ORIGINAL PAPER

Internet Addiction among Adolescents in Malaysia: The Prevalence and its Association with Attention Deficit Hyperactivity Disorder (ADHD) Symptoms

Mohd Isa S, Hashim AH, Kaur M, Ng CG

Department of Psychological Medicine, Faculty of Medicine, University Malaya, Malaysia

Abstract

Objective: As Internet use becomes ubiquitous among adolescents, Internet addiction turns out to be as a potential problem in adolescents. The aim of this cross-sectional study was to examine the prevalence of internet addiction and its associated factors among the adolescents in Malaysia. Methods: The association between internet addiction and attention deficit hyperactivity disorder (ADHD) symptoms was also examined in this cross-sectional study, which was conducted at four secondary schools in Malaysia. In this study, Malaysian Version of Internet Addiction Test (MVIAT), Conners-Wells Adolescent Self-report: Short Form (CASS:S), The Conners Teachers Rating Scale: Short Form (CTRS:S) and The Conners' Parents Rating Scale: Short For (CPRS: S) were used. Results: The results demonstrated 28.6% of the subjects were addicted to the internet and there was a positive association with ADHD symptoms. Male gender, early age of first internet use, longer total time of internet use are associated with internet addiction problem among the adolescents. Internet addiction has become highly prevalent among the adolescent in Malaysia. Conclusions: It is important to provide support for this group of adolescent with internet use problem. Measure to prevent the worsening of the situation and future research on the causal factors of internet addiction such as ADHD is needed.

Keywords: Internet, Addiction, Attention, Deficit, Hyperactivity

Introduction

The Internet has significantly impact how society lives and has brought huge changes in the way we do things[1-7]. The Internet has revolutionized communications and media around the world in an unprecedented manner[3]. Millions of people have embraced this new technology[5, 8-11] including millions of adolescents and children worldwide[12-14]. Internet addicts are people having pathological use of the internet or with the addictive properties of computer-mediated environments[15-18] or as termed by others as "excessive computer" and "internet usage"[19,20] also termed as a kind of "technological addiction"[18], similar to online gambling or online video game play[21,22],

which constitutes addiction or a dependency that is uncontrollable and often results in dysfunctional consequences[20,21,17]. These users become over-involved or spend too much time with the Internet, e.g. " spending forty to eighty hours per week, with single sessions lasting up to twenty hours"[23]. They remain connected virtually through the day and for "as long as they are awake"[24,25].

The Internet links people to a wide range of information and resources and for a vast majority, it has proven to be good[26,27]. However studies demonstrates that people are not necessary happy or that their quality of live improves[28]. It was reported even when used as little as 3 hours a week, being on the internet can lead to increasing levels of low mood and loneliness, including reduce interaction and communication with family[28]. Using the Internet causes in fact a person to be displaced in time and of ties with significant others[29]. Evidence found using the Internet for social reasons impacts on the users' quality of life[30]. Contrary to views of many, the quality of some relationships made or continued online are not as significant and lasting as relationships people have with others in their actual lives[30,29]. Additionally, these virtual relationships tend to be superficial; bonds can be broken effortlessly while spending the time online takes a person away from precious real life interactions and available contacts[30,28]. Internet usage diminishes communication between family members and overtime, both depression and loneliness increases with the amount of time a person spends online[28]. Equally worrying in the increasing reports of misuse of the internet e.g. harassment, stalking and pornography[31,32].

The "Internet has been blamed" for decreased family time, strains on relationships, decreased productivity in employment settings, perpetuation of false information, and the development or exacerbation of psychological problems[33]. Two studies[17,34] showed addicted users have a combination of psychological, social, school, and/or work difficulties, "people are becoming preoccupied with the Internet that they are unable to control their use, and are endangering their employment and relationships"[35]. Marriages and relationships between partners, friends and parent-child have been reported to be affected by excessive use of the Internet[17,7]. Despite these negative consequences, more than 50% of addicts claimed have "no desire to cut down"[17].

The pervasiveness of IA has caught the attention of numerous researchers and many have focused on internet addiction and co-morbidity in adolescents and young adults[36-39,14]. According to a study, 535 elementary school students were screened for ADHD and IA[40]. The study found the IA group had higher ADHD-related symptoms than in the non-addiction group; conversely the "ADHD group had higher IA scores compared with those in the non-ADHD group". The co-morbidity of these two disorders indicates that "the association between them is higher than expected and definitely not just by chance"[38]. There are many more studies that show the association of IA and ADHD[41] including a study[42] who found adolescents with higher ADHD symptoms were more likely to play more internet video gaming.

To date, there was no study on internet addiction among the adolescent in Malaysia. In the current study, we aim to determine the prevalence of internet addiction among secondary school student in Malaysia. The association with ADHD symptoms and other factors were also examined in the study.

