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ORIGINAL ARTICLE

Prevalence and Risk Factors of Internet Addiction (IA) Among National Primary School Children in Malaysia

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Abstract

Internet addiction (IA) is a growing issue with evidence of negative health and social outcomes to the user. However, data is lacking for younger children. This study determined the prevalence of IA among primary school students and its associated factors. A total of 178 school-children aged 11 years old and their parents consented to fill the validated Malay version of the Internet Addiction Test (MVIAT). The prevalence of IA among school-children and parents was 23.0% and 15.7%, respectively. In children, Internet usage was higher during school holidays (120 min/day) than during schooling day (60 min/day). There is a positive and significant correlation of MVIAT scores between children and their parents ($r = 0.28$, $p < 0.001$). IA was significantly associated with Malay ethnicity [AOR 2.32 (1.94, 5.78)] and longer duration of Internet use during holidays [AOR 1.02 (1.01, 1.04)] but using the Internet to seek information was less likely to be associated with IA [AOR 0.44(0.20, 0.75)]. Data on Internet addiction among young children can support public policy on Internet addiction. Effort should be taken to prevent IA among younger children by monitoring their Internet usage.

Keywords Internet addiction · Children · Internet · Addiction · Computer

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Introduction

Recent growth in information technology has created social, psychological and behavioural disorders. Internet addiction (IA), a fairly new phenomenon, is included in one of these disorders (Haque et al. 2016). IA is defined as a "psychological dependence on the Internet, regardless of the activity once logged on" (Kandell 1998). IA is "characterised by excessive or poorly controlled preoccupations, urges, or behaviours regarding computer use and Internet access that lead to impairment or distress" (Shaw and Black 2008). At present, IA is not listed in the latest Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (2013). However, pathological gambling is described as the most similar in nature to IA (Haque et al. 2016).

Worldwide, the prevalence of IA varies by population: the prevalence in Europe was reported to be 9%, Middle East between 1 and 12% and 2–18% in Asia (Christakis 2010). The prevalence of IA in Asian countries was found to be higher than in Western countries (Kuss et al. 2014). A study by Mak et al. (2014) using both the Internet Addiction Test (IAT) (5%) and the Revised Chen Internet Addiction Scale (CIAS-R) (21%) found that IA was highest in the Philippines among Asian countries (Mak et al. 2014). A study among medical students in Malaysia reported that a third of the students were found to experience IA (Ching et al. 2017). However, the considerable variance of the prevalence rates reported for Internet addiction (1–18%) should be interpreted cautiously as the diagnostic criteria and assessment questionnaires used for diagnosis varied by countries and studies, which made comparisons difficult (Christakis 2010; Mak et al. 2014).

A recent study in China reported that the prevalence of IA was 26.5%, where 0.96% was categorised as severe addiction (Miao et al. 2018). The significant risk factors for IA were males, older grade students, online activities such as social networking, school work entertainment, Internet gaming and shopping online (Miao et al. 2018). Another study found that the typical Internet 'addict' is most likely a student, teenager, male and someone who lacks social life with low self-confidence (Griffiths et al. 2016). Students were more vulnerable to Internet addiction as they have easy access to the Internet and have more flexible time. Other factors which promoted the development of IA were early age of first exposure to the Internet and increased frequency and longer duration of using the Internet (Cao et al. 2011). In addition, some parents may not be aware of their children's activities online and the risks associated with non-supervision of children online activities. The consequent IA on children can cause negative impact such as academic failure, lack of discipline, family discord, and other social problems (Chin Hooi 2011).

There are many well-established and validated measures to determine IA (Laconi et al. 2014). Some of these diagnostic measures and questionnaires have demonstrated promising psychometric properties (Laconi et al. 2014), which are important to assess and define emerging disorders such as IA (Widyanto and McMurran 2004). In Malaysia, one of these validated IA questionnaire is the Malay version of the Internet Addiction Test (MVIAT) which has been validated and found to be suitable to be used in the Malaysian setting (Guan et al. 2015).

