



## Stress and Depression among Dental Students at Loma Linda University: A Descriptive Study

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### Abstract:

**Purpose:** The stress experience in dental school is high. Every year students face academic and clinical challenges and the relative levels of these perceived stressors and potentially associated depression are not well established. The goal of this study is to describe dental students' perceived stress and depression levels, and additionally, compares stress and depression levels across demographically-defined groups.

**Methods:** Three hundred and eighteen dental students at Loma Linda University participated in a descriptive, cross-sectional study in the Fall of 2015. Perceived stress and depression were assessed using validated self-report questionnaires. Descriptive and mean comparison tests were performed to compare differences.

**Results:** The response rate for the study was 75%, with a majority of respondents being male. Stress levels were moderate (Dental Environment Scale  $66.4 \pm 17.3$ ), depression levels were low (Center for Epidemiological Studies Depression Scale Revised  $12.1 \pm 11.0$ ). Females had higher levels of stress and depression than males.

**Conclusion:** Stress experienced at dental school is most notable during clinical years, and varies meaningfully by group. Depression follows similar trends.

**Keywords-** Depression, Female, Male, Students, Surveys and Questionnaires, Universities

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### I. Introduction

The challenges of pursuing a medical or dental degree—the demanding schedule and long duration—can place a great deal of pressure on students and lead to feelings of stress and depression [1, 2]. Stress and depression are often correlated but produce different symptoms [1], with stress being a psychological state that occurs when an individual perceives that she or he does not have sufficient resources to meet environmental demands [3]. When a person is repeatedly exposed to stressors, with inadequate time to recover, stress may be considered chronic [4]. The World Health Organization in 1994 recognized stress as an epidemic disease of the 21st century [5] with stress identified as a contributor to metabolic disease [6] and cardiovascular diseases [7]. Furthermore, stress may directly lead to problems such as anxiety and stress [8].

Stress has sometimes been linked with depression, although they are distinct. A large body of literature examining mental health amongst dental students has revealed a significant increase in stress over time. Yet, although high levels of stress have been associated with depression, there is limited research [9]. Amongst students, depression can lead to sadness, loneliness, and poor concentration. It can be long lasting and impair the

ability for students to function at school [9]. Depressed individuals might spend time thinking of ways to rationalize why they feel guilty, have trouble making decisions, and have problems with memory [10] and may jeopardize relationships by becoming aggressive or very dependent [11]. Depression is known to decrease quality of life [12] and healthy behaviors [13]. As a result of these behaviors, depression also may compromise job performance, [14, 15] which may exact a particularly heavy toll for dental students.

### **1.1 Stress in Dentistry**

Dentistry can be a stressful profession [16]. Among dentists, stress can be caused by the nature of the dentistry profession. This can include clinical work, working with patients who may be anxious, and time pressures [4]. Furthermore, students have to endure long study hours, inadequate sleep due to rotations, long hours of standing, and mental fatigue [17]. This can often times lead to burnout, defined as a prolonged response to chronic stressors [18]. Dental students often exhibit exhaustion which is associated with increased academic responsibility. First year dental students report higher level of stress due to the demanding learning environment both theoretical and clinical [18]. Dental procedures require high attentiveness with precise hand movements, sometimes combined with a strong grip, which demands a level of finesse that produces more stress for the dentist [19]. Managing patient fears, maintaining a good relationship with patients, keeping up with scheduling, and managing staff and finances may also increase levels of stress felt by dentists [20]. Dental students are likely to experience some of these same stressors, combined with academic pressures [21, 22]. Generally, dental school stressors can include large amounts of classwork, dealing with difficult patients, and learning clinical procedures [22].

### **1.2 Depression among Dentists and Dental Students**

Long term stress has been associated with depression [9]. Students enrolled in dental school are at high risk for experiencing high pressure, specifically due to the vast amount of information they must learn. Compared to the general population, current research reveals that dental students report higher levels of stress and depression [9]. Studies revealed that students may have similar level of depression and stress comparable to the general population, however, this increases during medical school [9]. Uncontrolled chronic stress can lead to depression and depressive-like symptoms [23, 24]. Dental students simultaneously face two similar yet distinct types of stress — academic and occupational — as they learn to integrate their dual roles as graduate students and clinical practitioners [22, 25]. The nature of the relationship between stress and depression may be reciprocal [26]. Thus, depressed dental students may enter continuous unhealthy cycles even after graduation and becoming professional dentists [27]. This puts them at risk for negative health outcomes such as heart disease [28] and cancer [29]. However, not all students have the same stress or depression experience from the school environment, since many other demographic and predisposing factors may affect that experience

