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Survey of perceived stress-inducing problems among dental students, Saudi Arabia

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Abstract *Objective:* This study was conducted to assess the problems related to stress encountered by Saudi dental students.

Methods: One thousand and thirty questionnaires were distributed in four dental schools to all students from 2nd year level up to the internship level. The questionnaire contained 66 items organized into four categories: personal and administrative, theoretical, preclinical and clinical. The relationship between the demographic variables and students' academic performance with the investigated items was also assessed.

Results: The response rate was 53%. Saudi dental students showed high levels of perceived stress. The clinical training issues imposed the highest level of stress on the students. Some significant relationships between the investigated variables and the level of the perceived stress were found.

Conclusions: Female students had higher mean overall problem scores compared to male students, and second-year students showed lower perceived problems compared to other students.

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1. Introduction

Dental schools are known to be highly demanding and stressful learning environments (Polychronopoulou and Divaris, 2005). Contemporary dental curricula requires students to attain diverse proficiencies including acquisition of theoretical knowledge, clinical competencies and interpersonal skills (Garbee et al., 1980; Rajab, 2001; Polychronopoulou and Divaris, 2005).

Dental schools are demanding: the academic, preclinical and clinical requirements extend students' working hours into nights and weekends (Garbee et al., 1980; Rajab, 2001). Typical sources of stress for dental students include frequent examinations, examination phobia, reduced leisure time, demanding curricula, requirements to perform specified types and numbers of procedures, anxious patients, time limits, complicated treatments, possible conflicts with patients, fellow students, staff and faculty, lack of self-confidence, and the differences between the students' expectations and reality (Newton et al., 1994; Heath et al., 1999).

High levels of stress can result in a variety of physical and psychological distress which in turn can affect the well-being and performance of the student. Symptoms of distress can include anxiety, depression, phobia, hostility, fear, tension, dizziness, fatigue, sleeplessness, tachycardia, gastrointestinal symptoms, irritability and cynicism (Hendricks et al., 1949; Tedesco, 1986a; Westerman et al., 1993; Newton et al., 1994; Yap et al., 1996; Heath et al., 1999; Sanders and Lushington, 1999; Rajab, 2001; Acharya, 2003). Furthermore, there is evidence that high stress levels impair the immune system function (Sanders and Lushington, 1999).

Over the past decade, dental educators have given increasing attention to investigating stress among dental students within the academic environment. Several authors have attempted to identify the factors perceived as stressful among dental students, while others attempted to document stress symptoms via psychological testing (Tedesco, 1986b; Tedesco et al., 1987; Bradley et al., 1989; Grandy et al., 1989). Although some of these studies have followed a strict separation between the assessment of environmental factors involved in the appraisal of stress and subsequent results (i.e. the so called distress response) the clear distinction between an environmental stressor and distress response is difficult (Tedesco, 1986a; Tedesco et al., 1987). Furthermore, the initial reaction (response) to an event often serves as a new stimuli to elicit further unrest (Bradley et al., 1989).

Stress is significantly influenced by one's personal system of beliefs and attitudes. Stress can either motivate the student to peak performance or reduce their effectiveness in different degrees (Grandy et al., 1989).

Many studies have investigated the relationships between stress perception and several factors such as gender, marital status, living environment and academic year (Hendricks et al., 1949; Garbee et al., 1980; Tedesco, 1986a,b; Tedesco et al., 1987; Bradley et al., 1989; Grandy et al., 1989; Westerman et al., 1993; Newton et al., 1994; Yap et al., 1996; Heath et al., 1999; Sanders and Lushington, 1999; Rajab, 2001; Acharya, 2003; Polychronopoulou and Divaris, 2005). These studies have been repeated in several countries to verify whether different socio-cultural factors affect students' levels of perceived problems and Saudi Arabia is a country in which there are many socio-cultural issues that are fundamentally different than other countries. The dental education system in Saudi Arabia is a hierarchical system, in which there is an initial preparatory General Science year, followed by 5 years of dental school education in which the 1st and 2nd years include both basic sciences, medical and dental courses. The 3rd year introduces the students to the clinical disciplines, while the 4th and 5th year are mainly clinical oriented courses. The internship year is spent training on rotation in different hospitals around the kingdom. Dental schools are segregated into

