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Internet Usage and Sleep Quality among Filipino College Students in During the Covid-19 Pandemic

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Abstract **Original Research Article**

Online learning during the COVID-19 pandemic led to increased internet usage among students as they continued their education with online alternatives. Increased internet usage can lead to internet addiction. Studies have shown that internet usage and addiction lead to decreased sleep quality among students which indicates a poorer well-being. This study determined the levels of internet usage, prevalence of internet addiction, and sleep quality. The relationship between internet usage and sleep quality among 154 college students during the pandemic was determined. The sample was selected using simple random sampling. The students accomplished the survey distributed online using Google Forms. The relationship between internet usage and sleep quality was analyzed using Spearman Rank Correlation Coefficient. The results showed that the college students use the internet greater than 10 hours per day and most of them suffer from internet addiction. Additionally, they also showed poor quality of sleep. Through the Spearman Rank Correlation analysis, it was found that there is a positive monotonic relationship between internet use and difficulty in sleeping. However, the decrease in sleep quality is not totally explained by the increased internet use which indicates that other external variables contribute to the poor sleep quality of students. It is recommended for universities to deliver academic instruction that encourage students to lessen their screen time and improve their sleep quality.

Keywords: college students, internet usage, internet addiction, sleep quality.

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INTRODUCTION

The community quarantine imposed on different regions in the country during the pandemic included suspension of classes aimed to control the transmission of the virus among people. Online learning was implemented as a response to the continuity of education for students. Online methods for school instruction have been used as alternatives even before the pandemic; however, the pandemic made this the primary instructional method for students who wish to continue education during the lockdown (Barrot et al., 2021). People adapted their lifestyle towards online alternatives to continue doing their jobs and societal roles while minimizing the risks brought by the virus. The use of internet services generally increased from 40% to 100%. Internet services like Zoom, one of the platforms mainly used for online conferences, reported that there was 10 times increase in its usage (De' et al., 2020). This increase in internet usage covered around 28 million Filipino students who became online learners as schools closed (Joaquin et al., 2020).

The use of the internet has its benefits for students such as improving academic performance and social life through expanding relationships with online communication (Fatema et al., 2020). However, on the downside, it can expose the users to internet addiction, which can affect mental health by triggering depression, anxiety, and adverse mental health (Lebni et al., 2020). According to a study where 37.7% of respondents are students, the COVID-19 pandemic, together with too much use of the internet, had a significant effect on their psychological well-being and sleeping pattern. Some of the observed effects were anxiety, depression, and insomnia due to the fear of the virus (Elhadi et al., 2021). It showed that the increase in internet usage due to the pandemic contributed to the students' exposure to internet addiction which gradually worsened sleep quality.

Internet addiction (IA), which is sometimes referred to as "problematic internet use" or "compulsive internet use," explains symptoms associated with too much use of the internet. The prevalence of internet addiction varies depending on the region, with Middle East showing the highest prevalence

(10.9%) while Northern and Western Europe have the lowest (2.6%) (Cheng & Yee-lam, 2014). In Asia, the Philippines has one of the highest prevalence of internet addiction at 21% (Mak et al., 2014). The prevalence of internet addiction among populations varies but studies show that adolescents or young adults in Asia show the largest disparity in frequency, ranging from 0.9 to 37.9% (Alimoradi et al., 2019). The implementation of online learning and primary use of the internet to pursue education increased the students' vulnerability to internet addiction (De' et al., 2020; Kumar & Mondal, 2018). Adolescent students, thus, are more exposed to internet addiction compared to adults (Siste et al., 2021). In the Philippines, the increased internet use of Filipinos during the pandemic increased their exposure to problematic or excessive use of the internet (Fernandes et al., 2021). Some of the symptoms of IA are excessive internet usage, difficulty from stopping internet use, feeling uncomfortable when internet use is cut down, prioritizing internet use over other responsibilities, and using the internet as an escape from problems (Kumar & Mondal, 2018).