The field of IA is advancing rapidly, and there is a growing body of research and reports regarding IA worldwide (Griffiths et al. 2016; Kuss and Lopez-Fernandez 2016; Malak et al. 2017). There is concern that there could be an increasing trend of a younger age in Internet use and IA (Li et al. 2014). Thus far, there is a lack of information regarding IA among younger children and their parents. Furthermore, there is also a need to find out the impact of parental

Internet behaviour on their children's Internet activity as children may consider their parents as role model (Çankaya and Odabaşı 2009; Yusuf et al. 2014). The current study aimed to determine the prevalence and the association of IA among primary school students by socio-demographic, parental IA and Internet usage behaviour.

Materials and Methods

Study Design and Participants

This was a cross-sectional study conducted over a month in August 2014 in Petaling District of Klang Valley, Malaysia. The study participants were year-5 primary school students studying in public primary schools and their parents.

A total of six primary schools were selected randomly by using computer-generated numbers from a list of 56 primary schools with an estimated study population of about 3000. The total estimated sample size was 220 students, derived from Kish's Formula, where 40 students from the top class of each school were selected. The main reason of choosing students from the top class was to ensure that the participants had adequate literacy and ability to respond to the self-administered questionnaire. Each child and parent was given a letter explaining the research, and informed consent was obtained from both child and parent.

Study Instruments and Measurements

The research instrument was a questionnaire which consisted of two parts; the first is on participant socio demography and the second is the Malay Validated Internet Addiction Test (MVIAT). The MVIAT questionnaire is a Malay version of the original Internet Addiction Test (Guan et al. 2015). It consists of 20 items covering daily routine, social life, productivity, sleeping pattern and feelings. Each item comes with a Likert scale answer scheme requiring one answer rated from 1 = *tidak pernah* (never) to 5 = *sangat kerap* (frequent) as shown in Annex 1.The questionnaires were self-administered separately for both groups, with the students freely to answer the questions in their class and the parents at home. A teacher was available to supervise the students if they ever required one.

The MVIAT has been validated and has good internal consistency (Cronbach's alpha = 0.91), parallel reliability (intra-class coefficient = 0.88, $p < 0.001$), and concurrent validity with the Compulsive Internet Use Scale (Pearson's correlation = 0.84, $p < 0.001$) (Guan et al. 2015). The total score of 43 and more was found to be the cut-off point for those with IA (Guan et al. 2015). This is slightly different from the original Internet Addiction Test, where a total score of 70 to 100 was considered significant IA (Widyanto and McMurran 2004). This tool has been demonstrated to be a valid instrument for assessing IA in Malaysian university students (Guan et al. 2015).

At present, there is no reported validated tool to assess IA in Malaysian primary school children. However, primary school students in Malaysia are fluent in Malay language as it is the national language that is being used in the education system and could thus respond to the questionnaire accordingly. The appropriateness of the use of MVIAT for student was obtained from a group of local experts with vast experience in treating students of various age with mental illness. The experts include psychiatrists, counsellors, psychologists and nurses. The scale was also used in another study on IA in Malaysia for an adolescent group (Mohd Isa et al. 2016).

A total of 220 questionnaires and consent forms were distributed to the primary school children and 220 questionnaires to their parents. Data analysis was done on 178 children who had returned the questionnaire together with the signed informed consent form, giving the response rate of 81%. The 19% non-respondents were students who were absent on the day of data collection. We assumed they were missing at random since these students were from different schools.

Ethical Considerations

This study had obtained approval from the Institutional Medical Ethics Committee of University of Malaya Medical Centre, MEC Ref No. 1004.5. Permission and approval was also obtained from the Educational Planning & Research Department and Headmasters of the respective participating schools.

Statistical Analysis

Data from the completed questionnaire were entered into the SPSS (version 22.0) software for further analysis. The normality of continuous data was checked using Kolmogorov-Smirnov testing and the histogram was plotted with normal curve overlay. The significant level was set at $\alpha = 0.05$. If the Kolmogorov-Smirnov test has a p value of less than 0.05, then null hypothesis was rejected. For the non-normality distributed continuous data, it was presented in the form of median values and their corresponding inter-quartile range. The descriptive analysis on demographic data was done.

Chi-square test was used to compare the prevalence between children and their parents. Paired t test was used to compare each child to their parent. Multiple logistic regression analysis was conducted to examine the factors related to IA among school children. The factors that were tested include race, duration of using Internet and aim of using Internet. A p value < 0.05 was considered as significant.

