

Factors associated with poor sleep quality among dental students in Malaysia (#94453)

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Factors associated with poor sleep quality among dental students in Malaysia

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Background: Good sleep quality is crucial for dental students to have optimal cognitive function, memory, and decision-making to accomplish their learning requirements. This study aims to determine sleep quality, its associated factors, and the association between sleep quality and academic performance among dental students in Malaysia. **Methods:** A cross-sectional study was conducted among dental students in four public universities in Malaysia. A validated Pittsburgh Sleep Quality Index (PSQI) questionnaire was used to assess sleep quality. An additional self-administered questionnaire was used to obtain a sociodemographic profile, students' lifestyle, and academic performance. The data were analysed using descriptive, chi-square and multiple logistic regression. **Results:** Three hundred eighty-four dental students participated in this study. About half of the dental students in Malaysia (51.6%) have poor sleep quality. The mean hours of sleep per night was 5.72 (SD 1.06) hours. The sleep quality was significantly poor among Malay ($P=0.023$), students who stayed at hostel ($P=0.002$) and consumed caffeinated drinks ($P=0.028$). Multiple logistic regression analysis revealed poor sleep quality was significantly associated with self-perceived poor academic performance [Adjusted Odds Ratio (AOR) 2.95, 95% CI 1.25, 6.96, P -value=0.013] and students who skip class (AOR 1.70, 95% CI 1.00, 2.91, P -value=0.046). **Conclusions:** Most of the dental students in Malaysia have poor sleep quality. Ethnicity, accommodation, and caffeine consumption were significantly associated with sleep quality. Awareness to increase sleep quality among dental students is needed to ensure they are able to cope with a challenging dental school learning environment.

Factors associated with poor sleep quality among dental students in Malaysia

ABSTRACT

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Conclusions: Most of the dental students in Malaysia have poor sleep quality. Ethnicity, accommodation, and caffeine consumption were significantly associated with sleep quality. Awareness to increase sleep quality among dental students is needed to ensure they are able to cope with a challenging dental school learning environment.

Keywords: academic performance, dental students, sleep quality, skip class

INTRODUCTION

Sleep quality is referred as one's satisfaction with the sleep experience that can be further divided into sleep initiation, sleep maintenance, sleep quantity and refreshment upon awakening (*Kline, 2013*). It is well established that sleep quality comprises quantitative elements, including sleep duration, sleep latency, or number of arousals, and more purely subjective aspects(*Buyse et al., 1989*).

Sleep plays a vital function in enhancing cognitive abilities, particularly memory retention. Poor nighttime sleep quality and daytime lethargy negatively affect students' physical and cognitive health and academic performance (*Maheshwari & Shaukat, 2019*). Sleep disorders are among the most common health problems for late adolescents and young adults. Students usually report lack of sleep, or difficulty sleeping(*Becker et al., 2018*). Studies have shown that, poor sleep quality among university or college students in Asia was high ranging from 50%-58%(*Cheng et al., 2012; Ji & Wang, 2018; Suen,Tam & Hon,2010*). A study among medical, undergraduate and pharmaceutical students in Malaysia reported the prevalence of poor sleep quality was 59.6%, 70.6% and 84% respectively(*Hanapi et al., 2021; Nurismadiana & Lee, 2018; Said et al., 2020*). A study among dentistry students in Saudi Arabia and Brazil found 72.5% and 65.2% have poor

sleep quality respectively(Elagra et al., 2016; Muñoz et al., 2023). For dental or medical students to succeed and master their learning requirements, a restful night's sleep is crucial for optimal cognitive function, memory, and decision-making. Additionally, getting enough rest will give them the energy, stamina, and strength they need to withstand the demanding academic atmosphere of dental or medical school(Said et al., 2020).

