PSYCHOLOGICAL MEDICINE

Internet Addiction and Personality: Association with Impulsive Sensation Seeking and Neuroticism-Anxiety Traits

Zahiruddin Othman[1)], Chung Wah Lee[2)], Yee Cheng Kueh[1)]

ABSTRACT

Introduction: **The internet has revolutionized the information age. There has been growing concern regarding internet addiction, despite its benefits. Personality trait such as neuroticism has been linked with internet addiction.**

Objective: **The aim of the present study was to determine the prevalence of internet addiction and its association with personality traits among college students.**

Methods: **College students age 18-24 who were doing an attachment in a government hospital were recruited into the study. Internet addiction was assessed using the internet addiction test (IAT), whilst personality traits by using the cross cultural Malay language 40-item Zuckerman-Kuhlman personality questionnaire (ZKPQ-M-40-CC)**

Results: **The prevalence of internet addiction was 31.8%, with moderate and severe use of internet at 30.7% and 1.1%, respectively. Based on multiple logistic regression analysis, the impulsive sensation seeking and neuroticism-anxiety traits were found to be significantly associated with internet addiction.**

Conclusions: **The prevalence of internet addiction is comparable to other studies conducted in Malaysia. Personality traits impulsive sensation seeking and neuroticism-anxiety emerged as significant associated factors with internet addiction. Further study to understand the role of personality traits in the development of internet addiction is recommended.**

KEY WORDS

internet addiction, personality traits, young adults, college students, Malaysia

INTRODUCTION

The internet has revolutionized the information age, more so with the explosion of wireless communication. It helps students to broaden their academic knowledge, research and assignments by accessing to the information world and also by easy communication to their academic community[1,2)]. Though there are many benefits linked with the internet use[3)], there has been a growing concern regarding the risk associated with excessive use of internet. There has been report that possible internet addiction (IA) was associated with mental health[4-6)] as well as academic problems[7)].

The prevalence IA varies from region to region. In a cross-sectional study of 2,533 students using the Italian version of internet addiction test (IAT), the prevalence of moderate and severely addicted users were 5.0% and 0.8%, respectively[8)]. A much higher prevalence was observed in Nepal in which the prevalence of moderate and severe internet users was 41.5% and 3.1%[9)].

There can be many factors leading to this vast range of prevalence of IA globally. Some researchers have found that different cultures have different behaviors towards information technology adoption[10)]. Some reports also suggested that cultural values influence how its people use the information technology, the type of information technology used or the outcome of its use[11,12)].

Data from three different countries of different cultural, economic and technological context, namely the United States, Africa and China, demonstrated significant differences in psychometric construct across different cultural settings. It was also found that the Africans are more prone to use the internet for mood modification and have a higher emotional dependency towards its use despite having spent the least amount of time online[13)]. Thus, it is crucial to examine the prevalence of IA in a specific region for a better understanding of the extent of the problem.

Personality traits such as increased emotional reactivity, proneness to stress, impulsivity, and negative affect in drug addictions are associated with addictive behaviors[14)]. Since pathological internet use is currently viewed as an addictive behavior, personality traits are thus an important factor which may predispose an individual to IA. In a study involving 6,900 young adults in the United States, internet use was positively related to extraversion, neuroticism and conscientiousness[15)].

In another study using the Eysenck personality questionnaire, students addicted to internet had higher neuroticism/stability and psychoticism/socialization but lower lie scores, suggesting neuroticism, psychoticism, and immaturity[16)]. Consequently, identifying the personality traits that may predict IA would allow for an early identification and intervention on the population at high risk. To our knowledge, there is a lack of literature on personality traits of internet users in Malaysia. This study, therefore, aims to determine IA and its associated personality traits among college students in Malaysia.

METHODS

Study setting and subjects

The ethical approval was sought from the USM Human Research Ethics Committee (HREC) and Malaysia Medical Research and Ethics

Received on June 19, 2017 and accepted on July 4, 2017
1) School of Medical Sciences, Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan, Malaysia
2) Department of Psychiatry, Hospital Tengku Ampuan Rahimah
41200 Kelang, Selangor, Malaysia
Correspondence to: Zahiruddin Othman
(e-mail: zahirkb@usm.my)

Table 1. Comparison between IA and non-IA on socio-demographic and internet use characteristics

