



Original Article

High levels of burnout and depression in a population of senior dental students in a school of dentistry in Korea



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KEYWORDS

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Background/purpose: Dental students are exposed to highly stressful environments, making them high-risk for burnout and depression. This study intended to investigate the burnout and depression level in senior dental students in Korea.

Materials and methods: We conducted a cross-sectional questionnaire study among third- and fourth-year dental students enrolled at Seoul National University. Demographic data, Maslach Burnout Inventory (MBI), Patient Health Questionnaire (PHQ-9), dental education satisfaction, and counseling needs were measured. Statistical analyses included intergroup comparison of MBI subscales (emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA)) to identify the risk factors for burnout. Correlation analyses between MBI subscales and PHQ-9 were also conducted.

Results: Among 112 students included in the study, 44.6% had high EE, 36.6% showed high DP, and 51.8% had low PA. There were 20 (17.9%) students who satisfied burnout criteria on all three subscales. There were 19 (17.0%) students with PHQ-9 scores of 10 or greater. There were no significant differences in MBI subscales or PHQ-9 scores according to sex, study year, marital status, funding for studies, or academic grade, but there was a difference according to academic workload. All MBI subscales had significant correlation with PHQ-9 score. Burnout students reported significantly lower satisfaction scores and greater need for counseling compared to non-burnout students.

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Conclusion: Burnout and depression levels among dental students in Korea were relatively high and intercorrelated. Burnout level was significantly associated with high academic workload. Students experiencing burnout were likely to be dissatisfied with their education programs and likely to need counseling.

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Introduction

Dentistry is a challenging profession characterized by exposure to both physical and emotional stressors.^{1,2} Dental treatments commonly involve complex time-consuming procedures using sharp instruments that can introduce undesirable complications for patients or accidental injury to dentists.² Dentists must also deal with anxious patients who express fear of pain related to dental treatments.^{1–3} Prolonged exposure to such stressors and accumulation of negative effects from stress can lead to burnout.^{3,4}

Burnout traditionally has been described using three dimensions: increased emotional exhaustion (EE), increased depersonalization (DP), and decreased level of personal accomplishment (PA).^{5,6} Increased EE defined as chronic physical and emotional depletion that results from continuous excessive stress.^{3,7} Increased DP is characterized as a condition in which a person becomes insensitive and cynical toward others, and decreased PA is defined as negative self-evaluation due to a lack of professional achievement.^{3,7}

While studying dentistry, dental students are exposed to the above-mentioned stressors. In addition, dental education is highly demanding, as it requires both theoretical and clinical education that involves treating actual patients.^{4,8} Although some stress during education might be beneficial as a stimulus for learning dentistry, chronic uncontrolled stress can result in burnout.^{4,9,10} In fact, dental students are known to exhibit higher prevalence of burnout compared to medical students.^{7,11,12}

Although burnout is an important issue in dental education, it has not been widely reported in the literature, especially in Asian countries. The objective of the present study is to assess burnout and risk factors for burnout among Korean dental students. We also evaluated depression level, dental education satisfaction, and counseling needs related to burnout.

Materials and methods

Subjects

A cross-sectional survey was conducted during a 2-week period in November 2019. Dental students at the Seoul National University School of Dentistry were invited to participate in this study. Only third- and fourth-year students were recruited since students do not participate in clinical practice during the first two years. Each volunteer

provided informed consent and did not receive any compensation for participation.

The study protocol of the present study was approved by the Institutional Review Board (IRB) of Seoul National University Dental Hospital, Seoul, Korea (CRI19013). The study was conducted in full accordance with the World Medical Association Declaration of Helsinki.

Survey

The survey included questions regarding sex, age, study year, marital status, funding for studies (private, loan, scholarship), academic grades (low, intermediate, high), and academic workload (<40 h per week, 40–50 h per week, ≥50 h per week). Students were asked to calculate their academic workload by including all class hours, clinical practice hours, and self-studying hours. Students were told that 40 h per week can be seen as approximately eight hours per weekday.

