

ORIGINAL ARTICLE

Correlation of Internet Usage, Anxiety and Sleep Quality among Indonesian Moslem Students

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ABSTRACT

Introduction: The Internet has affected to many aspects of human life. The potential risk of Internet addiction can lead to various impacts, including anxiety, and poor sleep quality. In this study, we investigate the association between duration of internet usage, anxiety level, and sleep quality among Moslem students at Syarif Hidayatullah State Islamic University, Jakarta. **Methods:** A quantitative cross-sectional study was conducted. The respondents comprised 750 Moslem students selected by convenience sampling. The data were collected through a semi-structured questionnaire to determine the respondents' general character, internet usage duration, and sleep quality. In addition, a validated GAD-7 questionnaire was used to evaluate the anxiety level. Pearson correlation analysis between variables was performed, followed by linear regression analysis. **Results:** A total of 699 eligible responses were obtained, predominantly from female respondents (71.4%). More than half of these (57.7%) were found to use the internet excessively; 50.4% of students were detected to have anxiety, and 22.5% demonstrated poor sleep quality. Multivariate analysis showed a positive correlation between the duration of internet usage and students' anxiety ($p=0.004$, $r=0.108$). Moreover, the duration of internet usage and anxiety were negatively correlated with sleep quality ($p=0.016$; 0.000 , $r=-0.091$; -0.214). In addition, the higher the internet usage activity and anxiety level among students, the poorer their sleep quality ($p=0.000$, $R^2=0.051$). **Conclusion:** There is a significant correlation between internet usage activity, anxiety, and sleep quality among Moslem students in Indonesia. Therefore, for the sake of their wellness, it is important that students are prudent regarding their internet activities.

Keywords: Internet usage, Anxiety, Sleep quality, Moslem students, GAD-7

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INTRODUCTION

The insertion of the internet into the center of modern life means it has become integral to various aspects of our lives, especially concerning sharing and searching for information, knowledge, and various forms of entertainment. Internet technology has successfully altered numerous life practices, including for students as a subject in the world of education (1,2).

Data from the Association of Indonesian Internet Service Providers (APJII) in 2018 showed an internet user penetration rate of 171.17 million out of 264.16 million people. Examining data on the duration of use, the highest percentage of internet usage was eight hours and above, at 19.1%, followed by three to four hours at 14.1%. An overwhelming proportion of those in the 15- to 19-year-old age group were internet users (91%),

followed by 20- to 24-year-olds (88.5%) (3). These data support 2019 research by Miguel, that adolescents and young adults are more prone to addiction because they have yet to develop optimal ability in critical thinking and limits in socialising (sense of boundaries)(4). However, young people who are in a state of identity crisis in terms of their attitude and behaviour will be easily influenced by their friends and their curiosity, which will encourage them to try different and new things (5).

Excessive internet use to the extent where it becomes problematic can have impacts including certain psychological and emotional problems, such as depression, anxiety, and psychosis. In another study, it was found that students with moderate and severe levels of internet use had high levels of depression and anxiety in social interactions, and obsessive and compulsive disorders (6). Based on an epidemiological survey by the European Study of the Epidemiology of Mental Disorders (ESEMeD) in 2007, anxiety is the most common type of psychiatric disorder, with one-third or up to 33.7% of the showing the symptoms of anxiety

disorders during their lives (7).

Excessive internet activity can also have other impacts linked to sleep disorders, including insomnia, the tendency to sleep late, disrupted sleep and drowsiness throughout the day (8). Further research findings have also found that sleep problems, in this case insomnia and poor sleep quality, were related to problematic internet use (9). Poor sleep quality was reported by as many as 76.4% of the students at the University of Indonesia (10). One study reported some interesting findings based on the effects of high internet use (anxiety and sleep disorders). It found that sleep disorders are closely related to a high risk of anxiety, as anxiety is the main factor in sleeping disorders. The two aspects were also found to be related to different forms of psychiatric problems that were a factor in the risk of teenagers turning to drugs, committing suicide and even developing cardiovascular diseases. Moreover, another study found that sleep quality can determine the impact of technology use on depression and anxiety. Almost half of the respondents in that study used technology from the time they woke up to the time they went to sleep. Unfortunately, the study was limited to only one measure, that of replying to texts and accepting calls. However, the study did not identify a correlation between levels of anxiety and sleep quality (11). Therefore, this study aims to determine the association between duration of internet usage, anxiety level and sleep quality among Moslem students in Indonesia.

