Stress and Burnout of Undergraduate Dental Students in Chulalongkorn University during COVID-19 Pandemic

Keskanya Subbalekha[1], Masron Yuera[2], Ratchanon Chanpeng[2], Win Suwannarat[2],

Pagaporn Pantumwadee Pisarnturakit[3]

[1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry Chulalongkorn University, Bangkok, Thailand

[2]Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

[3]Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

Abstract

The challenge in dental curriculum brings a stressful learning environment. To be competent in patient treatment, adequate practicing time is required. The COVID-19 pandemic control strategies including city lockdown may impact the mental health status of dental students. Therefore, this cross-sectional study was performed to survey the prevalence and the impact of COVID-19 pandemic on stress and burnout of undergraduate dental students (UG). The UG studying at the Faculty of Dentistry, Chulalongkorn University (FDCU) in the academic year 2020 were invited to participate. The self-reported questionnaire was distributed online during 23rd June – 05th July 2021. The stress and burnout level was measured using a specific Thai language questionnaire. Demographic data, personality type, and the level of COVID-19 impaction on the UG's mental health were also collected. Descriptive statistics and ordinal logistic regression were used to investigate the associated factors of stress and burnout with a significance at p-value<0.05. The number of respondents was 180 (30 % response rate), 122 (67.8 %) were female, mean age 21.7 years. The participants who had job stress, began to burnout, and burnout were 66 (36.7 %), 39 (21.7 %), and 36 (20 %), respectively. The attitude during their study was the greatest odds of association with stress and burnout, while the personality type and exercise frequency were also associated factors. The worry of unable to complete the clinical requirements due to COVID-19 lockdown had the highest impact on the 4th and 5th year UG. In conclusions, around 80 % of UG of FDCU had stress and 40 % was classified as burnout. Several associated factors of stress and burnout were identified. The consequences of COVID-19 outbreak impacted the stress level. These results suggest an urgent need to support the UG to improve their mental well-being and quality of life.

Keywords: Burnout, COVID-19, Dental Students, Pandemic, Stress

Correspondence to :

Keskanya Subbalekha, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, 34 Henri-Dunant Road, Patumwan, Bangkok 10330, Thailand E-mail: skeskanya@gmail.com

Introduction

Dental students usually undergo a highly stressful educational environment. As a consequence of the professional requirements, they are challenged to be skillful in both theoretical knowledge and clinical practice. The clinical clerkship, including patient communication and management, face-to-face clinical practice, patient anxiety, limited intraoral accessibility, time pressure, defective instruments, inadequate instruments, as well as the lack of operative skill are potential stressors.[1,2] As a result of prolonged and unmanageable stress, dental students may be at risk of developing a burnout syndrome.

Stress is a complex subjective phenomenon with multivariate processes that result from a broad system of variables involving inputs, outputs, and the mediating activities of appraisal and coping.[3] Burnout is a physical and mental exhaustion commonly related to uncontrollable prolonged excessive workload.[1] There are 3 critical dimensions of this response, including emotional exhaustion, cynicism (a distant attitude toward the job), and reduced professional efficacy.[4] Stress is positively related to emotional exhaustion and depersonalisation and negatively related to personal accomplishment.[5] A number of studies reported the high prevalence of burnout in dentists and dental students.[1,2,6,7] For example, 52, 42.3, and 17.8 % of undergraduate dental students (UG) had emotional exhaustion, high stress, and burnout.[1] Long-term burnout tends to lead to significant long-term effects on the career adaptation.[8] Moreover, other negative consequences of burnout included treatment error, poor quality of life, lack of academic or career achievement, alteration of their current major study, considering dropping out of school, depression, and suicidal ideation.[9-12]

COVID-19, an emerging severe acute respiratory disease, has been widely spread throughout the world and become a public health emergency of international concern since late 2019.[13] It is commonly transmitted from infected person to other persons via hands, saliva, nasal droplets, and surface contacts.[14] The daily routine works of dental practitioners are in close contact with patients and unavoidable exposure to aerosol and droplets splashing out of patients' oral cavity.[15,16] Thus the risk of contracting the disease can be high among dental practitioners. Dental education in the COVID-19 outbreak area was also affected: all lectures, seminar, and meeting were transformed from face-to-face to be online, while laboratory and clinical practices were postponed. These situations caused some degree of mental illness in dental students.[17-19]

Several studies indicated the stress and burnout among UG. Previous study reported a high prevalence of stress in Thai UG[20]; however, the prevalence of burnout has never been studied in Thai UG. Moreover, the impact of COVID-19 pandemic on UG's stress should be clarified. The aims of this study were 1) to investigate the prevalence of stress and burnout in UG and 2) to study the impact of COVID-19 on their stress.

Materials and methods

This cross-section observational study was approved by the Human Research Ethics Committee of the Faculty of Dentistry, Chulalongkorn University (HREC-DCU 2021-029) and registered at the Thai Clinical Trials Registry (TCTR20210430005). The STROBE guidelines and the Helsinki Declaration guidelines were followed.

Data collection

All UG studying in the Faculty of Dentistry, Chulalongkorn University (FDCU) in the academic year 2020 were invited to participate. The self-administered questionnaires were distributed online during June, 23rd to July, 5th 2021. The incomplete answering questionnaires were excluded.

Stress and burnout survey

The questionnaire was divided into 2 main sections. The first section was the demographic data, including sex, age, religion, hometown, current academic year of study, monthly expense allowance, residential status, people whom they were staying with, frequency of exercise, laboratory practice hours, hours of sleep, time spent for traveling to the FDCU, attitude toward dental occupation, family support, and relationships with classmates.