male and female campuses. Females might get married early and have children during their course of study, thus increasing their responsibilities. Students may have to move away from home, as out of the seven dental colleges present in Saudi Arabia, only four are well-established and they are located in three major cities. King Saud University was the first university established in the Kingdom of Saudi Arabia in 1957 (King Saud University, Admission Department, 2006). The College of Dentistry opened its doors 32 years ago (in 1975). Maintaining social ties and family gatherings are very important within the Saudi culture. Therefore, the study of dentistry in Saudi Arabia may pose different kinds of problems and stress-inducing factors that may require further investigation. To date, no such study has been published that examines the perceived stressors that face dental students in Saudi Arabia.

The objectives of this study are to (1) determine the different problems facing dental students in the Kingdom of Saudi Arabia that may serve as possible stressors; (2) to investigate the role of gender, marital status, living environment and the academic year on problem perception; (3) to study the effect of the perceived problems upon the general academic performance of students.

2. Methods

2.1. Sample

All undergraduate students, who had completed at least one successful year in dental school, from four dental schools were included in the study. These schools are (King Saud University Dental College (KSU) and Riyadh College for Dentistry and Pharmacology (RCDP) in Riyadh, King AbdulAziz University Dental College (KAU) in Jeddah, and King Faisal University Dental College (KFU) in Dhahran) in Saudi Arabia. A total of 1030 questionnaires were distributed to the dental schools. The number of questionnaires that were distributed to female and male students at each dental school is presented in Table 1.

Since stress among dental students has been shown to vary over the course of the academic year, distribution of the questionnaires was done at approximately the same time in all schools at the beginning of the 1st half of the 2006–2007 academic year during September and early October.

The questionnaires were distributed to all students from 2nd year level through the internship level. First-year students were excluded from the study as they are not enrolled in dental courses. No students were enrolled in the clinical courses at the time of the study in both RCDP and KFU.

2.2. Instrument

An open-ended verbal and written interview of 12 dental students representing all four dental schools was conducted to assist in the development of the questionnaire which was designed to elicit students' perceptions of the problems they face during their study. The pilot questionnaire included the dental environmental stress questionnaire (DES) as well as an opportunity for the students to elaborate. After modification of the questionnaire, a final questionnaire was prepared.

The resulting questionnaire contained 66 items that required the student to assess a variety of possible academic and related non-academic problems that could have an influ-

Table 1 Number of distributed questionnaires and response rate of each dental school.

Dental school	Total questionnaires sent	Females	Males	Returned questionnaires	Response rate (%)
KSU	520	227	293	340	65.4
KAU	300	150	150	139	46.3
RCDP	120	60	60	52	43.3
KFU	90	–	90	17	18.9
Total	1030	437	593	548	

KSU: King Saud University – Dental College; KAU: King AbdulAziz University – Dental College; RCDP: Riyadh College for Dentistry and Pharmacy; KFU: King Faisal University – Dental College.

ence on them during their dental school years. The questionnaire was developed in English, and included questions regarding demographic data such as the participant's age, gender, marital status, name of dental school, place of residence and the academic year. Students were requested to indicate their GPA as a measurement of their academic performance. The questionnaire did not request the student names, to ensure honesty and to maintain confidentiality of the obtained data.

Questions regarding the potential stress-inducing problems were organized into four categories: (1) personal and administrative issues (21 items), (2) didactic (theoretical) related problems (16 items), (3) problems that might be faced during the preclinical training (12 items) and (4) problems that might be faced during the clinical training (17 items). Each item was scored using a three-point scale of severity: 1 = does not cause a problem, 2 = poses a small problem and 3 = poses a huge problem.

