specific issues and concerns, it would seem inaccurate to describe them as highly stressed overall. With a range from 0 through 5 on the DES scale, the overall mean DES for both the first-year (1.58) and second-year (1.83) students indicates only a modest degree of stress. Interestingly, however, the data does reveal that the longer the students are in the dental school, the higher their levels of stress. For the clinical students, the overall mean DES scores ranged from 2.39 to 2.65. It is reasonable to interpret this as a moderate degree of student stress. This increase in student stress levels during the five years of their education may reflect a cumulative effect or, alternatively, suggest that each progressive year of training becomes more difficult and stressful with year-specific stressors. This finding is similar to findings in Australia,¹¹ where the cumulative effect of performance pressure and workload was thought to be the cause of higher stress levels in the clinical years, but differs with findings in the United States, where overall mean DES score for Years 1 to 4 of the program were 2.19, 2.16, 2.16, and 2.27, respectively, indicating no trend of increasing stress.⁸

Throughout the discussion of these findings, we will suggest that the increase in stress levels reflects changing goals and objectives within each year of the dental program. For example, the mean DES scores have a noticeable spike in Year 3, the transition year into clinical training. This spike in stress levels for Year 3 students, suggesting a moderate degree of stress, indicates that the transition into the clinical setting may be difficult for many students. Interestingly, this finding is not reported in the United States,⁸ but is similar to findings in the UK,⁶ Australia,¹¹ and Singapore,¹² where increased stress levels coincided with the point of transition to clinical training. These findings support recommendations towards the implementation of specific programs or supportive interventions in order to minimize the negative impact of this critical transition in the dental student's education.

While *Examinations* and *Fear of failing* are consistently reported among the highest ranking stressors both in the current sample and internationally, the six highest ranked stressors within each respective year do, nonetheless, exhibit considerable variability. An appreciation of this data should help dental educators better understand the specific concerns and pressures of the dental student. It is not surprising that *Moving away from home* was one of the six highest ranked stressors only for the first year

students, as they begin their degree course. The highest ranking stressor for first-year students was *Fear of failing course or year*. The UWI, Faculty of Medical Sciences uses problem-based learning (PBL) for the teaching of basic sciences for all preclinical medical and dental students. This method of learning involves independent study along with group work, facilitated by members of the academic staff. For first- and second-year students, many of whom come directly from a secondary school where didactic teaching is the norm, the pressure of studying for a degree course with vast amounts of material to be learned independently (through PBL) may be a difficult and stressful adjustment. This speculation is further supported by the finding that *Fear of being able to catch up if falling behind* is also a highly ranked stressor for first- and second-year students.

It is interesting to note that *Fear of failing course or year* was also the highest ranked stressor for the final-year students, with a mean of 4.46. It is likely that this reflects a fear of not graduating on time coupled with the expectations of family and friends. Furthermore, the highest stress levels for many of the specific stressors are reported by students in their final year. The data convincingly promotes the need for specific support services for these students as they complete their final preparation to enter the profession.

First- and second-year students reported *Uncertainty about a dental career* as one of their top six stressors. Previous research has shown that students who placed medicine as their first choice when applying were more stressed than the students who had entered with dentistry as their first choice.¹⁰ Without this specific information, it is reasonable to assume that some of these dental students are those who initially applied to the medical school and entered dentistry only as a second option.

Among the three clinical years (Years 3, 4, 5), *Differences in opinions between clinical staff*, *Completing clinical requirements*, *Concern about treatment grades awarded*, and *Shortage of allocated clinical time* were among some of the six most stressful items and reflect immediate concerns during this phase of the program. Similar concerns were reported in Jordan,¹⁰ Singapore,¹² the UK,⁶ and Australia,¹¹ where clinical students rated *Falling behind with requirements* among their highest six stressors. Third-year students (the first clinical year) rated *Having reduced holidays* and *Expectation versus the reality of dental school* among their top six stressors. This may relate to the fact that they have just entered the clinical phase

of the program, which effectively has longer semesters and differs in teaching methods, exams, and day-to-day conduct from the preclinical years. Interestingly, *Patient management* was a high-ranking stressor only for final year students. This might be explained by their need to finish specific “complex” clinical cases as part of their final exam. Though not found in the present study, clinical students in the United States and UK also rated *Financial concerns* as one of their six highest ranking stressors.

