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The Effect of Online Gaming on the Students' Sleeping Pattern: A Case Study in University Malaysia Sabah

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Abstract

One of the pervasive effects of globalisation is the escalating culture of technology being practised worldwide. In tandem with that, online gaming is one fraction of the global technological civilisation that has affected many consumers, particularly students. Previous studies have shown that online gaming can be a damaging addiction and consequently impact avid gamers' sleeping trends. This study is conducted to identify the ensuing relationship between online gaming and its impacts on the students' sleeping pattern. Questionnaires are distributed to 300 students between the ages 18 to 25 years old identified through purposive sampling. In this study, the quantitative approach is employed to develop a descriptive analysis that captures frequency values and score min. Besides, inference analysis is undertaken to ascertain the prevailing relationship between university students' online gaming and sleeping patterns. Factor analysis is used to analyse a total of 17 parameters impacts of online gaming. The study found three (3) factors that contribute to online gaming: the first-factor 'sleep quality', the second-factor 'duration of sleep' and third, the 'health' factor. In turn, these had led to several implications such as loss of focus or concentration during lessons and physical complications. In conclusion, this study strongly recommends that the students gain control of their behaviour by practising self-discipline to prevent them from being continuously involved in unproductive activities such as excessive online gaming. Self-discipline is indeed a salient practice in facing the challenges of globalised technological culture we face today.

Keywords: University Students, Online Game, Sleeping Pattern, Sleep Quality, Duration of Sleep, Health.

Introduction

Technology advancement and lifestyles had undergone tremendous improvement to the point where the societies are spending more time on the internet, which had inadvertently led to internet addiction amongst the youth (Kwon et al. 2013). The online game can be assessed and played on many platforms such as personal computers, laptops, tablets and smartphones for as long as the internet connection is available (Aji, 2012). In line with the

advancement in technology coupled with changes in culture and lifestyle, today's youths were experiencing profound changes in internet usages compared to university students a decade ago (Zulkefly & Baharudin, 2009). In 2016, it was estimated that 58.7 % of internet users worldwide would increase to 2.4 billion users in 2017 (Gokcearslan, 2018). Simultaneously, the percentage of internet usage in Malaysia increased by 7.2%, i.e. from 68.7% in 2016 to 75.9% in 2017 (Malaysia Multimedia and Communication Commission 2017). Several kinds of research on smartphone usage (internet) in several states in Asia (Haug et al., 2015; Mok et al. 2014; Chen et al. 2015; Chen et al., 2017). From these researches, it is clear that the culture of the society is significantly influenced by modern technology and values concerning his internet culture is instilled from generation to generation through other media such as television.

Literature Review

The Globalisation of Online Gaming Culture

Online gaming is a type of game that can be played with an accessible internet network (Freeman, 2008). According to Kramer (2015), the gaming industry has expanded to a profound degree to the extent that it has become lucrative. Nonetheless, the research Peracchia and Curcio, (2018) shown that excessive online gaming has led to an addiction that replaced social activities such as social gatherings, academic meetings and outdoor leisure activities. According to a research carried out by Choo et al. (2011), the young generation between the ages of 18 to 25 (particularly those universities and colleges students) have a higher risk of being lured to internet addiction. This finding is supported by Mohd Aziz Shah et al. (2013), which revealed that habit worsens when numerous parties freely provide wireless internet services. Wireless internet services are freely available in cafes, restaurants, airports, hotels, and shopping complexes (Johari & Raja Shahrina, 2012). The effects of internet addictions have led to many discouraging consequences such as poor academic performance, emotional problems, disturbed periods of sleep, health and physical problems, low productivity life (Billieux et al., 2015; Gokcearslan, 2018). Most active online gamers tend to become more addictive and prone to neglect their sleep (Schiebener et al., 2015).