Results

A total of 178 students and their parents participated in the study. Majority of the school children were female ($N = 113$, 63.5%) and Malay ethnicity ($N = 112$, 62.9%). Forty students (22.5%) were Chinese, 20 (11.2%) were Indians and 6 (3.4%) were of other ethnicity. The school children's mean age was 10.6 ± 1.57 years old. The sociodemographic characteristics of primary school children and their parents who participated in this study are shown in Table 1. Among the parent respondents, most were mothers (67.8%), Malay ethnicity (61.8%) and had professional occupation (43.4% of fathers and 27.7% of mothers). More than half (57.1%) of the participants came from a household income of > RM4000.

Age of exposure to Internet use was median 8 ± 3 years for the children and 26 ± 15 for the parents. Duration of Internet usage among children was 60 min/day during schooling day and 120 min/day during school holidays. The parents reported spending the same duration of 120 min/day during working days and weekends (Table 2). The most commonly used gadget to access the Internet among parents and children was a notebook with 49.4% and 46.3% in each group. The most common reason for using the Internet was to search for information in both groups, with parents at 85.4% and students at 62.9%.

Table 1 Socio-demographic characteristics

		n	%
Gender (*n* = 171)	Male	55	32.2
	Female	116	67.8
Race (*n* = 178)	Malay	110	61.8
	Chinese	40	22.5
	Indian	20	11.2
	Others	8	4.5
Marital (*n* = 175)	Single	3	1.7
	Married	166	94.9
	Divorce	6	3.4
Father's job (*n* = 175)	Professional	76	43.4
	Teacher	3	1.7
	Clerking/admin	11	6.3
	Business	37	21.1
	Others	45	25.7
	Unemployed	3	1.7
Mother's job (*n* = 177)	Professional	49	27.7
	Teacher	7	4.0
	Clerking/admin	24	13.6
	Business	18	10.2
	Others	21	11.9
	House wife	58	32.8
Household income (*n* = 175)	RM500–RM1999	31	17.7
	RM2000–RM2999	27	15.4
	RM3000–RM3999	17	9.7
	More than RM4000	100	57.1

*Missing data not included

The prevalence of IA among parents and children was 15.7% and 23%, respectively but this difference was not statistically significant. However, there was a significant difference in the MVIAT mean score between parents (32.11 ± 12.14) and children (35.19 ± 12.26) ($t = -2.69$, $p = 0.008$), and a positive and significant correlation of MVIAT scores between children and their parents ($r = 0.28$, $p < 0.001$) (Fig. 1) suggesting parental Internet addiction is significantly associated with children Internet addiction.

Analysis by multiple logistic regression showed that the factors that were significantly associated with IA were race (Malay vs non-Malay) ($p = 0.045$), duration of Internet usage during holidays ($p < 0.001$), and using the Internet to search for information ($p = 0.044$). Malay children were associated with 2.32 (95% CI 1.94, 5.78) ($p = 0.045$) times higher risk of IA compared to non-Malay. Children who spent more time using the Internet during holidays were also associated with a higher risk of IA [OR = 1.02 (95% CI 1.01, 1.04) ($p < 0.001$)]. On the other hand, children who use Internet to search for information had protective risk of IA

Table 2 The duration of internet usage among parents and children per day

Variables	Parents (*N* = 178) Median (IQR)	Children (*N* = 178) Median (IQR)
Age of starting Internet use*	26 (15)	8 (3)
Duration of Internet usage during office/schooling days (min)/day	120.00 (150.00)	60.00 (62.25)
Duration of Internet usage during holiday(min)/day	120.00 (150.00)	120.00 (120.00)