Most studies show how too much internet use is significantly related to the development of sleep disorders and other problems that affect sleep quality (Do & Lee, 2018; Wang et al., 2020). During sleep, there is an alternating cycle between non-rapid eye movement (NREM) and rapid eye movement (REM). The NREM phases during sleep is divided into 4 stages and a sleeping human will successively go deeper through these stages and will finally enter the REM phase after the last stage. Deep sleep and recovery occur during the REM phase which starts after 80-100 minutes of sleeping (Carskadon & Dement, 1989). Frequent disturbances or interruption of sleep can result into sleep disorders, which affects the health and socio-economic well-being of an individual (Kumar, 2008). During adolescence, sleep quality is considered as a significant factor that is positively related to an individual's well-being (Kalak et al., 2014). Aside from subjective psychological well-being, it is also related to health-related quality of life (HRQoL) among adolescents (Roeser et al., 2012). Generally, adolescents need about 9.2 hours of sleep per day (Dubey et al., 2019). As one gets older, the recommended duration of sleep gets lower as well. A study on college students showed that during the later years in adolescence, a person will only need an average of 8 hours of sleep to perform better academically (Okano et al., 2019).

As people become more inclined towards the use of internet, more time is spent which affects the time that should be allotted for rest and sleep (Billari et al., 2018). The use of devices to access the internet for prolonged usage can affect one's sleeping pattern as it emits signals to the brain to be active. As a result, one's physical, psychological, social, and cognitive abilities will be significantly reduced (Abolghasem et al., 2016). These abilities must be safeguarded for optimum adolescent development. Multiple studies have already been conducted where the relationship between internet use and sleep quality have been determined (Abolghasem et al., 2016; Billari et al., 2018; Do & Lee, 2018; Elhadi et al., 2021; Franceschini et al., 2020; Kokka et al., 2021; Siste et al., 2021; Wang et al., 2020). These studies have concluded that there is a negative relationship between internet usage and sleep quality. Focusing on internet addiction and sleep quality, two reviews have concluded that internet addiction affects sleep quality and duration (Alimoradi et al., 2019; Sarfo et al., 2023). Studies done in Iran, Saudi Arabia, Taiwan and Turkey also show that internet addiction and sleep quality have an inverse relationship (Abolghasem et al., 2016; Guclu et al., 2024; Hammad et al., 2024; Lin et al., 2019). An individual's addiction can be focused not on the internet generally, but on one application or habit/practice such as watching videos, use of social networks, cybersex, gambling, and others (Alimoradi et al., 2019). In the Philippines, only two related studies were found. Tacda et al. (2025) found that smartphone addiction was associated with poor sleep quality among senior high school students while Go et al. (2021) found that internet addiction was associated with poor psychological well-being among high school students also. The relationship of IA and sleep quality may differ depending on the population and the time-being (Alimoradi et al., 2021). Thus, this study aims to determine if there is a relationship between internet usage and sleep quality among Filipino college students who also have a different context for development. It will contribute to the country's data relevant to the effects of the pandemic and on online learning as the primary method for school instruction (Amit et al., 2021).

METHODOLOGY

Research Design

The study used a quantitative cross-sectional design to distribute a one-time self-administered survey to a selected population to gather data regarding internet usage and sleep quality. It is also correlational research to determine the relationship between the variables.

Respondents and Sampling Procedure

The participants were a selected sample from the students at a college enrolled in the national university. The total population is 438. With a 95% confidence level and a 0.05 margin of error, a sample size of 205 was determined. Simple random sampling was used based on the list of the enrolled students. The selected respondents were contacted through their email addresses. Only 154 respondents accomplished the questionnaire for a 75% response rate. Of the respondents, 75% were aged 19-21 year and 77% of the population were males.

Research Instruments

The questionnaire was separated into the following sections: socio-demographic profile, Internet Use, and Pittsburg Sleep Quality Index (PSQI). The Young's Internet Addiction Scale was used to measure internet usage and addiction (Young, 1998). It is a 20-item questionnaire in a Likert-scale form, and it had an acceptable internal consistency during the pre-testing phase (Cronbach's α= 0.90). It has already been used among Filipinos to measure internet use patterns and behavior (Mak et al., 2014). The total score can range from 0-100 after answering the questionnaire. A total score from 0-30 shows normal level of internet usage; a score from 31-49 shows mild level of

internet addiction; a score from 50-79 shows moderate level of internet addiction; and a score from 80-10 shows severe level of internet addiction or dependence. An additional question regarding the duration of internet use was added to this questionnaire to determine the average period of internet use daily. The other scale used was the Pittsburg Sleep Quality Index (Buysse et al., 1989) that measured sleep quality among the respondents. It is a 19-item scale with an acceptable internal consistency (Cronbach's $\alpha = 0.66$) and was appropriate for the selected age group and setting in this study (Shahid et al., 2011; Xiong et al., 2020). The items in this scale are separated into seven components namely: Subjective sleep quality, Sleep latency, Sleep Duration, Habitual sleep efficiency, Sleep disturbances, Use of sleeping medication and Daytime dysfunction. The scores from all the components are then summed up to project a global PSQI score ranging from 0-21 with 0 indicating "no difficulty" and 21 indicating "severe difficulties" in all components.