The Effect of Online Gaming Culture on Sleeping Pattern

Relax environment is often associated with good quality sleep. Nonetheless, when the sleeping environment is affected by online gaming activities, it will influence one's sleeping pattern (Van, 2004b). Research by (Gradisar, 2013), concludes that the usage of technology around bedtime has become a mandatory routine in America. Those addicted to online gaming are also prepared to sacrifice their sleeping time due to their interaction with gaming characters such as the zombie team, the aliens, the sorcerer and the giants (Hassan et al., 2012). Frequent online gaming could significantly cut sleeping time, cause sleeping disturbances, and change the gamers' sleeping pattern (Van, 2007; Jap et al., 2013). Besides, Kim & Kim (2010) also revealed that online gaming also contained some gambling and betting elements, which led the gamers to become obsessive and cut down their sleeping. One research discovered that nurses who tend to patients with insomnia stress and hyper insomnia cited Internet Gaming Disorder (IGD) as the leading cause of inadequate sleep (Taylor dan Roane, 2010). The number of cases in sudden death and physical symptoms is also closely related to online gaming compared to the previous year (Astro Awani, 2017). Van (2004b) suggested that there should be a fixed time for online gamers. For example,

students need sufficient time to relax, study, and sleep (Bowers & Berland, 2013). Many online players will use daytime as their sleeping hours thus give a negative notion that the use of technology at night has caused less sleep. Therefore, the researchers suggest that there should be a restriction on the use of electronic devices at night (Hysing et. al., 2014).

Obligatory usages of technological appliances before bedtime has become the embraced culture at present (Calamaro et al., (2009). A research carried out Hershner and Chervin (2014) revealed that gadgets before bedtime reduce the quality of sleep and 51% of the users woke up feeling tired. The blue light from digital devices such as the computer, tablet, iPad, and mobile phones affects one's sleep and release melatonin (Hershner dan Chervin, 2014). A research carried out by Cheung and Wong (2011) reported that 719 of Chinese teenagers in Hong Kong experienced insomnia due to their obsession with online games. One research by Syracuse University (2007) discovered that addiction to online gaming deteriorated the quality of sleep and caused the gamers to become a social nuisance to society. To stay up late passed the midnight and lack of sleep will consequently lead to health problems. Wang and Zhu (2011) revealed that obsessive online gamers' brains became too sensitive to sound and light while sleeping. That is one of the many symptoms of insomnia and may lead to nerve damage.

The American National Sleep Foundation (Hirshkowitz et al. 2015) had issued several consensus on the recommended sleeping duration for various age groups, as depicted in Table 1. For the age group from 18 to 25 years old, the recommended sleeping duration for a healthy sleeping pattern is between seven to nine hours. According to research by the American Thoracic Society (2019), the negative impacts of lack of sleep include sleepiness during the day, accidents due to lack of focus, mood and appetite change. Even one-hour reduction of sleeping time may influence the thinking process and reactions on the next day. Lack of sleep may lead to extreme fatigue, which adversely affects performance at work and in the study. Lack of sleep is also often related to several health conditions such as diabetes, stroke, high blood pressure, kidney problems and mood swings. All these postulates that lack of sleep seriously influence one's health condition and well-being.

TABLE 1: Recommended Sleeping Duration according to Age Category

Age Group	Recommendation
Newborns (0 - 3 months)	14 - 17 hours
Infants (4 - 11 months)	12 - 15 hours
Toddlers (1 - 2 years)	11 - 14 hours
Preschoolers (3 - 5 years)	10 - 13 hours
Children (6 - 13 years)	9 - 11 hours
Teenagers (14 - 17 years)	8 - 10 hours
Young adults (18 - 25 years)	7 - 9 hours
Adults (26 - 64 years)	7 - 9 hours
Older adults (> 65 years)	7 - 8 hours

Source: Hirshkowitz et al. 2015

Problem Statement

Sleep is the designated time for mind and body to rest for it to recuperate and be ready to undertake daily tasks (Moorcroft & Belcher, 2003). Thus, sleep is an essential need for any human being and should not be taken for granted (Born and Gais, 2006). Many functions are often related to sleeping pattern such as consolidating of memories, (Born et al., 2006), reenergizing physiology organism and psychology (Irwin, 2006) and accumulating energy for bodily functions (Manquet, 1995). Thus, sleeps help to gain back energy, assist the mind to function properly, and maintain the capabilities to carry tasks in days to come (Hidayat, 2006).