*Round up to the nearest number

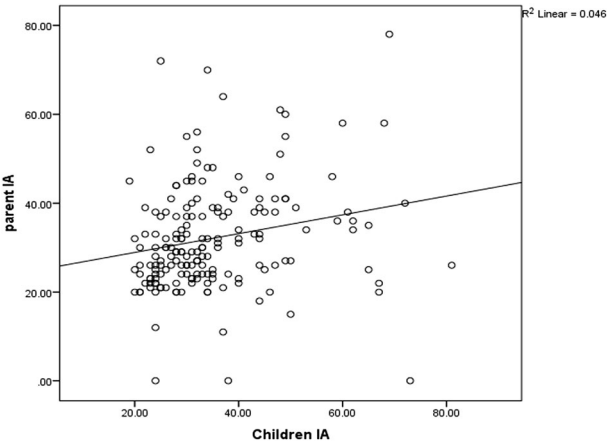

Fig. 1 The correlation of MVIAT scores between children and their parents. Regression, $R^2 = 0.046$

compared to those who use Internet for other purposes aside from searching information [OR = 0.44 (95% CI 0.20, 0.75) ($p = 0.045$)].

In our study, it showed that gender variable was not significant from the multiple logistic regression analysis. Therefore, gender variable acted as a confounding factor in this study.

Even though, discrepancy among female and male was present; in multiple logistic regressions, the range was not wide, and this discrepancy was believed not to have an influence on the final outcome.

Discussion

This study reports a novel finding of Internet addiction among young children in primary school, whereas, to the author's knowledge, data on Internet addiction has mainly focussed on teenagers, young adults and adults (Kuss and Lopez-Fernandez 2016; Wu et al. 2016).

The prevalence of IA among primary school children in this research was 23.0% higher when compared to other studies. A study among 120 lower and upper secondary school students in one of the states in Malaysia reported that only 3.3% were excessive Internet users (Qin 2011). A study among adolescents in six Asian countries reported that prevalence of IA in the Philippines using the Internet Addiction Test was 5% and using the Chen Internet Addiction Score-Revised was 21% (Mak et al. 2014), but in Central Greece, the prevalence of IA among school children aged 12–18 was 8.2% (Siomos et al. 2008). The difference in prevalence rate between the current study and other studies could be due to (1) differences in cultural diversity and background of the population studied, (2) differences in sample age, and (3) variation in methodology, where the literature has reported varying diagnostic criteria and questionnaire assessments used for diagnosis. The measurement tool used in this study was the MVIAT, which has been validated and used in other older secondary school children in Malaysia (Guan et al. 2015), but the Philippines study used the IAT and CIAS-R (Mak et al. 2014), whereas the Greece study used the Diagnostic Questionnaire for Internet Addiction (YDQ) (Siomos et al. 2008). However, the authors would like to highlight that the high prevalence of IA in this study warrants prompt attention and action by the parents, educationist and policy makers.

With regard to sociodemographic characteristics, the population of this study was mainly from married households, a higher social background as evidenced from income > RM4000, of professional parents and had access to laptops. Our population consists mainly of women (65% girls and 67.8% mothers) which reflects the population at the sampled schools and may thus have different characteristics which may affect the prevalence of IA. For example, Wu et al. (2016), who reported that IA among adolescents was found mainly in the divorced families, low-income families and dysfunctional families (Wu et al. 2016). We acknowledge that for accurate comparison; future studies should have more comparable population characteristics.

The prevalence of IA among parents was 15.7% and 23% among their children, with a weak but positive correlation of MVIAT score between children and parents. An increase of MVIAT score of the parents was associated with an increase of their children's MVIAT, giving an indication that parents' Internet usage behaviour has an influence on the Internet usage behaviour of their children (Çankaya and Odabaşı 2009; Valcke et al. 2010; Yusuf et al. 2014). This is consistent with reports which noted that parenting style has a significant effect on children's development and Internet usage (Valcke et al. 2010). Miller and Plant (2010) reported that the degree of parenting relates strongly to children's behaviour (Miller and Plant 2010), and it was also noted that IA is significantly associated with parental control especially during adolescent developmental period (Wu et al. 2016). Busy parents with busy and demanding work demands may lead to parents utilising the Internet for many of their daily tasks. This may lead to IA among the parents and also result in lack of quality time spent with their children (Park et al. 2008).