Methods

Participant

The study was conducted in a city, named Ipoh. Ipoh is the capital city of Perak state in Malaysia with the population of about 700,000. It is about 200km away from the capital of Malaysia, Kuala Lumpur. Six secondary schools were selected randomly using the computer generate randomizer (www.randomizer.org) from a total of 47 secondary schools in Ipoh. The selected secondary schools were SMK Dato' Haji Ahmad Taib, SMK Jalan Tasek, SMK Pinji, SMK Tarcisian Convent, SMK Dr Megat Khas and SMK Jalan Pasir Puteh. There are a total of 148 participants. This is a cross-sectional study using convenient sampling method to recruit non-duplicated sample of participants. Permission to carry out the study was obtained from the Kementerian Pendidikan Malaysia (Ministry of Education, Malaysia) and Jabatan Pendidikan Perak (Department of Education, Perak).

Data Collection

Data was collected from September 2013 till November 2013. The selected secondary schools were approached and permission was granted from the respective headmaster. Meetings were arranged with the schools' counsellors to explain about the questionnaire and data collection. Each school was given 50 sets of questionnaire to be completed. The participants were explained about the study and a Subject Information Sheet was provided to the parents. Participants were told about the confidentiality and emphasized that no identification data would be revealed in this study. The potential subjects were given a thorough explanation with regards to the study including participation was on voluntary basis. Confidentiality was assured to the all subjects of this study. The written consent was obtained from the subjects, their parents or caretaker. The subjects were identified with a specified coding during the analysis of the statistical data.

Only four out of six randomly selected schools agreed to involve in this study. Another 2 schools were unable to be involved due to time constraint and administrative issues. Hence, 200 sets of questionnaires were distributed. Each secondary school was given 50 sets of questionnaires. Out of these 200 samples, only 161 questionnaires were completed and included in the study for analysis.

Instruments

The questionnaire comprises of three parts which include basic demographic data, Malaysian Version of Internet Addiction Test (MVIAT) and ADHD Rating Scales. Basic demographic data consisted of socio-demographic, internet usage and family background. The socio-demographic data consisted of age, gender, race, language, past psychiatric and substance history, and current school achievement. The internet use data consisted total time of internet use in a week, age of first starting to use the internet, methods of using internet, place of internet use, aims of internet use, and duration and frequency of internet use. The family background data consisted of parent's age, parent's marital status, parent's education background, position in the family and total time of parent spending with the subjects in 24 hours.

IAT is a brief self-report questionnaire designed to measure internet use. It was developed by Young[43]. The Malay version of IAT (MVIAT) was validated by Ng et al.[44] IAT is a self-report, "5-points Liker-scale with 20 items with each question has a

response scale from 1 to 5 (1- tidak pernah to 5-sangat kerap).” The subjects are to circle the possible statements that “most closely describe their Internet use characteristics”. The MVIAT displayed good internal consistency (Cronbach’s alpha =0.91), parallel reliability (intraclass coefficient =0.88, P<0.001) and concurrent validity with the Compulsive Interne Use Scale (Pearson’s correlation=0.84, P<0.001)[44]. The recommended optimal cut off scores was 43 to distinguish subjects with and without Internet dependence[44].

Behavior rating scales are commonly used in the assessment of ADHD, giving valuable information for clinical and research purposes[45,46]. The scales used in this study are “Conners-Wells Adolescent Self-report: Short Form” (CASS:S), “Conners’ Parents Rating Scale: Short Form” (CPRS: S) and “Conners Teachers Rating Scale: Short Form” (CTRS:S).

The Conners-Wells Adolescent Self-Report Scale (CASS: Short) consist of “27 items and has four subscales which are conduct problems (6 items), cognitive problem/inattention (6 items), hyperactive-impulsive (6 items) and ADHD index (12 items)”[47]. The CASS: Short developed by Conners[47] and Conners and Wells[48] and “focuses on the conduct and cognitive problems, and hyperactivity dimensions” (Conners, 1997).This instrument is the simplified version of The Conners-Wells Adolescent Self-Report Scale (CASS: Long). The Conners-Wells Adolescent Self-Report Scale (CASS: Long) is a “84-item self-report measure of ADHD symptomatology designed for use in adolescents”[47]. The internal consistency and validity of the CASS: Long when used with adolescents have been reported[47,49]. Similarly the internal consistency and validity of the CASS: Short have been reported[47,49] and is more ideal for research purposes[50].

The Conners’ Parents Rating Scale: Short Form (CPRS: S) is a screening instrument assessing not only all of the 12 criteria that are listed in the Diagnostic and Statistical Manual of Mental Disorders-IV for Attention Deficit Hyperactivity Disorder, it also assess behaviours that are indicative of an oppositional defiant disorder[47]. It is a scale used by parents to assess ADHD symptoms in their children, assessing the child’s behaviour in the past one month[51]. It has “27 items measuring the ADHD symptoms in children with four subscales including oppositional (6 items), cognitive problem/inattention (6 items), hyperactivity (6 items) and ADHD index (12 items), using a 4-point scale ranging from 0 (not true at all) to 3 (very much true)”[51,7].