The second section comprised the following 2 instruments:

1) The Maudsley personality inventory (MPI), developed by Eysenck[21] and translated into the Thai language by Professor Dr.Nuntika Thavichachart.[22] The extraversion (E) scale is a measure of social extroversion or sociability, while the neuroticism (N) scale measures the neurotic tendency. The MPI consists of 24 E-scale items and 24 N-scale items. Two points are given to the specified response scale, 1 point to the designated response scale of "Not sure", and 0 score for "No". Therefore, the possible range of scores on the E and N scales is between 0 and 48. The score 0-24 indicates "Introvert" in E scale and "Stable" in N scale, while scores 25-48 indicates "Extrovert" in E scale and "Neuroticism" in N scale. The reliability of Thai MPI was 0.72.[22]

2) The stress and burnout measurement modified from the Maslach Burnout Inventory (MBI) by Professor Dr.Nuntika Thavichachart. The reliability was 0.84.[22] The agreement of both instruments was tested in 15 UG and resulted in a Kappa value of 0.613 which revealed a substantial agreement according to Anthony et al.[23] This questionnaire is composed of 20 items, scoring from 0-4 in each item. The level of stress and burnout is classified as: score 0-25 = Can cope with stress, 26-40 = Job stress, 41-55 = Begin to burnout, 56-80 = Burnout.

Since this study was performed in the 3rd outbreak of COVID-19 pandemic in Thailand, the lecture was held online and the laboratory/clinical practices were not available. These COVID-19 consequences might have some impacts on the UG's mental health, therefore 8 items about the COVID-19 situations were included. Participants were asked to rate 1-5 according to the level of impaction (1= the lowest impact and 5 = the highest impact). All participants were asked to rate 7 items except the item "worry of unable to complete the clinical requirements" that would be rated by the 4th- and 5th-year UG only.

Statistical analysis

The data were analyzed using IBM SPSS Statistics version 25 (IBM, Armonk, NY, USA) and Microsoft Excel (Microsoft, Redmond, DC, USA). Descriptive statistics was used to analyse the data and ordered logistic regression analyses were executed to investigate the associated factors of stress and burnout. A value of $p<0.05$ was considered statistically significant.

Results

Demographic data

Total participants were 180 (29.7 % response rate), including 80 preclinical students (1st to 3rd-year) and 100 clinical students (4th to 6th-year). The average age was 21.70±SD 1.62 years (range 18-25 years). Of all participants, 67.8 % were female, 85.6 % had a GPA of 3.00-4.00, 7.8 % were Buddhism, 63.3 % were Bangkok natives, 68.9 % stayed in their own accommodation, and 45.6 % stayed with their parents, while 30 % were alone. Sixty percent of them were able to reach the FDCU within 30 minutes in the morning. Normally, the allowance per month was of 5,000 to 10,000 Thai Baht. (Table 1)

Table 1 *Characteristics of participants and stress levels*

Characteristics		Number (% of the same class)				Total=180	Proportion (%) of all participants
		Can cope with stress	Job stress	Begin to burnout	Burnout		
		Total=39	Total=66	Total=39	Total=36		
Academic year	1st	7 (41.2)	5 (29.4)	5 (29.4)	0 (0)	17 (100)	17/180 (9.4)
	2nd	7 (24.1)	10 (34.5)	5 (17.2)	7 (24.1)	29 (100)	29/180 (16.1)
	3rd	6 (17.6)	11 (32.4)	7 (20.6)	10 (29.4)	34 (100)	34/180 (18.9)
	4th	5 (13.5)	13 (35.1)	9 (24.3)	10 (27.0)	37 (100)	37/180 (20.6)