The investigated items were based on those examined previously by several researchers in studies of stress among dental students (Bradley et al., 1989; Grandy et al., 1989; Garbee, 1981). Most of the items included in the dental environmental stress questionnaire (DES) were used for this study (Bradley et al., 1989). In general, the DES items were modified to suit the Saudi society, such as eliminating items pertaining to relations with members of the opposite sex, and alcohol usage. Some items obtained from the initial interview with the dental students were added to the questionnaire such as English language problems. The questions related to clinical training were not presented to second-year students because they have not taken any clinical courses as yet.

The questionnaires were distributed to the sample and collected by local student representatives who explained that the aim of the project was to obtain an accurate and quantifiable measure of student problems.

2.3. Statistical analysis

The statistical package for social sciences (SPSS version 12) was used for data analysis. Descriptive statistics including frequency distributions, means and standard deviations were calculated for each problem item and the different variables.

The Student problem section of each questionnaire was scored to yield an average problem score across all 66 possible items. In addition, the average of the problem scores in each category was calculated for each respondent.

The mean of the average problem score of all respondents was computed and referred to as overall problem score. Means of each category average problem score were calculated yielding four problem scores that are personal & administrative, theoretical, preclinical, and clinical.

To determine if any of the problem scores were statistically related to any of the respondent's demographic variables, the overall problem score mean as well as each of the four categorical problem score means were subjected to one-way ANOVA test with each variable. *Post hoc Duncan test* was used in case of variables with more than two subclasses to show the relationship between them. To investigate the relationship between each item and the demographic variables, cross-tabulation statistics with χ^2 analysis were used.

3. Results

The questionnaire was completed by 548 dental students giving a response rate of 53%. More than half of respondents (65.4%) were from King Saud University (KSU). Response rates among the four schools that participated in this study ranged from approximately 19% to 65% (Table 1).

The scores of different problems and their statistical relationship with the six investigated variables are presented in Table 2. The overall problem score obtained from all respondents ranged from 1.06 to 3 with a mean score of (2.23 ± 0.31) . The personal and administrative problem score ranged from 1.1 to 3 with a mean score of (2.10 ± 0.35) . The theoretical problem score ranged from 1 to 2.94 with a mean score of (2.20 ± 0.33) and the preclinical problem score ranged from 1 to 3 with a mean score of (2.28 ± 0.4) . The clinical problem score ranged from 1 to 3 with a mean score of (2.47 ± 0.31) .

For the overall problem score, female students had a higher overall mean problem score compared to male students. The dental students' place of residence showed a statistically significant relationship with the overall problem score; students living with their family reported higher problem levels than other students with different living arrangements.

Students with the lowest GPA showed significantly higher overall problem score than those with the highest GPA.

The differences in perceived problems among different schools were investigated. Students from KSU dental school showed the highest overall problem score. The same pattern was seen in three category scores: personal and administrative, theoretical and preclinical categories.

The overall problem score differed significantly across the academic year with students in the 3rd, 4th, 5th years and interns having higher scores than those in the 2nd year.

Statistically significant relationships were found between some of the six variables and the problem scores of the four categories. The personal and administrative problem score was found to be significantly different in relation to the dental schools, academic year and place of residence, while the theoretical problem score was found to be significantly different in relation to the dental school, the academic year and the

Table 2 Mean (SD) and statistical significant relation among various problem scores with different demographic variables.