The Conners Teachers Rating Scale: Short Form (CTRS:S) is used by the teachers to assess the ADHD symptoms in the students[47]. The teacher and the parent forms contain the same subscales[47]. It has “28 items comprising four subscales: oppositional (5 items), cognitive problem/inattention (5 items), hyperactivity (7 items) and ADHD index (12 items)” [47]. In clinical assessments, when combined with the Conners’ Parent Rating Scale, The Conners Teachers Rating Scale can discriminate between children with DSM-IV ADHD criteria from children with other conditions resembling ADHD[47].

Conners' Rating Scales – Revised : Interpretation Guidelines for T-Scores and Percentiles

T score	% ile	Guideline
70 +	98+	Markedly Atypical (Indicates Significant Problem)
66-70	95-98	Moderately Atypical (Indicates Significant Problem)
61-65	86-94	Mildly Atypical (Possible Significant Problem)
56-60	74-85	Slightly Atypical (Borderline: Should raise concern)
45-55	27-73	Average (Typical score : Should not raised concern)
40-44	16-26	Slightly Atypical (Low scores are good: Not a concern)
35-39	6-15	Mildly Atypical (Low scores are good: Not a concern)
30-34	2-5	Moderately Atypical (Low scores are good: Not a concern)
<30	<2	Markedly Atypical (Low scores are good: Not a concern)

In this study, the T scores of more than 65 are classified as ADHD; and less than 65 are classified as non-ADHD.

Results

Table 1. Socio-demographic and pattern of internet use among the students (N=161)

Characteristic	
Gender, n (%)	
Male	44 (27.3)
Female	117 (72.7)
Age, years, mean (sd)	13.89 (0.31)
Ethnic, n (%)	
Malay	96 (59.6)
Chinese	34 (21.1)
Indian	28 (17.4)
Sikh	3 (1.9)
Main language*, n (%)	
Malay	82 (50.9)
English	37 (23)
Mandarin/Cantonese	24 (14.9)
Tamil	13 (8.1)
Parent's age (years), means (sd)	
Mother	42.65 (8.37)
Father	42.88 (13.92)
Parent's marital status, n (%)	
Married	139 (86.3)
Divorce/ deceased	19 (11.8)
Not answered	3 (1.9)

Parent's education level, n (%)	
Father	
Never been to school	3 (1.9)
Primary	7 (4.3)
Secondary	116 (72.0)
Tertiary	27 (16.8)
Not answered	8 (5.0)
Mother	
Never been to school	1 (0.6)
Primary	8 (5.0)
Secondary	120 (74.5)
Tertiary	25 (15.5)
Not answered	7 (4.3)
Total time parent spending with children in 24 hours, n (%)	
Less than 10 hours	105 (65.2)
10 hours and more	54 (33.5)
Not answered	2 (1.2)
Total time of internet use in a week, n (%)	
Less than 4 hours	90(55.9)
4 hours and more	71(44.1)
Age of first using internet (years), n (%)	
≤ 12 years	117(72.7)
>12 years	44(27.3)
Tools for internet use*, n (%)	
Laptop/notebook	89 (55.3)
Tablet PC	38 (23.6)
Smartphone	67 (41.6)
Desktop PC	48 (29.8)
Others	3 (1.9)
Place for internet use*, n (%)	
School computer lab	11 (6.8)
Library	1 (0.6)
Cyber café	18 (11.2)
House	145 (90.1)
Others	5 (3.1)
Aim(s) of Internet Use, n (%)	
Searching for education-related information	50 (31.1)
Chatting with friends	46 (28.6)
Playing online games	22 (13.7)
Web surfing	22 (13.7)
Searching for new friend	3 (1.9)
Download new program	3 (1.9)
Checking the email	1 (0.6)
Others	5 (3.1)

Duration of frequent Internet use, n (%)	
Less than 1 year	67 (41.6)
1 year and above	91 (56.5)
Not answered	3 (1.9)
Total time of internet use in a week, n (%)	
Less than 4 hours	90 (55.9)
4 hours and more	71 (44.1)

* Subjects were allowed more than one choices

Of the 200 sets of questionnaires distributed, only 161 sets were completed. Majority were female (72.7%). During the selection of the secondary school for data collection, one all girls secondary school was selected and other 3 were mixed gender schools with both male and female students. For these reasons there were more female subjects than male. More than half of the subjects are Malay (59.6%), and 50.9% of the subjects use Bahasa Melayu (Malay language) as their main language. Most of the parents were educated until secondary school. Two third of the subjects, reported that their parents spending less than 10 hours in a day with them (Table 1).

