The Relationship between Smartphone Addiction, Sleep Quality and Stress among University Students
(Hubungan antara Ketagihan Telefon Pintar, Kualiti Tidur dan Tekanan di kalangan Pelajar Universiti)

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ABSTRACT

This study investigated the relationship between smartphone addiction, sleep quality and stress level among university students. Questionnaires were distributed to 90 university students in year 2017 who were selected randomly from various residential colleges of the Universiti Kebangsaan Malaysia, Bangi Campus. The data were collected and analyzed using Statistical Package of Social Science (SPSS) software. The results showed that 41.4% of the students had high risk of smartphone addiction while 88.9% and 37.8% of them had poor sleep quality and high perceived stress respectively. It was also found that with confidence interval 90% and maximum error estimate 6%, there was a positive correlation between smartphone addiction and sleep quality. The highest correlation was between smartphone addiction level and perceived stress, while the least correlation was between sleep quality and perceived stress. Hence, it is suggested for the residential colleges to organize or uphold any relevant programs to reduce the smartphone addiction among university students.

Keywords: Smartphone addiction, sleep quality, stress, university students

ABSTRAK

Kajian ini mengkaji hubungan antara ketagihan telefon pintar, kualiti tidur dan tahap tekanan di kalangan pelajar universiti. Soal selidik diedarkan kepada 90 pelajar universiti pada tahun 2017 yang dipilih secara rawak dari pelbagai kolej kediaman Universiti Kebangsaan Malaysia, Kampus Bangi. Data dikumpulkan dan dianalisis menggunakan perisian Statistical Package of Social Science (SPSS). Hasil kajian menunjukkan bahawa 41.4% pelajar mempunyai risiko ketagihan telefon pintar yang tinggi manakala 88.9% dan 37.8% daripadanya mempunyai kualiti tidur yang buruk dan tekanan yang dirasakan tinggi. Juga didapati bahawa dengan selang keyakinan 90% dan anggaran kesalahan maksimum 6%, terdapat hubungan positif antara ketagihan telefon pintar dan kualiti tidur. Korelasi tertinggi adalah antara tahap ketagihan telefon pintar dan tekanan yang dirasakan, sementara korelasi paling sedikit adalah antara kualiti tidur dan tekanan yang dirasakan. Oleh itu, disarankan agar kolej kediaman menganjurkan atau menjayakan sebarang program yang berkaitan untuk mengurangkan ketagihan telefon pintar di kalangan pelajar universiti.

Kata kunci: Ketagihan telefon pintar, kualiti tidur, tekanan, pelajar universiti

INTRODUCTION

Smartphone is a mobile phone typically with a touchscreen that performs many of the functions of a computer, enable Internet access, and can run software applications. Life is what happens to you when you are looking at your smartphone. This quote best describes the dependency of modern societies towards smartphone due to the convenience it brings to offer vast of information anywhere (Rai et.al., 2016; Alosaimi et.al., 2016; Goswami et.al., 2016; Ching et.al., 2015; Al-Barashdi et.al., 2015; Chang et.al., 2014). However, excessive use of smartphone may cause smartphone addiction which can be detrimental to our health and social well-beings (Rai et.al., 2016; Alosaimi et.al., 2016; Kiweri et.al., 2015). Smartphone addiction is defined as excessive or poorly controlled preoccupations, urges or behaviours pertaining to smartphone use to the extent that individuals neglect other areas of life.

Based on Rai et.al. (2016), people especially students are easily overusing the smartphone. Majority of students used their smartphone at home, thought that they used it beyond expectation, felt uneasy without it, annoyed by its frequent notifications and got furious when someone interrupts them while they were using smartphone in which all indicate smartphone addiction.

A study conducted among Turkish university students associated depression, anxiety, poor sleep quality, and daytime dysfunction with smartphone overuse (Demirci et.al., 2015). Another study found that undergraduate college students with an external locus of control, in comparison with those with an internal locus of control, have less control over their smartphone use, namely, they are more likely to use their phones at bedtime, in class, and while studying, and are consequently more vulnerable to the negative outcomes associated with excessive smartphone use, such as poor sleep quality, lower academic performance, and a reduced degree of subjective well-being (Li et.al., 2015).

Based on Lepp et.al. (2014), people feel inseparable from their smartphone. A study by Samaha et.al. (2016), showed that risk of smartphone addiction is related positively to perceived stress and negatively to academic performance. For instance, university students with high risk of smartphone addiction experienced higher levels of perceived stress.

