
PUBLIC HEALTH RESEARCH

Internet Addiction and Its Associated Factors among School-going Adolescents in Malaysia

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ABSTRACT

Introduction	Internet usage has changed the way adolescents socialize. This study aims to determine the determinants of internet addiction among school-going adolescents in Malaysia.
Methods	This study was a cross-sectional study involving 27,455 school-going adolescents from 212 selected schools in Malaysia, as part of the 2017 National Health and Morbidity Survey that implemented a two-stage stratified cluster sampling design. Data collection via a self-administered questionnaire was conducted from March till May 2017.
Results	Overall, 8,049 (29.0%) school-going adolescents had internet addiction. Internet addiction was positively associated with male (odds ratio, OR [95% confidence interval, CI] = 1.20 [1.08,1.34]) compared to female, Chinese ethnicity (1.67 [1.12,2.48]) compared to other ethnicity, feeling loneliness (1.37 [1.20,1.57]) compared to never feel lonely, unable to sleep due to worrying of something (1.40 [1.17,1.67]) compared to able to sleep, insufficient parental supervision (1.30 [1.14,1.48]) compared to sufficient parental supervision, depression (1.67 [1.48,1.89]) compared to no depression, anxiety (2.12 [1.95,2.30]) compared to no anxiety and stress (2.26 [1.96,2.61]) compared to no stress. The odds of having internet addiction increase from Form 2 (1.51 [1.28,1.78]), Form 3 (2.37 [2.01,2.80]), Form 4 (2.60 [1.76,3.85]) to Form 5 adolescents (2.96 [1.98,4.41]) compared to Form 1 adolescents.
Conclusions	Our results suggest that being a male, of Chinese ethnicity, higher form level, feeling loneliness, unable to sleep due to worrying of something, insufficient parental supervision, depression, anxiety and stress were positively associated with internet addiction among school-going adolescents.
Keywords	Internet addiction - public health - adolescents - NHMS - Malaysia.

Article history

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INTRODUCTION

Excessive use of the internet leads to internet addiction, which is defined as problematic, compulsive use of the internet resulting in significant impairment in an individual's function in various life domains over a prolonged period of time.

Adolescence is a period of time where a person rapidly develops knowledge and skills, and learn to manage emotions and relationships. There are major changes that occur in them during this period such as physical appearance, mental and social well-being. However, the advancement of technology that occurs at an astonishing pace has changed the way they live and socialize. Today's adolescents are trapped in the cyber world and have difficulties socializing in real life, which is later associated with mental health problems among them.

As adolescents surf the internet more than other age groups, they are at high risk of getting internet addiction.¹ In Europe, the prevalence of internet addiction among adolescents ranges from 5% to 15.2%,² while the prevalence of internet addiction among adolescents in Asian countries ranges from 2.5% to 26.8%.³ In Malaysia, a recent study of internet addiction among adolescents observed that the prevalence of Internet addiction was 28.6%.⁴

To date, there is still a lack of discussion on the relationship between internet addiction and its associated factors among adolescents in Malaysia. Thus, this study aims to determine the factors associated with internet addiction among school-going adolescents in Malaysia.

METHODS

Study Design and Sampling

This study was a cross-sectional study that implemented a two-stage stratified cluster sampling design involving students from Form 1 to Form 5 (13 to 17 years) as part of the 2017 National Health and Morbidity Survey: Adolescent Mental Health. In this study design, Malaysia was stratified into 13 states and three Federal Territories. A total of 212 secondary schools were selected randomly in the first stage of sampling. In the second stage of sampling, all classes in each selected school were included by using systemic random sampling. All students in the selected classes were selected. Sample size was calculated by using a single proportion formula for estimation of prevalence. The sample size calculation was based on a few criteria – variance of proportion of the variable of interest (based on Global School-Based Student Health Survey 2012), margin of error (e) (between 0.01 to 0.05), and confidence interval of 95%. The methodology was explained in detail in the previous article.⁵

Data Collection

Data collection was performed from March till May 2017. Teachers were briefed on the parental consent forms, who then distributed it to parents of students attending Forms 1 to 5 (13-17 years) to participate in the survey a week prior to the survey. During the actual day of the survey, student's consent was obtained from eligible respondents before survey was conducted. Students who did not receive parental consent or they themselves refused to participate were considered as non-response of eligible participants. To ensure their privacy, this study used validated self-administered bilingual questionnaires. Ethical approval was obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (NMRR-16-698-30042) and the Ministry of Education's Ethics Committee. The 2017 NHMS data were representative of all students attending Forms 1 to 5 (13-17 years) in Malaysia.

