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Sleep Deprivation and Study Habits Effects toward Medical Imaging Students, UiTM Puncak Alam

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Abstract

This study aimed to investigate the effects of sleep deprivation and study habits during online distance learning (ODL) among students. The objective of this study is to evaluate the relationship between sleep deprivation and study habits with academic performance among students during ODL. A cross-sectional survey is used through an online platform. The questionnaire was distributed to 191 students in Medical Imaging course. The data being analyzed using SPSS software version 26. Most students had poor sleep ($n=130$, 68.1%) and poor study habits ($n=136$, 71.2%). There is no significant correlation between sleep deprivation ($X^2=0.31$, $df=2$, $p=0.855$) and study habits ($X^2=1.26$, $df=2$, $p=0.533$) on student's academic performance.

Keywords: sleep deprivation; study habits; e-learning; academic performance

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1.0 Introduction

Sleep is a psychological process essential to humans and their normal functioning (Lawson et al., 2019). The Supra Chiasmatic Nucleus (SCN) controls the synthesis of melatonin during the night which is a sleep-inducing hormone (Ma & Morrison, 2020). Signals from the environment especially light are affected by physiological systems that follow a circadian rhythm such as the sleep-wake cycle, body temperature, and hormone releases (Kaliyaperumal et al., 2017). According to National Sleep Foundation, sleep deprivation (SD) is referring to getting less than the needed amount of sleep which is seven to nine hours for a healthy adult (Hirshkowitz et al., 2015). SD has a bad effect on cognitive function, attention, learning, and working memory. Someone with a lack of sleep has a limited ability to pay attention, react quickly, and make decisions, especially students during classes. Okano et al. (2019) stated that lack of sleep is related to a lack of concentration and attention during classes. Thus, sleep is important, especially for students to perform well in academics. Meanwhile, study habits also can influence students' academic performance. Study habits can be different for different individuals depending on their personality.

Trockels et al. (2019) wrote in a study that study habits are the most important predictors of academic performance, and several studies around the world have revealed the effect of study habits on academic performance. Study habits help students to grow in pursuing

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knowledge as they can tell a person how much can be learned, how much the person wants to go, and how much the person wants to earn (Rabia et al., 2017). With the current pandemic situation, there is limited information about the preference of student regarding their sleep deprivation and study habits during ODL together with the effect on their academic performance. Therefore, this study aims to investigate the effect of sleep deprivation and study habits on academic performance during ODL among students of Medical Imaging at UiTM Puncak Alam Campus. The objective of the study is to evaluate the relationship between sleep deprivation and study habits with academic performance among students during ODL.

1.1 Problem statement

SD phenomenal among online university students was understudied (Cort-Blackson, 2018). With the recent outbreak of COVID-19, all universities around the world have shifted traditional learning to fully online learning. UiTM also is not excluded and has moved all classes through Open Distance-Learning (ODL) methods for all its campuses nationwide until the end of the semester (Karim, 2020). The Ministry of Higher Education (MOHE) also mentioned that continuous education must be given through e-learning (Palansamy, 2020). However, this rapid transition from traditional classes to online learning has caught everyone unprepared and feel stressed (Mallow, 2020). This unprecedented event can affect their sleep, study habits, and academic performance.

Rosenberg (2020) stated that remote work and virtual learning lead to SD due to constant screen time, irregular schedules, bad bedroom habits, lack of relaxing time, and stress. A combination of these factors has made insomnia a common problem during online learning. Besides, the outbreak of COVID-19 added stress and made sleeping more challenging which makes the experts worry that COVID-induced insomnia would be the rise cause of depression and other mental issues (Rosenberg, 2020). Therefore, this study aimed to evaluate the effect of SD and study habits on academic performance during ODL among students of Medical Imaging at UiTM Puncak Alam Campus

2.0 Literature Review

2.1 Sleep deprivation (SD)

SD diminishes execution in errands that require supported consideration, coming about in increasingly slow factor reaction times that deteriorate with time on task (Massar et al., 2019). Loss of inspiration to invest energy during SD can deteriorate execution decay. Numerous psychological capacities and inspirational elements, like memory, consideration, and dynamics, are adversely affected by lack of sleep or sleep deprivation (SD). Lack of sleep or SD may have an adverse consequence on psychological and actual well-being. Ongoing a sleeping disorder can unleash destruction on the body's capacity to deal with data. It can likewise debilitate the body's insusceptible framework, making individuals more helpless against contaminations and ailments. In individuals with bipolar state of mind problems, an absence of rest can likewise cause craziness. Lack of sleep or SD depletes the cerebrum, making it incapable to play out its capacities adequately (Engle-Friedman, 2014).