Compared to students in other disciplines, students enrolled in healthcare professional courses, such as medicine, pharmacy, and dentistry, were commonly affected by changes in sleep quality(Almojali et al., 2017). Several factors have been identified by researchers as being associated with poor sleep quality. A study among university students in Taiwan found that, poor sleep quality was significantly associated with undergraduate students, female gender, skipping breakfast, tea drinking, a higher tendency toward internet addiction, poor social support and higher neuroticism(Cheng et al., 2012). A study among medical students in Malaysia found that students in the clinical year were less likely to have poor sleep quality than pre-clinical students. Nonetheless, students with depression symptoms, in comparison with those who did not have depression, have a 1.71 times higher risk of having poor sleep quality(Said et al., 2020). In another study involving medical students in Saudi Arabia, it was reported that students who do not suffer from stress are less likely to have poor sleep quality, whereas the risk of having poor sleep quality is almost four times higher in students with cumulative grade point average (GPA) less than 4.25(Almojali et al., 2017).Existing studies(Nurismadiana & Lee, 2018; Said et al., 2020) mainly focus on undergraduate students studying different programs, and there is a lack of data on how sleep quality affects dental students and their academic performance.

Poor sleep quality might affect students learning progress which leads to poor academic performance as well as performance as a healthcare professional in the future(Haque et al., 2018). Inadequate duration and poor sleep quality also negatively affect their concentration and cognitive function(Hanapi et al., 2021;Suen,Tam&Hon,2010). Sleep deprivations are commonly related to daytime sleepiness and declined level of attention affecting performance(Siraj et al., 2014). A study among dental students in Saudi Arabia found that, poor sleep quality was associated with lower academic performance, especially in clinical years(Elagra et al., 2016). In Malaysia, a study among medical students found that respondents who sleep less than 6 hours during the weekend have significantly lower CGPA compared to those with average sleep between 6 to 8 hours and those who sleep more than 8 hours(Siraj et al., 2014). Study also found that sleep disruptions frequently negatively impact students' academic performance, creating a vicious cycle(Abdulghani et al., 2012). Additionally, poor sleep also affects individual performance by increasing depression, decreasing motivation, and compromising health(Kazim & Abrar, 2011). However, whether similar factors influencing dental students' sleep quality and their academic performance remained unexplored. Therefore, this study is conducted to assess sleep quality and its associated factors among Malaysian University dental students. In addition, the association between sleep quality and academic performance of Malaysian University dental students is assessed. Understanding the factors that affect sleep quality among dental students' and how it impacts their academic achievement could help to develop targeted interventions to enhance their overall performance.

METHODS

Population and sample

This cross-sectional study was conducted among year 2 to year 5 dental students from Universiti Sains Malaysia, Universiti Malaya, International Islamic University Malaysia, and Universiti Teknologi MARA from 15th July 2023 to 30th August 2023. The convenience sampling method was applied in this study. The sample size was calculated using the single proportion formula with a 95% confidence interval (CI) based on the objective to determine the proportion of sleep quality among Malaysian University dental students. The expected proportion was estimated at 65%, which was the percentage of dental students in Saudi Arabia described their sleep as good or very good (Elagra *et al.*, 2016). Sample sizes were calculated for various precision, and a sample size of 348 was chosen with a precision of 0.05 while taking into consideration available resources. Anticipating a 10% of non-response rate, a sample size of 384 was decided for this study.

Ethical consideration

This study was approved by the Human Research and Ethics Committee, Universiti Sains Malaysia (USM/JEPeM/22040222) on 5 June 2022, Medical Ethics Committee, Faculty of Dentistry, University of Malaya (DF CO2204/0051(L)) on 27 June 2022, International Islamic University Malaysia (IIUM) Research Ethics Committee (IREC 2022-045) on 27 April 2022 and Universiti Teknologi Mara (UiTM) Research Ethics Committee on (REC/07/2022 (ST/MR/131) on 4 July 2022.

Research Tools

The online Google form questionnaire was used to collect variables of interest in this study. The questionnaire consisted of four parts. The first part included questions on the participants' demographic characteristics, including age, gender, ethnicity, parents' income, marital status, body mass index (BMI), current academic years, place of study, accommodation, and presence of any medical problems. The second part of the questionnaire was on activities or habits related to sleep quality such as exercise, eating sleeping pills, electronic device use, smoking, alcohol, and caffeinated drink consumption. The third part of the questionnaire was on the students' performance in the class. The questionnaire includes 1) self-perceived academic performance in the current academic year including very good, good, average, poor and very poor 2) falling asleep during class 3) skipping class, 4) coming late to the class and 5) involvement in extracurricular activities. The fourth part of the questionnaire assessed the students' sleep quality using the PSQI questionnaire. The questionnaire was developed and validated by Buysse *et al.*, in 1989 and was used with permission from the authors (Buysse *et al.*, 1989). The questionnaire has good internal consistency, with a Cronbach's alpha of 0.83 (Buysse *et al.*, 1989). The PSQI was divided into 10 questions which compromise 19 items forming seven components: (1) sleep quality (1 item), (2) sleep latency (2 items), (3) sleep duration (1 item), (4) sleep efficiency (3 items), (5) sleep disturbance (9 items), (6) sleep medication (1 item), and (7) daily dysfunction (2 items). The seven component scores are then summed to yield a global PSQI score ranging from 0-21, with higher scores indicating worse sleep quality and a cut-off score above five indicating poor sleep quality (Buysse *et al.*, 1989).