Measures

Assessment of Internet Addiction

Internet addiction was assessed using the Malay Version of the Internet Addiction Test (MVIAT), which was initially developed by Kimberly S. Young, translated into Malay language and was validated for use in the Malaysian population.⁶ The questionnaire was a 20-item questionnaire with a 5-point Likert-type scale of response (1 = rarely, 2 = occasionally, 3 = frequently, 4 = often, and 5 = always). The minimum possible score was 20 while the maximum possible score was 100. Respondents with a score of 43 points and above were defined as having internet addiction.

Sociodemographic Variables

Socio-demographic variables included sex, form, age group, ethnicity and parental marital status. Forms were based on the school's class system at government secondary schools. Form 1 generally applies to adolescents aged 13, Form 2 for 14 years old, Form 3 for 15 years old, Form 4 for 16 years old, and Form 5 for 17 years old.

Psychosocial Variables

For psychosocial variables, respondents were considered as lonely if they felt lonely "most of the time" or "always", during the past 12 months before survey. Respondents were considered unable to sleep due to worry of something if they responded either "most of time" or "always" for being worried about something as they could not sleep at night during past 12 months before survey. Respondents were considered as having had a close friend if they had at least one close friend at school.

Mental Health Variables

Mental health was assessed using the Depression Anxiety and Stress Scales (DASS-21), a 21-item

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scale to determine depression, anxiety and stress with a 4-point Likert scale ranging from 0 (“did not apply to me at all”) to 3 (“applied to me very much”). Respondents were suspected to have depression if the severity score was 14 or above, suspected to have anxiety if the severity score was 10 or above and suspected to have stress if the severity score was 19 or above.⁷

Other Variables

Peer support was described as students in their school who were kind and helpful most of the time or always during the past 30 days. Parental supervision was defined as parents/guardians had always or most of the time, checked to see if their homework was done in the past 30 days. Parental connectedness was defined as parents/guardians had always or most of the time understood their problems and worries in the past 30 days, while parental bonding was defined as parents/guardians had always or most of the time, really knew what they were doing with their free time in the past 30 days. Respondents were described as physically active if they had been active physically for at least 60 minutes per day, for a minimum of five days per week.

Statistical Analyses

Descriptive statistics were used to summarize the characteristics of the study population. Univariable and multivariable logistic regression analyses were performed to determine the association between internet addiction, socio-demographic, psychosocial, mental health and other independent variables. The results are presented as crude and adjusted odds ratios (ORs) with 95% confidence interval (CIs). All variables with a *p*-value of <0.25 in the univariable analysis were included in the final multivariable analysis⁸ and a *p*-value of <0.05 indicates statistical significance. All analyses were performed using the Statistical Package of Social Sciences (SPSS) for Windows version 25.0 (IBM

Corp., Armonk, NY, USA), taking into account the sample weighting and complex sampling design.

RESULTS

Table 1 shows descriptive statistics on sample characteristics and internet addiction status among school-going adolescents in Malaysia by socio-demographic, psychosocial, mental health and other independent variables. A total number of 27,455 school-going adolescents from 212 selected schools completed the survey.

According to gender, females and males contributed to almost similar size of respondents, with 50.4% and 49.6%, respectively. Majority were Malays (63.1%), followed by Chinese (16.7%), Bumiputera Sabah and Sarawak (11.5%), Indians (6.9%), and other ethnicities in Malaysia (1.8%). Majority of them were in the 13-15 age group (60.1%), followed by 16-17 age group (37.9%), 18 and above age group (1.4%) and 12 and below age group (0.6%). An almost equal percentage of students found by school Forms (class). 87.4% of respondents reported that their parents were married, while the remaining 12.6% reported that their parents were divorced/widowed/separated. Overall, the prevalence of internet addiction among school-going adolescents was 29.0%, which was higher in males (29.9%) compared to females (28.2%). The prevalence was higher in Chinese (34.3%), followed by Bumiputera Sabah and Sarawak (30.0%), Malay (28.2%), other ethnic (25.6%) and Indian (23.7%). The prevalence of internet addiction increased proportionately with higher school form – Form 1 (18.4%), Form 2 (23.5%), Form 3 (31.4%), Form 4 (34.8%) and Form 5 (37.9%) and increase in age group – 12 years and below (17.7%), 13-15 years (24.4%), 16-17 years (36.2%) and 18 years and above (40.0%). The prevalence of internet addiction was higher among students whose parents were divorced/widowed/separated (30.6%).