Maslach Burnout Inventory (MBI) – Human Service Survey, a 22-item questionnaire frequently used for healthcare professionals, was used to assess burnout in three subscales: EE (9 items), DP (5 items), and PA (8 items). The MBI asks respondents to answer the frequency of burnout on a 7-point Likert scale, ranging from 0 (never) to 6 (every day). It is considered to be a well-validated gold standard method for measuring burnout among medical healthcare professionals.^{9,13} The subscale score thresholds for identifying burnout are as follows: EE ≥ 26, DP ≥ 10, and PA ≤ 33.¹⁴ Those who fulfilled all three subscores threshold were defined as burnout student.

Patient Health Questionnaire (PHQ-9) scores were used to measure depressive symptoms among students.¹⁵ The PHQ-9 is a nine-item questionnaire that asks respondents how often symptoms of depression have occurred during the last two weeks on a 4-point Likert scale, ranging from “not at all” to “all the time”.^{9,15} This scale is reliable and valid tool for screening depression as well as measuring depression severity.^{15,16} The levels of depression severity according to PHQ-9 score can be grouped as follows: 0–4 (minimal), 5–9 (mild), 10–14 (moderate), 15–19 (moderately severe), and 20–27 (severe).^{9,15} PHQ-9 scores of 10 or greater have a sensitivity of 88% and a specificity of 88% for major depression.¹⁵

Finally, the students were asked if they were satisfied with their current dental education program and if they needed psychological counseling. Satisfaction with dental education and need for counseling were assessed using a 5-point Likert scale, ranging from “strongly dissatisfied/not need” to “strongly satisfied/need”.

Statistical analysis

Statistical comparisons were carried out using SPSS software 20.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (mean, standard deviation, frequency) were calculated for study variables. The Student's *t*-test or Mann–Whitney U test was performed to determine the significance of differences in scores (MBI subscales, PHQ-9 score, satisfaction score, and need for counseling score) between two groups. The one-way analysis of variance (ANOVA) or Kruskal–Wallis test was performed to determine the significance of differences in scores (MBI subscales, PHQ-9 score) between three groups. Pearson's correlation coefficient test was used to calculate the correlation between each MBI subscale and PHQ-9 score. A value of $p < 0.05$ was considered statistically significant.

Results

A total of 123 students among 160 eligible students participated in the survey (response rate 76.9%). Eleven students were excluded from the analysis, because they did not answer one or more questionnaire item. Therefore, 112 students were included in the study. There were 62 (55.4%) male students, and the mean age was 26.8 years (range, 23–36). There were 49 (43.8%) third-year students and 63 (56.3%) fourth-year students. The majority of them were not married (93.8%), and supported their studies using private funding sources (78.6%). Regarding academic workload, 35.7% of students reported less than 40 h per week, whereas 38.4% reported 50 h or more per week (Table 1).

Table 1 Characteristics of study sample.

Age (mean \pm standard deviation)	26.8 \pm 2.4
Sex	<i>n</i> (%)
Male	62 (55.4%)
Female	50 (44.6%)
Study year	<i>n</i> (%)
3rd	49 (43.8%)
4th	63 (56.3%)
Marital status	<i>n</i> (%)
Single	105 (93.8%)
Married	7 (6.3%)
Funding for studies	<i>n</i> (%)
Private	88 (78.6%)
Loan	22 (19.6%)
Scholarship	2 (1.8%)
Academic grade	<i>n</i> (%)
Low	30 (26.8%)
Intermediate	48 (42.9%)
High	34 (30.4%)
Academic workload	<i>n</i> (%)
<40 h per week	40 (35.7%)
40–50 h per week	29 (25.9%)
\geq 50 h per week	43 (38.4%)

Burnout and depression

The internal consistencies of MBI subscales (EE, DP, PA) and PHQ-9 scores were satisfactory (Cronbach's α : EE = 0.86, DP = 0.78, PA = 0.74, PHQ-9 = 0.90). For each dimension of MBI, 50 (44.6%) dental students had high EE scores, 41 (36.6%) students showed high DP scores, and 58 (51.8%) students had low PA scores. There were 20 (17.9%) students who satisfied burnout criteria on all three subscales. According to PHQ-9 score, 59 (52.7%) students were classified as minimally depressed, 34 (30.4%) students as mildly depressed, 10 (8.9%) students as moderately depressed, six (5.4%) students as moderately severely depressed, and three (2.7%) students as severely depressed. Therefore, 19 (17.0%) dental student had PHQ-9 scores of 10 or greater.