However, the repercussions of playing too many online games will affect the sleeping pattern and one's quality of sleep. In relatively recent research by Peracchia and Curcio (2018), it was discovered that there is a connection between continuous online gaming at night and its effects on Total Sleep Time (TST), as well as an increase of Sleep Onset Latency (SOL). International Telecommunication Union (2013) reveals that Malaysia is recorded to be on the fourth rank in high internet usage globally. Almost 75% of the Malaysian youths are digital consumers (Nahar et al. 2018). According to Steingerg (2004), teenagers are obsessed with electronic media vis-a-vis watching a video or involved in online games before going to bed. Therefore, it is apparent that excessive online gaming will affect the quality and pattern of sleep.

There is a high tendency among teenagers to sleep late because they are involved in online gaming until passed midnight. Online games at night time tend to delay the time to go to bed, affects the quality of sleep and sleeping (Peracchia & Curcio, 2018), and it also tends to have its toll on health (Orzeł, 2010). Several complications may occur if addiction on the

online game becomes uncontrollable such as insomnia, work fatigue, tiredness, and lack of quality sleep (Choi et al. 2009). This study seeks to identify the frequencies of online gaming and its effects on sleeping pattern amongst university students, focusing on the students of Universiti Malaysia Sabah (UMS).

Methodology

This research is undertaken to ascertain the effects of online gaming on the sleeping patterns of UMS students. A total of 300 students were selected to become the respondents of this study. The researchers constructed 23 questions in the questionnaires survey to determine the respondents' sleeping index. The survey questions were adopted from the combination of three sources, i.e. *Insomnia Severity Index* (Morin et al. 011), *Sleep Reduction Screening Questionnaire* (Van Maneen et al. (2014) and *Game Engagement Questionnaire* (Brock et al. 2009). The questionnaires also employ Likert of 4 Scale 1 (Strongly Disagree), 2 (Disagree), 3 (Agree), dan 4 (Strongly Agree). The data is analysed by using descriptive and inference methodology. The descriptive analysis is undertaken to explain the data and the chosen variables. Meanwhile, the chi-square test is employed to ascertain the comparison and frequency relationship between the amounts of time spent on an online game with gender. On the other hand, factor analysis is a multivariate methodology to analyse the correlation between variables to enable the analysis of those variables grouped in the same category (Horst, 1965). As a result of factor analysis, only 17 variables are acceptable for further analysis. Min analysis is undertaken to ascertain the effects of online gaming on the students' sleeping patterns as depicted in Table 2.

TABLE 2: Determination on the Level of the Effect of Online Game on Sleeping Patterns

Mean	Level
1.00 - 2.00	Low
2.01 - 3.00	Mediocre
3.01 - 4.00	High

Source: Bakar, Z. A. (2008).

Findings

The Frequency of Online Gaming among the Respondents

Online gaming will become a part of the students' daily routine in their life of University students at UMS when the study shows that 60% of respondents spent time every day with a smartphone or computer, while only 14 per cent play games in 1-2 days a week (Figure 1). That shows the addiction to online gaming has permeated in campus life.

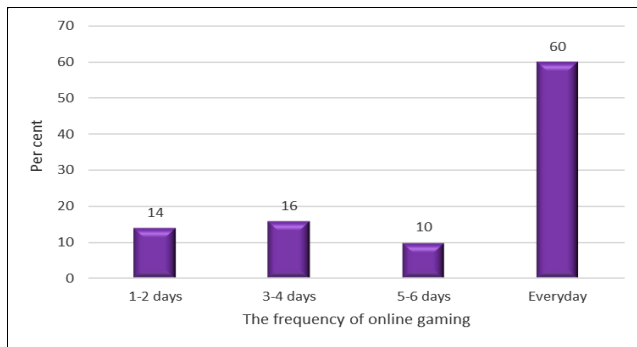


DIAGRAM 1: Frequency of Online Gaming

Nighttime is the time usually allocated for engaging in online games. As depicted in Diagram 2, 49% of the respondents choose to play online games at night. These findings align with studies (Mesquita & Reimão 2010), where online games on-campus students' are between 7.00 pm to 11 pm. This activity has profoundly affected their sleep because they tended to play online games during night time.