Table 1 *Characteristics of participants and stress levels (cont.)*

Characteristics		Number (% of the same class)				Total=180	Proportion (%) of all participants
		Can cope with stress	Job stress	Begin to burnout	Burnout		
		Total=39	Total=66	Total=39	Total=36		
Academic year	5th	8 (18.2)	18 (40.9)	11 (25.0)	7 (15.9)	44 (100)	44/180 (24.4)
	6th	6 (31.6)	9 (47.4)	2 (10.5)	2 (10.5)	19 (100)	19/180 (10.6)
Sex	Male	16 (27.6)	21 (36.2)	11 (19.0)	10 (17.2)	58 (100)	58/180 (32.2)
	Female	23 (18.9)	45 (36.9)	28 (23.0)	26 (21.3)	122 (100)	122/180 (67.8)
Religion	Buddhism	35 (22.2)	58 (36.7)	36 (22.8)	29 (18.4)	158 (100)	158/180 (87.8)
	Islam	1 (33.3)	2 (66.7)	0 (0)	0 (0)	3 (100)	3/180 (1.7)
	Christian	0 (0)	3 (60.0)	0 (0)	2 (40.0)	5 (100)	5/180 (2.8)
	Irreligion	3 (21.4)	3 (21.4)	3 (21.4)	5 (35.7)	14 (100)	14/180 (7.8)
Hometown	Bangkok	27 (23.7)	33 (28.9)	27 (23.7)	27 (23.7)	114 (100)	114/180 (63.3)
	Perimeters area[a]	3 (9.1)	19 (57.6)	6 (18.2)	5 (15.2)	33 (100)	33/180 (18.3)
	Other provinces	9 (27.3)	14 (42.4)	6 (18.2)	4 (12.1)	33 (100)	33/180 (18.3)
Accommodation	My own/ parent's	24 (19.4)	41 (33.1)	31 (25.0)	28 (22.6)	124 (100)	124/180 (68.9)
	University dorm	5 (55.6)	2 (22.2)	1 (11.1)	1 (11.1)	9 (100)	9/180 (5.5)
	Rental apartment	10 (21.3)	23 (48.9)	7 (14.9)	7 (14.9)	47 (100)	47/180 (25.6)
Staying with	Parents	20 (24.4)	24 (29.3)	21 (25.6)	17 (20.7)	82 (100)	82/180 (45.6)
	Alone	12 (22.2)	22 (40.7)	10 (18.5)	10 (18.5)	54 (100)	54/180 (30.0)
	Friends	5 (31.3)	8 (50.0)	2 (12.5)	1 (6.3)	16 (100)	16/180 (8.9)
	Siblings	0 (0)	8 (53.3)	2 (13.3)	5 (33.3)	15 (100)	15/180 8.3)
	Relatives	2 (15.4)	4 (30.8)	4 (30.8)	3 (23.1)	13 (100)	13/180 (7.2)
Travelling time in the morning (minutes)	< 15	9 (24.3)	17 (45.9)	3 (8.1)	8 (21.6)	37 (100)	37/180 (20.6)
	15 to 30	17 (23.9)	20 (28.2)	18 (25.4)	16 (22.5)	71 (100)	71/180 (39.4)
	31 to 60	10 (20.4)	18 (36.7)	14 (28.6)	7 (14.3)	49 (100)	49/180 (27.2)
	> 60	3 (13.0)	11 (47.8)	4 (17.4)	5 (21.7)	23 (100)	23/180 (12.8)
Allowance per month (THB)	< 5,000	9 (21.4)	14 (33.3)	8 (19.0)	11 (26.2)	42 (100)	42/180 (23.3)
	5,000-10,000	16 (20.3)	28 (35.4)	24 (30.4)	11 (13.9)	79 (100)	79/180 (43.9)
	10,001-20,000	14 (26.9)	21 (40.4)	5 (9.6)	12 (23.1)	52 (100)	52/180 (28.9)
	> 20,000	0 (0)	3 (42.9)	2 (28.6)	2 (28.6)	7 (100)	7/180 (3.9)
GPA	Unwilling to answer	2 (50.0)	0 (0)	0 (0)	2 (50.0)	4 (100)	4/180 (2.2)
	2.00-2.99	2 (9.1)	9 (40.9)	3 (13.6)	8 (36.4)	22 (100)	22/180 (12.2)
	3.00-4.00	35 (22.7)	57 (37.0)	36 (23.4)	26 (16.9)	154 (100)	154/180 (85.6)
Exercise frequency	<Once/month	12 (16.2)	26 (35.1)	14 (18.9)	22 (29.7)	74 (100)	74/180 (41.1)
	Once/month	7 (15.6)	20 (44.4)	12 (26.7)	6 (13.3)	45 (100)	45/180 (25.0)
	Once/week	14 (34.1)	15 (36.6)	9 (22.0)	3 (7.3)	41 (100)	41/180 (22.8)
	At least three times/week	6 (30.0)	5 (25.0)	4 (20.0)	5 (25.0)	20 (100)	20/180 (11.1)
Laboratory work (hours per day)	None	13 (29.5)	14 (31.8)	9 (20.5)	8 (18.2)	44 (100)	44/180 (24.4)
	<1	3 (17.6)	6 (35.3)	2 (11.8)	6 (35.3)	17 (100)	17/180 (8.9)

Table 1 *Characteristics of participants and stress levels (cont.)*

Characteristics		Number (% of the same class)				Total=180	Proportion (%) of all participants
		Can cope with stress	Job stress	Begin to burnout	Burnout		
		Total=39	Total=66	Total=39	Total=36		
Laboratory work (hours per day)	1	1 (12.5)	4 (50.0)	2 (25.0)	1 (12.5)	8 (100)	8/180 (5.0)
	2	8 (25.0)	16 (50.0)	4 (12.5)	4 (12.5)	32 (100)	32/180 (17.8)
	3	12 (20.0)	16 (26.7)	20 (33.3)	12 (20.0)	60 (100)	60/180 (33.3)
	>3	2 (10.5)	10 (52.6)	2 (10.5)	5 (26.3)	19 (100)	19/180 (10.6)
Sleeping hours (per night)	<4	1 (50.0)	0 (0)	0 (0)	1 (50.0)	2 (100)	2/180 (1.1)
	4-6	10 (16.9)	22 (37.3)	14 (23.7)	13 (22.0)	59 (100)	59/180 (32.8)
	6-8	25 (22.3)	42 (37.5)	24 (21.4)	21 (18.8)	112 (100)	112/180 (62.2)
	>8	3 (42.9)	2 (28.6)	1 (14.3)	1 (14.3)	7 (100)	7/180 (3.9)
The decision of studying was led by	Myself	39 (25.0)	53 (34.0)	32 (20.5)	32 (20.5)	156 (100)	156/180 (86.7)
	Parents	0 (0)	10 (52.6)	5 (26.3)	4 (21.1)	19 (100)	19/180 (10.6)
	Friends	0 (0)	3 (60.0)	2 (40.0)	0 (0)	5 (100)	5/180 (2.8)
Current attitude	Still want to be a dentist	38 (34.9)	41 (37.6)	18 (16.5)	12 (11.0)	109 (100)	109/180 (60.6)
	Unsure	1 (1.9)	22 (41.5)	19 (35.8)	11 (20.8)	53 (100)	53/180 (29.4)
	Prefer not to be a dentist	0 (0)	3 (16.7)	2 (11.1)	13 (72.2)	18 (100)	18/180 (10.0)
Psychological support from the family	Well supported	35 (22.6)	57 (36.8)	34 (21.9)	29 (18.7)	155 (100)	155/180 (86.1)
	Moderately supported	4 (16.0)	9 (36.0)	5 (20.0)	7 (28.0)	25 (100)	25/180 (13.9)
	Poorly/no supported	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0/180 (0)
Relationship with the classmates	Excellent	15 (29.4)	12 (23.5)	11 (21.6)	13 (25.5)	51 (100)	51/180 (27.8)
	Good	19 (19.0)	43 (43.0)	23 (23.0)	15 (15.0)	100 (100)	100/180 (56.1)
	Fair	5 (18.5)	10 (37.0)	4 (14.8)	8 (29.6)	27 (100)	27/180 (15.0)
	Bad	0 (0)	1 (50.0)	1 (50.0)	0 (0)	2 (100)	2/180 (1.1)
	Worst	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0/180 (0)
Personality type	Extrovert	25 (25.8)	39 (40.2)	18 (18.6)	15 (15.5)	97 (100)	97/180 (53.9)
	Introvert	14 (16.9)	27 (32.5)	21 (25.3)	21 (25.3)	83 (100)	83/180 (46.1)
	Neuroticism	13 (11.0)	42 (35.6)	32 (27.1)	31 (26.3)	118 (100)	118/180 (65.6)
	Stable	26 (41.9)	24 (38.7)	7 (11.3)	5 (8.1)	62 (100)	62/180 (34.4)