Data Gathering Procedure

The questionnaire was administered using Google Forms to distribute the online survey questionnaire to the selected sample. This method allowed the data collection and survey distribution easier, more efficient, and easily accessible (Regmi et al., 2016). The respondents were contacted through their email addresses. Prior to answering, an informed consent form and confidentiality agreement were presented to the respondents and signatures were requested.

Data Analysis

The data collected from the Google Forms was transferred to Microsoft Excel. The data was separated to three parts: Socio-demographic profile, Internet Addiction Test (IAT) and PSQI. Descriptive statistics were used to present the data from the socio-demographic profile. Data from the IAT and PSQI were then encoded to represent the values according to their respective Likert Scale scoring guides (Buysse et al., 1989; Young, 2015). Afterwards, the total scores per respondent were computed. Weight adjustment per response were performed to still allow the data to describe the population with a 5% margin of error. To measure the prevalence of internet addiction, the scores from the IAT were categorized into "normal level", "mild addiction", "moderate addiction" and "severe addiction". Afterwards, the level of sleep quality was determined by collecting the scores per each component (e.g., sleep latency, sleep duration etc.) first before the total scores were computed. Having a score of >5 indicates poor sleep quality. To determine the relationship between sleep quality and internet addiction levels, the scores were analyzed using Spearman's Rank Correlation Coefficient.

RESULTS AND DISCUSSION

Internet Usage and Addiction

To determine the internet use and prevalence of internet addiction among the college students, the Internet Addiction Test, accompanied by a single item regarding internet use duration, were collected, analyzed, and interpreted. The average duration of the participants' internet usage did not go lower than four hours per day. Of the respondents, 60.39% use the internet for more than 10 hours per day. Most likely, the students' internet usage is for academic tasks and requirements accompanied by other online activities that served as an alternative to fulfill one's daily needs such as shopping, communication, and entertainment (Mouratidis & Papagiannakis, 2021).

The responses for each item in the Internet Addiction Test summarizes how various habits and behaviors that influence internet usage can be observed from the college students. The statements which received the highest "always" responses were the following: Statement 1 [How often do you find that you stay online longer than you intended?] – 42.21%; Statement 7[How often do you check your email before something else that you need to do?]-26.80% and Statement 16 [How often do you find yourself saying "just a few more minutes" when online?]-24%. These reflect higher internet addiction. Firstly, staying longer online than intended means longer internet usage which is a primary symptom of having an internet addiction. It suggests that the students find the internet irresistible and may find it hard to stop accessing (Kokka et al., 2021). Furthermore, since the pandemic prohibited physical interactions, most adolescents tended to use social media more than before as they try to satisfy their social needs and to cope with the feeling of loneliness (Fernandes et al., 2021). Social media, one of the primary uses of the internet, is a significant factor that has a negative effect on sleep quality if the duration of use is not controlled (Van den Eijnden et al., 2021). Secondly, as students shifted to online learning due to the pandemic, some of them developed a habit of checking emails more frequently, even before something else that they need to do. Since students need instructions from their instructors, the internet was used as an online alternative to the main medium for communication (De' et al., 2020). Lastly, majority of the students tell themselves "just a few more minutes" when online. This habit contributes to their tendency to uncontrollably use the internet as they find themselves continuously satisfied as they access the internet (Ortega-Go & Hechanova, 2014). There was also an item pertaining to the students' tendency to lose sleep due to internet usage which showed that 31.33% answered "often" while 16.67% answered "always". These suggest that students are aware that their internet use habits affect their sleep quality.

The distribution of internet addiction scores into categories are shown in Table 1. The category which had the highest percentage of students is the Mild category of internet addiction where nearly half of the total number were classified. It is also worthy to note that nearly 39% were in the Moderate category. Totaling the mild to severe categories would result to 90.26% of the respondents that have developed internet addiction beyond the normal range. These results are consistent with other studies conducted in foreign countries such as Iran, Indonesia, and Saudi Arabia (Fernandes et al., 2021; Khayat et al., 2018; Siste et al., 2021). Their results also showed that most

adolescents suffer from mild internet addiction with very few who developed severe symptoms (Lebni et al., 2020). In the Philippines, Mak et al. (2014) found that the prevalence rate of internet addiction among Filipino adolescents is 21% while Go et al. (2021) found that 46.1% of their high school respondents had an internet addiction.