An understanding of the results is further enhanced by examining the statistically significant differences in specific stressors across all five years. While there were no significant differences between Year 1 and Year 2 students on any of the stressors, several items were more stressful for the clinical than the preclinical years. Stressors reflecting the change in the teaching environment from basic to clinical sciences were found to be significantly more stressful for Years 3, 4, and 5 (for example, *Approachability of staff* and *Rules and regulations of the dental school*), and this might suggest that the clinical courses are perceived as less student-friendly than their preclinical program.

This finding is in contrast to the United States,⁸ where significant differences between classes generally revealed that students in the preclinical phase (Years 1 and 2) have higher stress on educational and academic issues than the clinical years (Years 3 and 4).

Specifically within the clinical years, significant differences in the present study appear to reflect priorities for the stage of the program. For example, students in Year 3 (the first clinical year), who might be at a stage of adjusting to the clinical course, found the *Rules and regulations of the dental school* significantly more stressful than in Year 4. In turn, Year 4 students, who might be more focussed on completing their clinical requirements, found *Shortage of allocated clinical time* more stressful than students in Year 3. The final year students found *Competition for grades* significantly more stressful than Year 4 students, possibly due to them approaching the end of their training with some hoping to graduate with honors.

Consistent with previous research, female students perceived several items as significantly more stressful than male students.^{6,8,10-12} In the present study they found *Academic* and *Clinical* factors significantly more stressful than males; this finding is supported by the literature. For example, in the United States,⁸ UK,⁶ and Australia,¹¹ lack of confidence in being a dentist or making clinical decisions together

with examinations and workload issues were more stressful for female students. This lack of confidence may be related to setting oneself very high standards and constantly trying to meet and maintain them. Personality traits of “perfectionism” and “the impostor phenomenon” have been reported in student dentists.²¹ The impostor phenomenon occurs among high-achieving individuals who chronically question their ability and fear that others will discover them to be intellectual frauds. Both traits are assumed to be associated with an increased risk of psychological problems. It has also been suggested that female dental students feel more pressured to succeed in a male-dominated profession⁶ and find peer pressure and the competitive nature of dental school particularly stressful.^{6,8} Female students in the United States were also more stressed with respect to family and personal issues, a finding not apparent in the present study. This is probably due to students in the United States being older and therefore more likely to be married and have children. It is important to point out that the higher stress levels for females is not related to high levels of psychological disturbance, and it remains an important issue to determine if higher stress levels are in fact related to actual performance.

Conclusion and Recommendations

The overall value of this kind of research is to identify the sources of dental student stress so that clinical educators and administrators in dental schools can then make necessary programmatic adjustments and modifications. For example, an interesting finding in our study was the trend of increasing stress levels during the five years of the program. While the first two (preclinical) years appear to be in the mild stress range, dental student stress does reach moderate to high levels in the clinical years. This suggests a need for special attention to the structure of the clinical program, particularly at the point of transition from the preclinical to the clinical phase.

Consistent with this suggestion is a six-year study in the United States, which compared the effect of a “relaxed teaching method” to “traditional approaches” on student performance and well-being in preclinical operative technique courses.²⁵ The investigators reported significant benefit to the students’ well-being in courses using the “relaxed teach-

ing method.”²⁵ This method included the removal of fear of course failure, the encouragement of active student/teacher interaction, a reduction of intimidation and confrontation, and a maximising of supportive teaching methodologies.

The high percentage of students exhibiting psychological disturbance in the current study is most noteworthy, but needs to be viewed cautiously until replicated both in our and other institutions. Also, the source of this disturbance needs to be identified in future research. Data on the relationship among stress levels, psychological disturbance, and academic/clinical performance for male and female dental students may shed more light on important gender differences. Furthermore, longitudinal research into the relationship among these important factors may help to advance our understanding in this critical area. Obtaining data prior to the student’s enrolment in the dental program may allow for a better understanding of the apparent high levels of psychological symptoms and might allow understanding of whether students enter with such high levels of psychological disturbance or if it is the consequence of the educational program.

After identifying specific stressors and overall stress levels and determining the level of psychosocial disturbance, it is incumbent on educators and administrators to implement effective student support services (such as academic advising, counseling, and stress management courses). These programs must be readily accessible and aimed at enhancing the dental student’s overall psychosocial well-being. It is hoped that establishing dental student well-being might lay the foundation for sustaining the well-being of practicing dentists as well.

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