Table 1 Sample characteristics and internet addiction status among school-aged adolescents by socio-demographic and associated factors, NHMS 2017

Variables	Total sample N (%)	Internet Addiction Status	
		Internet Addiction N (%)	No Internet Addiction N (%)
Overall	27455 (100.0)	8049 (29.0)	19406 (71.0)
Sex			
Male	13114 (49.6)	3942 (29.9)	9172 (70.1)
Female	14341 (50.4)	4107 (28.2)	10234 (71.8)
Form			
Form 1	5693 (21.0)	1078 (18.4)	4615 (81.6)
Form 2	5496 (19.9)	1353 (23.5)	4143 (76.5)
Form 3	5830 (20.1)	1815 (31.4)	4015 (68.6)
Form 4	5519 (19.3)	1942 (34.8)	3577 (65.2)
Form 5	4917 (19.7)	1861 (37.9)	3056 (62.1)

Age group			
12 years and below	145 (0.6)	25 (17.7)	120 (82.3)
13-15 years	16784 (60.1)	4199 (24.4)	12585 (75.6)
16-17 years	10138 (37.9)	3686 (36.2)	6452 (63.8)
18 years and above	388 (1.4)	139 (40.0)	249 (60.0)
Ethnicity			
Malays	18690 (63.1)	5373 (28.2)	13317 (71.8)
Chinese	4093 (16.7)	1383 (34.3)	2710 (65.7)
Indians	1424 (6.9)	320 (23.7)	1104 (76.3)
Bumiputera Sabah and Sarawak	2694 (11.5)	823 (30.0)	1871 (70.0)
Others	554 (1.8)	150 (25.6)	404 (74.4)
Parents marital status			
Married	23510 (87.4)	6854 (28.8)	16656 (71.2)
Divorced/widowed/separated	3380 (12.6)	1035 (30.6)	2345 (69.4)
Feeling loneliness			
Lonely	2477 (9.3)	1171 (47.0)	1306 (53.0)
Not lonely	24936 (90.7)	6863 (27.2)	18073 (72.8)
Unable to sleep, worried something			
Unable to sleep	1886 (7.1)	894 (45.8)	992 (54.2)
Able to sleep	25515 (92.9)	7136 (27.7)	18379 (72.3)
Close friend			
No close friend	941 (3.6)	307 (31.4)	634 (68.6)
Had close friend	26392 (96.4)	7708 (29.0)	18684 (71.0)
Peer support			
Yes	12495 (44.2)	3720 (29.3)	8775 (70.7)
No	14931 (55.8)	4323 (28.9)	10608 (71.1)
Parental supervision			
Yes	3704 (13.2)	820 (22.4)	2884 (77.6)
No	23723 (86.8)	7221 (30.1)	16502 (69.9)
Parental connectedness			
Yes	9108 (32.0)	2462 (26.8)	6646 (73.2)
No	18304 (68.0)	5576 (30.1)	12728 (69.9)
Parental bonding			
Yes	11810 (42.6)	3333 (28.2)	8477 (71.8)
No	15563 (57.4)	4689 (29.7)	10874 (70.3)
Depression			
Yes	4768 (18.3)	2405 (48.7)	2363 (51.3)
No	22041 (81.7)	5449 (24.6)	16592 (75.4)
Anxiety			
Yes	10519 (39.7)	4483 (42.1)	6036 (57.9)
No	16312 (60.3)	3383 (20.6)	12929 (79.4)
Stress			
Yes	2479 (9.6)	1511 (59.0)	968 (41.0)
No	24283 (90.4)	6343 (25.9)	17940 (74.1)
Physical inactive			
Yes	21580 (80.2)	6234 (28.8)	15346 (71.2)
No	5798 (19.8)	1797 (30.2)	4001 (69.8)

Multivariate analysis using logistic regression revealed that internet addiction was positively associated with male (odds ratio, OR [95% confidence interval, CI] = 1.20 [1.08,1.34]) compared to female counterpart, Chinese (1.67 [1.12,2.48]) compared to other ethnic, feeling loneliness (1.37 [1.20,1.57]) compared to never feel lonely, unable to sleep due to worrying of something (1.40 [1.17,1.67]) compared to able to sleep, insufficient parental supervision (1.30 [1.14,1.48])

compared to sufficient parental supervision, depression (1.67 [1.48,1.89]) compared to no depression, anxiety (2.12 [1.95,2.30]) compared to no anxiety and stress (2.26 [1.96,2.61]) compared to no stress. The odds of having internet addiction increased proportionately with higher school form – Form 2, Form 3, Form 4 and Form 5, compared to the odds of having internet addiction among Form 1 students.