Analysis indicated that the three factors identified to be associated with IA among school children in this study were race (being Malay), duration of Internet usage during holidays and Internet use to search for information. Being a Malay was associated with an increased likelihood to have IA compared to non-Malays. This is a novel finding and provides further research interest to determine details in Internet activity and to explore factors affecting or contributing to I+nternet addiction among younger children by ethnicity. An earlier study among adolescents showed that ethnic Malay was more addicted to Internet compared to other races (Mohd Isa et al. 2016). Current study finding is similar to that of Ching et al. (2017) where frequency of Internet usage and accessing Internet for entertainment purposes were associated with Internet addiction among medical students. The current work also reports that children who spent more time using the Iinternet during school holidays were associated with a higher risk of IA. The duration of Internet usage among children was significantly longer during school holidays as compared to schooling days. The primary school children spent 60 min/day on the Internet during schooling days/weekdays and 120 min/day during school holidays/weekend to access the Internet (Table 2). In comparison, a study by Brand et al. (2014) reported a long duration spent on the Internet with mean of 972.36 min/week, with an average of 138 min/day. The time spent on the Internet is important as previous studies in Lebanon and Jordan showed that children who spent more time on the Internet, especially during the holidays, were associated with a higher risk of IA (Hawi 2012; Malak et al. 2017).

From this study, the most common reason given for using the Internet among the parents (85.4%) and children (62.9%) was to search for information. Information on the reason for using the Internet is important as this study found that using the Internet to search for information had a protective effect. The literature also reports that those who mainly used Internet for educational purposes had a lesser risk of IA compared to those using the Internet for other reasons (Cao et al. 2011; Hawi 2012). A study in Lebanon reported that problematic

Internet use was less associated with Internet use for information and research, but more associated with Internet use for entertainment (Hawi 2012). It is possible that those who use Internet to search for information are more focused in their aim of going online, more structured in getting certain information and more disciplined with the Internet usage. However, an opposite effect may be obtained in those Internet users who turn to online activities as a way to escape from social and emotional issues (Hoon and Jung-Hye 2014). In this study, we were unable to describe further the type of information searched as we did not ask the type of information searched by the children and parents from the questionnaire.

Strength and Limitations

The main strength of this study was the information obtained on IA among younger school children and their parents. At present, most of the reported prevalence studies of IA were among older adolescents and adults. Information on younger children social behaviour or behavioural excess provides important data for public health planning and policy making. The response rate of 81% in the present study is also very similar to another study (Kongsved et al. 2007). Also, at present, to the researcher's knowledge, this is the first study in Malaysia that looked at the prevalence of IA among primary school children and their parents. Furthermore, to reduce bias, the study recruitment was done using a random cluster sampling.

In this study, MVIAT questionnaire has been validated and well understood by the children of the National primary schools. The analysis was extended to multiple logistic regressions to adjust for confounding factors to determine the actual risk factor of IA in this study.

The present work also has several limitations. As this was a cross-sectional study, the authors could not provide the causal relationship of the various factors, and caution is needed to generalise the findings. In addition, the method of sample selection would induce selection bias as we only choose students from the top class to ensure that the participants had adequate literacy and ability to respond to the self-administered questionnaire.

Furthermore, while the self-administered questionnaire allowed participants freedom to disclose information, there was a risk of recall bias when answering the questionnaire. In addition, the participants were recruited from public schools in one urban district only which also limited generalising the findings of this study. Additionally, the questionnaire required anonymity, and thus excluded some personal questions such as students' parent gender and marital status, which may identify the responder, as some children live with single parent. The main reason for this was to allow higher respond rates among the parents as it was predicted that the parental responses might be lower if the questionnaires have had asked that specific information.

We recommend that the validity, reliability and psychometric properties of the MVIAT among primary school students are to be examined in the future study. To obtain a more robust data, the authors would like to recommend in conducting a longitudinal, multicentre study with a larger sample size to include the different socio-economic group from various locality of the population.

Implications for Practice

The literature reports that Internet excess or IA may lead to neglect of daily chores, hamper productivity and affect academic performance in children and students (Kuss and Lopez-Fernandez 2016; Wu et al. 2016). IA can also cause children and adolescents to have physical and psychological health issues (Canbaz et al. 2009).