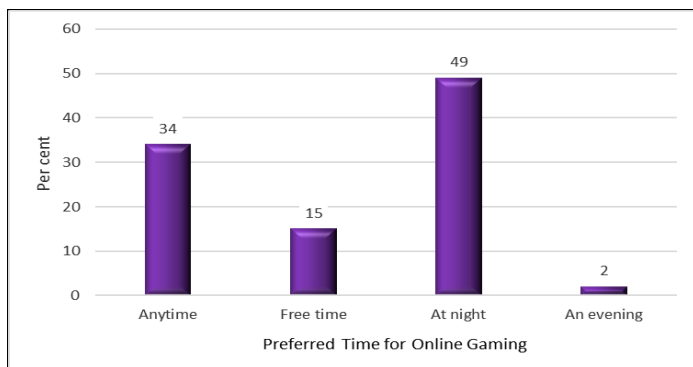


DIAGRAM 2: Preferred Time for Online Gaming

Diagram 3 would show a significant difference in the respondents' sleeping patterns if they chose to engage in *online gaming*. A total of 39% of the respondents decided to allocate only five to six hours for sleeping. Meanwhile, 26% of the respondents disclosed that they need at least seven hours of sleep and 29% of them only need three to four hours of sleep if they chose to spend time on online gaming instead of sleeping. This scenario distinctly shows that online gaming causes changes in the sleeping patterns of the youths. This finding is also in line with the research carried out by Twenge et al. (2017), which states that the engagement in video games led to shortening time allocated for sleeping, i.e. lessen by 44 minutes daily. Besides, it is also discovered that playing video games led to inadequate sleep required for healthy youth which should be seven or eight hours. This statistical data postulates the respondents' tendency to face problems relating to lack of sleep because of online gaming.

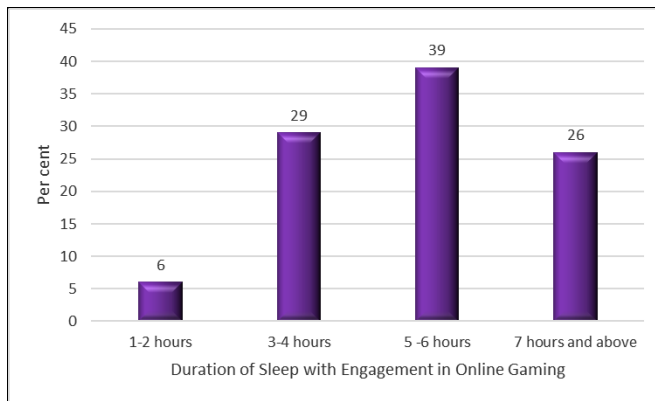


DIAGRAM 3: Duration of Sleep with Engagement in Online Gaming

Frequencies of Online Gaming and Its Relations to Gender

There are no significant differences in online gaming frequencies concerning gender among the university students on the campus. However, the frequencies in Table 3 shows that male students are more frequently involves in online gaming daily. A total of 35% of male respondents would engage in online games daily, whereas only 25% of female students do so. There is also a noticeable difference in the percentage of female students that play three to four days of online game in a week compared to the male students. In this regards, 25% of female students engage in online game three to four days a week, and only 8% of male student do the same routine. This analysis shows that the male UMS students tend to play online games as they tend to be engaging on the online games daily instead of the female students who are prone to play only three to four days weekly. This analysis is consistent with the research results by Tsai & Li (2004) and Chen et al. (2017), which revealed that more male students have an addiction to smartphone usage (for online gaming purposes) compared to female students were more addicted to online social networking.