Table 1. Internet addiction test score distribution

Internet addiction category	Frequency (n)	Percentage
Normal	15	9.74
Mild	75	48.70
Moderate	60	38.96
Severe	4	2.60

Sleep Quality

The students' perceived sleep quality during the past month is shown in Table 2. More than half of the students had a fairly good quality of sleep while about a third had it fairly bad. The responses in this item are subject to the individual's perceptions as there are differences among the students on what they consider as good sleep. These perceptions may be based on their sleep duration, sleepiness upon waking up, satisfaction, and comparing their sleep with other people (Kohyama, 2021). The findings for the seven components of sleep quality- subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction- are presented below.

One of the components measured in the Pittsburg Sleep Quality Index is the sleep disturbances, some of which seem to be commonly experienced by the students. More than a third (35.7%) find it hard to sleep within 30 minutes of going to bed. Especially during the pandemic, there were multiple stressors that may have hindered an individual's ability to sleep as early as possible. Anxiety, depression, post-traumatic stress, and fear from infection were found to be significant sources of stress that may lead people, especially to those who have already encountered an infection from the COVID-19 virus, to develop sleep disorders including insomnia (Brooks et al., 2020; Duran & Erkin, 2021). Adolescents who find it hard to sleep also tend to access the internet more and do activities such as browsing social media sites (Levenson et al., 2016). In addition, 19.5% of the students wake up in the middle of the night or early in the morning. This is associated with the disturbances of one's circadian rhythm which may be due to an increase in their screen time when accessing the internet using their gadgets. Aside from this, long hours of holding a gadget can result in muscle pains and discomfort which contribute to sleep disturbances (Windiani et al., 2021). Lastly, 14.3% feel hot when sleeping which can lead to waking up at night. During sleep, people tend to have better sleep quality if the temperature in the sleeping area is cool rather than hot (Zander et al., 2018). The Philippines has a tropical climate where the seasonal changes pertain to rainy months and hot summers (Bohra-Mishra et al., 2017). These changes contribute to the role of temperature in sleep disturbance by causing discomfort to people while asleep.

Table 2. Perceived sleep quality of the students

Sleep quality category	Frequency	Percentage
Very bad	12	7.79
Fairly bad	52	33.77
Fairly good	83	53.90
Very good	7	4.55

To sleep better, some students may take sleep-inducing medicine to avoid any trouble sleeping at night. Only 12.34% of the students take sleep-inducing medicine for their sleep problems. The result from this study is relatively better compared to other studies since a high percentage of students would rather get sleepy naturally than take any sleep-inducing medicine (Beck et al., 2021).

In terms of having trouble staying awake, 63.64% experience sleepiness during the times they should be awake. Even though the perceived sleep quality of most students indicates "fairly good", many still have trouble staying awake during the day. This suggests that the perceived sleep quality of students may be based on factors that does not include how tired they feel

during the day which is normally included when assessing one's quality of sleep (Harvey et al., 2008).

Majority (95.45%) stated that they a have a problem about keeping enough enthusiasm to get things done during the day. A quarter (25.32%) said that it is a big problem for them. Since majority of the students have trouble staying awake, it is expected that they would find it harder to feel enthusiastic or have feelings of tiredness when they are working/studying during the day. The results suggest that the majority of the students have poor sleep quality which leads to the inability to focus and show interest when working. This also suggests that poor sleepers will have reduced cognitive function during the day (Hussain & Griffiths, 2021). Having a bad sleep quality during the night also decreases one's physical activity during the day, this relationship was determined in a study that also used PSQI to measure sleep quality and physical activity levels during the pandemic (Trabelsi et al., 2020).

One factor that may cause disturbances to an individual's sleep is having a partner or roommate in the same bed or room. Fortunately, about 68.18% have their own bedroom without any partners or roommate while the remaining are those with partners with 29.87% of the partners in the same room or same bed. Some distractions which these students experienced due to having a roommate where restlessness of the partner like leg twitching, jerking or frequent checking of phones; long pauses between breathing; loud snoring; and disorientation or confusion. Some of these symptoms can be a sign of sleep disorders, examples of these are the sleep behavior syndrome, restless legs syndrome, breathing-related sleep disorders and circadian rhythm sleep-wake disorders (American Psychiatric Association, 2013).