[a]*Perimeter area of Bangkok: Nakhon Pathom, Pathum Thani, Nonthaburi, Samut Prakarn, and Samut Sakhon*

Lifestyle activities

Only 11.1 % of UG exercised at least 3 times per week. One third of them spent around 3 hours and 10.6 % spent more than 3 hours per days beyond studying hours for laboratory work. For 24.4 % who did not spend time on laboratory practice were mainly the 1st-year UG. However, 66 % got enough sleep hours (at least 6 hours per night). (Table 1)

Attitude of studying dentistry, psychological support, and personality type

Around 87 % made their own decision to study dentistry, while 10.6 % and 2.8 % were led by their parents and friends, respectively. Surprisingly, 29.4 % felt unsure to be a dentist and 10 % preferred not to be a dentist in the future career. While 86.1 % got well psychological support from their family, no one got poorly or no support. For the relationship with classmates, 83.9 % had good and excellent relationship, while 1.1 % and 0 % reported of bad and worst relationship. The percentage of extrovert UG was a little bit higher than the introvert UG (53.9 % and 46.1 %, respectively). The neuroticism type was about 2 folds of the stable type (65.6 % and 34.4 %, respectively). (Table 1)

Stress level and associated factors

Among 180 participants, 39 (21.7 %) could cope with stress, 66 (36.7 %) had job stress, 39 (21.7 %) were at the beginning of burnout, and 36 (20 %) were already burnout (Table 1). The univariate logistic regression analysis revealed that the factors associated with the level of stress and burnout in UG (*p*-value<0.05) included 1) the 3rd- and 4th-year UG had 3.6 and 3.8 times, respectively, more likely to be stress than the 1st-year UG; 2) the UG who stayed in their own or parents' accommodation had 4.8 times more likely to be stress than those who stayed in the university's dorm; 3) the UG who stayed with siblings

had 4.1 times more likely to be stress than those who stayed with friends; 4) the UG who exercised less than once per month had 2.8 times more likely to be stress than those who exercised once per week; 5) the UG who felt unsure to be a dentist and who did not want to be a dentist in the future career possessed 4.1 and 26.6 times, respectively, more likely to be stress than those who insisted to be a dentist; and 6) the introvert UG had 1.9 times more likely to be stress than the extrovert UG, while the neuroticism trait had 5.6 times more likely to be stress than the stable personality trait (Table 2). The multivariate regression analysis revealed that the greatest odds ratio was the attitude to be a dentist in the future career. The UG who preferred not to be a dentist and who felt unsure to be a dentist had 15.6 times (95 % CI 4.2-57.7) and 4.5 times (95 % CI 2.2-8.9), respectively, more likely to be stress and burnout (*p*-value<0.001). The UG who exercised less than once per month had 2.6 times (95 % CI 1.2-5.8, *p*-value = 0.021) more likely to be stress and burnout than those who exercise once per month. While the neuroticism trait had 4.1 times (95 % CI 2.0-8.2, *p*-value<0.001) more than the stable trait, the introvert had a borderline of 1.9 times (95 % CI 1.0-3.5, *p*-value=0.052) more likely to be stress and burnout than the extrovert. The academic year, accommodation, and people who they stayed with were not associated with stress and burnout (*p*-value>0.05). (Table 2)

Table 2 Ordered Logistic Regression Analysis

Factors		Univariate model			Multivariate model		
		OR	95 % CI	P value	OR	95 % CI	P value
Academic year	2nd	2.5	0.8-7.5	0.115	1.0	0.3-3.6	0.976
	3rd	3.6	1.2-10.6	**0.021***	1.6	0.4-6.2	0.490
	4th	3.8	1.3-10.9	**0.014***	1.1	0.3-4.1	0.911
	5th	2.4	0.9-6.8	0.089	0.7	0.2-2.9	0.656
	6th	1.2	0.4-3.9	0.771	0.5	0.1-2.5	0.416
	1st	Ref			Ref		
Sex	Female	1.5	0.8-2.6	0.191			
	Male	Ref					

Table 2 Ordered Logistic Regression Analysis (cont.)