The mean total time of internet use by the subjects in a week was 8.30 hours. More than half were using the internet for more than 4 hours a week (55.9%, n= 90). More than 70% (n=117) of the subjects started to use internet during their primary school years (less than 12 years old). Slightly more than half of the subjects (55.3%), use the laptop/notebook as their medium for using the internet followed by the use of the smart phone as the second commonest tool (41.6%). A majority of the subjects (90.1%) use the internet at home. Searching information for education was the most common reason to use the internet (31.1%), followed by chatting with friends (28.6%), playing online games (13.7%) and surfing the web (13.7%). More than half of the subjects reported using the internet frequently for more than a year's duration (57.6%) (Table 1).

Table 2. Univariate Analysis of Socio demographic, Internet use and Academic performance with Internet Addiction using Chi Square Analysis

Item	Internet Addiction n (%)			P value	OR	95% CI
	Yes	No	X^2			
Gender						
Male	20 (45.5%)	24(54.4%)				
Female	26(22.2%)	91(77.8%)	8.46	**0.004***	2.92	1.40-6.09
Race						
Malay	32(33.3%)	64(66.7%)				
Non Malay	14(21.5%)	51(78.5%)	2.64	0.104	1.82	0.88,3.77
Race						
Chinese	10(29.4%)	24(70.6%)				
Non-Chinese	36(28.3%)	91(71.7%)	0.02	0.903	1.05	0.46,2.42
Total Sibling						
Small Family (≤2)	26(31.0%)	58(69.0%)				
Large family(>2)	18(24.0%)	57(76.0%)	0.96	0.328	1.42	0.73,2.87

Mother's age (years)						
<45	28(28.6%)	70(71.4%)				
≥45	18(28.6%)	45(71.4%)	0.00	1.000	1.00	0.50,2.02
Father's age (years)						
<45	20(26.7%)	55(73.3%)				
≥45	26(30.2%)	60(69.8%)	0.25	0.617	0.84	0.42,1.67
Parent's marital status						
Married	40(28.8%)	99(71.2%)				
Divorced/Deceased	5(26.3%)	14(73.7%)	0.05	0.824	1.13	0.38,3.35
Father's academic status						
Secondary school and below	33 (26.2%)	93 (73.8%)	2.30	0.130	0.516	0.22,1.23
Tertiary and above	11 (7.8%)	16 (59.3%)				
Mother's academic status						
Secondary school and below	34(26.4%)	95 (73.6%)				
Tertiary and above	11 (44.0%)	14 (56.0%)	3.15	0.076	0.45	0.19, 1.10
Total time parent with children in 24 hours						
Less than 10 hours	33(31.4%)	72(68.6%)				
10 hours and more	12(22.2%)	42(77.8%)	1.49	0.220	1.60	0.75,3.44
Total time of internet use in a week						
Less than 4 hours	13(14.4%)	77(85.6%)				
4 hours and more	33(46.5%)	38(53.5%)	20.0	**<0.001***	0.194	0.09,0.41
Age of first internet use (years)						
≤12	40(34.2%)	77(65.8%)	6.62	**0.010***	3.29	1.28,8.43
>12	6(13.6%)	38(86.4%)				
Academic Performance						
Good	34 (26.0%)	97 (74.0%)	2.69	0.101	0.35	0.10, 1.29
Poor	5 (50.0%)	5 (50.0%)				

[a] = Fisher's Exact Test, * $p<0.05$

Using the cut-off point reported in previous study by Ng et al, 2006, the results revealed 46 (28.6%) subjects have Internet addiction. There is significant association of internet addiction with gender. Males are more addicted to the internet compared to females. Additionally, the other significant association with internet addiction are total time of internet use in a week and subjects who started using the internet during primary school (≤ 12 years old). Although the percentage of subjects with poor academic performance and internet addiction is higher, there was no significant association found between academic performance and internet addiction (Table 2).

Table 3. Multivariate analysis of the association of ADHD symptoms with Internet Addiction

Items	β	SE	Adjusted OR	P value	95% CI
Cognitive/Inattention symptoms based on CASS:S	-3.34	1.17	0.04	**0.04***	0.04-0.35
ADHD Index based on CTRS:S	-1.63	0.74	0.20	**0.03***	0.05-0.83

*Adjusted for gender and age of first age of internet use, *P<0.05

Further analysis was done to look for any significant association of ADHD symptoms with IA. Using the logistic regression analysis after adjusting for gender and age of first internet use (Table 4), revealed the cognitive/inattention symptoms of ADHD and ADHD index symptoms are significantly associated with IA (Table 3).