The Global PSQI score is the sum of all component scores. Based on the data, the lowest PSQI score was 1 while the highest was 18. On the average, the PSQI score is about 8. A score >5 means poor sleep quality and 71.4% of the students have poor sleep quality. Like other studies, adolescents or university students are often found to be poor sleepers wherein at least half of a population can suffer from poor sleep quality (Busubul & Rahman, 2021; Khayat et al., 2018; Tan et al., 2016).

Relationship of Internet Usage and Sleep Quality

The relationship of internet usage and sleep quality among the college students were analyzed using a Spearman Rank Correlation Coefficient between the IAT Scores and Global PSQI. The results showed that the estimated correlation coefficient between internet usage and sleep quality is r=0.4249 (with p-value of 0.00000003951). This means that there is a positive moderate monotonic association between the two variables. It seems that the higher the severity of a student's internet addiction is, the higher is the severity of poor sleep quality. The coefficient of determination of the said correlation is r2= 0.1805 and this shows that 18% of the variability in sleep quality can be explained by internet usage. Other factors not covered in the study may influence the sleep quality, as represented by the remaining 82%. Overall, at 5% level of significance, there is a significant association between internet usage and sleep quality of these college students.

Table 3. Correlation analysis of Internet Addiction Test and Pittsburg Sleep Quality Index scores

Constructs	Global PSQI scores
Internet usage/addiction	0.4249*

Note: *Correlation value is significant at 0.005 level

Multiple studies are consistent with these results. Particularly during the pandemic, the prevalence of internet addiction among university students became high and negatively influenced sleep quality (Busubul & Rahman, 2021; Elhadi et al., 2021; Mahamid et al., 2021; Nguyen et al., 2021). No studies are found to have contradicting results, however, some variables such as mental disorders, sleep disorders, drug use, gaming addiction, lifestyle changes and other possible factors should be considered since these may mediate the relationship between sleep quality and internet addiction (Do & Lee, 2018; Franceschini et al., 2020; Levenson et al., 2016; Olashore et al., 2020).

Limitations

The study focuses on the relationship between internet usage and sleep quality among college students selected from a national university. Data collection was through Google Forms. Other variables such as internet activities, existing sleep disorders, and the like that may influence the internet usage and sleep quality were not covered.

CONCLUSION

The objectives of the study were to determine the level of internet use and prevalence of internet addiction among the students, their level of sleep quality and establish the relationship between the two variables. Results showed that around 60% access the internet greater than 10 hours in average per day and nearly half suffer from mild internet addiction. Overall, about 90% suffer from internet addiction. The sleep quality of the students was determined using the Pittsburg Sleep Quality Index. For sleep quality, results showed that around 70% are poor sleepers, with an average Global PSQI Score of 8. There is a significant positive moderate monotonic association between internet addiction and sleep quality. It seems that as internet addiction gets more severe, sleep quality becomes poorer.

RECOMMENDATIONS

As the coefficient of determination shows that only 18% of decreased sleep quality can be explained by high internet usage, it is recommended to investigate factors that may be influential to both constructs such as mental disorders, sleep disorders, behavioral disorders, gaming addiction, internet activities, and locus of control. Additionally, in contrast to sleep inducing medicine, caffeine intake may also be investigated and how much it can affect their sleep quality. The study also did not focus on the sleeping habits of the students in terms of time allotted for sleep and in bed. For future studies, collecting information on how the students balance their schedule in terms of sleep in a full day cycle may also give light to sleep quality in adolescence.

Other methods can also be more effective when assessing the relationship between IA and SQ. Longitudinal studies can be done to observe the same variables and see their relationship over the course of a semester or schoolyear. For the tools and instrument used, the Internet Addiction Test was only used in a few studies in the Philippines. To further establish its reliability and accuracy in the Philippine setting, similar studies may be conducted to compare findings from the the IAT especially in the post-pandemic situation.

Results show that the college students were found to be poor sleepers and internet addicts. One of the factors that leads them to increase their internet usage was the online learning setup where their screentime included academic tasks, fulfillment of requirements, and other possible online activities. Universities and academic institutions may find alternative methods to deliver instructions or require tasks with lessened screentime and internet usage such as blended or hybrid models using both face-to-face and asynchronous sessions. Further, information campaigns and seminars on the importance of adequate sleep can help can be given to students.

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