Table 3: Relation between Gender and Frequencies of Online Gaming

Frequency of online gaming/week	Gender		Total
	Male (%)	Female (%)	
1-2 days	50	50	100
3-4 days	25	75	100
5-6 days	40	60	100
Every day	58.3	41.7	100

Chi-square = 16.835 Significant =0.051

Time to Play Online Game and Its Relations to Gender

There is no significant against on-line game time for gender. But the frequency distribution in Table 4 found that male students were more frequently playing games at night (60%) than female students (40%). Chen et al. (2017) found that smartphone addiction factors in male students were the use of game apps, anxiety, and low sleep quality. The same study also found that significant factors for female undergraduates were multimedia applications, social networking services, depression, anxiety, and low sleep quality.

TABLE 4: Relation between Time to play online Game and Gender

Frequency of online gaming/Week	Gender		Total
	Male (%)	Female (%)	
No specific/designated time	41.2	58.8	100
Only during leisure time	55.1	44.9	100
During Night Time	60.0	40.0	100

Chi-square = 4.169 Significant = 0.244

Factor Analysis of Effects of Online Gaming on the Sleeping Patterns of University Students

Factor analysis with the aim to construct factors on the effects of online gaming on UMS students were carried out in four points scale. The analysis is started with validation of data with by employing *Kaiser-Meyer Olkin* (KMO) and *Barlett's Test of Sphericity*. This test has to be undertaken in order to ascertain as to whether the data analysed in this research is sufficient for the construction of factors. The factor analysis is deemed appropriate if the value of KMO is bigger than 0.60. It turned out that the value of KMO is 0.824 which means that the data is free from problems relating to *multicollinearity* and the items are suitable for factor analysis. The *Barlett's Test of Sphericity* is employed to ascertain the co relation between the items that are sufficient and appropriate for factor analysis. The result of the test is significant where $p < 0.05$ and this indicates that the co relation between the items are appropriate for factor analysis. Table 5 shows the result of KMO test, *Bartlett's Test*, factors, the selected items, loading factor, the eigen value, variant percentage and *Cronbach's Alpha* analysis on the sleeping duration of UMS students.

Based on EFA results, the effects on sleep quality are the most important factor as it contributes 42.439 per cent out of 60.301 per cent overall with the eigenvalue of 10.610 (see Table 5). This factor contains six (6) items. The second important factor is the usage of sleeping time for online gaming. The eigenvalue is 2.595 with the variant of 10.382 per cent. This factor also contains six (6) item. Lastly, the third important factor is the effects on health factors with (5) items that contribute 7.480 per cent variant with the eigenvalue of 1.870.

TABLE 5: The effect of Online Gaming on the Sleeping Pattern of University Students

Item	Factor		
	1	2	3
Quality of Sleep			
Lack of sleep	0.752		
Bad quality sleep	0.695		
Sleeping difficulty	0.712		
Late-night gaming habit	0.809		
Awake in the middle of the night	0.690		
Not getting sleepy playing games	0.786		
Duration of Sleep			
Time and schedule are not consistent		0.717	
Affects daily tasks and functions		0.709	
Sleeping during the day		0.659	
Less time for sleep at night		0.679	
More time on game at night		0.890	
Can't sleep until the game's over.		0.786	
Health			
Drowsy throughout the day			0.724
Trouble getting up in the morning			0.711
Difficult to overcome video game addiction			0.783
Body fatigue and tired			0.748
Have to take sleeping pills			0.811
Cronbach's Alpha	0.919	0.847	0.837
Total Variance Explained	10.610	2.595	1.870
Percentage Variance Explained	42.439	10.382	7.480

Notes: Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.824; $\chi^2 = 1956.325$; Bartlett's Test of Sphericity Significance = 0.000; df = 300

Diagram 4 shows three factors constructed from factor analysis: firstly, 'quality sleep' factor, secondly, 'duration of sleep' factor, and thirdly 'health' factor.