Factors		Univariate model			Multivariate model		
		OR	95 % CI	*P* value	OR	95 % CI	*P* value
Religion	Buddhism	3.0	0.4-20.7	0.271			
	Christian	6.0	0.5-72.8	0.163			
	Irreligion	5.5	0.6-48.4	0.122			
	Islam	Ref					
Hometown	Bangkok	1.7	0.9-3.5	0.126			
	Perimeters area[a]	1.5	07-3.6	0.312			
	Other provinces	Ref					
Accommodation	My own/parent's	4.8	1.2-18.6	**0.024***	5.2	0.5-54.9	0.168
	Rental apartment	3.0	0.7-12.1	0.130	1.8	0.2-15.4	0.579
	University dorm	Ref			Ref		
Staying with	Parents	2.3	0.9-5.9	0.093	0.5	0.1-3.0	0.458
	Alone	1.97	0.7-5.2	0.198	0.6	0.1-2.9	0.477
	Siblings	4.1	1.2-14.5	**0.026***	1.2	0.2-8.5	0.825
	Relatives	3.2	0.9-11.7	0.082	0.8	0.1-5.6	0.802
	Friends	Ref			Ref		
Travelling time in the morning (minutes)	15 to 30	1.5	0.7-3.0	0.311			
	31 to 60	1.3	0.6-2.7	0.551			
	> 60	1.5	0.6-3.8	0.405			
	< 15	Ref					
Allowance per month (THB)	< 5,000	1.5	0.7-3.2	0.288			
	5,000 to 10,000	1.3	0.7-2.4	0.460			
	> 20,000	2.7	0.7-10.5	0.159			
	10,001 to 20,000	Ref					
GPA	Unwilling to answer	1.2	0.1-13.2	0.911			
	2.00-2.99	2.1	0.9-4.7	0.083			
	3.00-4.00	Ref					
Exercise frequency	<Once/month	2.8	1.4-5.7	**0.004***	2.6	1.2-5.8	**0.021***
	Once/month	1.9	0.9-4.1	0.094	1.8	0.8-4.4	0.163
	At least three times/week	1.9	0.7-5.1	0.229	2.2	0.6-7.8	0.223
	Once/week	Ref		Ref			
Laboratory work (hours per day)	< 1	2.0	0.7-5.7	0.211			
	1	1.3	0.4-4.7	0.717			
	2	0.8	0.4-1.8	0.599			
	3	1.7	0.8-3.4	0.170			
	>3	1.6	0.6-4.1	0.369			
	None	Ref					

Table 2 Ordered Logistic Regression Analysis (cont.)

Factors		Univariate model			Multivariate model		
		OR	95 % CI	P value	OR	95 % CI	P value
Sleeping hours (per night)	<4	2.4	0.1-97.2	0.646			
	4-6	2.8	0.6-12.3	0.186			
	6-8	2.1	0.5-9.2	0.308			
	>8	Ref					
The decision of studying was led by	My parents	1.7	0.8-3.8	0.199			
	My friends	1.2	0.3-4.7	0.830			
	Myself	Ref					
Current attitude	Unsure	4.1	2.2-7.5	**<0.001***	**4.5**	2.2-8.9	**<0.001***
	Prefer not to be a dentist	26.6	8.4-83.3	**<0.001***	**15.6**	4.2-57.7	**<0.001***
	Still want to be a dentist	Ref			Ref		
Psychological support from the family	Moderately supported	1.5	0.7-3.2	0.312			
	Well supported	Ref					
Relationship with the classmates	Good	0.9	0.5-1.7	0.718			
	Fair	1.3	0.5-3.0	0.617			
	Bad	1.2	0.1-11.1	0.867			
	Excellent	Ref					
Personality type	Introvert	1.9	1.1-3.2	**0.022***	1.9	1.0-3.5	0.052
	Extrovert	Ref			Ref		
	Neuroticism	5.6	3.0-10.5	**<0.001***	**4.1**	2.0-8.2	**<0.001***
	Stable	Ref			Ref		

[a]Perimeter area of Bangkok: Nakhon Pathom, Pathum Thani, Nonthaburi, Samut Prakarn, and Samut Sakhon

*significance at p-value <0.05

Impact of COVID-19 pandemic on stress

The need to change their routine activities due to COVID-19 pandemic made the UG felt tensed at the highest level of impact (mean 3.67±SD 1.29), followed by worrying of insufficient clinical skill (mean 3.16±SD1.29) and social distancing (mean 3.06±SD 1.1). They reported the levels of impact from unable to have clinical/laboratory practice and online learning of mean 2.81±SD 1.22 and mean 2.71±SD 1.2, respectively. Moreover, unable to exercise in the gym and unable to go to the movie theatre also impacted at the level mean 2.21±SD 1.09 and mean 2.31± SD 1.18, respectively. However, the 4th- and 5th-year UG rated a high level of impact on the item "worry of unable to complete the clinical requirements" (mean 4.02±SD 1.1). (Fig. 1)
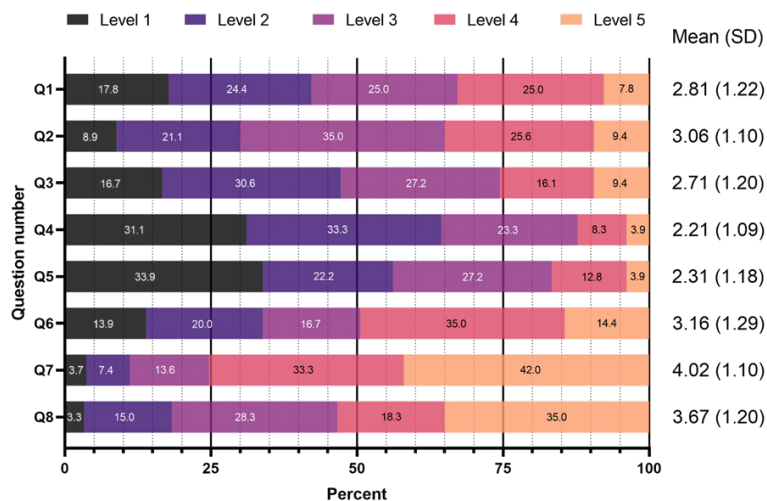
Figure 1 *Percentage of UG who rated each level of impact of COVID-19 lockdown situations on the stress. Level 1 = the lowest impact, level 5 = the highest impact*

Q1: Unable to have clinical/laboratory practice

Q2: Social distancing

Q3: Online learning

Q4: Unable to exercise in the gym

Q5: Unable to go to the movie theatre

Q6: Worry of insufficient clinical skill

Q7: Worry of unable to complete the clinical requirements (only 4th and 5th year students were asked)

Q8: Routine activities were changed

Discussion

This study surveyed the prevalence of stress and burnout in UG of FDCU. The results showed 78.4 % of participants had stress including burnout. The associated factors included the attitude to be a dentist, the frequency of exercise, and the personality type. Some consequences of COVID-19 pandemic lockdown impacted their stress at a high level.