### **1.3 Demographic and Other Predisposing Factors for Stress**

Within the same dental school environment, stress experiences vary across students according to many criteria. Age can influence the stress experience, with older individuals tending to experience more stress than younger individuals, in particular dental students older than 30 years suffered higher stress levels than younger students [30]. This was due to differences in lifestyle with young adults tending to be more overwhelmed from multiple stressors at the same time such as dealing with children and employment. Some have found no sex-related difference among dental students when it comes to stress levels [18]. However, the prevalence of depression among female students is much higher than males [17]. Though these rates may be associated with breakups and marital status, depression is reported higher among unmarried women [17]. Gender may also be relevant to perceived stress levels, perhaps due to differences in coping. For example, some have found that women experienced greater stress than men and also were more likely to use emotion-focused coping than men [31]. Because emotion-focused coping is less likely to ameliorate the stressful conditions, a tendency to use this approach might allow the stressors to persist, resulting in longer-term exposure to those stressors. Race and ethnicity may also play a role in the stress experience. Researchers note that discrimination is a frequently-

experienced stressor for members of minority groups [32]. Related to this, those with lower socioeconomic status (SES; which correlates with minority status) have greater stress than those with higher SES [32]. Furthermore, food insecurity among students is associated with increased stress and worsened academic performance[33].

The types of experiences and associated stressors encountered vary somewhat across the years of dental school[27]; as students in the two primary years of study are likely to experience less stress than those in the two advanced years, since their patient and clinical exposures are fewer. Finally, academic performance is also seen as relevant to the experience of stress, with lower grade point averages (GPA) associated with greater perceived stress. Each of the described differences in stress may also be reflected in measures of depression, since stress and depression are linked[34, 35].The present study assesses perceived stress and depression levels in a sample of dental students and compares these perceptions across demographic and other groups.

## **II. Methods**

For this cross-sectional study, a onetime anonymous survey was distributed to dental students at one university.

### **2.1 Participants**

Dental students at Loma Linda University from the Doctor of Dental Surgery (DDS) program, the International Dentist Program (IDP), and the Advanced Dental Education program (ADEP) were invited to the study. Of 454 students, 318 of dental students participated in the study. The mean age was  $26.68 \pm 3.74$  years with more males (57.9%) than females. The majority of respondents were second (29.6%) and third (29.0%) year DDS students, while 25.2% were fourth year DDS, 8.5% were IDP, and 7.6% were ADEP. A majority of the participants were Asians (41%) and Caucasians (non-Hispanic) (27.4%) (See Table 1).

### **2.2 Procedures and Recruitment**

An email which included a recruitment letter, advertising flyer with day, time, and location of the study, and a link to an electronic copy of the study was sent to all dental students via the Student Affairs Office. Interested participants completed the study online or attended one of the in-person sessions to complete a hard copy version of the questionnaire. In-person sessions were scheduled on multiple days, but not on days that included testing or other particularly stressful experiences for students. All participants completed informed consent prior to participation. The study was approved by Loma Linda University's Institutional Review Board (IRB # 150119).

### **2.3 Measures**

The primary variables in this study were perceived stress and depression. Comparison variables include age, gender, race/ethnicity, socioeconomic status, class year, and recent grade point average (GPA).

Perceived stress was assessed using the 38-item Dental Environment Scale (DES)[22], a questionnaire created to assess the particular stress experience encountered by members of the dental profession. Responses are on a 4-point Likert scale with response options ranging from "not stressful," to "very stressful." All responses were summed and the score range was 25 to 116. Depression was assessed using the CESD-R[36]. This scale is comprised of 20 items, with responses on a 5-point Likert scale with response options ranging from "not at all or less than one day" to "nearly every day for 2 weeks," indicating the frequency with which the respondent experienced certain feelings, thoughts, and behaviors. All scores were summed and the range was 0 to 60, as the rarely used extreme values of 4 were collapsed so a four-point scale was used for analysis.

For the comparison analysis, all grouping variables were considered as categorical. To measure the trend of change with stress and depression, age and GPA were considered as continuous variables. In order to make the group comparisons, age was categorized into four groups as follows: 20-23 years, 24-27 years, 28-32 year, and 33 years and older. GPA was dichotomized around the mean value, which was 3.41 (see Table 2).

## 2.4 Statistical Analysis

The statistical software package SPSS 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) was used to perform the statistical analysis. We used t-tests, linear regression and ANOVAs for mean comparisons.