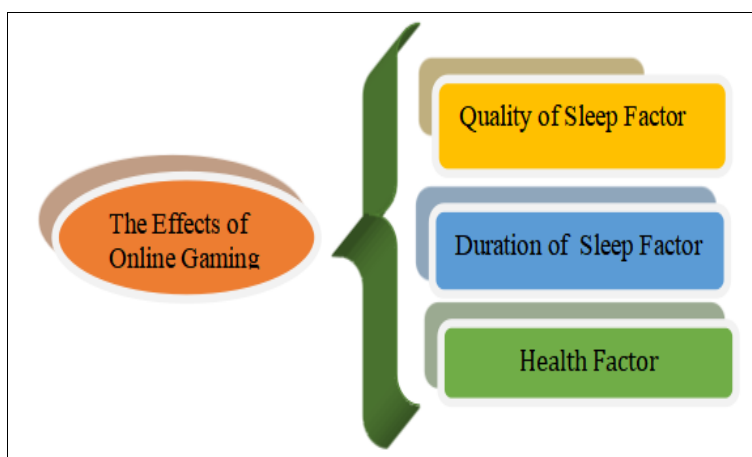


DIAGRAM 4: The Construction of Factors on the Effect of Online Gaming

Factor 1 : Quality of Sleep

Quality sleep is an excellent quality sleep such that when an individual wakes up from sleep, he or she feels healthy and refreshed. Quality sleep may not take a long time, but the individual in question needs to be calm and free from any mind interference before, during and after sleep. Online gaming stimulates and maintains the gamer's mind's activeness even during their sleep; which causes them to wake up frequently. Consequently, students who have become addictive to online gaming often struggle to give good quality sleep. A study by Mesquita & Reimão (2010), discovered that internet usage between 7.00 PM to 12.00 Midnight intensifies the risk of poor sleep among adolescents compared to the television viewing times. Meanwhile, a study by Heo et al. (2015) found that acute addiction with smartphones lower sleep quality, particularly in terms of difficulties staying awake. In this study, the UMS students who are addicted to online gaming have problems sleeping, often wake up during sleeping, feel sleepy, or do not have any urge to sleep during online gaming.

Factor 2 : Duration of Sleep

Addiction to online gaming has caused the students to continuously serve the internet and only stop when the game is finished. This study found that the UMS students tend to utilise their time to replace their sleeping time which they deprived of at night. As a result, their daily schedule is disrupted; they are sleepy during lecture and unable to complete daily tasks. According to Suguma et al. (2007), adolescent youth (students on campus) are more prone to insufficient sleeping time than adults. Above all, the most concerning issue is the manner lack of good quality sleep affects their studies. Kelly et al., (2001) found that the effect of the lack of good quality sleep is the student's poor performance in his/her study.

Factor 3 : Health

In all circumstances, lack of quality and quantity in sleep gives negative ramifications to one's health. Peltzer & Pengpid (2016) had carried on the relationship between sleep duration and university students' health conditions at 26 universities. They found a strong relationship between sociodemographic variables, health risk behaviour and health status variables with short and long sleep duration. The same study unravelled students had to endure sleepiness throughout the day, had difficulties getting up in the morning, and experienced body fatigue and tiredness. The effect is severe such that they had to depend on sleeping pills to get good quality sleep. As stated by (Suen et al., 2010; Orzech et al., 2011; Tang, 2017), that expressed dissatisfaction with their sleep and inadequate duration as well as poor quality of sleep negatively affect their concentration, leading to tardiness or even absence from classes, and will eventually lead to depression among students.

Average Mean Score on the Effects Online Gaming Sleeping Patterns of University Students

The mean score value is taken into account to identify each factor's contribution and effect item of Online Gaming patterns of University Students. The average mean score analysis is a process of finding dominant factors that impact online gaming on university's students. Table 6 shows 17 items that contribute to the effect of sleep patterns because of playing online games provided by the respondents.