There were no statistically significant differences in MBI subscales or PHQ-9 scores according to sex, study year, marital status, funding for studies, or academic grade. However, EE and DP scores were significantly different according to academic workload. Bonferroni post-hoc analysis showed that students with 50 h or greater academic workload per week had significantly higher EE scores ($p = 0.003$) and DP scores ($p = 0.018$) compared to students with less than 40 h of work per week (Table 2).

Depressive symptoms were positively correlated with EE score ($r = 0.625$) and DP ($r = 0.463$) score and negatively correlated with PA score ($r = -0.208$). These correlations were all statistically significant (Table 3).

Satisfaction and need for counseling

Satisfaction with their current dental education program and need for counseling were compared between students reporting burnout and students who did not report burnout. Burnout students, who satisfied all three subscale criteria for burnout, reported significantly lower satisfaction scores and greater need for counseling compared to non-burnout students. In specific, students with high EE scores had significantly lower satisfaction scores and greater need for counseling. Students with high DP scores also had significantly lower satisfaction scores and greater need for counseling. Students with low PA scores exhibited significantly lower satisfaction with their education program (Table 4).

Discussion

Dental students, especially during the clinical education period, are exposed to highly demanding and stressful environments requiring both theoretical and clinical training including interactions with actual patients.^{2,4,8} Prolonged mismatch between situational demands and individual student's coping capacities to stress can result in burnout.² Burnout impairs both personal and social functioning and often results in damage to physical and mental health.^{1,4,12} Negative psychological outcomes of burnout include lack of academic achievement, absenteeism, abandonment of career, depression, substance abuse, and even suicidal ideation.^{4,6,9,17,18} Therefore, burnout is not a psychological phenomenon limited to workplace or school, but can be problematic in personal and social life.¹⁸

Table 2 Maslach Burnout Inventory subscales and Patient Health Questionnaire (PHQ-9) scores according to characteristics of dental students (mean \pm standard deviation).

	EE	DP	PA	PHQ-9
Sex				
Male	23.1 \pm 9.9	11.0 \pm 5.2	31.1 \pm 7.5	5.0 \pm 4.3
Female	26.9 \pm 10.3	12.0 \pm 7.1	29.5 \pm 6.1	6.5 \pm 6.0
	$p = 0.055^a$	$p = 0.370^a$	$p = 0.222^a$	$p = 0.151^a$
Study year				
3rd	25.8 \pm 10.3	11.8 \pm 6.4	30.0 \pm 7.0	6.6 \pm 5.6
4th	24.0 \pm 10.2	11.1 \pm 6.0	30.7 \pm 6.8	5.0 \pm 4.7
	$p = 0.347^a$	$p = 0.568^a$	$p = 0.600^a$	$p = 0.088^a$
Marital status				
Single	24.6 \pm 10.2	11.4 \pm 6.2	30.7 \pm 6.8	5.5 \pm 5.1
Married	27.1 \pm 10.2	12.3 \pm 6.6	26.1 \pm 7.9	8.6 \pm 5.2
	$p = 0.420^b$	$p = 0.763^b$	$p = 0.125^b$	$p = 0.099^b$
Funding for studies				
Private	34.0 \pm 12.3	15.2 \pm 5.9	36.1 \pm 6.3	6.3 \pm 5.6
Loan	32.6 \pm 9.7	16.4 \pm 6.2	38.9 \pm 7.0	5.6 \pm 5.1
Scholarship	27.0 \pm 8.5	9.0	40.5 \pm 9.2	4.5 \pm 2.1
	$p = 0.577^c$	$p = 0.154^c$	$p = 0.210^c$	$p = 0.849^c$
Academic grade				
Low	21.6 \pm 10.0	10.6 \pm 5.4	28.8 \pm 7.4	5.3 \pm 5.7
Intermediate	26.0 \pm 11.3	11.3 \pm 6.9	31.8 \pm 5.7	6.5 \pm 5.9
High	26.0 \pm 8.4	12.4 \pm 5.7	29.8 \pm 7.8	4.9 \pm 3.1
	$p = 0.127^d$	$p = 0.498^d$	$p = 0.151^d$	$p = 0.361^d$
Academic workload				
<40 h/week	20.9 \pm 10.7	9.9 \pm 6.7	30.2 \pm 7.6	5.3 \pm 5.2
40–50 h/week	25.1 \pm 8.0	10.4 \pm 5.0	30.5 \pm 6.9	5.4 \pm 4.7
\geq 50 h per week	28.2 \pm 9.9**	13.6 \pm 5.8**	30.6 \pm 6.4	6.3 \pm 5.5
	$p = 0.004^{**}$	$p = 0.012^{**}$	$p = 0.965^d$	$p = 0.659^d$