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Table 2 Unadjusted and adjusted logistic regression for internet addiction among school-aged adolescents by socio-demographic and associated factors, NHMS 2017

Variables	Unadjusted OR (95% CI)	p-value	Adjusted OR ^a (95% CI)	p-value
Sex				
Male	1.09 (0.99-1.20)	0.074	1.20 (1.08-1.34)	0.001
Female	1.00		1.00	
Form				
Form 1	1.00		1.00	
Form 2	1.36 (1.16-1.60)	0.000	1.51 (1.28-1.78)	0.000
Form 3	2.03 (1.74-2.37)	0.000	2.37 (2.01-2.80)	0.000
Form 4	2.36 (2.05-2.72)	0.000	2.60 (1.76-3.85)	0.000
Form 5	2.71 (2.29-3.21)	0.000	2.96 (1.98-4.41)	0.000
Age group				
12 years and below	1.00		1.00	
13-15 years	1.50 (0.83-2.69)	0.178	1.00 (0.56-1.81)	0.993
16-17 years	2.64 (1.45-4.79)	0.002	1.01 (0.51-2.01)	0.973
18 years and above	3.10 (1.61-5.95)	0.001	1.08 (0.51-2.28)	0.846
Ethnicity				
Malays	1.14 (0.86-1.52)	0.369	1.27 (0.87-1.84)	0.212
Chinese	1.52 (1.12-2.07)	0.008	1.67 (1.12-2.48)	0.012
Indians	0.90 (0.63-1.29)	0.573	0.81 (0.52-1.25)	0.335
Bumiputera Sabah and Sarawak	1.24 (0.88-1.76)	0.213	1.20 (0.79-1.81)	0.390
Others	1.00		1.00	
Parental marital status				
Married	1.00		1.00	
Divorced/widowed/separated	1.09 (0.99-1.20)	0.087	0.97 (0.86-1.10)	0.662
Feeling loneliness				
Feeling loneliness	2.37 (2.12-2.67)	0.000	1.37 (1.20-1.57)	0.000
Never feel lonely	1.00		1.00	
Unable to sleep, due to worrying of something				
Unable to sleep	2.20 (1.95-2.49)	0.000	1.40 (1.17-1.67)	0.000
Able to sleep	1.00		1.00	
Close friend				
No close friend	1.12 (0.93-1.35)	0.218	0.87 (0.71-1.06)	0.166
Had close friend	1.00		1.00	
Peer support				
Yes	1.00		1.00	
No	0.98 (0.90-1.07)	0.673	0.95 (0.86-1.05)	0.289
Parental supervision				
Sufficient	1.00		1.00	
Insufficient	1.49 (1.33-1.67)	0.000	1.30 (1.14-1.48)	0.000
Parental connectedness				
Yes	1.00		1.00	
No	1.18 (1.08-1.28)	0.000	1.06 (0.97-1.15)	0.230
Parental bonding				
Yes	1.00		1.00	
No	1.08 (1.00-1.15)	0.040	0.94 (0.87-1.03)	0.182
Depression				
Yes	2.90 (2.61-3.23)	0.000	1.67 (1.48-1.89)	0.000
No	1.00		1.00	
Anxiety				
Yes	2.81 (2.59-3.05)	0.000	2.12 (1.95-2.30)	0.000
No	1.00		1.00	
Stress				
Yes	4.12 (3.63-4.68)	0.000	2.26 (1.96-2.61)	0.000
No	1.00		1.00	
Physical inactive				
Yes	0.94 (0.85-1.03)	0.163	0.94 (0.84-1.04)	0.235
No	1.00		1.00	

OR, Odds ratio; CI, confidence interval.

^aOdds ratios adjusted for all other variables with unadjusted p-value of less than 0.25.