MATERIALS AND METHODS

Design and Participants

An analytical quantitative non-experimental cross-sectional study was performed at the Universitas Islam Negeri Syarif Hidayatullah, Banten, Indonesia.. A total of 750 Moslem students were considered as candidates for the study using the convenience sampling method. The inclusion criteria were male and female Moslem students aged 18-25 years who used the internet in their daily activities. Fifty-one university students were excluded because their forms were incomplete. Thus, a total of 699 Moslem students were included in the study. The data were collected between February and March 2020.

Measures

All of the participants were assessed using semi-structured demographic questionnaire. The following scale or questions were used to assess the study variables. Internet usage and sleep quality were assessed subjectively and empirically using single question, respectively. Internet usage was assessed using DSM-V criteria; excessive use (≥ 8 hours) and normal use (< 8 hours). Meanwhile, the sleep quality question comprised five possible responses; from not good at all to excellent. To evaluate the anxiety level, the scale by Spitzer (2006), GAD-7, was used. This measure includes

two factors consisting of seven items in total. The first factor measures the cognitive and emotional experience of anxiety (items 1-3 and 7) while the second factor considers bodily symptoms (items 4-6). Total scores on the GAD-7 range from 0 to 21, with higher scores indicating anxiety disorder. The optimal balance of sensitivity and specificity was found to be cut-off point of ≥ 10 (12,13).

Data analysis

Software using the likelihood fitting function (Mplus 6.1) was used to analyse the unidimensional factor of GAD-7. The fit model for confirmatory factor analysis (CFA) was evaluated using the root mean square error of approximation (RMSEA).

The data analysis was performed using SPSS 25.0 for Windows. Categorical variables were presented as frequencies and percentages. The genders in the primary variable data were compared by using an independent t-test. Pearson correlations were used to determine the strength of the correlation between the variables. Linear regression analysis was performed to examine the internet usage and anxiety as predictors of poor sleep quality.

Ethics

The study was approved by the Ethics Committee, Faculty of Medicine, Universitas Islam Negeri Syarif Hidayatullah, with the ethics review letter number B-009/F12/KEPK/TL.00/2/202 and protocol number 3674022P1111320200225. Written informed consent was obtained from all of the student participants after the study protocol had been thoroughly explained.

RESULTS

In the GAD-7 construct validity test, the data were obtained from a fitness model following six modifications in accordance with the many measurement errors that were correlated. It was based on two RMSEA values: an estimate value of 0.047 (< 0.05) and an RMSEA probability value, which indicates the probability that the RSMEA value is below or equal to 0.05, of 0.547 (> 0.05). The GAD-7 was thus considered to be unidimensional or as only measuring one variable.

Based on DSM-V, the duration of internet usage was divided into two groups: excessive use (≥ 8 hours) and normal use (< 8 hours). Of the 699 students, 57.7% ($n=403$) were categorised as excessive users, and 42.3% ($n=296$) were categorised as normal users (Table I). The former group contained a greater proportion of female students (≥ 8 hours=58.1%; < 8 hours=41.9%) than male (≥ 8 hours=56.5%; < 8 hours=43.5%). The two groups were similar in terms of gender ($t=1.526$; $p>0.05$).

Of the Moslem students enrolled in this study, 49.6% ($n=347$) were found to have anxiety and 50.4% ($n=352$) were not found to have anxiety. There was a significant

Table I: Demographic characteristics of respondents

Characteristics	Categories	n	%
Age	17-19 y.o.	242	34.7
	20-22 y.o.	452	64.7
	23-25 y.o.	5	0.6
Gender	Male	200	28.6
	Female	499	71.4
Faculty	Social Humanity	349	49.9
	Science	122	33.7
	Religious Study	115	16.4
	Social and Political Sciences	62	8.8
Semester	2-4	199	28.5
	6-8	500	71.4

difference in terms of gender, with the greatest anxiety among the females ($t=-2.666$; $p<0.05$) (Table II).