Demographic variables	Problem score				
	Overall problem score	Personal and administrative problem score	Theoretical problem score	Preclinical problem score	Clinical problem score
<i>Gender</i>					
Male	2.15 (0.30) ^a	2.07 (0.35) ^a	2.19 (0.34) ^a	2.26 (0.39) ^a	2.38 (0.32) ^a
Female	2.30 (0.31) ^b	2.13 (0.35) ^a	2.19 (0.31) ^a	2.30 (0.41) ^a	2.56 (0.27) ^b
<i>Marital status</i>					
Single	2.22 (0.31) ^a	2.09(0.36) ^a	2.19 (0.38) ^a	2.27(0.40) ^a	2.46 (0.32) ^a
Married	2.28 (0.30) ^a	2.15(0.33) ^a	2.21 (0.30) ^a	2.35(0.40) ^a	2.55 (0.31) ^b
<i>Dental school</i>					
KSU	2.28 (0.28) ^a	2.13 (0.34) ^a	2.26 (0.31) ^a	2.34 (0.37) ^a	2.49 (0.29) ^a
KAU	2.18 (0.32) ^{ab}	2.08 (0.38) ^{ab}	2.12 (0.33) ^b	2.26 (0.43) ^a	2.44 (0.33) ^a
RDC	2.00 (0.31) ^c	1.97 (0.33) ^{bc}	2.02 (0.35) ^b	1.98 (0.39) ^b	–
KFU	2.14 (0.30) ^b	1.92 (0.31) ^c	2.10 (0.26) ^b	2.25 (0.46) ^a	2.29 (0.39) ^a
<i>Academic year</i>					
2nd	2.08 (0.35) ^a	2.02 (0.37) ^a	2.13 (0.37) ^a	2.11 (0.47) ^a	–
3rd	2.27 (0.31) ^b	2.17 (0.35) ^b	2.25 (0.34) ^b	2.30 (0.41) ^b	2.40 (0.35) ^a
4th	2.29 (0.25) ^b	2.07 (0.33) ^{ab}	2.24 (0.33) ^b	2.41 (0.30) ^b	2.51 (0.27) ^b
5th	2.26 (0.29) ^b	2.13 (0.36) ^b	2.19 (0.29) ^{ab}	2.31 (0.37) ^b	2.47 (0.32) ^{ab}
Intern	2.28 (0.22) ^b	2.11 (0.30) ^{ab}	2.18 (0.26) ^{ab}	2.36 (0.35) ^b	2.52 (0.26) ^b
<i>GPA</i>					
< 2.5	2.32 (0.17) ^a	2.19 (0.26) ^a	2.26 (0.21) ^a	2.38 (0.28) ^a	2.51 (0.24) ^a
2.5–< 3	2.20 (0.33) ^{ab}	2.12 (0.37) ^a	2.23 (0.31) ^{ab}	2.21 (0.43) ^a	2.43 (0.34) ^a
3–< 3.5	2.22 (0.30) ^{ab}	2.09 (0.34) ^a	2.20 (0.34) ^{ab}	2.28 (0.40) ^a	2.42 (0.32) ^a
3.5–< 4	2.25 (0.27) ^{ab}	2.11 (0.33) ^a	2.21 (0.29) ^{ab}	2.31 (0.38) ^a	2.51 (0.30) ^a
4–< 4.5	2.20 (0.34) ^{ab}	2.09 (0.36) ^a	2.16 (0.34) ^{ab}	2.26 (0.44) ^a	2.47 (0.33) ^a
4.5–5	2.10 (0.35) ^b	2.00 (0.41) ^a	2.07 (0.35) ^b	2.17 (0.41) ^a	2.41 (0.28) ^a
<i>Place of living</i>					
Family	2.25 (0.30) ^a	2.21 (0.35) ^a	2.21 (0.32) ^a	2.30 (0.40) ^a	2.50 (0.29) ^a
Other	2.17 (0.32) ^b	2.02 (0.34) ^b	2.18 (0.35) ^a	2.23 (0.39) ^a	2.39 (0.56) ^b

Different alphabetical letters denote statistically significant differences between the means within each cell at ($P < 0.05$).

students' GPA. The preclinical problem mean score was also found to be significantly different in relationship to the RCDP dental school and to the second year. The clinical problem mean score was found to be significantly different in relation to the gender, marital status and place of residence.

