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RESEARCH PAPER

Addiction Among Adolescents to Social Networking Sites in Malaysia: A Hierarchical Multiple Linear Regression Analysis

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Abstract

Background: Social networking sites (SNSs) have changed the ways that we interact with each other. The use of social networking sites by adolescents is addictive, with numerous negative consequences. Various factors influence social networking sites addiction among adolescents.

Objective: We aimed to determine the prevalence of gender-specific social networking sites addiction among adolescents and the factors influence social networking sites addiction.

Methods: A quantitative, cross-sectional community-based research was conducted by face-to-face interviews among adolescents in all 11 administrative divisions of Sarawak, Malaysia. The multistage cluster sampling technique was followed, with an adolescent selected systematically from each household. An adapted and validated questionnaire, which included 20 items of social networking sites addiction, was used to collect data. We analysed 1344 adolescent's data using IBM SPSS Version 22.0. A partial least square structural path with mediation analysis was done using WarpPLS version 7.0.

Results: Three-quarters of the adolescents (76.2%) used social networking sites, but only two-fifths of them (40.4%) were addicted, with 15% having moderate-severe addiction to social networking sites. The most frequently used social networking sites was YouTube (77.9%), followed by Facebook (75.2%) and Instagram (59.0%). Self-esteem had a negative correlation, while adolescent risk behaviours directly affected social networking sites addiction (p<0.001). The most potent predictors for social networking sites addiction were YouTube, Instagram, and Pinterest (p<0.05).

Conclusion: Tackling risk behaviours and enhancing adolescents' self-esteem would reduce the tendency to be addicted to social networking sites.

Keywords: Adolescents, Addiction, Social networking sites, Social media

Introduction

Ever since its introduction, social networking sites (SNSs) have become a phenomenon that has taken the world by storm, with its usage growing exponentially over the years.[1-3] Social networking sites are defined as "Web-based services allowing individuals to create a public or semi-public profile within a limited system, which articulates a list of other similar users whom they share a connection and interest with, and at the same time view and traverse their list of connections and those made by others within the system".[1,4] Examples of current social networking sites frequently used by people worldwide include Facebook, Twitter, LinkedIn, Google+, YouTube, Instagram, Pinterest, Tumblr, Reddit, and Flickr.

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People of all ages use social networking sites, but adolescents are the most avid users, with the prevalence of social networking sites increasing over the years.[3,5] About 46.4% to 96.8% of the world adolescents were found to have accessed or engaged in social networking sites. However, these statistics varied and may be underestimated.[2,6-10] Various theories, such as the Uses and Gratification (U & G) theory, examined adolescents' needs and motives for social networking sites consumption. The Prototype Willingness Model, which predicted the adolescents' willingness to engage in risky online activities, and the planned behaviour theory, which described the usage of social networking sites by the adolescents as positive behaviour, have been linked to the phenomenon of social networking sites usage by the adolescents.[2] Social networking sites' usage is a double-edged sword, as their usage was assistive from certain aspects but detrimental from other aspects.

Adolescents rely heavily on social networking sites and tend to spend hours using them, with a reported average duration spent ranging from one to ten hours per week. However, there was a possibility of under-reporting [3,5]. The long hours spent by adolescents on social networking sites increased their tendency to get addicted to social networking sites.[4,11] About 50% to 90% of adolescents who used social networking sites were reported to be addicted to some extent, with addiction ranging from mild to severe [4,11]. Social networking sites addiction is the "Pathological use of social networking sites, exceeding regular social networking sites usage, where typical behavioural addiction signs and symptoms were portrayed, interfering in various aspects of daily life, and resulting in negative outcomes for the concurrent and future development of the adolescents".[3,4,12]