The prevalence of stress and burnout in UG found in this study concurs with a study in a private university in Mexico which reported 52 % emotional exhaustion, 42.3 % high stress, and 17.8 % burnout.[1] Sixty-three percent of UG in a university in The UK also self-reported high stress.[24] However, some lower prevalence was also reported. A survey in 7 European dental schools showed that 22 % of the 1st-year UG had an emotional exhaustion,[25] while 10 %, 17 %, and 28 % of the 4th- and 5th-year UG from 3 universities in Germany and Switzerland suffered from severe emotional exhaustion, a lack of personal accom-

plishment, and severe depersonalization, respectively.[2] A survey in the 4th-6th-year UG in Khon Kaen University revealed 31.2 %, 46 %, and 12.7 % of the participants had moderate, high, and severe stress, respectively.[20]

Although female had 1.5 times more likely to be stress and burnout than male, no significant difference was found in this study. Some studies showed that stress was a gender-specific, with females reporting higher levels of total perceived stress and specific stressors.[26-28] In contrast, a systematic review reported a higher stress in male.[6] However, no gender preference of the stress and burnout was found in the Thai Oral and Maxillofacial Surgery residents[29] which might suggest the cultural involvement on this aspect.

The high stress in the 3rd-year UG might be due to the tight studying schedule with overloaded subjects, while the 4th-year UG were in the transition period of pre-clinical to clinical curriculum. A study in a Canadian dental school reported the clinical workload as a stressor

for UG in clinical years.[30] Examination anxiety and transitional stress were reported to be associated with the emotional exhaustion.[2] However, after adjusting for other factors (including type of accommodation, staying with whom, frequency of exercise, current attitude, and personality type), the academic year was not an associated factor of stress in this study. In contrast, Kaewsutha *et al.* found that the 4th to 6th-year UG were 4.41 times more likely to have mental health problems than the 1st to 3rd-year UG.[31]

Association of personality and burnout have been widely reported, neuroticism and extraversion appeared to be the most constant predictors of burnout.[32] The result from this study is consistent with others. The extravert tends to be optimistic (reappraise problems positively), rational problem-solving, and seeking for social support, thus the extraversion is a psychoprotective factor.[33,34] The neuroticism has a tendency to experience negative and distressing emotions. They tend to set extremely high goals for themselves, while underestimate their own performance. Moreover, they seem to use ineffective stress coping strategies, including avoiding rather than approaching problems. Thus, the neuroticism is highly associated with burnout and lower personal accomplishment.[35,36]

To the best of our knowledge, this is the first study showing the probability that negative attitude to be a dentist in the future career may be a significant stressor; however, further study is needed to clarify this factor. Considering relevant theoretical and empirical studies conducted in different fields, our finding is consistent with others. Japanese UG whose first choice of admission was dentistry experienced less stress than those whose first choice was other disciplines.[28] A study in nurses and care workers in nursing homes and geriatric hospitals in Japan found that a positive attitude towards providing end-of-life care was a protective factor against depersonalization and related to lower feelings of personal accomplishment.[37] The fine arts high school students' attitudes toward instrument education were found to be a significant predictor for their burnout.[38] A positive attitude toward prayer among Anglican parochial clergy was associated with the lower levels of emotional exhaustion, lower levels of depersonalization, and higher levels of personal accomplishment.[39] In spite of the UG's own decision to choose dentistry, the thought of unsure and would like not to be a dentist in the future career existed during studying. This can be considered in the other perspective that the stress during study might drive the UG to have that thought. This result suggests the need of investigation for the root of this negative attitude and the prompt response to this problem.

Our finding that UG who rarely exercised tended to be burnout is consistent with the result found in Japanese UG which showed that the regularly exercised UG had a significantly lower stress levels and higher well-being than those who did not exercise.[28] The benefits of exercise on psychological well-being such as improving anxiety level, personal accomplishment, psychological distress, perceived stress, and emotional exhaustion were reported in many studies.[40,41] This finding supports the need of physical health promotion which will foster the psychological well-being.

This survey was taken place during the third outbreak of COVID-19 pandemic in Thailand so people had to change their lifestyles to the new normal, such as social distancing, mask-wearing in public areas, and frequent hand sanitization. The education was also affected; students needed to adapt their learning to the online format. They had to stay in front of their own electronic devices at their accommodations with less interaction with their friends and teachers. Although adaptability is a valuable skill that allows a person to respond to changing situations, this ability varies greatly from person to person. A survey in the UG from the US, Spain, Ireland, Chile, India, and Brazil showed that the UG who perceived a smoother transition from the face-to-face to the online study had a lower stress level.[42] Overall, the UG in our study perceived the daily routine changes were the most affected factors on their stress. Moreover, clinical practices in the FDCU were strictly offered only urgent and emergency dental treatment during COVID-19 lockdown, all students had to postpone their laboratory and clinical practices. The

worry of unable to complete the clinical requirements appeared to be the highest impact on the 4th- and 5th-year UG. This finding was similar to that of Klaassen et al.[42] which revealed that UG who had more concern about academic progress had a higher stress level. Our findings indicate that the pandemic and lockdown have a detrimental effect on mental health of UG and are consistent with other studies which reported that the effects of COVID-19 lockdown brought a fear of losing their manual dexterity skills, anxiety related to its consequences on the examination and their long-term plans.[17,19,43]