Variable	n	No IA	IA	X^2 (df)	*p-value*
		n (%)	n(%)		
Gender					
Male	37	20 (54.1)	17 (45.9)	3.94 (1)	0.047
Female	230	162 (70.4)	68 (29.6)		
Race					
Malay	236	159 (67.4)	77 (32.6)	0.725 (3)	0.867
Chinese	10	7 (70.0)	3 (30.0)		
Indian	9	7 (77.8)	2 (22.2)		
Others	12	9 (75.0)	3 (25.0)		
Mode of online					
Smart phone					
Yes	262	179 (68.3)	83 (31.7)	0.157 (1)	0.692
No	5	3 (60.0)	2 (40.0)		
Home computer					
Yes	91	60 (65.9)	31 (34.1)	0.317	0.574
No	176	122 (69.3)	54 (30.7)	(1)	
Computer outside					
Yes	12	4 (33.3)	8 (66.7)	7.025 (1)	0.008
No	255	178 (69.8)	77 (30.2)		
Purpose Online					
Social networking					
Yes	230	153 (66.5)	77 (33.5)	2.065 (1)	0.151
No	37	29 (78.4)	8 (21.6)		
Chatting					
Yes	207	141 (68.1)	66 (31.9)	0.01 (1)	0.975
No	60	41 (68.3)	19 (31.7)		
Surfing					
Yes	113	68 (60.2)	45 (39.8)	5.760 (1)	0.016
No	154	114 (74.0)	40 (26.0)		
Online game					
Yes	67	41 (61.2)	26 (38.8)	2.003 (1)	0.157
No	200	141 (70.5)	59 (29.5)		
E-mail					
Yes	124	76 (61.3)	48 (38.7)	5.042 (1)	0.025
No	143	106 (74.1)	37 (25.9)		
Downloading					
Yes	167	112 (67.1)	55 (32.9)	0.248 (1)	0.618
No	100	70 (70.0)	30 (30.0)		
Online shopping					
Yes	97	68 (70.1)	29 (29.9)	0.264 (1)	0.608
No	170	114 (67.1)	56 (32.9)		
		Mean (SD)		**Mean difference**	
Average online time (hr/day)					
Weekdays		4.66 (4.161)	5.74 (4.904)	1.076 (2.217, 0.065)	0.064*
Weekends		9.73 (5.886)	12.11 (6.232)	2.375 (-3.927, -0.824)	0.003*

*Independent t test

Committee (MREC) of the Ministry of Health Malaysia (MOH). This cross-sectional study was conducted from November 2015 to January 2016 at Hospital Tengku Ampuan Rahimah (HTAR), Klang. Students from nearby allied health colleges came to this government hospital to do attachments and postings as part of their training necessary for the completion of their respective courses.

The researcher obtained the name list of all the Malaysian students age 18-24 from the training unit in the administrative office of HTAR. The subjects were engaged in small groups of five to ten students at different departments. They were briefed on the study related information and questionnaires. All the questionnaire set were tagged with a serial number for easy reference during data entry. The completed questionnaires were detached and separated from the consent form so that they remained anonymous. Students with history of mental illness or on prescription for psychiatric illness were excluded from the study.

Measurements

a. A Self-constructed questionnaire on socio-demographic and internet use information

The questionnaire was devised to obtain data such as duration of internet use in hours during the weekdays and during the weekends, vehicle for internet use, such as smartphone, home computer or computer outside home, and purpose of internet use, whether it is used for social networking, chatting, surfing, games, e-mailing, downloading, or shopping.

b. The internet addiction test (IAT)

The original IAT was created by Kimberly Young and by far the

Table 2. Comparison between IA and non-IA on personality traits.

	No IA (n = 182)	IA (n = 85)	Mean Difference (95% CI)	*t statistic (df)*	*p-value*
	Mean (SD)	Mean (SD)			
Act	25.96 (5.736)	26.01 (5.254)	0.056 (-1.501, 1.390)	0.76 (265)	0.934
Sy	22.92 (4.560)	25.07 (4.222)	2.153 (-3.306, 1.000)	3.678 (265)	**< 0.001**
Agg-Host	17.38 (5.609)	19.71 (6.724)	2.327 (-3.875, -0.779)	2.959 (265)	0.003
Imp-SS	17.64 (5.714)	21.66 (5.795)	4.016 (-5.501, -2.531)	5.326 (265)	**< 0.001**
N-Anx	16.04 (5.742)	22.22 (7.215)	6.185 (-7.801, -4.569)	7.537 (265)	**< 0.001**

Table 3. Significant factors associated with internet addiction using multiple logistic regression

	b	Adjusted OR (95% CI)	Wald Statistic (df)	*p-value*
Imp-SS	0.064	1.066 (1.010-1.126)	5.344 (1)	0.021
N-Anx	0.121	1.128 (1.073, 1.187)	22.143 (1)	< 0.001
E-mailing	0.629	1.876 (1.048, 3.360)	4.479 (1)	0.034

most widely translated and used tools for the assessment of IA globally. It comprises a total of 20 items rated on a 5-point Likert scale which takes about 5 minutes to complete; 8 items were adapted from the DSM-IV pathological gambling criteria and the remaining 12 items assessed the areas of life affected by the excessive internet use. It has good internal consistency and concurrent validity and is a reliable instrument to assess the addictive use of the internet[17].