Data collection

Data collection was conducted via a self-administered questionnaire using Google Forms from 7 July 2022 to 31 August 2022. Google Form questionnaire link, along with participant information sheet, consent form, was distributed through WhatsApp network to all participants through each Universities representative. The first section of the Google form contained an explanation of the survey's purpose and confidentiality. On the first page, participants must indicate their agreement and consent to participate in the study. The consent form was designed to be skipped. If participants selected "No" in response to the consent query, they were redirected to a page, thanked for their time, and exited the form. If they selected "Yes," signifying their agreement to participate, they were redirected to answer the questionnaires.

Statistical Analysis

Data entry and analysis were carried out using IBM SPSS Statistics for Windows (version 27.0, IBM Corp., Armonk, NY, USA). Data checking and cleaning were performed before the analysis. Descriptive analysis was used to describe the sociodemographic characteristics of the respondents and to determine the proportion of good and poor sleep quality among Malaysian University dental students. Numerical data were presented as a mean and standard deviation (SD), and categorical data were presented as frequency and percentage. A Chi-square and Fisher's exact test were used to determine the factors associated with sleep quality among Malaysian University dental students. Simple and multiple logistic regression analyses (MLR) were used to determine the association between poor sleep quality and academic performance of Malaysian University dental students. The independent variables included self-perceived academic performance, fallen asleep in class, skip class, come late to class and involvement in extracurricular activities. The dependent variable was the total score of PSQI items with score above five indicating poor sleep quality and score less than or equal to five indicating good sleep quality. Before MLR was performed, the distribution and frequencies were examined. Simple logistic regression was done to screen the variables for further MLR analysis. All variables with P-value less than 0.25 and clinically significant variables were included in the MLR. The P-value was set larger than the level of significance to allow more important variables to be included in the model. The interaction terms were checked using the likelihood ratio test. Multicollinearity-related issues were identified by the variance inflation factor test. The final model was assessed for fitness using the Hosmer-Lemeshow goodness-of-fit test. The sensitivity and specificity, classification table and the area under the receiver operating characteristic (ROC) curve were also obtained to evaluate the model fitness.

RESULTS

The Google Form link was closed when we reach 384 respondents. The respondents' sociodemographic profile and BMI status are shown in Table 1. The mean age of respondents was 22.63 ± 1.35 years, and the majority were female (79.7%) and single (97.9%). Most respondents were Malay (82.0%) and more than a quarter were from M40 (39.1%) socio-economic income group. About half of the respondents had a normal BMI (49%) and most lived in a hostel (90%).

Respondents' lifestyle that might affect sleep quality is shown in Table 2. About two-thirds (72.1%) of the respondents performed exercise and more than half (62.1%) exercised less than 3 times per week. Most respondents (96.4%) are non-smokers and use electronic devices before sleep (92.5%). Only 4.9% of the respondents' drink alcohol. Most of the respondents (78.9%)

consumed a caffeinated drink. The average cup of caffeinated beverage consumed per week was 2.77 ± 3.11 cups.

The respondents' academic performance is shown in Table 3. More than half (68.5%) rated themselves as average in self-perceived academic performance, while about one-third of the respondents sometimes (37.0%) fell asleep in class. The majority did not skip class (82.0%) and did not come late to class (74.0%). About one-third (31.8%) are sometimes involved in extracurricular activities.

Table 4 shows the distribution of respondents by sleep quality elements. About half (51.6%) of the respondents had poor sleep quality. The average sleep duration of the respondents is 5.72 ± 1.06 hours. Meanwhile, the habitual sleep efficiency domain shows that the average sleep efficiency is $94.50\% \pm 9.65$.