There are many tools to measure the burnout, MBI is the most widely accepted for identifying burnout in the medical research literature.[44] Owing to the need of payment for the patent of MBI, a set of Thai-language questionnaire developed by Professor Dr. Nuntika Thavi-chachart which has a high reliability and a substantial agreement to the MBI was used in this study. The MBI scoring test was analyzed using a 22-item questionnaire, which indicates the three essential components of stress and burnout: emotional exhaustion, depersonalization, and personal accomplishment. Nevertheless, Stress Test Questionnaire (ST-5), utilized by Thailand's Department of Mental Health is a five-item stress scale to assess stress primarily. The degrees of stress are stratified into no stress, suspected stress, and severe stress without regard to burnout.[45] The questionnaire used in this study comprising questions focus on the stress from occupation or job; hence, it cannot identify the stress from other factors including family relationship and personal life.

Several limitations of this study include 1) the respondents could not get more explanation on the vague items since it was a self-administered questionnaire and distributed online with anonymous response, 2) this research did not assess the adverse implications of study-related burnout, 3) certain factors had not been included (such as the freedom of clinical decision-making, the incidence of clinical mistakes, moral or sexual harassment) to make this questionnaire to be completed within fifteen minutes, 4) the low response rate can lead to insufficient power, wrong effect size , and sample bias due to selective non-response, which is the probability that someone taking part in the survey may be related to the parameter being measured. Further research should be conducted to determine when and why the negative attitudes emerge and how they can be dealt with. The consequences of stress and burnout on future career path is also highly recommended.

From the results of this study, to prevent the negative consequences of chronic unmanageable stress in UG students, we would like to suggest that the course supervisors be mindful of dental students' stress and burnout. The resilient learning and clinical practicing environment should be arranged. The appropriate coping strategies should be implemented at the earlier stage of stress. Moreover, stress management should be taught as a part of the dental education curriculum which will bring about a long-term benefit for the professional accomplishment and quality of life.

Conclusions

The prevalence of stress and burnout among UG of FDCU was high. The main associated factor was the attitude to be a dentist in the future career. Some minor associated factors were the lack of exercise and the personality type. The consequences of COVID-19 pandemic and lockdown also impacted this stress. The results of this study suggest the urgent need to support the highly stressed and burnout UG and to implement preventive measures to prevent serious psychological effects and to improve their quality of lives.

Acknowledgment

Acknowledgment

1. Jimenez-Ortiz JL, Islas-Valle RM, Jimenez-Ortiz JD, Perez-Lizarraga E, Hernandez-Garcia ME, Gonzalez-Salazar F. Emotional exhaustion, burnout, and perceived stress in dental students. *J Int Med Res* 2019;47(9):4251-9.

2. Pohlmann K, Jonas I, Ruf S, Harzer W. Stress, burnout and health in the clinical period of dental education. *Eur J Dent Educ* 2005;9(2):78-84.

3. Lazarus RS, DeLongis A, Folkman S, Gruen R. Stress and adaptational outcomes: The problem of confounded measures. *Am Psychol* 1985;40(7):770-9.

4. Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Annu Rev Psychol* 2001;52:397-422.

5. Gomes AR, Faria S, Gonçalves AM. Cognitive appraisal as a mediator in the relationship between stress and burnout. *Work Stress* 2013;27(4):351-67.

6. Singh P, Aulak DS, Mangat SS, Aulak MS. Systematic review: factors contributing to burnout in dentistry. *Occup Med* 2016;66(1):27-31.

7. Lee CY, Wu JH, Du JK. Work stress and occupational burnout among dental staff in a medical center. *J Dent Sci* 2019;14(3):295-301.

8. Cherniss C. Long-term consequences of burnout: An exploratory study. *J Organ Behav* 1992;13(1):1-11.

9. Menon NK, Shanafelt TD, Sinsky CA, Linzer M, Carlasare L, Brady KJS, *et al.* Association of Physician Burnout With Suicidal Ideation and Medical Errors. *JAMA Network Open* 2020;3(12):e2028780.

10. Atalayin C, Balkis M, Tezel H, Onal B, Kayrak G. The prevalence and consequences of burnout on a group of preclinical dental students. *Eur J Dent* 2015;9(3):356-63.

11. Campos JA, Jordani PC, Zucoloto ML, Bonafe FS, Maroco J. Burnout syndrome among dental students. *Rev Bras Epidemiol* 2012;15(1):155-65.

12. Deeb GR, Braun S, Carrico C, Kinser P, Laskin D, Golob Deeb J. Burnout, depression and suicidal ideation in dental and dental hygiene students. *Eur J Dent Educ* 2018;22(1):e70-e4.

13. Mahase E. China coronavirus: WHO declares international emergency as death toll exceeds 200. *BMJ* 2020;368:m408.

14. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci* 2020;12(1):9.

15. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care. *J Endod* 2020;46(5):584-95.

16. Meng L, Hua F, Bian Z. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *J Dent Res* 2020;99(5):481-7.

17. Agius AM, Gatt G, Vento Zahra E, Busuttil A, Gainza-Cirauqui ML, Cortes ARG, *et al.* Self-reported dental student stressors and experiences during the COVID-19 pandemic. *J Dent Educ* 2021;85(2):208-15.