Table 1. Demographics and descriptive analysis of stress and depression.

n=318		Measurement
Age (years)		26.82 ± 3.74*
Last quarter GPA		3.41 ± .38*
Stress (38 items, $\alpha = .91^{**}$ )		66.4 ± 17.3
Depression (20 items, $\alpha = .93$ )		12.1 ± 11.0
Gender		
	Male	184 (57.9)***
	Female	133 (41.8)
	Missing	1 (.03)
Race/ethnicity		
	Hispanic or Latino	29 (9.1)
	Caucasian (non-Hispanic)	87 (27.4)
	Asian	13 (4.2)
	Middle Eastern	39 (12.3)
	Others	31 (9.7)
	Missing	1 (.03)
Socioeconomic status		
	Less than \$24,999	91 (28.6)
	\$ 25,000 through \$ 49,999	42 (13.2)
	\$50,000 and greater	125 (39.3)
	No response	60 (18.9)
Class year		
	Second year DDS	95 (29.8)
	Third year DDS	92 (28.9)
	Fourth year DDS	80 (25.2)
	International Dentist Program	27 (8.5)
	Advanced Dental Education program	24 (7.6)

## III. RESULTS

The response rate in this study was 75.0% (n = 318/454). Table 1 describes the characteristics of the responders. Approximately 39.3% fell into the highest SES grouping and 29.6% were in the lowest group. The mean GPA was moderately high: 3.41 ± .38. Participants showed moderate levels of stress (66.40 ± 17.30) and low levels of depression (12.10 ± 11.00).

In Table 2 we can see that stress levels differed significantly by age groups (p = .005). The lowest stress was for those 20 to 23 years of age and the highest stress for those greater than 33 years of age. Females showed significantly higher levels of stress (70.60 ± 16.40, p < .001) than males (63.5 ± 17.3). A significant difference was also found between racial/ethnic groups (p < .001), with Middle Easterners reporting higher stress (77.10 ± 14.90) than Caucasians (64.4 ± 16.0). No significant differences were reported in stress levels of dental students from different SES groups (p = .833). Though not significant with ANOVA, second year students showed lower stress levels (57.5 ± 16.6) compared to fourth year students (73.6 ± 15.6). Lastly, no significant difference was found in perceived stress for students with a GPA of 3.41 or higher as compared with those with GPAs of 3.40 or lower (p = .119). For the depression variable, females reported higher rates of depression (12.90 ± 10.60, p < .001) than males (11.4 ± 11.3). There was also a significant difference between race/ethnic groups (p < .014), with Middle Easterners showing higher depression levels (18.20 ± 13.80, p < .001).

than the other racial/ethnic groups. There were no significant differences in depression based on age group, socio-economic status, class year, and GPA.

**Table 2** Descriptive analysis of level of stress and depression among dental students according to their race/ethnicity, socioeconomic status and class year category.

Age	N	Stress Mean ± SD	p	Depression Mean ± SD	p
20– 23 years	47	58.8 ± 13.8	.005*	11.8 ± 9.9	.983*
24 – 27 years	151	66.8 ± 16.9		11.6 ± 10.0	
28 – 32 years	88	67.8 ± 17.8		12.8 ± 13.3	
33 > years	25	72.0 ± 18.8		12.2 ± 9.5	
<b>Race/ethnicity</b>					
Hispanic or Latino	29	64.4 ± 16.2	.001	10.2 ± 8.9	.014
Caucasian (non-Hispanic)	85	64.4 ± 16.0		10.6 ± 9.8	
Asian	130	65.6 ± 18.5		11.7 ± 10.6	
Middle Eastern	39	77.1 ± 14.9		18.2 ± 13.8	
Others	31	62.9 ± 13.8		11.3 ± 11.7	
<b>Socioeconomic status</b>					
Low (Less than \$24,999)	91	66.8 ± 17.4	.833	12.6 ± 11.4	.722
Moderate (\$25,000 through \$49,999)	40	64.5 ± 16.7		10.7 ± 10.9	
High (\$50,000 and greater)	124	66.2 ± 17.1		11.5 ± 10.3	
No response	59	67.0 ± 17.8		13.2 ± 11.9	
<b>Class year</b>					
Second DDS year	95	57.5 ± 16.6	.001	9.7 ± 8.3	.394
Third DDS year	89	65.9 ± 14.5		12.1 ± 10.7	
Fourth DDS year	79	73.6 ± 15.6		13.4 ± 11.8	
International Dentist Program	27	72.2 ± 18.8		12.9 ± 12.7	
Advanced Dental Education Program	24	72.8 ± 17.4		13.9 ± 15.1	
<b>Gender</b>					
Males	182	63.5 ± 17.3	.001**	11.4 ± 11.3	.001**
Females	132	70.6 ± 16.4		12.9 ± 10.6	
<b>GPA</b>					
<3.40	134	64.8 ± 17.3	.119	12.6 ± 10.8	.404
>3.41	148	68.0 ± 17.1		11.5 ± 11.17	