Table 5 shows the factors associated with poor sleep quality among Malaysian University dental students. The sleep quality of Malaysian University dental students was significantly poor among Malay ethnicity students who stayed at hostel and consumed caffeinated drinks.

The simple logistic regression analysis to determine the association between poor sleep quality and academic performance of Malaysian University dental students identified 5 variables with p-values less than 0.25. These variables were included in the multiple logistic regression analysis, and 2 were significantly associated with sleep quality. The variables were self-perceived academic performance and skipping class (Table 6). These results can be interpreted as follows: 1) Students who self-perceived poor academic performance had higher odds of poor sleep quality by 2.95 times than students who self-perceived very good/good academic performance [Adjusted Odds Ratio (AOR) 2.95, 95% CI 1.25, 6.96, P -value=0.013], 2) Students who skip class had 1.7 higher odds of poor sleep quality than students who did not skip class (AOR 1.70, 95% CI 1.00, 2.91, P -value=0.046).

DISCUSSION

The healthcare profession such as dental or medical specialty, places a heavy burden on students and necessitates long hours of study and practice, which may reduce the quality of their sleep (BaHammam *et al.*, 2012). Even when utilizing the same assessment tool, the PSQI, is used, the prevalence rates of poor sleep quality exhibit notable variation across various university professional courses, such as medicine, pharmacy, and dentistry (Hanapi *et al.*, 2021; Nurismadiana & Lee, 2018; Said *et al.*, 2020). This current study used the PSQI to measure Malaysian university dental students' sleep quality. In this study, the mean number of hours of sleep per night for all students was 5.72 (SD 1.06) hours and 39.6% slept for 5-6 hours per night. Our finding was comparable with a study conducted among dental students in Saudi Arabia (Elagra *et al.*, 2016). A study among medical and pharmacy students in Malaysia found 35.3% and 59% of the respondents sleep about 5 to 6 hours per night (Hanapi *et al.*, 2021; Said *et al.*, 2020). According to the American Academy of Sleep Medicine and Sleep Research Society, adults require at least 7 hours of normal sleeping hour per day (Watson *et al.*, 2015). However, children and adolescents require an average sleep time of nearly 9 hours per night (Mercer, Merritt & Cowell, 1998).

213 The current study showed that 51.6% of students reported having poor sleep quality, which was
 214 lower than studies done among medical students in Pakistan and dental students in Saudi Arabia
 215 and Brazil where 64.2%, 72.5%, and 65.2%, of the students have poor sleep quality(Elagra et al.,
 216 2016; Maheshwari & Shaukat, 2019; Muñoz et al., 2023). The findings of the present study were
 217 comparable with studies conducted among university students in China (50.2%), Taiwan (54.7%)
 218 and Hong Kong(58%)(Cheng et al., 2012; Ji & Wang, 2018; Suen, Tam&Hon,2010). Furthermore,
 219 the study revealed a lower prevalence of poor sleep quality compared to the local studies conducted
 220 among medical students at International Islamic University Malaysia, health sciences students at
 221 Universiti Putra Malaysia and pharmaceutical students at Universiti Sains Malaysia (Hanapi et al.,
 222 2021; Nurismadiana & Lee, 2018; Said et al., 2020) .The disparities in the prevalence of poor
 223 sleep quality among university students may be primarily due to differences in the courses offered,
 224 sample population background and curriculum structures across these universities. The study
 225 findings suggest that Malaysian dental students tend to have poor sleep quality, which they may
 226 not be aware of. The results underscore the importance of addressing sleep quality among dental
 227 students, and it may be necessary to implement tailored interventions to promote adequate sleep
 228 duration and quality, ultimately leading to improved academic performance and overall well-
 229 being.

230
 231 This study found that sleep quality was significantly associated with students' ethnicity, those who
 232 stayed at the hostel, and those who consumed caffeinated drinks. Specifically, Malays were found
 233 to have poorer sleep quality compared to other racial groups. This finding was consistent with a
 234 study among health sciences students in Malaysia, which reported a higher percentage (52.7%) of
 235 poor sleep quality among Malay students than other races(Nurismadiana & Lee, 2018). Similarly,
 236 an earlier study conducted in Singapore reported an association between ethnicity and sleep
 237 disturbance, with Malays and Chinese having a higher prevalence of sleep disturbance than those
 238 of the Indian ethnicity(Ng & Tan, 2005).