The ranking of the top five perceived problems for each category is presented in Table 3 together with the associations with the demographic variables. This ranking was based on the frequency of scoring the problem as a “huge problem” by the students. The most frequently selected problems as “huge problems” were in the clinical category (range of 70.2–82.7%), while the least frequently selected problems were reported in the preclinical category (range of 48.3–56%). The number of female students who selected the “huge problem” option was significantly higher than male students in 9 of the top 20 ranked perceived problems. Among the top 20 perceived problems, nine of these problems were reported by the students of King Saud University (KSU) as “huge problem” significantly more frequent than other schools. King AbdulAziz University (KAU) students reported only five of the top 20 perceived problems significantly more frequently than others, while King Faisal University (KFU) reported only two “huge” problems.

Second-year students did not report any “huge” problems, while the 3rd year students reported problems in two of the

personal and administrative category. Fourth year students had major problems with four problems, two of which were preclinical in nature. Fifth year dental students had one significant problem in each category. Interns reported the highest amount of problems (5) among academic years. Married students reported significantly higher problems in three areas, mainly in the clinical category. Those living with their families had higher problems in the theoretical and clinical areas. Only students with a GPA of 4–<4.5 GPA reported a problem with lack of patient attendance.

4. Discussion

Identification of potential problems is important in dental education programs as it might give students, faculty and administrators an opportunity to take precautionary measures to prevent dental stress (Yap et al., 1996). It is assumed that higher levels of perceived student problems lead to more stress ((Bradley et al., 1989). In the present study, the general problem level perceived by dental students was represented by the overall problem score. Stress levels, inferred from the overall problem score, revealed that most of the students in this study had a relatively high level of perceived stress, which lies between “poses a small problem” and “poses a huge problem”. This may indicate that most of the dental students are not well

Table 3 Ranking of the top five perceived problems per category in relation to demographic variables.

Perceived problem	N	% of replies "huge problem"	Gender	Marital status	Place of residence	GPA	Dental school	Academic year
<i>Personal and administrative problems</i>								
1. Lack of time for relaxation	533	69.4	*F	*Sing			*KSU	*4th
2. Neglect of personal life	525	53.3	*F	*Marr			*KSU	*5th
3. Being treated as immature and irresponsible by faculty	511	51.5					*KAU	*Intern
4. Responsibility of having children	419	47.3	*F				*KAU	*3rd
5. Inadequate break times	515	45.2						*3rd
<i>Theoretical problems</i>								
1. Amount of study load	526	69.6	*F				*KAU	*5th
2. Having a lecture, clinical or laboratory session immediately before an exam on its scheduled day	525	66.9					*KSU	*Intern
3. Overloaded feeling due to vast (huge) syllabus	506	65.2	*F				*KAU	
4. Having exams in break times	520	61.7					*KSU	
5. Conflict between different subjects when scheduling exams	522	54.4	*F		*Family		*KSU	*4th
<i>Preclinical problems</i>								
1. Fear of being unable to complete required projects	514	56					*KSU	*4th
2. Amount of required projects (requirements)	518	53.5					*KFU	*4th
3. Inconsistency of feedback on your work between different instructors	514	53.3					*KSU	*Interns
4. Inadequate instructor:student ratio	519	52					*KSU	*5th
5. Lack of time for more practice on assigned projects	518	48.3						
<i>Clinical training</i>								
1. Patient being late or not showing	393	82.7				4 - < 4.5*	*KSU	
2. Responsibility of getting suitable patients	392	79.3	*F		*Family		*KFU	*Interns
3. Inadequate instructor:student ratio	390	74.6					*KAU	*5th
4. Being criticized by faculty in-front of patients	388	71.6	*F	*Marr			*KSU	
5. Inadequate number of dental assistants	392	70.2	*F	*Marr				*Interns

N, Number of responses; F, female; Marr, married; Sing, single.

adjusted to the dental school educational environment and to the pressure imposed to fulfill the school requirements.

Among the investigated categories, the problem score related to clinical training was the highest. The problem score of personal and administrative issues was lower than other problem scores, which indicated that non-academic areas are not considered as stressful as the academic and clinical aspects of dental education. When comparing the top ranking perceived problems in each of the categories: the clinical category had the least amount of responses, as half of the dental schools (RCDP and KFU) do not have students enrolled in clinical courses yet.