Discussion

Prevalence of Internet Addiction among study samples

This study found 28.6% of the subjects have IA. A study done locally by Yong[52] among secondary school students in Kampar showed 54% of the students surveyed were moderate users of internet and only 3.33% (n = 4) were classified as excessive user. The difference might be due to their sample coming from just one school, the study used the English version of the IAT and data was collected by interview, not self-rated. Prevalence of IA among adolescent varies across different areas of the world as reported by different researchers, ranging from 1.98% to 35.8% in Western and non-Western countries[53]. These disparities could be attributed due to methodological and cultural differences. Based on similar Young's Internet Addiction Test (IAT) the prevalence rates of problematic Internet use have been reported to range between 1.6–10.7% for Korean adolescent Internet users[36,54-56,14] while in 61.4 % of senior primary school students, 35.2 % of junior secondary students and 37.0 % of college students in Hong Kong were highly at risk of IA[57]. South Korea[58] and Hong Kong[53,59,60] considers IA among adolescents as one of the country's serious public health issue. In the other studies, it[61] was found 4.2% of the sample of 833 intermediate and secondary students from public and private schools in Lebanon had significant problems, and reported a rate of 1.98% among Norwegian youths aged between 12-18 years had IA with an additional 8.68% considered to have an at-risk Internet use[62], prevalence of 24.2% moderate or serious over-users was found[63] in the sample of Finnish adolescent and reported a rate of 12.2% among high-school students in China[64]. In a study done in Singapore, 30.8% of 227 secondary school students surveyed were found to be at risk of internet excessive use[65]. Despite the difference in prevalence rate, policy makers, parent groups and educators have cautioned to the realistic negative impacts of problematic internet use.

Internet Addiction and associated socio-demographic factors

Based on gender, the study found 45.4% (n=20) male subjects and 22.2% (n=26) female subjects were internet addicted and this was a significant association. Males were found to be more addicted to the

internet compared to females. This finding is consistent with the local study[52] and other studies done internationally which showed more male youth were addicted to the internet compared to female[20,13,66,41,14,67]. Moreover gender association[14] is seen across problematic internet use be it mild or moderate, with female adolescents to be more likely moderate online users, with reporting in problematic use, the incidence rates of males is four times higher than females[20]. Ideas put forth why males are more prone to pathological use of the internet maybe due to the difference in socialization between gender[68,70], identity styles, attachment dimensions and identity commitment[71]. Chodorow hypothesized that "boys are more probable to be psychological independent and are more emotionally detached than girls", while at the same time "girls are more probable to develop a sense of intimacy and they seek closeness to their parents"[68]. Males "tend to be more independent and display their emotional arousal in more physical ways", which is "totally opposite to females who tend to be more expressive"[58,72] and more likely to react to negative emotion-eliciting events[72].

More Malays are addicted to internet compared to other races (33.3% vs 29.4%, 14.3%, 14.3%). This finding represents the percentage of races in Malaysia, with the Malay race being the most common race followed by other races. There are no other studies to compare the effect of race on IA. Additionally, in this study, the age of starting internet use proved a positive association with the internet addiction, subjects who started using the internet during primary school (≤12years old) were more likely to have internet addiction problem compared to subjects who started using the internet at a later age. This finding is consistent with a study[73] who found the age of first exposure to Internet use was significantly associated with Internet addiction.

Research shows that "ongoing positive family connections are protective factors against a wide range of risky and problematic behaviors"[71,74], which in this context, includes problems of addiction. The developmental changes during adolescence involving pubertal maturation, continuing brain development, adolescents' sensitivity to stimulation added with changing parent relationships, and an increasing social peer environment, all contribute to risk for the early onset of addictive behaviours[75,76,14]. Thus the "presence and continuity of family connections and secure emotional base is a necessity and crucial for their positive development" [73]. In this study, there was no significant difference noted among subjects with or without IA with regards to their family matters. Among family factors associated with IA are Internet addicts were more likely to be an only child or only child living at home[73]; while higher educational level of parents and the number of recreational settings in the community were risk factors for IA[77]. Adolescents with IA were more likely to come from a single-parent family[73]. Another study found among 138 youth "problematic mother-teen relationships were predictive of the youths' preference for online communication and the greater likelihood of forming friendships online" added with no guarantee of improved relationship with their online relationships[78]. Although there was no significant association with family factors noted in this study the above studies show that family factors may contribute to the adolescent problematic internet use. This is as well important as by understanding possible family factors that contribute to IA or problematic use, may provide critical and useful information in treatment and prevention programs targeting adolescents

with unhealthy levels of involvement with the Internet[79].

Conclusion

In conclusion, the prevalence of Internet Addiction among the secondary school students from Malaysia was high. There were significant associations with gender, age of commencement using the internet and ADHD symptoms. Despite IA being a new disorder and many controversies exist with regards to its diagnostic criteria, the impact of this addiction or problematic use is real, with countries such as South Korea, China and Taiwan having worrying rates of IA among adolescents. Looking at the high rates obtained in this study, prevention strategies should be thought of seriously as the impact goes beyond just the adolescents. These would include identification of significant demographic factors associated with internet addiction, effective screening and intervention for children with ADHD, and early psycho-education.

References

1. Besen SM, Israel MA. The evolution of Internet interconnection from hierarchy to ‘‘Mesh’’: Implications for government regulation. Information Economics and Policy. 2013; 25:235-245.