239
 240 Most of the students in this study resided in a hostel rather to outside accommodation. Notably,
 241 students' who stayed at the hostel demonstrated significantly poor sleep quality. This finding was
 242 aligns with a study conducted among university students in Malaysia and Hongkong, which
 243 reported a high prevalence of poor sleep quality among those living in hostels(Nurismadiana &
 244 Lee, 2018; Tsui & Wing, 2009). In contrast, a separate study conducted among undergraduate
 245 health sciences students in Malaysia found students who reside outside the campus have a five
 246 times greater risk of developing poor sleep quality compared to their on campus counterparts(Saat
 247 et al., 2020). The living environment could play an important role in students' sleep quality and
 248 practice. Students living on-campus tend to delay their sleep phases on weekdays and weekends,
 249 resulting in poorer sleep quality(Tsui & Wing, 2009). In addition, students may encounter stressful
 250 situations when adapting to a new environment, particularly in hostels with issues such as
 251 maintenance problems, noise, inadequate facilities and substandard accommodation. These factors
 252 are particularly prevalent in free academic housing or hostels. In contrast, students living outside
 253 of hostels, such as with their parents, tend to experience better sleep quality. This could be
 254 attributed to the familiarity of their living environment, better support systems, a greater sense of
 255 security and more personal space, which can contribute to improving sleep habits(Araújo et al.,
 256 2014; Tsui & Wing, 2009).

257 Additionally, lifestyle factors are often associated with individual sleep quality. Findings from this
 258 study revealed that respondents who consumed caffeinated drinks were more likely to have poor

sleep quality. Similar results were reported by *Yilmaz, Tanrikulu & Dikmen, 2017* and *Lemma et al., 2012a*. Contrarily, a previous study by *Lund et al., 2010* found caffeine consumption was not a significant predictor of sleep quality (*Lund et al., 2010*). Caffeinated drink is commonly consumed to help offset fatigue. However, it can have several adverse effects on sleep quality and quantity. Evidence suggests that higher total caffeine consumption was associated with decreased bedtime, and greater caffeine consumption was associated with reduced sleep quality (*Watson et al., 2016*).

Our study found no significant associations between sleep quality and age, gender, academic years, BMI, medical problems, exercise, use of electronic devices, smoking, and alcohol consumption. Gender, academic years and BMI have been identified as factors affecting the quality of an individual's sleep in previous studies. Females with lower BMI tend to have poor sleep quality (*Cheng et al., 2012; Nurismadiana & Lee, 2018*). In contrast, *Narang et al., 2012* reported higher BMI was associated with higher sleep disturbance and shorter average sleep duration scores (*Narang et al., 2012*). A study conducted among medical students in Malaysia found that clinical years students were less likely to have poor sleep quality compared to pre-clinical students (*Said et al., 2020*). Similar to our findings, *Yilmaz et al., 2017* reported age, gender, and academic years did not affect sleep quality (*Yilmaz, Tanrikulu & Dikmen, 2017*). Studies have shown that electronic media use is related to sleep quality (*Lavender, 2015*). This aligns with a previous study among Jordanian dental students that found students with high smartphone addiction significantly associated with poor sleep quality (*Sanusi et al., 2022*). Our study found more than 90% of dental students used electronic devices before sleep. The previous study also found that exercise, alcohol consumption, and the presence of chronic diseases (*Yilmaz, Tanrikulu & Dikmen, 2017*) were not significant predictors of sleep quality.

Our result showed that students who self-perceived poor academic performance had higher odds of poor sleep quality by 2.95 times than students who self-perceived very good/good academic performance. Our finding was consistent with a study conducted among undergraduate dental students in Brazil that found, poor sleep quality negatively impacts the academic performance (*Muñoz et al., 2023*). Similar findings were reported in a study conducted among dental students in Saudi Arabia, where they found a significant negative correlation between sleep quality and the students' grade point averages (GPAs). Poor sleep quality was associated with lower academic performance, especially in clinical years (*Elagra et al., 2016*). Dental school students have a different study rhythm in the clinical years compared to nonclinical years (*BaHammam et al., 2012*). The study and practice of dentistry, particularly during the clinical years, necessitate high concentration, cognitive performance, and motor dexterity. Poor sleep quality or sleep deprivation can negatively impact performance (*Lemma et al., 2014b*). In addition, poor sleep quality and daytime lethargy reduce levels of attention, increase anxiety, affect cognitive performance, and may impair memory and decision-making (*Lo et al., 2014*).