Some of the demographic variables were found to be related to the overall problem score, category scores and individual item scores in perceived problems that were ranked in the top five items in each category.

One of the demographic variables related to the problem scores was gender. Female students reported higher scores in both the overall problem score and the clinical problem score than males. This is especially evident in the top ranked problem items. Most of their perceived problems centered on the feeling of being overloaded, lack of time, and increased responsibilities. The gender-linked difference in stress perception in dental school may be attributed to differing patterns of psychological morbidity; males are simply less expressive of their concerns (Westerman et al., 1993; Newton et al., 1994; Sanders and Lushington, 1999; Acharya, 2003). Some research have confirmed the social construct of masculinity in which men are less expressive

of stress and are thus more vulnerable to health risk. (Eisler, 1995; Sanders and Lushington, 1999). On the other hand, it has been reported that females may feel inadequate due to minority status, lack of strong professional female role models, and internalizing (self) criticism (Westerman et al., 1993).

As this survey was conducted at the beginning of the academic year, the students' responses to the different problem items are most likely to be influenced by their experiences of the previous years. The 2nd year students had significantly less overall problem scores, category scores as well as individual item scores compared to the other academic years. This finding is in agreement with several studies (Bradley et al., 1989; Westerman et al., 1993; Sanders and Lushington, 1999) and may be explained by the fact that students at the beginning of the 2nd academic year are not yet exposed to any clinical experience or to highly condensed preclinical courses, which would impose a significant amount of stress.

Students from different dental schools surveyed in this study, showed differences in their perceived problem levels. Dental students at KSU had significantly higher perceived overall problem scores, categorical scores and individual scores in the top five ranked problems than the other dental school students. An established dental educational system such as the one implemented by KSU with its school curriculum, rules and regulations, is subject to review and modification under the umbrella of the University. This type of review might not currently be as sensitive to student changing

needs. The number of students that KSU accommodates per year is much more than all of the other dental schools can accommodate. The competition thus created between students can also create higher levels of perceived stress. KSU also implements a yearly system which can create different types of stress than those present among students who study through semester systems (King Saud University, Department of Statistics, 2006).

Students living with their families had higher overall problem scores, and higher problem scores for the categories of personal and administrative issues and clinical training. These findings may be explained by lack of time and the increased demands of social activities that may limit time in general and lead to a feeling of being overloaded.

Single students reported lack of time for relaxation more significantly than married students, while married students reported neglect of personal life as a huge problem. A possible explanation might be that married students already endure less personal time, due to their social status, and thus do not feel this effect as single students do. Married students also stated that being criticized in-front of patients and inadequate number of dental assistants also posed a large problem. This could be due to the self-perceived magnified social status and responsibility that married students believe that they have.

In this study, only students with the lowest GPA experienced marginally statistically significant more perceived problems than students with the highest GPA in overall problem score and the theoretical problem score. This is consistent with the finding of other studies which showed that low academic achievement is characterized by less satisfaction with the education environment (Pimparyon et al., 2000; Mayya and Roff, 2004).

Among the top 20 ranked problematic items in this study, some were related to student-relationship with the faculty. That is in agreement with the results of many studies (Hendricks et al., 1949; Garbee et al., 1980; Tedesco et al., 1987; Sanders and Lushington, 1999; Rajab, 2001). A certain amount of tension exists between students and faculty as a result of the faculty's evaluative and authoritative role which could lead to unavoidable stress. Also, some stress may result from the faculty abuse of their evaluative authority (Garbee et al., 1980).

5. Conclusion and recommendations

Within the limitations of this study, the findings indicated that Saudi dental students had high levels of perceived stress.

Clinical training was perceived to be the highest source of problems. The availability of suitable patients, their compliance with the treatment and student-faculty relationships were the students' main concerns related to their clinical training. This suggested that enhancing and adjusting systems of patient screening and distributing them to different clinical courses, may contribute to possible reduction in the perceived problems by the students. The results of the present study showed that the demands of the profession related to both quality and quantity of academic and practical performance are potent sources of stress.