2. Salman A, Choy EA, Mahmud WAW, Latif RA.Tracing the diffusion of internet in Malaysia: Then and now. Asian Social Science. 2013; 9:9-15.

3. Dutta S, Dutton WH, Law G. The new internet world: A global perspective on freedom of expression, privacy, trust and security. [Internet] 2011 Aug [cited 2016 Oct 20] Available from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1916005.

4. Leiner BM, Cerf VG, Clark DD, Kahn RE, Kleinrock L, Lynchet DC, et al. The beginnings of the Internet. The Internet History Project. 2004.

5. Ferguson DA, Perse EM. The World Wide Web as a functional alternative to television. Journal of Broadcasting & Electronic Media. 2000; 44:155-174.

6. Subrahmanyam K, Kraut RE, Greenfield PM, Gross EF. The impact of home computer use on children’s activities and development. The Future of Children. 2000; 10:123-149.

7. Young KS. Internet addiction: The emergence of a new clinical disorder 104th annual meeting of the American Psychological Association Toronto. 1996; Canada.

8. Amichai-Hamburger Y, Hayat Z. The impact of the Internet on the social lives of users: A representative sample from 13 countries Computers in Human Behavior. 2011; 27:585-589.

9. Murali V, George S. Lost online: An overview of Internet addiction. Advances in Psychiatric Treatment. 2007; 13:24-30.

10. Gross EF, Juvonen J and Gable SL. Internet use and well-being in adolescence. Journal of Social Issues. 2002, 58:75-90.

11. Becker HJ. Who's wired and who's not: Children's access to and use of computer technology. Future of Children. 2000; 10:44-75.

12. Ko CH, Yen JY, Chen CC, Chen SH,Yen CF. Proposed diagnostic criteria of Internet addiction for adolescents. The Journal of Nervous and Mental Disease. 2005; 193:728-733.

13. Ko CH, Yen JY, Chen CS, Yeh YC, Yen CF. Predictive values of psychiatric symptoms for internet addiction in adolescents: a 2-year prospective study. Archives Pediatric Adolescence Medicine. 2009; 163:937-943.

14. Yu L , Tan DLS. Internet addiction in Hong Kong adolescents: A three-year longitudinal study. Journal of Pediatric and Adolescent Gynecology 2013; 26:S10-S17.

15. Young K. What makes online usage stimulating: potential explanations for pathological internet use 105th Annual Convention of the American Psychological Association Chicago. 1997; Illinois.

16. Anderson K. Internet dependency among college students: Should we be concerned? . Jounal of American College Health. 1998; 50:21-26.

17. Young KS. Internet addiction: The emergence of a new clinical disorder Cyber Psycholog and Behavior. 1998c; 1: 237-244.

18. Griffiths MD. Internet addiction: Does it really exist? . In: Gackenbach J (ed) Psychology and the internet: Intrapersonal, interpersonal and transpersonal implications. 1998; New York: Academic Press.

19. Morahan-Martin J. Internet Abuse Addiction? Disorder? Symptom? Alternative explanations? Social Science Computer Review. 2005; 23:39-48.

20. Morahan-Martin J, Schumacher P. Incidence and correlates of pathological Internet use among college students Computers in Human Behavior. 2000; 16:13-29.

21. Charlton JP, Danforth IDW. Distinguishing addiction and high engagement in the context of online game playing. Computer Human Behaviour. 2007; 23:1531-1548.

22. Peters CS, Malesky JLA. Problematic usage among highly-engaged players of massively multiplayer online role playing games. Cyberpsychology & Behavior. 2008; 11.

23. Young KS. Internet Addiction: Symptoms, evaluation and treatment. In: VandeCreek L and Jackson TL (eds) Innovations in Clinical Practice Sarasota. 1999; Florida: Professional Resource Press.

24. Chou C, Chou J, Tyan NN. An exploratory study of Internet addiction, usage and communication pleasure - the Taiwan's case International Journal of Educational Telecommunications. 1999; 5:47-64.

25. Li SM, Chung TM. Internet function and Internet addictive behavior Computers in Human Behavior. 2006; 22:1067-1071.

26. Beard KW. Internet addiction: a review of current assessment techniques and potential assessment questions. CyberPsychology and Behavior. 2005; 8:7-14.

27. Beard KW, Wolf EM. Modification in the proposed diagnostic criteria for internet addiction CyberPsychology and Behavior. 2001; 4:377-383.

28. Kraut R, Patterson M, Lundmark V, Kiesler S, Mukopadhyay T, Scherlis W. Internet paradox: a social technology that reduces social involvement and psychological well-being? . American Psychologist. 1998; 53:1017-1031.

29. Lee PSN, Leung L, Lo V, Xiong C, Wu T. Internet communication versus face-to-face interaction in quality of life. Social Indicators Research. 2011; 100:375-389.