Various factors were associated with social networking sites addiction among adolescents, such as their age and gender.[3,4,12] Moreover, self-esteem and risk behaviours were predictors of adolescents' tendencies towards social networking sites usage and addiction [4,3,12]. Previous studies had established that a negative relationship existed between social networking sites addiction and self-esteem, where adolescents with lower self-esteem had a higher tendency of social networking sites addiction.[3,4,12] Also, adolescents involved in risk behaviours were more likely to be addicted to social networking sites.[3,4,12]

Naturally, as social networking sites usage continues to grow, the risk of social networking sites addiction also continues to increase. Thus, not only is it crucial to determine the level of social networking sites addiction, but also the potential predictors of social networking sites addiction among adolescents. In this context, the study aimed to test two hypotheses, namely:

H_1: Social networking sites addiction was positively correlated with risk behaviours and negatively correlated with the self-esteem of the adolescents; and

H_2: Self-esteem had a mediated effect on social networking sites addiction among adolescents.

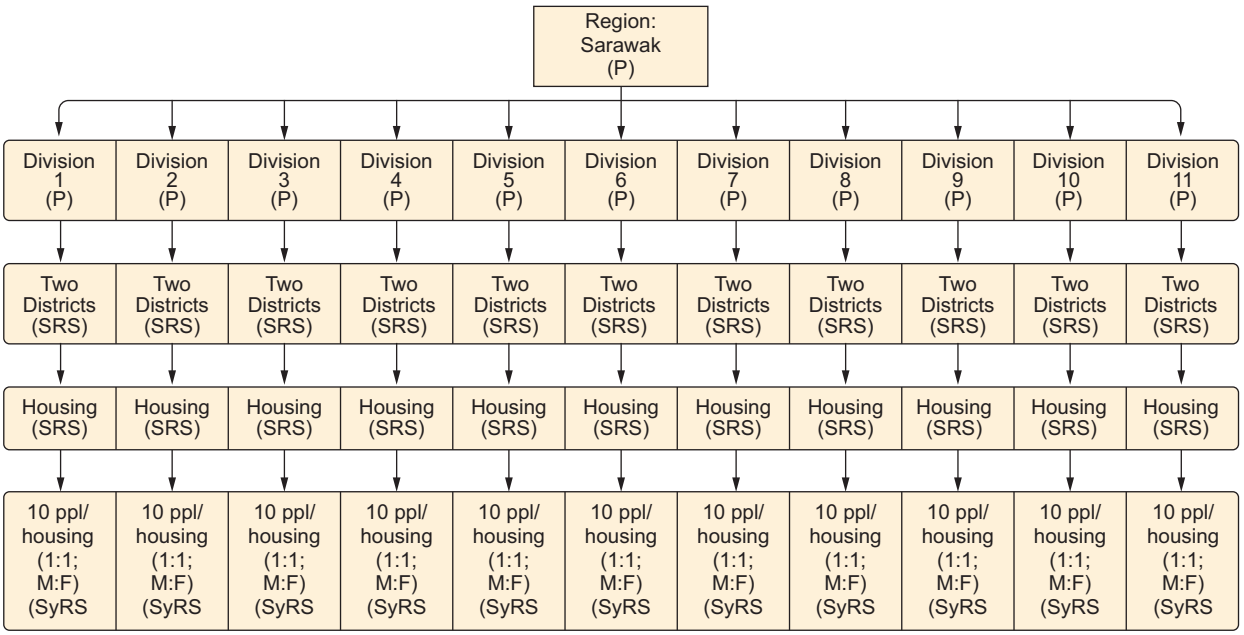
Materials and Methods

*Setting, sampling and data collection:*The study was a quantitative, cross-sectional, community-based research conducted among the general adolescent population from all 11 administrative divisions in Sarawak, Malaysia. Two districts were randomly selected from each of the divisions. Then from a list obtained from the district office or local council, a specific number of housing areas, villages or longhouses were randomly selected from each of those districts. A maximum of ten adolescents (five males and five females) were selected from each housing area, villages or longhouses (figure 1). The inclusion criteria were all Malaysian adolescents between the ages of 10 to 19 years who lived in easily accessible housing areas, villages or longhouses with internet access in Sarawak. However, adolescents with mental or cognitive impairment, or those who did not understand English, Bahasa Malaysia, or Mandarin, and those without a paired opposite gender from the same housing area, village or longhouse were excluded from the study. Data were then collected from those adolescents through face-to-face interviews in English, Bahasa Malaysia, or Mandarin, using pre-tested and standardised interviewer-administered questionnaires. The questions were adopted or adapted from validated questionnaires after permission was obtained.[3,4,12]