SD and sleepiness can result from a variety of factors and have a variety of negative consequences. Acute SD or chronic partial sleep deprivation are two terms used in the literature to describe SD (Hershner & Chervin, 2014). Acute SD is referred to as "pulling an all-nighter", which means staying up for 24 hours or longer. Sleep deprivation is more commonly described as chronic partial SD, in which a student gets some but not enough sleep. Sleepiness is a common side effect of SD, but it can also be caused by other factors, the most common of which are sleep disorders. Normal sleep and its effect on learning, memory, and efficiency are important to comprehend the effects of sleepiness and sleep deprivation (Lazzari et al., 2018). Potential initiatives are also essential because they can provide an opportunity to enhance health and educational outcomes for this population.

SD can be chronic or acute, and the severity can vary greatly. Acute SD occurs when a person sleeps for a shorter period than normal or does not sleep at all. Good sleep can lead to an increase in energy and alertness, as well as a better mood. Sleep is essential for energy conservation, tissue, and cognitive function regeneration, emotion control, and immune system health. Many of sleep's restorative functions are linked to non REM sleep (Pacheco, 2021). Our sleep-wake cycle and path through the sleep stages are controlled by multiple systems in the body. Although there is no replacement for a good night's sleep, there are a few things an individual can do to ensure enough rest. Sleep deprivation has been attributed to an unbalanced rise in energy consumption compared to expenditure.

2.2 Study habit

Study habits define as different individual behavior about studying and it is a combination between method and study skill (Jafari et al., 2019). There are various styles of study habits. According to Walck-Shannon et al. (2021), study habits can be from the amount of time that student's study, to the studying strategies, and the studying environment. Study habits are the gateway to success and are different for an individual (Kamoru & Ramon, 2017). Academic performance can be influenced by study habits.

Several studies show the relationship between study habits and academic performance either in primary education, secondary education, or higher education. Studies by Kaur & Singh (2020) and Rabia et al. (2017) have shown that study habits correlate with the academic performance of the students. They also wrote that understanding the study habits factors of the students is important as it could help in developing a well-defined study habit program for issues concerning academic performance.

3.0 Methodology

3.1 Study design

This study was a cross-sectional survey study. It was conducted through an online platform. The data were collected via Google Form that was sent to their 'WhatsApp'. It consists of 42 questions that were adapted from Maheshwari & Shaukat (2019). A pilot study was conducted to check for the internal consistency and reliability of Cronbach's alpha.

3.2 Pilot study

A pilot study was conducted among 30 medical imaging students to determine the validity and reliability of the questionnaire. The reliability of the questionnaire was calculated using SPSS to derive Cronbach's alpha. The Cronbach's alpha of 0.6 and more was deemed acceptable. Table 4 shows the result of Cronbach's alpha value which indicates all 7 items of section B and 30 items of section C in the questionnaire are reliable with the value of 0.768 and 0.875 respectively. Therefore, the data collected is normal and reliable.

Table 4. Cronbach alpha for section B and C of the questionnaire

Cronbach Alpha	
Section B	
Sleep Deprivation based on PSQI score	
Subjective sleep quality	0.739
Sleep latency	0.733
Sleep duration	0.756
Habitual sleep efficiency	0.749
Sleep disturbance	0.720
Use of sleep medication	0.747
Daytime dysfunction	0.727
Section C	
Study habits based on PSSHI score	0.875

3.3 Study setting

The survey was done through the distribution of a web-based, self-administered questionnaire from the second year until final year students of Diploma and Bachelor in Medical Imaging, UiTM Puncak Alam Campus. This study focus on students from this course as pioneer study. The study was done from December 2021 until February 2022.

3.4 Sample size

The sample in this study were students in the Medical Imaging program, Faculty of Health Sciences UiTM Selangor, Puncak Alam Campus. Based on sample size calculation, the sample to be recruited in this study will be selected using convenience sampling. Raosoft software was used to calculate the sample size population with a 5% margin error. The total number of students in the Medical Imaging program at UiTM Puncak Alam Campus was 303 students. Therefore, based on the Raosoft calculation, the recommended and minimum sample size for this study was 170 respondents as stated in Figure 1. However, only 91 respondents participated in this study while 9 respondents were excluded since they did not meet the criteria.