30. Leung L ,Lee PSN. Multiple determinants of life quality: the roles of Internet activities, use of new media, social support, and leisure activities Telematics and Informatics. 2005; 22:161-180.

31. Durkin KK. Misuse of the internet by pedophiles: Implications for law enforcement and probation practice. Federal Probation. 1997; 61:14-18.

32. Franklin M. Detecting, preventing misuse of the Internet Canadian HR Reporter. 2012; 25:5-8.

33. Young KS. Internet Addiction: Symptoms, evaluation and treatment. In: VandeCreek L and Jackson TL (eds) Innovations in Clinical Practice Sarasota. 1999; Florida: Professional Resource Press.

34. Young KS, Rogers RC. The relationship between depression and Internet addiction. CyberPsychology and Behavior. 1998; 1:25- 28.

35. Young KS. Understanding Online Gaming Addiction and Treatment Issues for Adolescents The American Journal of Family Therapy. 2009; 37(5): 355-372.

36. Kim K, Ryu E, Chon MY, et al. Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey International Journal of Nursing Studies. 2006; 43:185-192.

37. Gundogar A, Bakim B, Ozer OA, Karamustafalioglu O. The association between internet addiction, depression and ADHD among high school students. European Psychiatry. 2012; 27.

38. Ko CH, Yen JY, Yen CF, Chen CS, Chen CC. The association between Internet addiction and psychiatric disorder: A review of the literature. European Psychiatry. 2012; 27:1-8.

39. Dalbudak E and Evren C. The relationship of Internet addiction severity with Attention Deficit Hyperactivity Disorder symptoms in Turkish University students; impact of personality traits, depression and anxiety Comprehensive Psychiatry In Press. 2013; Corrected Proof, Available online 27 November.

40. Yoo HJ, Cho SC, Ha J, Yune SK, Kim SJ, Hwang J, et al. Attention deficit hyperactivity symptoms and internet addiction. Psychiatry and

Clinical Neurosciences. 2004; 58:487-494.

41. Yen JY, Ko CH, Yen CF, Wu HY, Yang MJ. The Comorbid psychiatric symptoms of internet addiction: Attention Deficit and Hyperactivity Disorder (ADHD), depression, social phobia, and hostility Journal of Adolescent Health. 2007; 41:93-98.

42. Chan PA, Rabinowitz T. A cross-sectional analysis of video games and Attention Deficit Hyperactivity Disorder symptoms in adolescents. Annals General Psychiatry 5.2006.

43. Young K. Caught in the Net, New York: John Wiley;1998a.

44. Ng CG, Saramah Mohammed Isa, Aili Hanim Hashim, Pillai SK, Harbajan Singh MK, et al. Validity of the Malay Version of the Internet Addiction Test: A Study on a Group of Medical Students in Malaysia Asia Pac J Public Health.2012.

45. Vaughn ML, Riccio CA, Hynd GW, Hall J. Diagnosing ADHD (predominantly inattentive and combine type subtypes): Discriminant validity of the behavior assessment system for children and the Achenbach parent and teacher rating scales. Journal of Clinical Child Psychology. 1997; 26:349-357.

46. Lampert TL, Polanczyk G, Tramontina S, Mardini V, Rohde LA. Diagnostic performance of the CBCL-Attention Problem Scale as a screening measure in a sample of Brazilian children with ADHD. Journal of Attention Disorders, 2004; 8:63-71.

47. Conners CK. Conners' Rating Scales-Revised: Technical manual Toronto, Ontario, Canada Multi-Health Systems.1997.

48. Conners CK, Wells KC. ADD-H adolescent self-report scale Psychopharmacology Bulletin. 1985; 21:991-992.

49. Robin AL, Vandermay SJ. Validation of a measure for adolescent self-report of attention deficit disorder symptoms. Journal of Developmental and Behaviour Pediatrics. 1996; 17:211-215.

50. Marczinski CA. Self-Report of ADHD Symptoms in college students and repetition effects. Journal of Attention Disorders. 2005; 8:182-187.

51. Conners KC. Conners 3-Parent Short form assessment form. North Tonawanda, Toronto, Canada: Multi-Health Systems Inc.2008.

52. Yong SQ. A study of internet addiction among students of Sekolah Menengah Jenis Kebangsaan Pei Yuan, Kampar. Final Year Project, Faculty of Art And Social Science Universiti Tunku Abdul Rahman (UTAR).2011.

53. Shek DTL, Sun RCF, Yu L. Internet addiction In: Pfaff DW, Martin E and Pariser E (eds) Neuroscience in the 21st century. New York Springer. 2013; 2775-2811.

54. Jang KS, Hwang SY, Choi JY. Internet addiction and psychiatric symptoms among Korean adolescents. Journal of School Health. 2008; 78:165-171.

55. Choi K, Son H, Park M, et al. Internet overuse and excessive daytime sleepiness in adolescents Psychiatry and Clinical Neurosciences. 2009; 63:455-462.