*Statistically significant according to one-way analysis of variance test, $p < 0.05$.

**Significantly higher than the '<40 h/week' group according to Bonferroni post-hoc analysis, $p < 0.05$.

DP: depersonalization.

EE: emotional exhaustion.

PA: personal accomplishment.

^a Student's *t*-test.

^b Mann–Whitney U test.

^c Kruskal–Wallis test.

^d One-way analysis of variance test.

Table 3 Correlations between Maslach Burnout Inventory subscales and Patient Health Questionnaire (PHQ-9) scores.

	EE	DP	PA
PHQ-9	$r = 0.625^*$	$r = 0.463^*$	$r = -0.208^*$
	$p < 0.001$	$p < 0.001$	$p = 0.028$

*Statistically significant according to Pearson's correlation coefficient test, $p < 0.05$.

DP: depersonalization.

EE: emotional exhaustion.

PA: personal accomplishment.

In our study, 17.9% of dental students were burnout and the percentage of students who fulfilled cut-off score for each MBI subscales were high (44.6% high EE, 36.6% high DP and 51.8% low PA). These levels are higher than those found in a recent study in the US showing that 34% of dental students were experiencing burnout according to the EE score, while the rate of burnout was 17% according to DP score and 22% according to PA score.⁹ Direct comparisons between studies in different countries should be made with

caution, but the burnout level among Korean dental students was found to be higher than in other countries according to previous studies.^{2,4,9,11,12,17} A unique finding of our study is that a high percentage of students had low PA scores, meaning that many Korean dental students had negative feeling about their competence and self-achievement. The reason for this finding is unknown and needs to be identified in further studies. Regardless, dental educators must be remain aware of this finding since

Table 4 Satisfaction with dental education and need for counseling among burnout and non-burnout dental students (mean \pm standard deviation).

	EE		DP		PA		Burnout	
	High EE (n = 50)	Non-burnout (n = 62)	High DP (n = 41)	Non-burnout (n = 71)	Low PA (n = 58)	Non-burnout (n = 54)	Burnout (n = 20)	Non-burnout (n = 92)
Satisfaction	3.2 \pm 0.8*	3.9 \pm 0.8	3.3 \pm 0.8*	3.7 \pm 0.9	3.2 \pm 0.7*	4.0 \pm 0.8	3.0 \pm 0.5*	3.7 \pm 0.9
	$p < 0.001^a$		$p = 0.021^a$		$p < 0.001^a$		$p < 0.001^b$	
Need for counseling	3.4 \pm 1.0*	2.7 \pm 1.0	3.5 \pm 1.0*	2.8 \pm 1.0	3.1 \pm 1.0	3.0 \pm 1.1	3.7 \pm 0.9*	2.9 \pm 1.0
	$p < 0.001^a$		$p = 0.001^a$		$p = 0.941^a$		$p = 0.002^b$	

*Significantly different from non-burnout group according to Student's *t*-test or Mann–Whitney U test, $p < 0.05$.

DP: depersonalization.

EE: emotional exhaustion.

PA: personal accomplishment.

^a Student's *t*-test.