The inclusion criteria of this study were full-time Diploma and Bachelor's students of Medical Imaging, UiTM Puncak Alam from the second year to final year. The respondents must be aged 18 and above to participate in this study. The respondents also must be proficient in English.

The exclusion criteria in this study were first year and distance learning (e-PJJ) students of the Medical Imaging program at UiTM Puncak Alam Campus. The respondents who were unable to give a corporation and complete the questionnaire also were excluded from this study.

3.5 Data collection

Self-administered questionnaires that were adapted from Maheshwari & Shaukat (2019) were distributed using an online google form as a method how to collect data as is the quickest and safest way during this pandemic. Face-to-face distribution of the questionnaires to the participants was not advisable to reduce the risk of Covid-19 infection. Questionnaires were constructed with three sections which were sections A, B, C, and D as shown in Table 1. Section A contained 5 questions on demographic characteristics which are gender, age, level of education, current semester, and current Cumulative Grade Points Average (CGPA). Then, section B has seven questions which had constructed to assess the SD among the Medical Imaging students, at UiTM Puncak Alam Campus while section C assessed the study habits of the students during online distance learning (ODL).

Table 1. Sections of Questionnaire

Section	Number Of Questions	Total Score
A-Demographic characteristics	5	-
B-Sleep deprivation	7	21
C-Study habits during ODL	30	300

In section B, there were seven closed-ended questions to assess sleep deprivation. Pittsburgh Sleep Quality Index (PSQI) questionnaire was used as it is an efficient measure of the quality and pattern of sleep. The PSQI has seven components which are sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. In this section, the score is a minimum of 0 and a maximum of 3. Thus, the total score ranges from 0 to 21. Then, the combined score of all 7 components is called 'Global Score', and scores that more than 5 indicate poor sleep quality as tabulated in Table 2.

Table 2. Sleep deprivation based on PSQI

PSQI Category	Score
Poor sleep quality	≥5
Good sleep quality	<5

Meanwhile, section C used 30 questions to assess the study habits. In this section, the questionnaires are based on Palsane and Sarma Study Habits and Inventory (PSSHI) tool. There were 6 components in this section, which are reading textbooks, taking notes, studying, memorizing, preparing for tests, and managing your time for study. Each component has 5 questions and is given a 3-option Likert scale which is "rarely", "sometimes", and "often". The options were allocated scores as 0, 5, and 10. Thus, the total scores will range from 0 to 300. Then, it was categorized into two groups tabulated in Table 3. This method was adopted by V et al. (2016).

Table 3. Study habits during ODL based PSSHI

PSQI Category	Score
Fairly good	> 210
Need to improve	< 210

3.6 Data analysis

The data were analyzed using statistical analysis, SPSS software version 26. All variables were examined using frequency distribution to check the accuracy of data input and identify the missing values. For descriptive analysis, frequency and percentage were used for categorical data, and mean for continuous data. Research objective one could be answered by using mean to determine the sleep deprivation of students and descriptive analysis which is total scoring study habits among the students.

Pearson chi-square was used to evaluate the relationship between variables which are sleep deprivation and study habits among students during ODL with academic performance that was evaluated by their current CGPA. Table 5 below showed the summary of data analysis.

Table 5. Outcome measure and type of analysis

Research objectives	Outcome Measures	Statistical Analysis
To identify the sleep deprivation and study habits among Medical Imaging students during ODL	Identify the sleep deprivation and study habits among Medical Imaging students during ODL	- Descriptive analysis (frequency, percentage, mean)
To evaluate the relationship between sleep deprivation and study habits with academic performance among Medical Imaging students during ODL	Identify if there is relationship between sleep deprivation and study habits with academic performance among medical Imaging students during ODL	Chi-square analysis

4.0 Findings

4.1 SD and study habits during ODL

According to Table 6, there were 130 students (n=130, 68.1%) who had poor sleep as compared to good sleep (n=62, 31.9%). It means most students in this study had sleep deprivation with a score of more than 5 based on the PSQI score as mentioned in Table 2.

However, the findings in this study also found that majority of the students had poor study habits during ODL (n=136, 71.2%) as compared to students with good study habits (n=55, 28.8%). It means most of the students had scores less than 210 based on the PSSHI score as mentioned in Table 3. The students also need to improve their study habits to increase their academic performance.