DISCUSSION

The prevalence of internet addiction in this study (29.0%) was almost similar to that of previous study in Malaysia (28.6%).⁴ Our prevalence of internet addiction among adolescents was higher compared to that of high school adolescents in India (11.8%)⁹ and China (10.8%).¹⁰ These differences may be due to the different tools used and different populations studied.

Several factors associated with internet addiction among school-going adolescents were recognized. Male students had a higher risk of having internet addiction compared to female students, confirming that the majority of related studies showed a male preponderance of internet addiction with a reason that males involve more in online activities such as gaming, pornography, and gambling which can lead to pathological internet use.¹¹

The risk of having internet addiction increased proportionately with higher school forms. This finding was similar to the finding from other study¹² revealing that the rate of internet addiction was higher in senior middle school compared to junior middle school students.

In our study, Chinese students had a significantly higher risk of internet addiction compared to other races. This finding contradicted the findings of a previous study¹³ that showed no significant association between races and internet addiction.

In the present study, feeling loneliness was significantly associated with internet addiction, in line with the findings from other study mentioning that loneliness was a psychosocial factor that was positively associated with problematic internet use.¹⁴ Other related studies showed that the Internet provides a good social environment for public interaction¹⁵ and lonely people tend to spend excessive amount of times socializing on the Internet.¹⁶

Another finding from the present study was that adolescents who were unable to sleep, worried about something were likely to be addicted to the Internet. This is comparable with the finding from other study reporting that student who slept less than 6 hours daily was positively associated with internet addiction.¹⁰

In our study, we found that depression was significantly associated with internet addiction. This finding was in line with the finding of the previous study reported a significant correlation between pathological internet use and depression.¹⁷

In the current study, we also found that anxiety was positively associated with internet addiction, which was consistent with the finding from other study revealed that higher levels of anxiety were associated with higher Internet addictive behavior.¹⁸

Comparable with the report from a previous study,¹⁹ stress was another associated factor for internet addiction. Adolescents used the Internet to counter stress by avoiding cognitive tasks and engaging in distraction activities.

Last but not least, in our study, insufficient parental supervision was linked positively to anxiety, consistent with the report from other study²⁰ indicating that adolescents with insufficient parental supervision had a higher risk of pathological internet use.

Our study observed no relationship between having a close friend, peer support, parental connectedness, parental bonding and physical inactivity, with internet addiction.

The strengths of the current study were its large sample size that provided a better power analysis and its high response rate that eliminated non-response bias and proved the data collection method was suitable to adolescents. The two-stage stratified cluster sampling design ensured national representation and eliminated the threats to external validity by eliminating clustering / stratification effects.

The limitation of this study was its cross-sectional design, that limiting the determination of the temporal relationship between the studied independent variables and internet addiction, in order to establish a true cause and effect relationship.

Future studies need to focus on whether early prevention and early intervention programs could reduce the severity of internet addiction, and ensure healthier adolescents.

CONCLUSION

Our results suggest that being a male, of Chinese ethnicity, higher form level, feeling loneliness, unable to sleep due to worrying of something, insufficient parental supervision, depression, anxiety and stress had a strong association with internet addiction among school-going adolescents.

We suggest that parents should communicate and spend quality time with the adolescents at level best for better and sufficient parental supervision. Schools can contribute strongly in prevention and recovery of internet addiction by developing an Internet addiction programme for adolescents taking into account for the psychosocial factors above, such as Reality Therapy group counselling.

Abbreviations

OR: Odds ratio

CI: Confidence interval

DASS-21: Depression, Anxiety and Stress Scale, 21-item questionnaire

MVIAT: Malay Version Internet Addiction Test, 20-item questionnaire

MREC: Medical Research and Ethics Committee

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NHMS: National Health and Morbidity Survey
SPSS: Statistical Package of Social Sciences
WHO: World Health Organization

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Availability of the data and materials

For data protection purposes, the data used for this study are not publicly available but are available from the Institute for Public Health, Ministry of Health Malaysia upon reasonable request and with permission from the Director General of Health Malaysia.

Ethics approval and consent to participate

Participants were provided with written consent to participate in the study prior to interviews. The study was approved by the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (NMRR-16-698-30042) and the Ministry of Education's Ethics Committee.

Consent for publication

The authors obtained permission to publish this paper from the Director General of Health Malaysia.

Competing interests

The authors declare that they have no competing interests.

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