Thus, the findings of this study regarding the factors influencing IA among primary school children can be used as a basis to provide cautionary information to parents on how they provide Internet access to their children. Similarly, parents should take note and reconsider or limit their Internet usage behaviour when around their children in view of the positive association between the IA score among parents and their children. They should also be actively involved and monitor their children's daily activity specifically on online access. As for educationist and policy makers, there is a need to create awareness to the school children and the community on the healthy use of Internet and develop guidance on the proper use of Internet for children at various levels from young children to teenagers and older adults to prevent IA.

Conclusion

Information regarding IA among young children is an important step to prevent public health and social issues related to Internet use. Knowing the IA risk and protective factors among young children would provide data to support educational and public policy making in preventing Internet addiction.

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Informed Consent Informed consent was taken from parents of the participating children.**Conflict of Interest** The authors declare that they have no conflict of interest.

Appendix: Malay Version Internet Addiction Test

KAJIAN PENGGUNAAN KOMPUTER/INTERNET

Arahan: Sila nilaikan setiap soalan dengan menggunakan nombor daripada skala dibawah untuk MENJAWAB soalan-soalan tersebut.

Sila bulatkan jawapan.

	Perkara	Tidak pernah	Kadang-kadang	Agak kerap	Sederhana kerap	Sangat kerap
1	Berapa kerapkah anda menggunakan internet lebih lama daripada masa yang dirancang?	1	2	3	4	5
2	Berapa kerapkah anda mengabaikan tugasan dengan bermain komputer/internet?	1	2	3	4	5
3	Berapa kerapkan anda memilih untuk berseronok dengan internet berbanding bersama keluarga/kawan-kawan?	1	2	3	4	5
4	Berapa kerapkah anda memulakan hubungan baru dengan pengguna internet lain?	1	2	3	4	5
5	Berapa kerapkah orang dalam hidup anda mengadu kepada anda mengenai masa yang anda gunakan untuk bermain internet?	1	2	3	4	5
6		1	2	3	4	5

	Perkara	Tidak per-nah	Kadan-g--kada-ng	Agak ke-rap	Sederhana kerap	Sangat ker-ap
	Berapa kerapkah kerja anda terjejas(seperti ponteng sekolah, menangguhkan kerja rumah) disebabkan oleh bermain internet?					
7	Berapa kerapkah anda memeriksa internet seperti e-mail sebelum melakukan perkara lain?	1	2	3	4	5
8	Berapa kerapkah pencapaian akademik/kerja anda terjejas disebabkan penggunaan internet?	1	2	3	4	5
9	Berapa kerapkah anda berahsia apabila ada orang bertanyakan tentang aktiviti anda di internet?	1	2	3	4	5
10	Berapa kerapkah anda cuba menghilangkan stress/masalah dengan bermain internet?	1	2	3	4	5
11	Berapa kerapkah anda tertunggu-tunggu/mengharapkan untuk segera bermain internet apabila anda tidak menggunakannya?	1	2	3	4	5
12	Berapa kerapkah anda merasa bimbang sekiranya hidup anda tanpa internet bosan dan tidak menyeronokkan?	1	2	3	4	5
13	Berapa kerapkah anda merasa marah atau sedih sekiranya orang mengganggu anda menggunakan internet?	1	2	3	4	5
14	Berapa kerapkah anda tidur lewat disebabkan menggunakan internet?	1	2	3	4	5
15	Berapa kerapkah anda asyik terfikir tentang internet walaupun ketika itu anda tidak menggunakannya?	1	2	3	4	5
16	Berapa kerapkah anda berkata kepada diri sendiri, sekejap lagi…apabila anda menggunakan internet?	1	2	3	4	5
17	Berapa kerapkah anda ingin mengurangkan penggunaan internet tetapi tidak berjaya?	1	2	3	4	5
18	Berapa kerapkah anda cuba menyembunyikan tentang masa penggunaan internet daripada pengetahuan orang lain?	1	2	3	4	5
19	Berapa kerapkah anda memilih untuk bermain dengan internet berbanding dengan bermain dengan kawan-kawan?	1	2	3	4	5
20	Berapa kerapkah anda merasa sedih atau resah apabila tidak menggunakan internet dan perasaan ini akan hilang sebaik sahaja anda menggunakan internet semula?	1	2	3	4	5

TERIMA KASIH DI ATAS KERJASAMA.

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