Table 6. Descriptive data on sleep deprivation and study habits during ODL

Category	N	Percentage	Mean (SD)
Sleep Deprivation			0.32 (0.47)
Poor sleep	130	68.1%	
Good sleep	61	31.9%	
Study habits during ODL			0.71 (0.45)
Fairly good (>210)	55	28.8%	
Need to improve (<210)	136	71.2%	

4.2 Gender difference and level of education with sleep deprivation

According to the results shown previously, most students had experienced poor sleep. Hence, the results in Table 7 showed gender differences in who had poor sleep the most. Referring to the results below, female students had poor sleep (n=115, 60.2%) higher than male students (n=15, 7.9%). Only 49 (n=49, 25.7%) students who have good sleep were female. Again, male students were the lowest who have good sleep (n=12, 6.3%). These were calculated by using Pearson Chi-Square and there is no significant correlation between gender differences on sleep deprivation ($X^2=2.26$, $df=1$, $p\text{-value}=0.133$).

In addition, the level of education also was compared to the sleep quality of the students in this study. Most of students from Bachelor level had sleep deprivation (n=73, 38.2%) as compared to students from Diploma level (n=57, 29.8%). In contrast, Diploma students (n=34, 17.8%) who had good sleep is higher than Bachelor students (n=27, 14.1%). Pearson Chi-Square also was used to assess the relationship between the student's level of education on SD. As the result showed in Table 7 below, there was no significant correlation between the level of education and SD ($X^2=2.35$, $df=1$, $p\text{-value}=0.125$).

Table 7. Relationship between some demographic characteristics and sleep deprivation

Variables	N (%)		X^2 (df)	p-value
	Poor sleep	Good sleep		
Gender			2.26 (1)	0.133
Male	15 (7.9)	12 (6.3)		
Female	115 (60.2)	49 (25.7)		
Level of education			2.35 (1)	0.125
Diploma	57 (29.8)	34 (17.8)		
Bachelor	73 (38.2)	27 (14.1)		

4.3 Relationship between sleep deprivation and study habits on CGPA

Table 8. Relationship between sleep deprivation and study habits on academic performance

Variables	N (%)			X^2 (df)	p-value
	CGPA 1.0-2.49	CGPA 2.5-3.49	CGPA 3.5-4.0		
Sleep deprivation				0.31 (2)	0.855
Poor sleep	2 (1.0)	100 (52.4)	28 (14.7)		
Good sleep	1 (0.5)	49 (25.7)	11 (5.8)		
Study habits				1.26 (2)	0.533
Fairly good	0 (0)	44 (23)	11 (5.8)		
Need to improve	3 (1.60)	105 (55)	28 (14.7)		

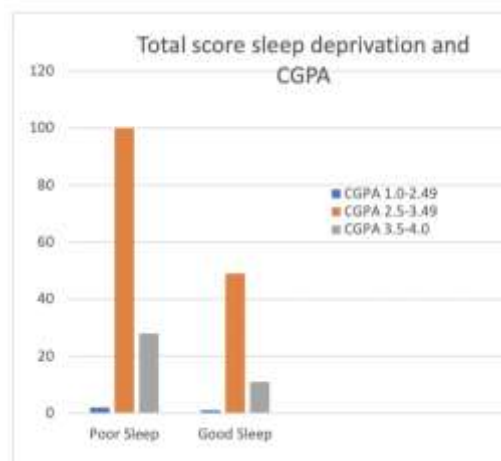


Figure 1: Relationship between total score sleep deprivation and CGPA

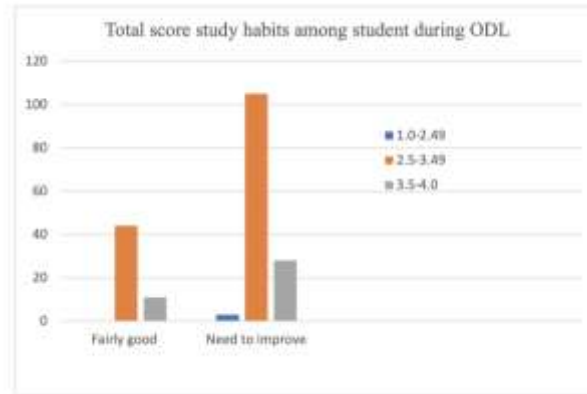


Figure 2: Relationship between total score study habits and CGPA

However, to assess the relationship between SD and study habits among MI students during ODL on their academic performance (CGPA), the Pearson Chi-Square test was run (see Table 8). According to the results shown below, most of the students who had SD (poor sleep) have fairly good CGPA which is between 2.50 to 3.45 (n=100, 52.4%). Furthermore, most of the students who had good sleep also got fairly good CGPA which is between 2.50 to 3.49 (n=49, 25.7%). It means, excellent students with a CGPA of 3.5

5.0 Discussion

5.1 SD and Study Habits among MI Students During ODL

The SD and study habits among Medical Imaging students during online distance learning had been identified which answered research question number one. The findings showed most Medical Imaging students have poor sleep and poor study habits which need to be improved. Hypothesis one in this study was to rule out if there is any correlation between SD and study habits among Medical Imaging students during online distance learning (ODL). It has been answered by accepting the null hypothesis that there was no significant correlation between SD and study habits among Medical Imaging students during ODL (see Table 6).