Both academic and non-academic perceived sources of stress should be considered in curriculum planning and the working environment for dental education.

The educational system should deal with the potential stressors for students by stress management programs. Effective assistance from teaching staff, faculty administrators, and families is essential.

References

- Acharya, S.H., 2003. Factors affecting stress among Indian dental students. *J. Dent. Educ.* 67, 1140–1148.
- Bradley, I., Clark, C., Eisner, J., DeGruchy, K., Singer, D., Hinkleman, K., Gelskey, S., 1989. The student survey of problems in the academic environment in Canadian dental faculties. *J. Dent. Educ.* 53, 126–131.
- Eisler, R., 1995. The relationship between masculine gender role stress and men's health risk: the validation of a construct. In: Levant, R., Pollack, W., et al. (Eds.), *A New Psychological Men*. Basic Books, New York, pp. 207–225.
- Garbee, W., Zucker, S., Selby, G., 1980. Perceived sources of stress among dental students. *J. ADA* 100, 853–857.
- Garbee, W.H., 1981. Sources of stress in the dental school environment. *J. LA Dent. Assoc.* 39, 9–14.
- Grandy, T., Westerman, G., ErskineCombs, C., Turner, C., 1989. Perceptions of stress among third-year dental students. *J. Dent. Educ.* 53, 718–721.
- Heath, J.R., Mcfarlane, T.V., Umar, M.S., 1999. Perceived sources of stress in dental students. *Dent. Update* 26, 94–100.
- Hendricks, S., Joshi, A., Crombie, K., Moola, M., 1949. Perceived sources of stress among black dental students in South Africa. *J. Dent. Educ.* 58, 406–410.
- King Saud University, Admission Department, 2006. <www.ksu.edu.sa/english/statics.php>.
- King Saud University, College of Dentistry, Department of Statistics, 2006.
- Mayya, S.S., Roff, S., 2004. Students' perceptions of educational environment: a comparison of academic achievers and under-achievers at Kasturba Medical College, India. *Educ. Health* 17, 280–291.
- Newton, J.T., Baghalenaini, F., Goodwin, S.R., Invest, J., Lubbouck, M., Marouf Saghakhaneh, N., 1994. Stress in dental school: a survey of students. *Dent. Update* 5, 162–164.
- Pimparyon, P., Roff, S., McAleer, S., 2000. Educational environment, students' approaches to learning and academic achievement in a Thai nursing school. *Med. Teach.* 22, 359–364.
- Polychronopoulou, A., Divaris, K., 2005. Perceived sources of stress among Greek dental students. *J. Dent. Educ.* 69, 687–692.
- Rajab, L., 2001. Perceived sources of stress among dental students at the University of Jordan. *J. Dent. Educ.* 65, 232–241.
- Sanders, A., Lushington, K., 1999. Sources of stress for Australian dental students. *J. Dent. Educ.* 63, 688–697.
- Tedesco, L.A., 1986a. A psychological perspective on the dental education experience and student performance. *J. Dent. Educ.* 50, 601–605.
- Tedesco, L.A., 1986b. The etiology of survival: a psychological perspective on the dental school experience. In: Paper presented at the American Association of Dental Schools Annual Meeting, Washington DC, March.
- Tedesco, L.A., Flatow, E., Davis, E.L., Brewer, J.D., Cooper, M.L., 1987. Performance and psychosocial response to the dental school educational experience: exploring barriers to learning. In: Paper presented at the American Association of Dental School Annual Meeting, Chicago, March.
- Westerman, G., Grandy, T., Ocanto, R., Erskine, C., 1993. Perceived sources of stress in the dental school environment. *J. Dent. Educ.* 57, 225–231.
- Yap, A., Bhole, S., Teo, C., 1996. Across-cultural comparison of perceived sources of stress in the dental school environment. *J. Dent. Educ.* 60, 459–464.