Measurements

*Risk behaviours:*The adolescents' risk behaviours were measured using a 21-item question adapted from the Youth Risk Behaviours Surveillance System (YRBSS) by the Centres for Disease Control and Prevention. [13] The most appropriate answer to all 21 items was selected from a four-point Likert's scale, with scores ranging from 0 to 3, which corresponded with the adolescents' level of involvement with the mentioned risk behaviours. The lowest score of 0 indicated 'Never', followed by a score of 1 that indicated 'Within the last month', a score of 2 that indicated 'During the last 1-6 months', and a score of 3 that indicated 'Beyond the last 6 months'. From the summative score that ranged from 0 to 63, a weighted mean score was calculated and using equal percentiles based on scanned cases.[13] The level of risk behaviours was classified into no low-medium risk and high risk.

*Self-esteem:*The adolescents' self-esteem level was measured using a 10-item question, which was adopted from the Rosenberg self-esteem scale.[14] The best answer to all ten items was selected from a four-point Likert's scale, with scores ranging from 1 to 4, which corresponded with the adolescents' level of agreement with the mentioned item. The lowest score of 1 indicated 'Strongly disagree', followed by a score



P = Purposive; SRS = Simple random sampling; SyRS = Systematic random sampling; M = Male; F = Female:

Figure 1: Flowchart of the sampling procedure

of 2 that indicated 'Disagree', a score of 3 that indicated 'Agree', and a score of 4 that indicated 'Strongly agree'. After reversing the five reverse responses, a summative score was calculated, ranging from 10 to 40. A weighted mean score was calculated using equal percentiles based on scanned cases. [13] The adolescents' self-esteem level was classified into low, moderate, high and very high.

*Social networking sites usage:*Adolescents were required to select the types of social networking sites used and the duration (minutes per day) spent on each of those sites, and the number of times a day that they used those sites.

*Social networking sites addiction:*The level of addiction among adolescents to social networking sites was measured using a 20-item questionnaire adapted from the questionnaire by Young.[15] The word 'Internet' in the study by Young was changed to 'social networking sites' for this study. The best answer to all 20 items was selected from a six-point Likert scale, with scores ranging from 0 to 5, which corresponded with the adolescents' level of agreement with the mentioned item. The lowest score of 0 indicated 'Never', followed by a score of 1 for 'Rarely', 2 for 'Occasionally', 3 for 'Frequently', 4 for 'Often', and 5 for 'Always'. Total scores were calculated across the items to produce a summative score ranging from 0 to 100. Based on Young's Internet Addiction Test, the level of the adolescents' addiction to social networking sites was classified into no addiction (≤30), mild addiction (31-49), moderate addiction (50-79), and severe addiction (80-100).[13] Cronbach's Alpha internal reliability coefficients provided information that the test had internal reliability, and past studies found that the test instrument had high construct validity.[16,17]

*Data entry and analysis:*All collected data were checked and verified manually, with immediate correction of any inconsistencies and inaccuracies. The completed data were then coded and entered into the computer using Statistical Package for Social Science (SPSS) version 22.0.[18] After all the data were cross-checked for any unusual findings, outliers, and missing values, multiple imputation techniques were used to impute the missing values.[19] A total of 1344 responses were used for analysis. Descriptive statistics were presented as frequency and percentage.