Scores of 0-19, 20-49, 50-79, and 80-100 indicate limited use, mild/average user, moderate/regular user/occasional or frequent problems secondary to internet use, and severe/significant problematic use of internet. In this study, internet users in moderate and severe category were considered as possible IA. The Malay version of IAT was available and already validated with good internal consistency (Cronbach's α = 0.91), parallel reliability (intraclass coefficient = 0.88, $p < 0.001$) and concurrent validity with the Compulsive Internet Use Scale (Pearson's correlation = 0.84, $p < 0.001$)[18].

c. The Zuckerman-Kuhlman personality questionnaire (ZKPQ)

The original version of ZKPQ was developed to identify the basic factors of personality based on the alternative five model of personality traits. The model divides personality traits into activity (Act), sociability (Sy), aggressive-hostility (Agg-Host), impulsive sensation seeking (Imp-SS) and neuroticism-anxiety (N-Anx) with theoretical biological underpinning for each of the traits within the model[19]. Therefore, it should be able to compare with the traits of other species, reliable across genders, age and culture. The Big Five Model, for comparison, cannot be applied to describe the behavior of animals, such as when it comes to conscientiousness, agreeableness or openness to experience. The ZKPQ is shown to be applicable universally across different cultures[20] and have a strong predictability for personality disorders or personality traits according to the DSM-IV[21].

The cross cultural Malay language 40-item ZKPQ (ZKPQ-M-40-CC) consists of 8 items on each of the personality traits. The answers are rated on a 5-point Likert scale ranging from 0 (not at all like me) to 5 (completely like me) which takes about 5 minutes to complete. It is a validated Malay version of ZKPQ-50-CC with 10 items omitted after factor analysis. The ZKPQ-M-40-CC demonstrated satisfactory factor loadings with good psychometric properties with Cronbach alpha 0.76-0.84 and composite reliability 0.75 for all the five domains[22].

RESULT

A total of 267 students who fulfilled the inclusion and exclusion criteria, and answered all the questions were included into the study. The mean age was 20.9 years old with a standard deviation of 1.4. The majority were Malay (88.4%) and female (86.1%). With regard to duration online during the weekdays 123 (46.1%), 84 (31.5%), 31 (11.6%), 14 (5.2%) and 15 (5.6%) of subjects spent less than 3 hours, 3 to < 7 hours, 7 to < 9 hours, 9 to < 12 hours, and 12 hours or more, respectively. During the weekend 13 (4.9%), 73 (27.3), 42 (15.7), 81 (30.3) and 58 (21.7) of subjects spent time online for less than 3 hours, 3 to < 7 hours, 7 to < 9 hours, 9 to < 12 hours, and 12 hours or more, respectively. The data demonstrated increased use of internet during the weekends.

The purpose for internet access varied from individual to individual. 230 (86.1%) of the subjects use the internet for social networking sites, 207 (77.5%) for chat group purposes, 113 (42.3%) for surfing and obtaining information, 67 (25.1%) for online game purpose, 124 (46.4%) for emailing, 167 (62.5%) for downloading songs and videos, and 97 (36.3%) uses for internet shopping.

It was found that 82 (30.7%) of the students fall into the moderately addicted category of IA, which means they had at some points in their life problems arising in relation to the use of internet, and 3 (1.1%) were found to be severely addicted to the internet. Therefore, a total of 85 (31.8%) students had pathological internet use or internet addiction.

Independent samples t-test determine the association between personality traits and IA. As shown in table 2, significant associations ($p < 0.001$) were observed in personality traits impulsive sensation seeking (Imp-SS) and neuroticism-anxiety (N-Anx). The other 3 personality traits including activity (Act), sociability (Sy) and aggression-hostility (Agg-Host) were not significantly associated with IA.