56. Tang J, Yu Y, Du Y, Ma Y, Zhang D, Wang J. Prevalence of internet addiction and its association with stressful life events and psychological symptoms among adolescents' internet user. Addictive Behaviors In Press. 2013; Accepted Manuscript, Available online 18 December.

57. Tsuen Wan Centre and Chinese YMCA of Hong Kong. Study on adolescents' Internet using behaviors Hong Kong.2004.

58. Block JJ. Issues for DSM-V: Internet addiction American Journal of Psychiatry. 2008; 165, 306-307.

59. Shek DTL, Ma HK and Sun RCF. A brief overview of adolescent developmental problems in Hong Kong. The Scientific World Journal. 2011; 11:2243-2256.

60. Shek DTL and Leung JTY. Adolescent developmental issues in Hong Kong: Phenomena and implications for youth service: Development and Evaluation of Positive Adolescent Training through Holistic Social Programs (P.A.T.H.S.). Quality of Life in Asia. 2013; 3:1-13.

61. Hawi NS. Internet addiction among adolescents in Lebanon Computers in Human Behavior. 2012; 28:1044-1053.

62. Johansson A, Götestam KG. Internet addiction: characteristics of a questionnaire and prevalence in Norwegian young (12-18 years). Scandinavian Journal of Psychology. 2004; 45:223- 229.

63. Sinkkonen HM, Puhakka H, Meriläinen M. Internet use and addiction among Finnish adolescents (15–19 years) Journal of Adolescence. 2014; 37:123-131.

64. Wang H, Zhou X, Lu C, Wu J,Deng X, Hong L. Problematic Internet Use in high school students in Guangdong Province, China. PLoS ONE. 2011; 6:0019660.

65. Lee RMK, Goh LG. Survey of Internet Use Among Secondary School Students in Singapore 3rd Singapore Health & Biomedical Congress Singapore Annals Academy of Medicine OP-NA-14.2012.

66. Yang SC, Tung CJ. Comparison of internet addicts and non-addicts in Taiwanese high school Computers in Human Behavior. 2007; 23:79-96.

67. Carli V, Durkee T, Wasserman D, et al. The association between pathological Internet use and comorbid psychopathology: a systematic review Psychopathology. 2012; 46:1-13.

68. Chodorow N. Feminism and psychoanalytic theory New Haven, CT Yale University Press. 1989.

69. Brand S, Gerber M, Beck J, et al. Perceived parenting styles differ between genders but not between

elite athletes and controls Adolescent Health, Medicine and Therapeutics. 2011; 2:9-14.

70. Beyers W, Goossens L. Dynamics of perceived parenting and identity formation in late adolescence Journal of Adolescence. 2008; 31:165-184.

71. Kerpelman JL, Pittman JF, Cadely HS-E, Tuggle FJ, Harrell-Levy MK, Adler-Baeder FM. Identity and intimacy during adolescence: Connections among identity styles, romantic attachment and identity commitment. Journal of Adolescence. 2012; 35:1427-1439.

72. Hess U, Sene´cal S, Kirouac G, Herrera P, Philippot P, Kleck RE. Emotional expressivity in men and women: Stereotypes and self-perceptions. Cognition and Emotion 2000; 14:609-642.

73. Ni X, Yan H, Chen S, Liu Z. Factors influencing Internet addiction in a sample of freshmen university students in China. CyberPsychology and Behavior. 2009; 12:327-330.

74. Kerpelman JL, Pittman JF, Lamke LK. Toward a microprocess perspective on adolescent identity development: an identity control theory approach. Journal of Adolescent Research. 1997; 12:325-346.

75. Castellanos-Ryan N, Conrod PJ. Personality and addiction processes. In: Miller PE (ed) Principles of addiction: Comprehensive addictive behaviors and disorders San Diego, CA: Elsevier. 2013;271-281.

76. Chung T. Adolescent substance use: Symptoms and course In: Miller PE (ed) Principles of addiction: Comprehensive addictive behaviors and disorders. San Diego, CA Elsevier. 2013; 97-106.

77. Deng Y, Hu M, Hu GQ, Wang LS, Sun ZQ. An investigation on the prevalence of internet addiction disorder in middle school students of Hunan province. Zhonghua Liu Xing Bing Xue Za Zhi. 2007; 28:445-448.

78. Szwedo DE, Mikami AY, Allen JP. Qualities of peer relations on social networking websites:Predictions from negativ emother-teen interactions. Journal of Research on Adolescence. 2011; 21:595-607.

79. Li W, Garland EL, Howard MO. Family factors in Internet addiction among Chinese youth: A review of English- and Chinese-language studies Computers in Human Behavior. 2014; 31:393-411.

Corresponding Author
Aili Hanim Hashim
Add: Department of Psychological Medicine,
Faculty of Medicine, University Malaya, Lembah Pantai
50603 Kuala Lumpur, Malaysia
Tel: 60379492068

Email: aili@ummc.edu.my