Critical Issues in Dental Education

Emotional Intelligence and Perceived Stress in Dental Undergraduates: A Multinational Survey


Abstract: This multinational survey investigated the relationship between emotional intelligence (EI) and perceived stress (PS) in seven countries. First-year dental undergraduates attending a dental school in England, Greece, Romania, South Africa, Australia, and the United States and three schools in Malaysia were invited to complete a set of questionnaires on age, gender, academic background, satisfaction with career choice, EI, and PS. Of 860 questionnaires distributed, 596 were fully completed—a response rate of 69.3 percent. Mean EI score was 123.8 (95 percent CI 122.7-124.9), and mean PS score was 19.1 (95 percent CI 18.6-19.7). Significant differences in EI and PS scores were detected between different countries. Females (p<0.05), younger students (p<0.001), those without a previous higher education qualification (p<0.001), and those not satisfied with their decision to study dentistry (p<0.001) were more likely to report PS when compared to their counterparts. A significant inverse relationship (coefficient=-0.29, p=0.001) between EI and PS was detected. Independent significant predictors of PS identified were gender (ß=0.22, t=5.71, p=0.001), previous higher education qualification (ß=-0.14, t=-2.42, p=0.010), satisfaction with decision to study dentistry (ß=-0.20, t=-5.11, p=0.001), and EI (ß=-0.24, t=-6.09, p=0.001), with the latter being relatively the most important predictor. In conclusion, the inverse relationship between EI and PS has been confirmed in this heterogeneous sample representing diverse sociocultural and academic contexts of dental undergraduates.

Stress has been defined as the strain that accompanies a demand perceived to be either challenging (positive) or threatening (negative) and, depending on its appraisal, may be either adaptive or debilitating. Stress can act as a creative force that increases drive and energy, but once it reaches a certain degree, the results can be negative. In the working lives of dentists, stress has been reported to be considerable, and there has been increasing interest in stress management programs for dentists. Whether the experience of stress in dental students leads to stress in working dentists is not known. There is, however, some evidence linking stress in medical students and future risk for depression. A recent systematic review of psychological distress in medical students concluded that perceptions of stress are correlated with depression, anxiety, somatic symptoms, and health problems and are predictive...
of future risk for depression. In health professions students it has been a subject of much research interest. It is therefore important to study the experience of stress in dental students and to identify ways to manage it.

Published reports on the prevalence of stress in dental students exist for the United States, United Kingdom, Germany, Greece, Jordan, Nigeria, South Africa, India, Singapore, Malaysia, Japan, Australia, and the West Indies. Research on stress in dental students has developed from investigating the perceptions of stress to experiences of burnout and general psychological well-being. Much research on stress in dental students has centered on the sources of stress in the dental training environment, which include completing graduation requirements, achieving good examination grades, fear of failing the course, approachability of staff, patients' being late or not showing for their appointments, and fear of facing parents after failure. While it should be recognized that environmental stressors can be modified to support a more conducive learning environment, the question as to why some students cope better with these stressors than others remains relatively unexplored.

Recent research using self-completed questionnaires to survey dental undergraduates in one dental school has shown that those with high emotional intelligence (EI) are less likely to report perceived stress (PS). EI may be conceptualized in terms of perception, appraisal, and expression of emotions; emotional facilitation of thinking; understanding, analyzing, and employing emotional knowledge; and reflective regulation of emotions. In popular terms, it is a measure of an individual’s ability to perceive emotions in self and others, manage them, and handle relationships. It is therefore expected that students with high EI would cope better with the stressors in the dental training environment and report less perceived stress. In medical education, EI has been proposed as an important attribute of professional competence. Recognition of the role that EI can play in improving patient outcomes has led some researchers to recommend it as a criterion for the selection of medical, nursing, and osteopathy students. However, psychometric testing (such as the use of EI scales) of applicants to health professions schools is rarely conducted. More commonly, the applicant’s academic background is a prime criterion for consideration. For example, some dental schools admit students by competitive examinations, so that those who do not make the grades for the academic program (such as dental school) that they desire as a first choice are admitted to a program that is not of their first choice. Where admission is by competitive examinations, dental students whose first career choice was not dentistry have been shown to report more stress. Some schools, on the other hand, may require applicants to possess a qualification from a higher education institution. Currently in the United Kingdom, for example, there is a trend towards recruiting biological sciences graduates to train as doctors and dentists. It is surmised that these graduates may actually cope better with the demands of dental training because of their maturity and experience of having successfully completed a degree already.