Further analysis in the form of hierarchical multiple regression analysis was done in which the score of social networking sites addiction was used as a continuous dependent variable. Hierarchical regression is a model-building technique in regression model, which builds successive linear regression models, with the addition of more predictors.[20] Then, a partial least square structural path analysis was done using WarpPls version 7.0 to test the effect of

adolescent risk behaviours and self-esteem on social networking sites addiction.[21] Finally, the direct and indirect effects of adolescent risk behaviours and self-esteem were interpreted using Cohen's guideline.[22]

Ethical issues: The respondent information sheet was provided in English, Bahasa Malaysia and Mandarin. Written informed consent was then obtained from both the parent or guardian and the adolescents if the respondent was less than 18 years old or only if the respondent was 18 or 19 years old. Participation was voluntary, with the respondents having no obligation to participate in the study. All participants were assured of anonymity, privacy and data confidentiality.

Results

Characteristics of the adolescents: The mean (SD) age of the male and female adolescents were respectively 14.95 (2.5) years and 15.09 (2.7) years (table I). Gender-stratified analysis of all the adolescents' characteristics showed no statistically

Table I: Socio-demographic characteristics of the adolescents

Characteristics	Gender						†*p*-value
	Male (n=672)		Female (n=672)		Total (n=1344)		
	n	%	n	%	n	%	
Age (years)							
Mean (SD) (years)	14.95 (2.54)		15.09 (2.66)		15.02 (2.60)		-
Ethnicity							
Chinese	194	28.9	199	29.6	393	29.2	*p*>0.05
Malay	191	28.4	158	23.5	349	26.0	
Iban	171	25.4	167	24.9	338	25.1	
Bidayuh	40	6.0	54	8.0	94	7.0	
Orang Ulu	42	6.3	45	6.7	87	6.5	
Melanau	34	5.1	49	7.3	83	6.2	
Religion							
Christian	373	55.5	401	59.7	774	57.6	*p*>0.05
Islam	234	34.8	212	31.5	446	33.2	
Buddhist	48	7.1	45	6.7	93	6.9	
No religion	12	1.8	11	1.6	23	1.7	
[a]Others	5	0.7	3	0.4	8	0.6	
Marital status							
Single	663	98.7	661	98.4	1324	98.5	*p*>0.05
Married	9	1.3	8	1.2	17	1.3	
[a]Others	0	0.0	3	0.4	3	0.2	
Occupation							
Student	639	95.1	638	94.9	1277	95.0	*p*>0.05
Unemployed	9	1.3	10	1.5	19	1.4	
Housewife	0	0.0	3	0.4	3	0.2	
Employed	24	3.6	21	3.1	45	3.3	
Highest level of education							
No formal education	2	0.3	2	0.3	4	0.3	*p*>0.05
Kindergarten	1	0.1	2	0.3	3	0.2	
Primary	150	22.3	140	20.8	290	21.6	
Secondary	451	67.1	439	65.3	890	66.2	
Pre-university	53	7.9	71	10.6	124	9.2	
Vocational	8	1.2	14	2.1	22	1.6	
Diploma	7	1.0	4	0.6	11	0.8	
Average pocket money each day (MYR)							
Mean (SD) (MYR)	7.25 (8.37)		7.38 (8.06)		7.31 (8.21)		-
Median (MYR)	5.00		5.00		5.00		

[a]Engaged, Divorced
†p-value reached from Chi-square test of independence
*p<0.05; **p<0.01; ***p<0.001

significant differences between males and females (p>0.05).