^b Mann–Whitney U test.

suicidal ideation has been shown to be related to low PA in dental students.⁹

Investigation of potential risk factors for burnout in dental students is important in dental education research. Identifying risk factors will enable dental educators to screen or monitor dental students who are at high risk for burnout. A recent systematic review showed that younger age, male, certain personality type, student status (especially for clinical degree programs), and high job-strain/working hours are associated with increased prevalence of burnout in dentists and dental students.⁶ Since the current study exclusively involves third- and fourth-year dental students, most in their late 20s, it would be unreasonable to assess the effect of age on burnout. We did not identify any differences in burnout level among female and male students. This finding is consistent with those of previous studies of dental students.^{4,7,9,11,17} Although a previous study in Korea showed that male dentists were at higher risk for burnout,³ this might not apply to dental students. One previous study mentioned that being married is a risk factor for burnout in dental students,¹⁷ but we could not detect this relationship. This may be due to the limited number of married students in our study. Some studies showed that students in certain grades (e.g., fourth year of a five-year program) had higher levels of burnout,^{7,19} but this finding was not observed in the current study. As for academic workload, students with higher workload (50 h or greater per week) had significantly higher EE and DP scores compared to students with lower workloads. This is consistent with the results of a previous study that showed greater academic overload to be related to increased burnout in dental students,¹⁹ as well as with previous studies that showed dentists who worked longer hours per week had higher burnout levels than dentists who worked fewer hours.^{1,3} Interestingly, actual academic grade was not significantly related to burnout level. Therefore, we suggest that burnout is related to student input (time) to meet their academic demands rather than to objective output (grades).

In addition to burnout, depression among dental students is an issue of concern in dental education. In the current study, 17% of students had at least moderate depressive symptoms, and three students were classified as

having severe depressive symptoms. This rate is higher than that found in a previous study indicating that 10% of dental students were moderately or moderately severely depressed, although no students were severely depressed.⁹ Since depression is known to be closely related to suicidal ideation, the high rates and severity of depressive symptoms should command attention.^{9,19} As in the previous study, all three domains (EE, DP, and PA) in the present study showed significant associations with depressive symptoms.⁹ Burnout and depression are known to be reciprocally related, with constant interactions between each other.^{9,19–21} Although the causal relationship between burnout and depression is not clarified, Ahola and Hakanen suggested that the effect of burnout on depression appears to be stronger than that of depression on burnout.²⁰ Taken together, these results indicate that it should be mandatory for dental schools to screen students experiencing burnout for possible clinical depression.

Burnout in dentists has been shown to be negatively associated with job satisfaction, professional calling, or willingness to reselect dentistry as an occupation.³ Therefore, it is reasonable to suspect that dental students experiencing burnout would feel dissatisfied with their educational programs. As suspected, burnout students had lower satisfaction scores. In addition, many students with burnout (especially high EE and DP students) reported higher needs for counseling compared to students without burnout. This suggests that students experiencing burnout are consciously or subconsciously aware of their condition and tend to seek professional psychological care.

The main limitation of this study is that it recruited participants from a single institution and its relatively small sample size. Therefore, the current study cannot obtain confirmative conclusion about burnout and depression level of senior dental students in Korea. A nationwide study including students from multiple universities is warranted to confirm our findings. Additionally, not all senior dental students from our institution participated and completed the survey. It is possible that burnout students may be reluctant to complete the survey or that they would be more interested to participate because the survey is relevant to them.^{22,23} Finally, this study was a cross-sectional study. Therefore, no causal relationship (e.g., between

burnout and depression) can be identified. Longitudinal follow-up study may further clarify the relationships between factors related to burnout.

In conclusion, burnout and depression level among dental students in Korea were relatively high. Burnout level was associated with academic workload. Compared to students without burnout, students with burnout less satisfied with their educational programs and expressed higher needs for counseling. To reduce the risk and prevalence of burnout, schools should screen for burnout among their students and provide proactive interventions.⁶ For students with actual burnout, schools should provide counseling programs to reduce burnout level and teach coping strategies for daily stressors to increase satisfaction and success in their current programs. In addition, flexibly adjusting the academic burden for these students should be considered. In the long run, improving student coping strategies to deal with stress will have beneficial effects later in their careers as dentists.

Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article.

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