Since the entry requirements for dental schools worldwide are different, an international, multi-country survey may provide some understanding of the explanatory factors for stress and an evaluation of the role that EI plays in the experience of PS. It also allowed testing of the hypothesis that EI is inversely correlated to PS in different sociocultural contexts; in other words, students with higher EI are more likely to report lower PS, and this relationship will hold true for dental students in several nations with different sociocultural environments. The aim of this study was therefore to compare reports of EI and PS between dental schools in different countries and explore the association among academic background, satisfaction with career choice, EI, and PS in a multinational sample of dental students.

**Methods**

A cross-sectional survey was conducted in six dental schools located in England, Romania, South Africa, Australia, the United States, and Greece, plus three government dental schools in Malaysia, for a total of nine schools in seven countries. First-year dental undergraduates who had completed at least six months of their dental degree course during 2005-06 were invited to complete a set of questionnaires on emotional intelligence and perceived stress. The appropriate research ethics approval was obtained for each school. Where a research ethics committee did not exist, approval was secured from the head of the dental school and tutor for student welfare.

Occasions were identified when students would be attending a lecture together. The lecturers were approached, and permission was sought to survey the students at the end of the lectures. A researcher
explained to the students the purpose of the survey and assured them of confidentiality. Completion of the questionnaire took eight to twelve minutes. Where attendance was low at a lecture, the students were visited during their small-group seminar classes, and any who had not completed the questionnaires were invited to do so there.

Data on EI were collected using a scale developed by Schutte et al., who have also tested its construct, predictive, and discriminant validities. Two-week test-retest reliability was found to be high. The EI scale comprises thirty-three items, three of which are reverse-scored, measured on a five-point Likert scale from 1 to 5. The possible range of scores is 33, indicating low EI, to 165, indicating high EI. PS was measured using the Perceived Stress Scale (PSS-10), whose internal consistency, test-retest reliability, concurrent validity, and predictive validity have been tested in a general population. The PSS-10 was designed to measure the “degree to which situations in one’s life are appraised as stressful.” It comprises ten items, four of which are reverse-scored, measured on a five-point Likert scale from 0 to 4. The possible range of scores is 0, indicating no perception of stress, to 40, indicating high perception of stress. An EI total and a PS total score were derived by summing up the item responses. Demographic questions included gender and age. Students were also asked if they had a previous qualification from a higher education institution and if they were satisfied with their decision to study dentistry.

The questionnaires were administered in English, except in Romania and Greece where they were translated into their national languages. The questionnaires were first translated by lecturers in English at the respective universities, back-translated into English by another translator, and checked for comprehension by the researcher at the dental school and by both translators.

Statistical analyses carried out using SPSS version 13 included frequency distributions, reliability analyses, t-tests, correlation analysis, and multiple regression. Frequency distributions of gender, age groups, previous higher education qualification, and satisfaction with decision to study dentistry for each of the dental schools in the survey are presented. The responses to the three reverse-keyed items in the EI scale were recoded so that all items were scored in the same direction. Similarly, the four reverse-keyed items in the PS scale were recoded. Reliability analysis, based on the average inter-item correlation, was carried out for the EI and PS scales. Mean scores for EI and PS, with 95 percent confidence intervals, for each school and by gender, age, previous higher education qualification, and satisfaction with decision to study dentistry were calculated and compared using t-tests for statistical significance. Bivariate correlational analysis was performed to test for association between EI and PS. Finally, in order to examine whether gender, age, previous higher education qualification, satisfaction with decision to study dentistry, and EI independently accounted for variance in PS, a stepwise multiple regression analysis was carried out with PS entered as the dependent variable. Significant independent variables identified in t-tests and correlation analyses were entered into the regression analysis.

Results

Eight hundred and sixty questionnaires were distributed. Of the 741 questionnaires that were returned, 596 were completed fully, representing a response rate of 69.3 percent. Two hundred and twenty-three (37.4 percent) of the volunteers who completed the questionnaires were male, and 373 (62.6 percent) were female (Table 1). Four hundred and sixty-one students were aged twenty-one years or younger (77.3 percent); 114 (19.1 percent) reported having a previous higher education qualification; and 456 (76.7 percent) expressed satisfaction with their decision to study dentistry. Comparison among the countries indicated that there were higher proportions of female students in all dental schools except for the United States. Similarly, except for the U.S. dental school, all had higher proportions of those aged twenty-one years or younger and without previous higher education qualification. The majority of students in all dental schools reported that they were satisfied with their decision to study dentistry.