Our study also observed that students who skipped class had 1.7 higher odds of poor sleep quality than students who did not skip class. Inadequate sleep quality results in fatigue, loss of concentration, a low pain threshold, anxiety, restlessness, irrational thoughts, and irritability, among other symptoms (*Hayashino et al., 2010*). Consequently, students with poor sleep quality are typically less motivated to attend class and tend to avoid class (*Lai & Say, 2013*). However, a study among Two Tertiary Institutions in Malaysia found, no significant difference in the frequency of skipping class between good and poor-quality sleepers (*Lai & Say, 2013*).

This study has several limitations. Firstly, data on academic performance and sleep quality were self-reported, which may be susceptible to recall bias. Validated and reliable questionnaires were employed to enhance data on sleep quality to minimize this bias. Secondly, the study was prone to selection bias due to using a convenient sampling method necessitated by time constraints. The main strength of our study was we involved 4 different university dental students in Malaysia, which might get a more accurate result than other studies.

Conclusion

About half of the dental students in Malaysia have poor sleep quality. Ethnicity, accommodation, and caffeine consumption were identified as significant factors associated with sleep quality. The study also found self-perceived poor academic performance and skipping class among the factors associated with poor sleep quality. The findings highlight the importance of raising awareness to improve sleep quality among dental students, enabling them to better cope with the demanding learning environment of dental school.

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ADDITIONAL INFORMATION AND DECLARATIONS

Funding

The authors received no funding for this work.

Competing Interests

The authors declare there are no competing interests.

Author Contributions

_ Noraini Mohamad and Munirah Mohd Adnan conceived and designed the experiments, contributed reagents/materials/analysis tools, wrote the paper, prepared figures and/or tables, reviewed final drafts of the paper.

_ Khor Yong Jie performed the experiments, analyzed the data, wrote the paper, reviewed drafts of the paper.

_ Nor Azlida Mohd Nor, Nor Faharina Abdul Hamid and Zurainie Abllah performed the experiments and reviewed approved the final draft of the paper.

Human Ethics

The following information was supplied relating to ethical approvals (i.e., approving body and any reference numbers):

Human Research and Ethics Committee, Universiti Sains Malaysia (USM/JEPeM/22040222), Medical Ethics Committee, Faculty of Dentistry, University of Malaya (DF CO2204/0051(L)), International Islamic University Malaysia (IIUM) Research Ethics Committee (IREC 2022-045)

and Universiti Teknologi Mara (UiTM) Research Ethics Committee on (REC/07/2022 (ST/MR/131).

Data Availability

The following information was supplied regarding data availability:
The raw data is supplied as a Supplemental file.

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Table 1(on next page)

Sociodemographic data

Table 1. Sociodemographic data and BMI status of the respondents (*n*=384)

Variables	Frequency (%)	Mean (SD)
Age		
20	1 (0.3)	22.63 (1.35)
21	101(26.3)	
22	92 (24.0)	
23	79 (20.6)	
24	71(18.5)	
25	37 (9.6)	
26	3 (0.7)	
Gender		
Male	78 (20.3%)	306 (79.7%)
Female	306 (79.7%)	
Ethnicity		
Malay	315 (82.0%)	101 (26.3%)
Chinese	45 (11.7%)	
Indian	11 (2.9%)	
Others	13 (3.4%)	
Parents' Income		
B40 (<RM4,850)	133 (34.6%)	RM8592.98(9831.25)
M40 (RM4,851-RM10,970)	150 (39.1%)	
T20 (>RM10,971)	101 (26.3%)	
Marital Status		
Single	376 (97.9%)	7 (2.1%)
Married	7 (2.1%)	

Body Mass Index (BMI)

Underweight (BMI <18.5)	63 (16.4%)	22.02 (4.00)
Normal (BMI 18.5-22.9)	188 (49.0%)	
Overweight (BMI 23-27.5)	95 (24.7%)	
Obese (>27.5)	38 (9.9%)	

Current academic years

Second Year	108 (28.1)
Third Year	100 (26.0)
Fourth Year	75 (19.5)
Fifth Year	101 (26.4)