*Social networking sites usage:*More than three-quarters of the adolescents (76.2%; n=1024), comprising 74.4% of the males and 78% of the females, used social networking sites (table II). However, gender-wise, there was no statistically significant differences in the use of social networking sites (p>0.05). The social networking sites used most by the adolescents was YouTube (77.9%), followed by Facebook (75.2%) and Instagram (59.0%), while the least frequently used social networking sites were others for Weibo, Bebo, and Google+ (2.9%). Bivariate analysis revealed that the proportion of social networking sites usage among the male and female adolescents was similar for all the different social networking sites, except for Instagram (p<0.001; Cramer's V = 0.119). The mean (SD) duration that the adolescents spent on social networking sites per day were 298.93 (241.31) minutes, with a minimum of ten minutes and a maximum of 960 minutes (16 hours). On average, the adolescents spent the most extended amount of time per day on YouTube with a mean(SD) of 113.4 (118.5) minutes, followed by Facebook with a mean(SD) of 84.6 (111.7) minutes and Instagram with a mean (SD) of 61.8(90.7) minutes.

Social networking sites addiction: Only two-fifths of the adolescents (40.4%) who used social networking sites were addicted to social networking sites, with 15% having moderate-severe addiction to social networking sites. Although male adolescents (44%) were found to be more addicted to social networking sites compared to their females counterparts (37%), the gender differences was not statistically significant (p>0.05) (figure 2).

*Factors associated with social networking sites addiction:Hierarchical multiple linear regression analysis:*A hierarchical multiple linear regression analysis was done to determine the factors associated with social networking sites addiction among adolescents. Social networking sites addiction, which was in the form of continuous data, was the dependent variable. Gender was dummy-coded with male gender as '1' and female gender as '0'. Exploratory data analysis was done to determine the potential outliers and skewed data. Univariate and multivariate outliers were determined using Mahalanobis distance.[23] A total of 347 data were removed due to outliers. There was no potential multi-collinearity as variance inflation factors (VIF) was less than three.[24] Two variables, namely age in years and gender were entered into the model and was subsequently followed by other variables such as self-esteem, risk behaviours, Facebook, Twitter, YouTube, Instagram, Pinterest, Reddit, Swarm, Tumblr, Snapchat, other social networking sites, time spent on social networking sites (minutes) and duration of using social networking sites (days). In the first model, age and gender had no potential impact on addiction to social networking sites with adjusted R-square = 0.006 though ANOVA

Table II: *Gender-stratified percentage distribution of types of social networking sites used*

Social networking sites	Gender						†p-value
	Male (n=500)		Female (n=524)		Total (n=1024)		
	n	%	n	%	n	%	
YouTube	399	79.8	399	76.1	798	77.9	p>0.05
Facebook	386	77.2	384	73.3	770	75.2	p>0.05
Instagram	265	53.0	339	64.7	604	59.0	p<0.001
Twitter	107	21.4	120	22.9	227	22.2	p>0.05
Snapchat	45	9.0	82	15.6	127	12.4	p>0.05
Pinterest	48	9.6	46	8.8	94	9.2	p>0.05
Tumblr	21	4.2	22	4.2	43	4.2	p>0.05
Reddit	23	4.6	15	2.9	38	3.7	p>0.05
Swarm	19	3.8	12	2.3	31	3.0	p>0.05
Others (Weibo, Bebo, Google+)	18	3.6	12	2.3	30	2.9	p>0.05

*p<0.05, **p<0.01; ***p<0.001;
†p-value reached from Chi-square test of independence

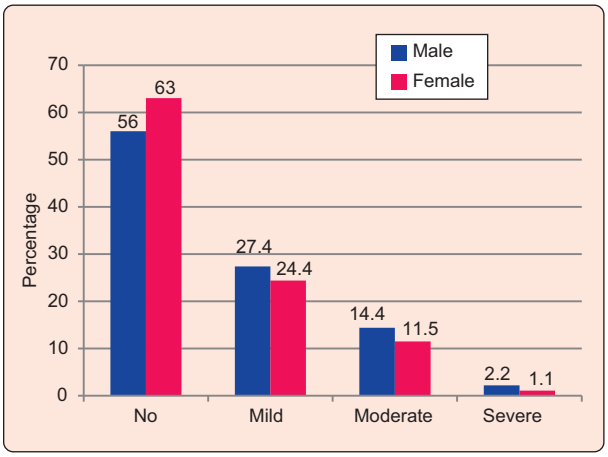


Figure 2: Gender-stratified level of social networking sites addiction (n=1024)

showed a statistically significant model [F(df)= 3.173(2,674); p<0.05)]. However, after the inclusion of other variables, the model significantly improved at 21.2% (p<0.001) with adjusted R-square = 0.202. The ANOVA table of the second model was also statistically significant [F(df)= 11.726(16,660); p<0.001].