TABLE 6: Mean Score for Online Gaming Impression against Student's Sleeping Pattern

No	Item	Mean	Ave mean	Level
Factor 1 : Quality of Sleep				
1.	Lack of sleep	2.21	2.49	Moderate
2.	Bad quality sleep	2.39		
3.	Sleeping difficulty	2.18		
4	Late-night gaming habit	2.59		
5	Awake in the middle of the night	3.05		
6	Not getting sleepy playing games	2.54		
Factor 2 : Duration of Sleep				
10	Time and schedule are not consistent	2.60	2.56	Moderate
11	Affects daily tasks and functions	2.55		
9	Sleeping during the day	2.77		
10	Less time for sleep at night	2.55		
11	More time on game at night	2.21		
12	Can't sleep until the game's over	2.69		
Factor 3 : Health				
13	Drowsy throughout the day	2.68	2.36	Moderate
14	Trouble getting up in the morning	2.73		
15	Difficult to overcome video game addiction	2.78		
16	Body fatigue and tired	1.44		
17	Have to take sleeping pills	2.19		

The study results found that the most influential factor in the effect of online gaming is the 'duration of sleep' factor with an overall mean score of 2.56. The highest average mean for this factor is the item "sleeping during the day". Daytime used for sleeping will interfere with students' daily activities, such as lectures, libraries or leisure activities.

The second factor is 'quality of sleep' in which the highest item score is 'awake in the middle of the night' with a mean score of 3.05. The results show that respondents have a habit of playing online games before bed, resulting in difficulty sleeping for the rest of the night. In line with Hale and Guan (2015) findings, The study has deduced that students play online games at night most of the time. Moreover, Weaver et al. (2010) stated that one's commitment to work or study is affected by addiction to playing online games, sacrificing time for sleep, and exposing some negative cognitive consequences (Wolfe et al., 2014). A study conducted by the American Academy of Sleep Medicine (2016) showed that most gamers stay up 36% per cent of the night they play video games.

Although this average score is considered moderate, the long-term effects will make 'health factors' more significant. The item of 'difficult to overcome video game addiction' is a warning that it will affect the player's mental and health without control of this online game. This condition can affect player performance, loss of enthusiasm for learning, fatigue, and sleepy in class (Choi et al., 2019). If this habit continues, it could affect student academic

performance and job performance. Students will lose focus in the classroom due to being too sleepy or tired, affecting employees. Furthermore, the respondents' negative effect was that the quality of the respondents' sleep was at a poor level due to the online game the night before. The effect item with the lowest mean score is "take sleeping pills" with a mean score of 1.44. Thus, researchers can conclude that playing online games significant impacts respondents' sleeping patterns if online game activities are not controlled.

Discussions

This study was conducted to discover the effects of online games on the students' sleeping patterns at Universiti Malaysia Sabah (UMS). The study found that online gaming has become part of campus life such that it has affected the sleep duration of the students. Persistent and long hours of playing online games have also significantly changed their sleeping patterns as the night time is often spent engaging in online games. In relation to gender, there is no significant difference between male and female students in term of frequencies of online gaming. However, the male students tend to be more frequently involved and spend more time online than the female students. The factor analysis further revealed that quality of sleep, duration of sleep and health are the three significant impacts of online gaming. Among the three, duration of sleep is the most influential factor. As the students sacrificed their night sleeping time, they tend to sleep during the day, affecting their other daily students' activities. When it comes to sleep quality, playing the online game before bedtime led them to have difficulties sleeping throughout the night. In other words, the pleasure of online gaming has stimulated the mind to the point that it has compromised the quality of their sleep. As for the health factor, the implications are relatively low compared to the duration and sleep quality factors. Even if the addiction is moderate, online gaming may negatively impact the students' health if it is done excessively.

Moreover, students tend to spend more time playing online when they are addicted. Consequently, they may miss out on food, study and sleep. Long-term effects may cause the students to endure stress and poor physical health, and lack social interaction and concentration in the study. To overcome the negative repercussions of excessive online gaming, the students need to control their habits and make their studies at the university their priorities. More importantly, the students need to practice self-discipline in managing their time prudently, mainly to prevent themselves from being involved continuously in unproductive activities such as excessive online gaming. In addition, peers, lecturers, and parents also have a pertinent role in instilling awareness on time management and self-discipline among university students to ensure that teaching and learning are not affected by online gaming addiction.

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