All personality trait factors (Act, Sy, Agg-Host, Imp-SS and N-Anx) and possible confounding factors (gender, use of computer outside the house, internet activities of social networking, surfing, online game and emailing, and duration of internet use in the weekdays and weekends) with a p-value of < 0.25 in simple logistic regression were further analyzed using multiple logistic regression (MLR). Using forward and backward logistic regression, the relevant variables were selected. Imp-SS, N-Anx and e-mailing were retained in the final MLR model. All MLR assumptions were met. There was no multicollinearity in the model. The goodness of fit was acceptable as measured by Hosmer-Lemeshow (p-value 0.890), classification table (specificity 100%, overall 68.2%) and area under the ROC curve (0.802).

The following are the interpretation of the significant variables based on the final model as shown in table 3.

I. For every one score increased in the Imp-SS of ZKPQ-M-40-CC, there was 1.07 times higher odds to have IA (aOR 1.066, p-value 0.021).
II. For every one score increased in the N-Anx of ZKPQ-M-40-CC, there was 1.13 times higher odds to have IA (aOR 1.128, p-value < 0.001).
III. Using e-mail as an online activity had 1.88 times higher odds to have IA (aOR 1.876, p-value 0.034).

DISCUSSION

In this study, 30.7% and 1.1% of the subjects were found to be moderately, severely addicted to the internet, respectively. Thus, the IA prevalence 31.8% in this study was slightly lower than an IA prevalence of 36.9% in a recent cross-sectional study conducted among 426 Malaysian medical students[23]. A previous local study on 120 secondary school students in 2011 demonstrated a higher prevalence of moderate (IAT scores 50-79) and excessive (IAT scores 80-100) users were 54.2% and 3.3%, respectively[24]. Overall, the statistics are comparable to those of Mumbai, India with 24.8% and 0.7%[25], Nepal 41.5% and 3.1%[9], Greek 22.4% and 1.0%[26], and Korea 18.4% and 3.5% of moderate and severe users of the internet respectively[27].

There were no associations found between socio-demographic factors within the study population, namely gender and race. However the study had found that using the internet for activity such as emailing was significantly correlated with IA, whereas social networking, chatting, surfing for information, online gaming, downloading and online shopping were not significantly associated with IA. On the contrary, there are other studies which suggest social networking[28], chat groups[29], online gaming[30] and downloading in particular digital piracy[31] are all been found to be correlated with IA. The variation in findings perhaps is dependent on the population group that we were investigating. The population in this study was all students and e-mailing was probably one of the more common modes of interaction between them and their family

or contacts far away from them. E-mailing is also perhaps a more formal interaction of the student with their supervisors in task related purposes in their respective courses.

However, the recent development chatting applications in smartphone, the finding which suggested emailing as an associated factor is debatable. It has been argued that IA is not the addiction of internet itself but the addictive behavior that accompanies with the use of the internet instead. Therefore, a different population group would be more predisposed to different types of online activities which may be an addictive behavior or simply responsibility bound. It is thus worthy to further investigate into the online activities among internet users to identify specifically its risk towards the specific population group.

Previous studies that have compared IA using the alternative five model of personality traits had found significant associations of impulsive-sensation seeking, neuroticism-anxiety and aggression-hostility traits with IA[32,33]. This study however, did not find aggression-hostility trait as a significant associated factor with IA. The inconsistency in findings were apparently due to the small sample size of those studies, and also in the ways the samples were collected as individuals with a particular personality traits are more predisposed to a certain online activities[34]. Thus, recruiting a group of sample which tends to have a certain peculiar need or ways in going online, such as only college students who are normally requiring many hours of online surfing for information for example, can affect the results on personality traits findings. A more generalized group of sample population may be more suitable in investigating on the association of personality traits and IA in future studies.

In a recent study conducted in German, participants with IA showed higher frequencies of personality disorders (29.6%) compared to those without IA (9.3%; $p < 0.001$). In males with IA, cluster C personality disorders were more prevalent than among non-addicted males[35]. An earlier study found a homozygous short allelic variant of the serotonin transporter gene (SS-5HTTLPR) expression was closely related to harm avoidance in IA suggesting that IA subjects may have genetic and personality traits similar to depressed patients[36]. Further, the association between IA and depression is well known and had been shown in a previous study[6].

CONCLUSIONS

Internet addiction is associated with impulsive sensation seeking and neuroticism-anxiety traits. The prevalence of possible IA was 31.8% with moderate and severe users of internet at 30.7% and 1.1%, respectively. Future in depth study involving a bigger sample and more diverse groups of the population is recommended in order to further investigate the dependent users and also to take measures to rehabilitate them if necessary.

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