Based on Chang et.al. (2016), the negative impact on sleep causes by electronic devices may results from the short-wavelength-enriched light emitted. Their results show that evening exposure to a light-emitting (LE)-eBook phase-delays the circadian clock, acutely suppress melatonin and has important implications for understanding the impact of such technologies on sleep, performance, health and safety. The participants awake feeling sleepier and it took them hours longer to fully "awake" and achieve the same level of alertness when reading the LE book compared to reading the printed book. Using an LE device in the hours before bedtime is likely to increase the risk of delayed sleep-phase disorder and sleep onset insomnia (Dijk DJ, 2013 as cited in Chang et.al., 2016). Induction of such misalignment of circadian phase is likely to lead to chronic sleep deficiency (Czeisler CA, 2013 as cited in Chang et.al., 2016).

Growing studies suggest that the use of LE devices in the evening may adversely affect sleep quality and timing, daytime performance, health and safety (Wood B. et.al., 2013 and Chang AM et.al., 2014 as cited in Gringras et.al., 2015). Based on Gringras et.al. (2015) when modern LE devices are used in the evening before bedtime all these factors combine to produce a "perfect storm," which can adversely affect sleep. A study showed that university students in Saudi Arabia are at risk of addiction to smartphone use, which is associated with negative effects on sleep, energy level, eating habits, weight, exercise, and academic performance (Alosaimi et.al., 2016).

Because sleep is a significant biological mechanism related to mood regulation (Thomée, et al., 2011), students whose sleep is disrupted because of technology use may be more likely to experience markers of depression such as loss of energy, concentration problems, and daytime sleepiness (Adams & Kisler, 2013). Poor sleep quality has emerged as a relevant public health problem in technologically advanced societies (Cheung et.al., 2011).

We cannot deny that smartphone has become a basic need for society nowadays especially among university students (Alosaimi et.al., 2016; Goswami et.al., 2016; Kiweri et.al., 2015; Al-Barashdi et.al., 2015). A study conducted by Rai et.al. (2016) among college students in Indore, found that the higher the addiction level is, the lower level of self-regulated learning the students have, as well as low level of flow when studying. Further interview for smartphone addiction group was conducted, it has been found that the smartphone addict-learners are constantly interrupted by the other applications on the phones when they are studying, and does not have enough control over their smartphone learning plan and its process (Rai et.al., 2016). Samaha et.al. (2015) stated that research investigating smartphone use and how it is affecting people's lives is still at a very early stage. It is vital to know the stress level among university students because

as students, stress can be a serious stumbling block that will affect their academic performance adversely. Thus, by knowing the correlation between smartphone addiction, sleep quality and stress to educate university students on the proper use of smartphone and how it would affect sleep quality and stress level.

In this study, we are interested to investigate the relationship between smartphone addiction, badness of sleep quality and stress level among university students. Hypotheses of the study are as follows:

i. There is a significant relationship between smartphone addiction and badness of sleep quality.
ii. There is a significant relationship smartphone addiction and stress level
iii. There is a significant relationship between badness of sleep quality and stress level.

METHODOLOGY

The study was conducted in the Universiti Kebangsaan Malaysia Bangi Campus from 1 March 2017 until 30 June 2017. Student samples were selected by convenient random sampling method. In two days, every residential college in the university were visited and approximately around 10 to 20 participants from each college were selected. They were randomly chosen at the cafeteria of each college. Thus, they consist of different genders, age and faculties. Some inclusion and exclusion criteria were being used in order to get suitable students to answer the questionnaires.

Inclusion criteria:
Age 19 and above
Able to read and understand Malay and English language
Able to give written informed consent
Own a smartphone
Exclusion criteria:
Age below 19
Not able to read and understand Malay and English language
Does not own a smartphone

Before completing the survey, a form explaining the purpose of the study and assured volunteers that data collection, storage, and reporting techniques would protect confidentiality and anonymity was given. Cases with invalid responses to trap question were removed from the dataset. The survey composes of four separate sections, including one for demographic information and three separate research instruments. The remaining three sections encompassed the Smartphone Addiction Scale (SAS), the Pittsburgh Sleep Quality Index (PSQI) and the Perceived Stress Scale (PSS). The amount of time required to complete the survey was approximately 5 to 10 minutes.

The demographic information questionnaire consists of 10 questions which are name, gender, age, faculty, family monthly income, monthly expenditure on mobile data, number of apps owned, number of social media owned, number of gaming apps owned, prevalence of online shopping.