5.2 Effect of SD on Academic Performance of Students

In this study, the findings showed that most Medical Imaging students have poor sleep (n=130, 68.1%). A sleep-deprived person usually starts from poor sleeping. SD also can reduce the probability of students getting very good marks in their studies (Heady Marks, 2021). This is because sleep is very crucial for the brain's ability to learn and memorize. Identifying SD among students would help the institutions to improve their sleep habits and at the same time increase their academic performance, especially during the final exam. According to the American Academy of Sleep Medicine (AASM), getting a good night's sleep was the best way to maximize academic performance (Medicine, 2017).

Other factors that can be related to SD were demographic characteristics. According to this study, a few demographic characteristics were related to SD such as gender, and level of education. Based on the findings, female students had more experienced sleep deprivation (poor sleep) as compared to male students as in Table 7. There are no previous studies on gender differences experienced SD but there are some studies on the effect of SD on each gender. According to Ferrara et al., (2015), males have a higher risk of experiencing sleep loss which will disturb their decision-making of the person. Females also had the effect, but minimal risk as compared to males. The effect is the difference if the female had to take care of their child at night. (Ferrara et al., 2015).

Besides that, level of education was also taken into consideration in this study. According to the findings, both Diploma and Bachelor students most experienced poor sleep Table 7. Only 14% of Diploma and 17% of Bachelor students had experienced good sleep. It means students in university had a high commitment in their daily life such as assignments, quizzes, or final examinations. Still, there is a limitation in this study as factors that leads to SD was not done in this study. As for gender factors, there were only small.

23 male samples as compared to females. Hence, there is no significant correlation between both demographic characteristics (gender and level of education) and sleep deprivation.

5.3 Study Habit among Students During ODL and Academic Performance

The study habit among Medical Imaging students during online distance learning was assessed by Palsane and Sarma Study Habits and Inventory (PSSHI) scores. Based on PSSHI scores that were recorded and tabulated in Table 8, most of the students who had a CGPA range of 2.5 to 3.49 (fairly good), which N=105 (55%) need to improve their study skills. As for students who had fairly good study habits, the majority were from the CGPA range of 2.5 to 3.49 (fairly good) too. Hence, it is clearly stated that most of the Medical Imaging students in UiTM Puncak Alam Campus were in fairly good CGPA (2.5 to 3.49). There was no significant correlation between study habits and academic performances of the student as the p-value=0.533 which is more than 0.05 and 1 X² (df) was 1.26 (2).

There are numerous studies showed students who had experienced sleep deprivation will suffer academically (Richter, 2015). SD can become chronically worse, and it will lead to impairment to understand, memorize, focus, and performing academically. There was also a

survey done by Carskadon at high school as mentioned in Richter (2015) and the results were students who are going to bed earlier on school nights and less sleeping on weekend got a higher grades as compared to students who sleep late at night.

6.0 Conclusion & Recommendations

This study increases the awareness of the effect of SD and study habits on the academic performance of students. Both SD and poor study habit are seen as high for the majority of the students. The factors that contribute to SD including poor sleep, demographic characteristics and level of education. Although the majority of students had experienced poor sleep and their study habit needed to improve, most of the students managed to get a CGPA range of 2.5-3.49 which are second class and still a fairly good pointer for CGPA. Therefore, it is recommended for higher institutions and students to create awareness of SD and study skills which will improve their education performance. Other than that, institutions can invite certified motivators or counselors to help the students identify their learning styles based on the Visualization, Auditory, Kinesthetic, and Digital (VAKD) test as founded by Richard Bandler and John Grindler in Neuro-Linguistic Programming (NLP). Lastly, further studies on a factor that leads to sleep deprivation in students' daily life should be done in the future to assess the relationship between the factors of SD toward their academic performance.

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Paper Contribution to Related Field of Study

This study will contribute information regarding the academic performance of students undergoing online distance learning. The information will give ideas, especially to the higher institution regarding the importance of awareness of SD and study skills which will help the students to maintain their mental health and improve their academic performance

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