The analysis revealed that self-esteem, which was negatively correlated with social networking sites addiction (p<0.001), had the highest contribution (20.8%) in the model, followed by risk behaviours involvement (12.2% contribution), which was positively correlated with social networking sites addiction (p<0.001). The other related variables that contributed to the model were social networking sites usage (14.9% contribution, p<0.001), duration spent on social networking sites per day (8% contribution, p<0.05), YouTube (7.9% contribution, p<0.05), Instagram (8.2% contribution, p<0.05) and Pinterest (7.3% contribution, p<0.05). Otherwise, other variables, such as Facebook, Twitter, Reddit, Swarm, Tumblr, and Snapchat, had no potential effect on social networking sites addiction (table III).

Table III: Factors affecting social networking sites addiction: Hierarchical multiple linear regression analysis

Model/Variables	*Unstandardized B*	*Std. Error*	*Standardized Beta*	*95% CI for B* LL	UL	*Contribution to model*
1 (Constant)	18.824***	5.120		8.770	28.877	
Age (years)	.556	.323	.066	-.078	1.190	.066
Gender	3.007	1.701	.068	-.332	6.347	.068
2 (Constant)	39.672***	6.717		26.482	52.861	
Age (years)	-.105	.336	-.012	-.765	.555	-.011
Gender	1.790	1.592	.040	-1.336	4.916	.039
Self-esteem	-10.670***	1.764	-.216	-14.134	-7.206	-.208
Risk behaviour	.531***	.150	.129	.238	.825	.122
Facebook	1.626	1.071	.059	-.478	3.729	.052
Twitter	.897	1.199	.028	-1.457	3.251	.026
YouTube	2.432*	1.060	.092	.351	4.514	.079
Instagram	2.451*	1.023	.096	.442	4.461	.082
Pinterest	3.901*	1.825	.084	.318	7.484	.073
Reddit	-1.944	4.289	-.024	-10.365	6.477	-.016
Swarm	-6.042	4.935	-.069	-15.732	3.648	-.042
Tumblr	2.876	3.223	.043	-3.452	9.204	.031
Snapchat	-2.506	1.603	-.060	-5.653	.642	-.054
Other SNSs	4.149	2.901	.052	-1.548	9.846	.049
Time spent on SNSs (min)	.010*	.004	.117	.002	.018	.080
Duration of using SNSs (days)	.004***	.001	.167	.002	.006	.149

*p<0.05, **p<0.01; ***p<0.001;
LL=Lower limit of 95% CI and UL=Upper limit of 95% CI

Structural path and mediation analysis: To understand the mediated effect of self-esteem, a mediation analysis was done.[21,25] Model fitting information revealed average adjusted R^2 = 0.119 (p<0.001) and average VIF = 1.041, which indicated no potential multi-collinearity. The Tenenhaus Goodness of Fit was 0.349, which was acceptable (small ≥0.1, medium ≥0.25, large ≥0.36). The analysis revealed that social networking sites addiction was negatively correlated with self-esteem with small effect (β=-0.243; p<0.001; ES=0.069). However, risk behaviours directly affect social networking sites addiction (β=0.176; p<0.05; ES=0.040) with small effect. Self-esteem was negatively correlated with risk behaviours (β=-0.097; p<0.001; ES=0.009), but the effect was very weak. Moreover, the analysis also showed that the duration spent on social networking sites per day and the total duration of social networking sites usage (β=-0.185; p<0.001; ES=0.077) had a direct effect on social networking sites addiction (β=-0.240; p<0.001; ES=0.048) (table IV).