The SAS, developed by (Kwon, Lee, et.al., 2013) is a self-rated questionnaire that consists of 33 items rated on a six-point Likert-type scale, ranging from "Strongly Disagree", coded 1, to "Strongly Agree", coded 6 which is used to assess smartphone addiction. It covers the domains of daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. It is based on the Internet addiction scale and the features of smartphones. The Cronbach's alpha of the SAS is 0.967. Higher sum of scores, indicate a higher risk of smartphone addiction. Ching et.al. (2015) had translated the SAS into the Malay version of SAS (SAS-MV) which had been validated. The total score for this scale ranges from 33 to 198. For this research a score from 33 – 99 is considered as non-addict, a score from 100 – 109 is considered as average while a total score of > 109 is considered as smartphone addicts.

PSQI is an effective instrument used to measure the quality and patterns of sleep in adults. It differentiates "poor" from "good" sleep quality by measuring seven areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. It was developed by (Buysse et.al., 1989) and is a self-report questionnaire that consists of 4 structured questions, 4 Likert-type scale items, ranging from "Not during the past month" coded 0, to "Three or more times a week", coded 3. There is one more Likert-type scale item ranging from "Very good" coded 0, to "Very bad" coded 3. The Cronbach's alpha is equal to more than 0.7. The higher the sum of score, the poorer the sleep quality.

The PSS developed by (Cohen et.al., 1983) measures the perception of stress, that is, the degree to which situations are appraised as stressful by asking respondents to rate the frequency of their thoughts and feelings related to situations occurred in the last month (Cronbach's alpha coefficient = .79). It is one of the most widely used psychological instruments which was used

in hundreds of studies and validated in many languages thus, offers useful psychometric properties. It consists of 10 items rated on a five-point Likert-type scale, ranging from "Never", coded 0, to "Very Often", coded 4. In the present study, the scores for this scale ranged from 6 to 34, and Cronbach's alpha coefficient was 0.87. The translation of scale into Malay language was done with a qualitative method that is a one-way translation (translation and control of the questionnaire with a different group of translators after inquiry (Savasır, 1994). The scale was translated into Malay language independently by two psychological counsellors who had at least a master's degree and bilingual efficiency. Later, centre of language and translation in a local university other than the location of study, selected the best anonymous version among two translations; also, the researcher and co-researchers compared the match and contrast between the translations. The reconcile version was then back translated to the original language by a native speaker of the English language and fluent in Malay language. Few minor discrepant items were found. Finally, a Malay language teacher reviewed the absolute form and her suggestions were added into the translation. Then, this form was presented to the researcher team working on this project. The higher the sum of scores, the higher the stress level.

Based on a study done by Bian et.al (2015), 13.5% of the students in the sample is addicted towards smartphone. Thus, we use sample proportion, $\hat{p}$ as 0.135. We choose confidence interval 90% and maximum error estimate $E = 6\%$.

Hence, the minimum sample size is

$$n = \hat{p}(1-\hat{p})\left(\frac{z_{\alpha/2}}{E}\right)^2 = 88.311$$

Based on the Central Limit Theorem, if samples of size where n≥30, are drawn from any population with a mean (μ) and a standard deviation (σ), then the sampling distribution of sample mean approximates a normal distribution. The greater the sample size, the better the approximation. Thus, the sample size of 90 students is used in this study.

Descriptive statistics (means and standard deviation for continuous variables and percentages for categorical variables) were calculated for all variables. The inferential statistics that being used was Pearson's correlation analyses. A p value of less than 0.05 was considered to indicate statistical significance. All statistical analyses were performed using the IBM Statistical Package for Social Sciences (Version 23.0 for Windows).

RESULTS AND DISCUSSION

Of 90 respondents, 25.6% were males and 74.4% were females. The average age was 21.01 years old (SD = 1.222) with an overall range between 19 to 26 years old. The percentage of students who were at high risk of smartphone addiction (41.1%) was slightly higher than that of students with low risk (36.7%) while 22.2% students were at the average score of smartphone usage.

Based on the findings of this research, almost half (40%) of the students spend more than RM30.00 monthly for mobile data which can be considered as a high expense on mobile data monthly. Quite a number of students (18.9%), own more than 15 apps in their smartphones. Most of the students (60%) have 4-6 social media accounts while two of the students have 6-8 social media accounts and even one of them has more than 8 social media accounts in their smartphone. Majority of the students (47.8%) have 1-3 gaming applications in their smartphones while there are four of them who owns more than 6 gaming applications. Besides, most of the study samples only shop online once in three months however, there are 3 students who shop online for more than 6 times in that period. This may cause them to constantly check new items sold online through their smartphone and increases the proneness towards smartphone addiction. Hence, these results explained, the higher percentage of smartphone addicts among UKM students found in this study.

As for sleep quality, 11.1% of the samples studied have good sleep quality while the rest of 88.9% more have poor sleep quality. The percentage of students identified as having high level of perceived stress (37.8%) was far greater than students with low level of perceived stress (6.7%) while 55.5% students have average level of perceived stress.