When asked about their sleep quality, the majority of the participants reported having somewhat good sleep quality. In contrast, 22.5% of the students were found to not have good sleep quality (not good at all=1.6%; not quite good=20.9%). Similar sleep quality characteristics were noted for both gender ($t=1.529$; $p>0.05$). The full characteristics of sleep quality are shown in Table II.

Table II: Characteristics of respondents

Characteristics	Male	Female	Total	p
Internet Usage				
<8 hours	87 (43.5%)	209 (41.9%)	296 (42.3%)	0.127
≥8 hours	113 (56.5%)	290 (58.1%)	403 (57.7%)	
Anxiety				
High	97 (48.5%)	250 (50.1%)	347 (49.6%)	0.008
Low	103 (51.5%)	249 (49.9%)	352 (50.4%)	
Sleep Quality				
Not good at all	2 (1%)	9 (1.8%)	11 (1.6%)	0.127
Not quite good	43 (21.5%)	103 (20.6%)	146 (20.9%)	
Somehow good	89 (44.5%)	260 (52.1%)	349 (49.9%)	
Very good	54 (27%)	106 (21.2%)	160 (22.9%)	
Excellent	12 (6%)	21 (4.2%)	33 (4.7%)	

Pearson correlation analysis showed a positive correlation between the duration of internet usage and students' anxiety ($p=0.004$, $r=0.108$). Meanwhile, the duration of internet usage and anxiety were negatively correlated with sleep quality ($p=0.016$; 0.000 , $r=-0.091$; -0.214). Moreover as seen in Table III, there was a significant correlation between internet usage activity, anxiety, and sleep quality among the Moslem students ($p<0.05$).

As seen in Table IV, our results show that the higher the internet usage activity and anxiety level among students, the poorer their sleep quality ($p=0.000$, $R^2=0.051$). However, while there was no direct effect of internet usage on sleep quality ($\beta=-0.01$; $t=-1.860$; $p=0.063$), sleep quality was directly predicted by anxiety ($\beta=-$

Table III: Correlation of the variables (r)

Variable	Internet usage	Anxiety	Sleep quality
Internet usage		0.108*	-0.091*
Anxiety	0.108*		-0.214*
Sleep quality	-0.091*	-0.214*	

* $p<0.05$

Table IV: Linear regression analyses

Variable	Regression coefficient	t	p	R	R ²	F	Model p
Internet usage	-0.01	-1.860	0.063	0.225	0.051	18.551	0.000
Anxiety	-0.019	-5.556	0.000				

Dependent Variable: Sleep quality

0.019; $t=-5.556$; $p=0.000$).

DISCUSSION

The highest incidence rate was found for the internet usage variable, where as many as 403 out of the 699 respondents (57.6%) registered excessive internet use of ≥8 hours. This aligns with the results of research conducted by Rachdianti, 'that young adults in the age range of 18-22 were the highest intensity internet users (frequency above 10 times and duration above 10 hours)'(14). However, that study did not measure the frequency of internet use.

The possible responses for another variable, sleep quality, were divided into five categories, from not good at all to excellent. A majority of the Moslem students in this study reported somehow good sleep quality, namely 349 students (49.9%). This finding is inversely proportional to that of research conducted on University of Indonesia students by Herawati and Gayatri, who found that 76.4% of the students in their study had poor sleep quality (10).

For the anxiety variable, the largest category was not anxious, accounting for a total of 352 students (50.4%). A similar study conducted by Nag et al., among students aged 17-20 years in Tripura, India measured and distinguished anxiety levels from low anxiety to severe anxiety. The finding of this study supports Nag et al., where of 400 students assessed, 198 (49.4%) were found to be experiencing low anxiety (15).