Analysis of the indirect and total effect of different parameters indicated that the total effect of self-esteem on social networking sites addiction was statistically significant (p<0.001), but had a minimal effect on risk behaviours (p>0.05). Risk behaviours had a direct effect on social networking sites addiction (p<0.001). The other two control variables, namely duration spent on social networking sites per day and the total duration of social networking sites usage had a direct effect on social networking sites addiction (p<0.001) (table V, figure 3). However, all the effect sizes were very weak (less than 0.15).[22]

Table IV: Structural path analysis of social networking sites addiction

Hypothesis	Parameters	Coefficient	SE	ES	Acceptance
H_1	SNSs addiction <-Risk behaviour	0.176***	0.037	0.040	Accepted
H_2	SNSs addiction <- Self-esteem	-0.243***	0.038	0.069	Accepted
H_3	Risk behaviour <- Self-esteem	-0.097***	0.038	0.009	Accepted
Control variables					
1	SNSs addiction <- Duration of use of SNSs per day	0.240***	0.037	0.048	Accepted
2	SNSs addiction <- Duration of use of SNSs	0.185**	0.038	0.077	Accepted

Table V: Indirect and total effect on social networking sites addiction

Parameters	Indirect effect	p-value	ES	Total effect	p-value	ES
SNSs addiction <- Self-esteem	-0.017	0.265	0.005	-0.260	0.001	0.075ø
SNSs Addiction <- Risk behaviour	-	-	-	0.176	0.001	0.040ø
Risk behaviour <- Self-esteem	-	-	-	-0.097	0.01	0.009ø
SNSs addiction <- Use of SNSs per day			-	0.240	0.001	0.077ø
SNSs addiction <- Duration of SNSs use	-	-	-	0.185	0.001	0.048ø

*p<0.05, **p<0.01; ***p<0.001

ES= Effect size.

Ø=Small (0.02); øø=Medium (0.15); øøø=Large (0.35)

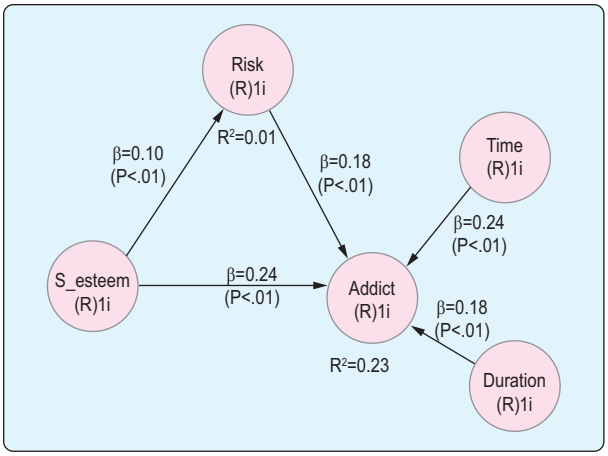


Figure 3: Structural path analysis of social networking sites addiction

Discussion

Adolescents' social networking sites usage may be explained by different theories, such as Uses and Gratification (U&G), Prototype Willingness Model, and planned behaviour.[26-28] Different theories demonstrated the various factors that affected social networking sites usage and addiction among adolescents. Thus, different studies reported different prevalence of social networking sites usage among the adolescents, where the prevalence ranged from 46.4% to 96.8%, with this study reporting a percentage of 76.2%.[28] However, although there was no significant gender difference in social networking sites among adolescents, female adolescents tend to use more social networking sites compared to their male counterparts.[28]

Various studies showed that the most frequently used social networking sites was Facebook.[28] However, in this study, YouTube was the most frequently used social networking sites, followed by Facebook and Instagram, and this preference was also demonstrated in another study among Malaysian adolescents.[28] These different preferences of social networking sites types demonstrated the personal preferences of adolescents.