Mean ± Standard Deviation. P values for either Independent t-test or Analysis of Variance

#### IV. CONCLUSION

As with any experience, stress varies from person to person. Because stress is a risk factor for a variety of negative health outcomes, it is important to understand perceived stress and how it may vary across identifiable groups. According to our results, age may be an important factor in the stress experience of dental students. Likewise, gender, race/ethnicity and class year are factors that are related to differential levels of self-reported stress among dental students, a finding that is consistent with other's results[31]. When looking at class years, we found that stress seems to increase during the last two class years: 3rd and 4th year of the DDS program, the international dentist program, and the advanced dental education program (Table 2). One possible reason for this is that these class years are clinically oriented, with students starting to see patients at the dental clinic, which may add to their existing academic stressors. As clinical responsibilities increase, so do stress levels, with higher levels in the international dentist program, and the highest levels in the advanced dental education program. Students in both these programs are expected to deal with more patients and more complicated cases. This, too, is consistent with findings from other researchers such as Al-Sowygh[34] and Deshpande and Chari [37] that clinical years (3rd and 4th years) were higher in stress levels than pre-clinical years (1st and 2nd). However, an alternative explanation, could be related to age and changing life roles.

Higher level students often found to have worse mental health compared to lower level students. One intermediate pathway is that prolonged stress may lead to burn-out [38]. We also found that older students (over age 33) reported higher levels of stress than younger and this may be in part because older students are more likely to have families and more extensive extracurricular obligations than are younger students. This study did not assess these potential explanatory variables, so this hypothesis cannot be examined. But it should be kept in mind that age and class year are, to some degree, confounded in this analysis. We think it is likely that age/responsibility and clinical pressure factors are working together to create the greater perceived stress reported by students in the later clinical years. The associations of age and higher levels of schooling are further compounded in that at Loma Linda University Dental School, students in the International Dentist program, a two-year program to help dentists who trained overseas prepare for their US dental license, are exposed to larger numbers of patients than students in any year of the DDS program, while those in the Advanced Dental Education program see more patients and much more complicated cases than all other class years. Hence, stress levels are expected to increase across class years.

Despite relatively high levels of reported stress, depression levels were found to be low. Other researchers, such as KirsiAhola and JariHakanen[26], have linked the stress from dental practice with depression through burnout and emotional strain. The relatively low levels of depression we observed, in spite of the relatively high stress, suggests that although stress is experienced, students are likely to be coping with it effectively. Although stress differs according to some of the factors examined, there is no significant translation of this differential stress into differential depression by group, which suggests that the groups are equally able to manage their stress in ways that minimize feelings of depression. This study occurred at an explicitly faith-based university which emphasizes wholeness and religious/spiritual coping [39]. Though there is evidence that an emphasis on religion may reduce both stress and depression among students [40], we did not explicitly examine such factors in the present study.

The only exception was Middle Easterners, who were significantly higher than other groups on both stress and depression. This may be explained by two factors: most Middle Eastern students are all in the International Dentist Program, a more advanced program than the DDS, which may explain the higher levels of emotional strain and exhaustion. Another factor may be that because Middle Easterners are new to the U.S., the stressors related to adapting to a new environment as well as family and financial pressures, might exacerbate the experience of stress, and also depression. These same factors might also diminish coping abilities, as extended family and close friends are unlikely to be present and other resources may be unknown or difficult to access.

Further research and intervention should focus particularly on at-risk groups: students older than 33 years, females, Middle Easterners, and students in the fourth year of the DDS program, the International Dentist

Program, and the Advanced Dental Education Program. Screening protocols to identify those at risk might be useful, and an accelerated plan for early intervention including referrals to the student counseling center, brief stress management training, and social activities to encourage social support. In general, the dental school environment is stressful to students regardless of their demographic characteristics. Students' mental health status can be affected by such an environment and although it is important to provide adequate resources for all students, those at particular risk might benefit from targeted guidance toward those resources. Awareness of the issues of stress and depression, on the part of both school staff and students, is an important step toward enhancing mental health among dental students.

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