Significant differences were found in this study between the male and female Moslem student respondents, in that the female students felt the most anxiety. Various factors can be proposed as to why anxiety is higher among females, e.g. genetic, neurodevelopmental, environmental, and neurobiological. Among the most powerful of these is that the female reproductive hormones of estrogen and progesterone play an

important role in the neurobiology of anxiety disorders. There are also significant differences in the structure and function of the brain responsible for anxiety events, such as the prefrontal cortex, hippocampus, and amygdala (16).

The results of the Pearson correlation tests revealed a positive correlation between the duration of internet use and anxiety. However, the correlation was very weak. This means that the higher the duration of internet use, the higher the Moslem students' anxiety. Another Pearson correlation test was conducted to determine the correlation between the duration of internet use and sleep quality variables. Here, a significant negative correlation was identified between internet usage and sleep quality. This indicates that the higher the duration of internet use, the worse the Moslem students' sleep quality. The final Pearson correlation test showed a significant negative correlation between anxiety and sleep quality. Thus, the higher the anxiety, the lower the Moslem students' sleep quality.

Demirci, Akgönül and Akpınar identified a positive correlation between the Smartphone Addiction Scale Score (assessing the severity of smartphone use), anxiety, and sleep quality (9). However, while they specifically assessed the severity of smartphone use, their definition of the severity of smartphone use referred to the definition of problematic internet use. This reflects how smartphones have a variety of features that are supported by the internet. Separately, Carli V, et al., in a systematic reviews of 20 articles, reported that 57% found a significant correlation between problematic internet use and anxiety (8). Meanwhile, when Yücen and Üzer assessed anxiety using the items on the Leibowitz Social Anxiety Scale (LSAS) to investigate the potential association with problematic internet use, the results showed a significant correlation in a positive direction (17). A significant correlation between internet use and sleep quality with a positive correlation direction was also reported in another study, albeit with a similar weakness to the correlation determined in this study (17). This study also conducted multiple linear regression tests to examine the effect of internet use duration and anxiety levels (independent variables) on sleep quality (dependent variables). The results showed that the duration of internet use and anxiety levels had a significant effect on sleep quality. The proportion of influence between the duration of internet use and the level of anxiety on sleep quality was 0.051 or 5.1%. The remaining 9% could be influenced by other factors that were not measured in this study; for example, fatigue, medicalisation, lifestyle and nutrition (19).

Demirci, Akgönül and Akpınar also conducted regression tests on varied research. They reported that the severity of smartphone use, anxiety and depression simultaneously had a significant effect on sleep quality (9). Furthermore, this study also obtained significant

values and regression coefficients respectively from internet use and anxiety. The result showed that only anxiety has a significant effect on sleep quality with a negative relationship direction; thus, high levels of anxiety will worsen sleep quality. These results are in accordance with those of Kelly and El-Sheikh on a group of families comprising 176 children (78 boys and 98 girls) and their parents. The identified anxiety symptoms as one of the factors that cause poor sleep quality (20). These results were also supported by Cao, et al., who found that a high level of anxiety in a person will result in poorer sleep quality (21).

Meanwhile, the effect of the duration of internet use was found to have an insignificant impact on sleep quality. This result is inversely proportional to those obtained by Lin, et al., who found that excessive internet use has a significant impact on poor sleep quality. In their study, poor sleep quality had a high score, which meant that the regression coefficient showed a positive correlation (22). In theory, the influence of exposure to electromagnetic fields when using a smartphone at night will affect brain activity, especially in the pineal gland to secrete melatonin. This produces a change in the brain's blood flow and electrical activity of the brain that ultimately reduces the quality of sleep (9,23).

In relation to the variables in this study, Yücen and Üzer also reported in their study of 392 medical students at Afyon Kocatepe University, that anxiety levels had a significant effect on internet users who are problematic (17). These results were supported by Dalbudak et al. findings, which identified a incidence of anxiety among students (6).

CONCLUSION

Most of the Moslem university students in this study were found to use the internet excessively. It was determined that the higher the duration of internet use, the higher the students' anxiety level. In addition, prolonged internet use was found to lead to worse sleep quality. Therefore, it is necessary to raise awareness among students of the need to limit and to control the duration of their internet use for the health reason.

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