Cronbach’s alpha, which reflects the internal consistency of a measurement scale, ranged from 0.82 in the Romanian sample to 0.92 in the Greek sample for the EI scale, and from 0.77 in the Romanian sample to 0.94 in the Australian sample for the PS scale (Table 2). The reliability of both scales is within the acceptable limits for each population group. The mean EI score for the sample was 123.8 (95 percent CI 122.7-124.9), and the mean PS score was 19.1 (95 percent CI 18.6-19.7). Comparison of mean EI scores (Table 3) showed statistically significant differences between the highest (Romania and United States) and the lowest (Malaysia) scoring
Statistically significant differences were also detected in mean PS scores between the highest (Romania and Malaysia) and lowest (England and United States) scoring schools. Results of t-tests indicated that low scorers on the EI scale were more likely to be younger compared to older students (p<0.001), those without a previous higher education qualification such as a degree compared to those with one (p<0.001), and those who were not satisfied compared to those who were satisfied with their decision to study dentistry (p<0.001). Those who had higher PS scores were statistically more likely to be female rather than male students (p<0.05), younger rather than older students (p<0.001), those without rather than those with a previous higher education qualification (p<0.001), and those who were not satisfied rather than those who were satisfied with their decision to study dentistry (p<0.001). Correlation analysis between EI and PS indicated a statistically significant inverse relationship (coefficient=-0.29, p=0.001) for the whole sample. Analysis of data from each of the dental schools showed similar inverse relationships between EI and PS, although not of statistical significance for the English, Australian, and U.S. schools.

Stepwise regression analysis (Table 4) identified significant predictors of PS as gender ($\beta=0.22$, $t=5.71$, $p=0.001$), previous higher education qualification ($\beta=-0.14$, $t=-2.42$, $p=0.010$), satisfaction with decision to study dentistry ($\beta=-0.20$, $t=-5.11$, $p=0.001$), and EI ($\beta=-0.24$, $t=-6.09$, $p=0.001$). Among these statistically significant predictors of PS, the t statistic indicates that EI explains the greatest amount of variation in PS and is therefore relatively the most important predictor of PS.

## Discussion

This survey is the first multi-country comparison of levels of EI and perceptions of stress amongst first-year dental students. The study involved nine dental schools from seven countries and explored whether gender, age, academic background, satisfaction with career choice, and EI are associated with PS. The key findings are that there are statistically significant differences in EI and PS scores between some dental schools, and EI is an important independent predictor of PS when compared to gender, academic background, and satisfaction with career choice.

A strength of this study is that data were collected from dental schools in seven different coun-

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**Table 1. Sample characteristics by gender, age, education background, and satisfaction with decision to study dentistry, shown as number and (in parentheses) percentage**

<table>
<thead>
<tr>
<th>Gender</th>
<th>21 Years and Older</th>
<th>22 Years and Older</th>
<th>Non-HE Background</th>
<th>HE Background</th>
<th>Career Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18 (34.6)</td>
<td>12 (23.1)</td>
<td>33 (59.2)</td>
<td>3 (5.2)</td>
<td>46 (84.6)</td>
</tr>
<tr>
<td>Female</td>
<td>112 (65.4)</td>
<td>88 (76.9)</td>
<td>27 (40.8)</td>
<td>17 (24.8)</td>
<td>14 (25.4)</td>
</tr>
<tr>
<td>Total</td>
<td>130 (69.3)</td>
<td>100 (72.3)</td>
<td>60 (94.4)</td>
<td>16 (22.8)</td>
<td>60 (88.8)</td>
</tr>
</tbody>
</table>

QD=number of questionnaires distributed
QR=number of questionnaires returned
QU=number of usable questionnaires
HE=higher education

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tries, providing a heterogeneous sample for exploring the association between EI and PS. Differences in distributions for gender, age, academic background, and satisfaction with career choice were detected amongst the different countries. Apart from the United States, the majority of students in the dental schools surveyed were female. The majority of students were aged twenty-one years or below, except in the United States where all the students were aged twenty-two years and above. Since many U.S. dental schools require their applicants to have a first degree, it is expected that their applicants would be older. The majority of the students were satisfied with their decision to study dentistry, although the proportions that were satisfied were higher in the United States and England than in Malaysia and Greece.

In each country, an inverse relationship between EI and PS was observed, although in three countries this relationship did not have statistical significance. Results from this survey therefore provide strong support for the inverse correlation previously reported in the literature.\textsuperscript{11,34,35} In addition, EI remained a significant predictor of PS independent of the student’s gender, academic background, or career choice. In other words, irrespective of whether students were male or female, with or without a degree prior to entering dental school, or satisfied or dissatisfied with their career choice, EI remained a predictor of PS. Reports of the association between PS and mental health in medical students have been published in the research literature,\textsuperscript{36-39} including one longitudinal study documenting the predictive ability of PS for future risk of depression.\textsuperscript{40} The finding that EI is inversely associated with PS has two implications. First, it suggests that students with higher EI can cope better with the stressful demands of their training, supporting the proposition for training to enhance EI\textsuperscript{41} in health professions students as part of their curricula. Second, it reinforces the argument that EI, along with the ability to manage stress, is a necessary attribute of professional competence\textsuperscript{25,26} and lends further support to the proposal for using EI as a selection criterion for entry into health professions training.\textsuperscript{28-31}