Place of study

Universiti Sains Malaysia (USM)	120 (31.3%)
Universiti Malaya (UM)	43 (11.2%)
International Islamic University Malaysia (IIUM)	103 (26.8%)
Universiti Teknologi MARA (UiTM)	118 (30.7%)

Accommodation

Hostel	372 (96.9%)
Rental/ Family house	12 (3.1%)

Medical Problems

Yes	30 (7.8%)
No	354 (92.2%)

3

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Table 2 (on next page)

Respondents lifestyle

1 **Table 2.** Respondents' lifestyle ($n=384$)

Variables	Frequency (%)
Exercise	
Yes	277 (72.1%)
No	107 (27.9%)
Frequency of exercise ($n=277$)	
>5 times per week	28 (10.1%)
3-5 times per week	77 (27.8%)
<3 times per week	172 (62.1%)
Eating of sleeping pills	
Yes	4 (1.0%)
No	380 (99.0%)
Electronic device used before sleep	
Yes	355 (92.5%)
No	29 (7.5%)
Frequency of electronic device used before sleep ($n=355$)	
>5 times per week	317 (89.3%)
3-5 times per week	30 (8.5%)
<3 times per week	8 (2.2%)
Smoking	
Yes	14 (3.6%)
No	370 (96.4%)
Alcohol	
Yes	19 (4.9%)
No	365 (95.1%)
Caffeinated drink consumption	

Yes 303 (78.9%)

No 81 (21.1%)

Frequency of caffeinated drink consumption
(*n*=303)

Rarely consume a caffeinated drink 68 (22.4%)

1 day per week 35 (11.6%)

2-3 days per week 93 (30.7%)

4-6 days per week 53 (17.5%)

Everyday 54 (17.8%)

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3

Table 3(on next page)

Respondents academic performance

1 **Table 3.** Distribution of Respondents by academic performance ($n=384$)

Variables	Frequency (%)
Self-perceived academic performance	
Very good	5 (1.3%)
Good	84 (21.9%)
Average	263 (68.5%)
Poor	32 (8.3%)
Very poor	0 (0%)
Fallen asleep in class	
Never	78 (20.3%)
Seldom	101 (26.3%)
Sometimes	142 (37.0%)
Often	47 (12.2%)
Very Often	16 (4.2%)
Skip class	
Yes	69 (18.0%)
No	315 (82.0%)
Frequency of skip class ($n=69$)	
< 3times per month due to illness	26 (37.7%)
3 times or more per month due to illness	4 (5.8%)
< 3 times per month due to other reason	34 (49.3%)
3 times or more per month due to other reason	5 (7.2%)
Come late to the class	
Yes	100 (26.0%)
No	284 (74.0%)
Frequency of come late to class ($n=100$)	

< 3times per month due to illness	39 (39.0%)
3 times or more per month due to illness	12 (12.0%)
< 3 times per month due to other reason	43 (43.0%)
3 times or more per month due to other reason	6 (6.0%)
Involvement in extracurricular activities	
Never	101 (26.3%)
Seldom	98 (25.5%)
Sometimes	122 (31.8%)
Often	41 (10.7%)
Very often	22 (5.7%)

Table 4(on next page)

Respondents Sleep Quality

1 **Table 4.** Distribution of respondents by sleep quality elements ($n=384$)

Element of sleep quality	Frequency (%)	Mean (SD)
Sleep Latency (minutes)		
Less than 15	127(33.1%)	16.09(16.34)
16-30	168(43.8%)	
31-60	72(18.8%)	
More than 60	17(4.3%)	
Sleep Duration (hours)		
>7	71(18.5%)	5.72(1.06)
6-7	156(40.6%)	
5-6	152(39.6%)	
<5	5(1.3%)	
Habitual Sleep Efficiency (%)		
>85	322(83.9%)	94.50(9.65)
75-85	41(10.7%)	
65-75	17(4.4%)	
<65	4(1.0%)	
Sleep Disturbances		
None	38(9.9%)	
Mild	288(75.0%)	
Moderate	57(14.8%)	
Severe	1(0.3%)	
Use of Sleeping Medication		
None	371(96.7%)	
Mild	7(1.8%)	
Moderate	4(1.0%)	
Severe	2(0.5%)	