On average, the adolescents spent about 228 minutes per day on social networking sites, which amounted to about four hours per day or 27 hours per week. Nevertheless, most adolescents spent between 30 minutes to two hours a day on social networking sites, with more than one-fifth of the adolescents spending more than two hours a day on social networking sites.[29,30] The different times spent on social networking sites in other studies demonstrated the adolescents' subjective reporting on the amount of time they spent using social networking sites. The duration of time spent on social networking sites would be more accurate if the adolescents counted the exact time spent using timing counters.

Although Internet addiction had been the focus of experts and researchers over the past two decades with the 20-item Internet Addiction Test tool by Young frequently used, internet addiction had not been included in the official classification of mental illness and disorder.[31] Only Internet gaming disorder had been classified as a psychiatric disorder in the International Classification of Disease and Related Health Problems (ICD-11), which would be implemented on 1 January 2022.[31] However, among adolescents, who were the most avid users of social networking sites, the issue of social networking sites addiction was a more pressing issue, which had only started to be mentioned in recent years.[3,5]

About two-fifths of the adolescents were addicted to social networking sites, within the range of prevalence of social networking sites addiction among adolescents reported, ranging from 1.6% to 90% in other studies.[29,30] The vast range in prevalence may be attributed to the country and the population involved in the research. Age was not associated with social networking sites addiction among the adolescents, which corresponded with the findings of some studies, but contradicted with others that reported older adolescents to more likely to be addicted to social networking.[29-31] Furthermore, although not significant, male adolescents were more likely to be addicted to social networking sites than female adolescents, especially under the moderate-severe addiction category.[11,32] Also, adolescents who spent more time using social networking sites were more likely to be addicted to them.[33,34]

Among all the mentioned social networking sites, YouTube, Instagram, and Pinterest were the most potent predictors of social networking sites addiction. YouTube was an essential part of adolescents' lives, where a high number of them used the social networking site for a long period.[8] At the same time, Instagram and Pinterest had the most reciprocity with YouTube, and thus the adolescents tend to spend a long time using them.[35] Naturally, the adolescents who spent more time using social networking sites were more likely to be addicted to them.[35]

Self-esteem was inversely related to social networking sites addiction. Higher self-esteem was a protective factor for social networking sites addiction, while lower self-esteem was a risk factor for social networking sites addiction. [3,33,36-39] Risk behaviours were positively related to social networking sites addiction. The adolescents who were more involved in risk behaviours were more likely to be addicted to social networking sites.[40]

This study was generalisable to the whole of Sarawak, given the adolescents' diversity and the large sample size involved. Baseline evidence was also provided regarding the adolescents' addiction to social networking sites and the determining factors, such as risk behaviours and self-esteem, which could be used to plan and develop suitable policies to tackle social networking sites addiction among adolescents. However, the limitation of the study was the possibility of response and recall bias, where data collection was based on self-reports, with face-to-face interviews involving adolescent-adult interactions. Although other factors may affect social networking sites addiction, such as family dysfunction and parental monitoring and general psychiatric status, this study only took into account a few factors. Moreover, this study was done from the adolescent's perspective, when it would be worthwhile to get their parents' perspective on behavioural indicators. Furthermore, being a cross-sectional study, this study could only guide the possible factors determining social networking sites addiction. This study was also conducted to screen for the severity of social networking sites addiction, where further assessment would be required to confirm the presence of social networking sites addiction among adolescents.

Conclusion

The study was to test the relationship between Facebook, Instagram, Twitter, and Snapchat use by adolescents and social networking sites addiction, risk behaviours and self-esteem. Risk behaviours and self-esteem were important predictors of social networking sites addiction. Thus, by preventing adolescents from being involved in risk behaviours and enhancing their level of self-esteem through education and involvement in motivational programes, adolescents' tendency to be addicted to social networking sites would be reduced. Although further research would be required to demonstrate the causal relationship between the variables, the study's findings provided a basis for further studies.

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