In this survey, female students did not differ from male students in EI scores, whereas they were more likely to report PS compared to male students. This is consistent with previous studies, which have similarly reported that women are more likely to express their perceptions of stress.\textsuperscript{8,9,11,22,42} Subjective measures used to assess stress levels necessarily rely on how willing respondents are to disclose their experiences of stress. The explanation for higher reported stress in female students may be that female students find it easier to express their experiences of stress than do male students. The results also show that those in the younger age group were more likely to score lower on the EI scale and higher on the PS scale, although the association between age and PS was not significant in regression analysis.

The results also indicated that those who did not possess a higher education degree when entering dental school were more likely to report PS. This may be that students who have completed a degree program are more experienced in coping with the demands of higher education and therefore less likely to feel stressed. There has been an increase in graduate entry programs in medicine and dentistry in the United Kingdom in recent years. The finding that graduate entrants are less likely to report stress will need to be confirmed in future cohorts of graduate entrants in dental schools. Although the selection of graduate entrants is becoming more common in

### Table 2. Cronbach alphas for the EI and PS scales as applied to the different dental schools, males and females, younger and older students, those without and with previous higher education qualification, and those who were not satisfied and satisfied with their decision to study dentistry

<table>
<thead>
<tr>
<th>Country</th>
<th>EI Scale</th>
<th>PS Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>0.87</td>
<td>0.78</td>
</tr>
<tr>
<td>Romania</td>
<td>0.82</td>
<td>0.77</td>
</tr>
<tr>
<td>South Africa</td>
<td>0.87</td>
<td>0.87</td>
</tr>
<tr>
<td>Australia</td>
<td>0.88</td>
<td>0.94</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.86</td>
<td>0.83</td>
</tr>
<tr>
<td>United States</td>
<td>0.87</td>
<td>0.91</td>
</tr>
<tr>
<td>Greece</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>Whole sample</td>
<td>0.87</td>
<td>0.85</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>EI Scale</th>
<th>PS Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0.88</td>
<td>0.85</td>
</tr>
<tr>
<td>Female</td>
<td>0.86</td>
<td>0.85</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>EI Scale</th>
<th>PS Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 years and younger</td>
<td>0.86</td>
<td>0.84</td>
</tr>
<tr>
<td>22 years and older</td>
<td>0.88</td>
<td>0.89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Background</th>
<th>EI Scale</th>
<th>PS Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-HE background</td>
<td>0.87</td>
<td>0.84</td>
</tr>
<tr>
<td>HE background</td>
<td>0.87</td>
<td>0.90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Career Choice</th>
<th>EI Scale</th>
<th>PS Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not satisfied</td>
<td>0.86</td>
<td>0.86</td>
</tr>
<tr>
<td>Satisfied</td>
<td>0.86</td>
<td>0.84</td>
</tr>
</tbody>
</table>

HE=higher education
developed countries, its practice in developing countries may not be practical as the costs of a first degree education followed by training in dentistry would be prohibitive. To select students who can cope better with the challenges of dental training, an assessment of EI may be useful.

In our survey, those students who were satisfied with their decision to study dentistry were less likely to report PS. Satisfaction with the decision to study dentistry may reflect that the student has chosen dentistry as his or her first career choice. This is consistent with previous studies in which students whose entry into dental schools was determined by competitive examinations or by their parents' decision were more likely to report stress. The association between career decision and stress during professional training should be taken into account when reviewing student selection processes at dental schools. To ensure that students who can cope well with stress are admitted to dental training, dental schools should consider selecting from applicants whose first career choice is dentistry.

This survey has identified gender, EI, academic background, and career choice as independent pre-
ditors of PS in first-year dental undergraduates. A limitation of this study is that other factors that may be correlated to PS such as the dental training environment and curricula, teaching and learning methods, and students’ personality traits and learning styles were not examined. The focus of this study has been on some of the personal factors that accompanied students on entry into dental schools. Future research should explore other factors that predispose dental students’ experiences of stress and enable their management of it.

In conclusion, this multinational survey has demonstrated that EI is inversely correlated to PS, independent of students’ academic background and satisfaction with career choice. This finding suggests two possible strategies to manage the issue of stress in dental students: student selection based on EI, and interventions to enhance EI. Although there is ongoing debate as to whether EI can be improved, some evidence exists to suggest that it can be enhanced. Future research is needed to test the impact of these two strategies on perceptions of stress in dental students and also the long-term impact on working dentists.

REFERENCES