18. Hung M, Licari FW, Hon ES, Lauren E, Su S, Birmingham WC, *et al.* In an era of uncertainty: Impact of COVID-19 on dental education. *J Dent Educ* 2021;85(2):148-56.

19. Hakami Z, Khanagar SB, Vishwanathaiah S, Hakami A, Bokhari AM, Jabali AH, *et al.* Psychological impact of the coronavirus disease 2019 (COVID-19) pandemic on dental students: A nationwide study. *J Dent Educ* 2021;85(4):494-503.

20. Weraarchakul W, Weraarchakul W. Factors related to stress in the 4th - 6th year dental students at the Faculty of Dentistry Khon Kaen University. North-Eastern Thai J Neuroscience 2014;13(3):11-20.

21. Eysenck HJ, Eysenck SBG. Manual of the Eysenck Personality Questionnaire : (EPQ-R Adult). San Diego, Calif.: EdITS/Educational and Industrial Testing Service; 1994.

22. Chiaroongroj K. Prevalence of occupational stress and burnout and the related factors among cabin attendants of Thai Airways International Public Company Limited [dissertation]. Bangkok: Chulalongkorn University; 2005.

23. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. *Fam Med* 2005;37(5):360-3.

24. Jenkins S, Johnson I, Ginley J. Work. Stress and Play: Students' perceptions of factors impacting on their studies and well-being. *Eur J Dent Educ* 2019;23(3):349-54.

25. Humphris G, Blinkhorn A, Freeman R, Gorter R, Hoad-Reddick G, Murtomaa H, *et al.* Psychological stress in undergraduate dental students: baseline results from seven European dental schools. *Eur J Dent Educ* 2002;6(1):22-9.

26. Collin V, O'Selmo E, Whitehead P. Stress, psychological distress, burnout and perfectionism in UK dental students. *Br Dent J* 2020; 229(9):605-14.

27. Al-Sowygh ZH. Academic distress, perceived stress and coping strategies among dental students in Saudi Arabia. *Saudi Dent J* 2013;25(3):97-105.

28. Sugiura G, Shinada K, Kawaguchi Y. Psychological well-being and perceptions of stress amongst Japanese dental students. Eur *J Dent Educ* 2005;9(1):17-25.

29. Taenguthai T, Subbalekha K, Pisarnturakit P, Pimkhaokham P, Kiattavorncharoen S. Stress and burnout in Thai oral and maxillofacial surgery residents. *Thai J Oral Maxillofac Surg* 2020;34(2):118-25.

30. Elani HW, Bedos C, Allison PJ. Sources of stress in Canadian dental students: a prospective mixed methods study. *J Dent Educ* 2013; 77(11):1488-97.

31. Kaewsutha N, Laosrisin N, Visalseth W. Mental health and associated factors in Srinakharinwirot University dental students.

Srinakharinwirot University (Journal of Science and Technology) 2014;6(11):16-24.

32. Bughi S, Lie D, Zia S, Rosenthal J, Bughi-Capecci S. Using a personality inventory to identify risk of distress and burnout among early stage medical students. *Health Educ* 2017;30(1):26-30.

33. Matthews G, Dorn L, Glendon I. Personality correlates of driver stress. *Pers Individ Differ* 1991;12(6):535-49.

34. Watson D, Hubbard B. Adaptational style and dispositional structure: Coping in the context of the Five-Factor Model. *J Pers* 1996;64(4):737-74.

35. Zellars KL, Perrewé PL, Hochwarter WA. Burnout in health care: The role of the Five Factors of Personality. *J Appl Soc Psychol* 2000; 30(8):1570-98.

36. Francis L, Louden S, Rutledge C. Burnout among Roman Catholic Parochial clergy in England and Wales: Myth or reality? *Rev Relig Res* 2004;46(1):5.

37. Okamura T, Shimmei M, Takase A, Toishiba S, Hayashida K, Yumiyama T, *et al.* A positive attitude towards provision of end-of-life care may protect against burnout: Burnout and religion in a super-aging society. *PLoS One* 2018;13(8):e0202277.

38. Girgin D. Motivation, self-efficacy and attitude as predictors of burnout in musical instrument education in Fine Arts High Schools. *Eurasian J Educ Res* 2020;20:93-108.

39. Turton D, Francis L. The relationship between attitude toward prayer and professional burnout among Anglican parochial clergy in England: Are praying clergy healthier clergy? *Ment Health Relig Cult* 2007;10:61-74.

40. Long BC, Stavel Rv. Effects of exercise training on anxiety: A meta-analysis. *J Appl Sport Psychol* 1995;7(2):167-89.

41. Bretland RJ, Thorsteinsson EB. Reducing workplace burnout: the relative benefits of cardiovascular and resistance exercise. *Peer J* 2015;3:e891.

42. Klaassen H, Ashida S, Comnick C, Xie X, Smith B, Tabrizi M, *et al.* COVID-19 pandemic and its impact on dental students: A multi-institutional survey. *J Dent Educ* 2021;85(7):1280-6.

43. Wathelet M, Fovet T, Jousset A, Duhem S, Habran E, Horn M, *et al.* Prevalence of and factors associated with post-traumatic stress disorder among French university students 1 month after the COVID-19 lockdown. *Transl Psychiatry* 2021;11(1):327.

44. McCray LW, Cronholm PF, Bogner HR, Gallo JJ, Neill RA. Resident physician burnout: is there hope? *Fam Med* 2008;40(9):626-32.

45. Department of Mental Health, Ministry of Public Health. Guide-lines for using mental health tools for public health personnel in community hospitals Revised edition. Office of Mental Health Promotion and Development Department of Mental Health. Retrieved from http://envocc.ddc.moph.go.th/uploads/ประชุม/20-21_11_61/C_1.pdf.