Daytime Dysfunction		
None	48(12.5%)	
Mild	245(63.8%)	
Moderate	86(22.4%)	
Severe	5(1.3%)	
Total PSQI Global Score		
≤ 5 (Good)	186(48.4%)	5.63 (2.28)
> 5 (Poor)	198(51.6%)	

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Table 5(on next page)

Factor associated with sleep quality

Table 5. Factors associated with sleep quality among Malaysian University dental students
(n=384)

Variables	Sleep Quality n (%)		χ^2 (df)	P value
	Poor	Good		
Age				
20-22	101 (26.3)	93 (24.2)	0.39(1)	a 0.843
23-26	97 (25.3)	93 (24.2)		
Academic years				
Second year-third year	108 (28.1)	100 (26.0)	0.24(1)	a 0.878
Fourth year-fifth year	90 (23.4)	86 (22.5)		
Gender				
Male	39 (10.2)	39 (10.2)	0.96(1)	a 0.757
Female	159 (41.4)	147 (38.2)		
Ethnicity				
Malay	171 (44.5)	144 (37.5)	5.205(1)	a 0.023
Others	27 (7.1)	42 (10.9)		
Parents' Income				
B40 (<RM4,850)	68 (17.7)	65 (16.9)	0.918(2)	a 0.632
M40 (RM4,851- RM10,970)	74 (19.3)	76 (19.8)		
T20 (>RM10,971)	56 (14.6)	45 (11.7)		
Marital status				
Single	196 (51.0)	182 (47.5)		b 0.314
Married	2 (0.5)	4 (1.0)		
Body Mass Index (BMI)				
Underweight (BMI <18.5)	35 (9.1)	28 (7.3)	3.345 (2)	a 0.188
Normal (BMI 18.5- 22.9)	88 (22.9)	100 (26.0)		
Overweight (BMI 23- 27.5) /Obese (>27.5)	75 (19.5)	58 (15.2)		
Accommodation				
Hostel	197 (51.3)	175 (45.6)	9.268(0.1)	a 0.002
Rental/ Family house	1 (0.3)	11 (2.8)		
Medical problems				
Yes	20 (5.2)	10 (2.6)	2.973(1)	a 0.085
No	178 (46.4)	176 (45.8)		
Exercise				
Yes	142 (37.0)	135 (35.2)	0.036(1)	a 0.85

No	56 (14.6)	51 (13.2)		
Eating of sleeping pills				
Yes	3 (0.8)	1 (0.3)		^b 0.624
No	195 (50.8)	185 (48.1)		
Electronic device use before sleep				
Yes	185 (48.2)	170 (44.3)	0.57(1)	^a 0.45
No	13 (3.4)	16 (4.1)		
Smoking/vape				
Yes	8 (2.0)	6 (1.6)	0.181(1)	^a 0.670
No	190 (49.5)	180 (46.9)		
Alcohol				
Yes	7 (1.8)	12 (3.1)	1.734(1)	^a 0.188
No	191 (49.7)	174 (45.4)		
Caffeinated consumption	drink			
Yes	165 (43.0)	138 (35.9)	4.813(1)	^a 0.028
No	33 (8.6)	48 (12.5)		

^a Pearson Chi-Square

^b Fisher's Exact Test

Table 6(on next page)

Sleep quality and academic performance

Table 6. Association between poor sleep quality and academic performance of Malaysian University dental students ($n=384$)

Variable	Crude OR ^a (95% CI)	Adjusted OR ^b (95% CI)	Wald ^b Statistic (df)	P-value ^b
Self-perceived academic performance				
Very good/ Good	1.00	1.00		
Average	1.48(0.91,2.40)	1.50(0.92,2.45)	2.67(1)	0.102
Poor	2.95(1.25,6.96)	2.99(1.26,7.08)	6.21(1)	0.013
Skip Class				
No	1.00	1.00		
Yes	1.70(1.00,2.91)	1.73(1.01,2.97)	3.98(1)	0.046

^a Simple Logistic regression

^b Multiple logistic regression

OR=Odds Ratio

CI=Confidence interval

df=degree of freedom

The Hosmer–Lemeshow goodness of fit test p -value=0.995

The percentage of correct classification=55.2%

The area under ROC curve=0.6

There are no interaction and multicollinearity problems.