The results of this study are as shown in Figure 1. Based on Figure 1, the correlation between the level of smartphone addiction (as measured by SAS) and sleep quality (as measured by Pittsburgh Sleep Quality Index) was investigated using Pearson product-moment correlation coefficient. There was a positive correlation, r = 0.391, N = 90, p < 0.01, with higher score for smartphone addiction associated with lower sleep quality. The same positive correlation was found in a study conducted by Rathore et.al. (2016) with p-value of 0.001857 and the result is statistically significant (since P value<0.05) which implies a strong association between subjective sleep quality and smart phone usage. Those who did not used smart phones, were relatively more satisfied with their quality of sleep and vice versa (Rathore et.al., 2016). However, a study by Demirci et.al. (2015), shows that there there was no

Correlations

[DataSet1] C:\Users\USER\Documents\data research.sav

Correlations

		sumSAS	sumPSQI	sumSTRESS
sumSAS	Pearson Correlation	1	.391**	.454**
	Sig. (2-tailed)		.000	.000
	N	90	90	90
sumPSQI	Pearson Correlation	.391**	1	.278**
	Sig. (2-tailed)	.000		.008
	N	90	90	90
sumSTRESS	Pearson Correlation	.454**	.278**	1
	Sig. (2-tailed)	.000	.008	
	N	90	90	90

**. Correlation is significant at the 0.01 level (2-tailed).

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CORRELATIONS
  /VARIABLES=sumSAS sumPSQI
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
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FIGURE 1

direct effect of high smartphone use on sleep quality (β = –0.022, t = –0.379, p = 0.705).

The highest correlation can be seen between smartphone addiction level and perceived stress (as measured by Perceived Stress Scale) with a positive correlation of r = 0.454, N = 90 and p < 0.01. Higher score for smartphone addiction associated with higher stress level. This result supports Samaha et.al. (2015) study in which there was a small, positive correlation, r = 0.2, N = 249, p < .002, with high risk of smartphone addiction associated with high levels of perceived stress. The same results were obtained in Thomee et.al. (2011) study in which for women in the study, medium smartphone overuse was associated with current stress and high and medium smartphone overuse was associated with sleep disturbances.

Lastly, the least correlation can be seen between sleep quality and perceived stress with a positive correlation of r = 0.278, N = 90 and p < 0.01. Lower sleep quality associated with higher stress level. Thus, all the null hypotheses can be rejected and all the results support the study hypotheses. Based on a study by Thomee et.al. (2011), being awakened at night was associated with current stress, sleep disturbances, and symptoms of depression for the men and women in the study. For the men, smartphone overuse was associated with current stress, sleep disturbances, and symptoms of depression.

IMPLICATION AND LIMITATION

Since smartphone is still considered as a new technology, research regarding smartphone usage and its correlation relating with biological psychology such as sleep quality and stress level is still scarce. There are not many research articles can be referred to in completing this research. This research results did unravel the association between smartphone addiction with sleep quality and stress thus, there is now an open opportunity to conduct further investigations relating the cause and effect relationship since this research is lack of that elements. Besides, students' self-reported data on each questionnaire could not be independently supervised and verified. The understanding of each questionnaire item measuring an abstract concept vary from one participant to another. In addition, the researcher is not always available for clarifications to

every participant. So, self-reported responses may be inaccurate despite honesty. Nevertheless, rating scales could be answered in different ways. Some people preferred to use the edges such as strongly agree and strongly disagree while others respond to choices around the middle. Still, there are participants who kept all the choices within the pool without paying enough attention to the questionnaire items. Furthermore, response bias is another limitation where participants answered misleadingly as they may feel pressure to give answers that are socially acceptable. This will influence the correlation between scales. Moreover, the study sample in this study is too small which is only 90 participants compared to a total of approximately 20 000 UKM students. Future research may involve a larger sample for a more robust correlation. Besides, this study only includes UKM students. Future research might investigate the hypothesized model in general.

CONCLUSION

Results of this study showed the existence of a positive relationship between smartphone addiction and sleep quality, smartphone addiction and perceived stress as well as sleep quality and perceived stress. This study found that the higher the level of smartphone addiction, the poorer the sleep quality. Besides, the higher the level of smartphone addiction, the higher the level of perceived stress and the poorer the sleep quality, the higher the level of perceived stress. All of the findings are congruent with past studies (Rathore et.al.,2016; Demirci et.al., 2015; Samaha et.al., 2015 & Thomee et.al., 2011). As smartphone use continues to be on the rise, despite all the alarming negative implications mainly behavioural addiction, intervention programs must be developed and implemented without further ado with the most vulnerable population segments children and adolescents.

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