

Pattern and Predictors of Internet Addiction among Secondary School Adolescents in Enugu, Nigeria

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ABSTRACT

Background: Internet addiction has negative effects on adolescents. These range from psychological and social impediments to school absenteeism. **Aim:** To ascertain the pattern of Internet addiction and the factors that predict Internet addiction among secondary school adolescents in southeast Nigeria. **Subjects and Methods:** This was a cross-sectional study that involved 796 secondary school adolescents drawn from six secondary schools in Enugu, Nigeria. The data were analyzed using IBM Statistical Package for Social Sciences (SPSS) software. **Results:** The highest proportion of the respondents (36.3%) had a moderate level of Internet addiction, while the least proportion (2.1%) had severe dependence on the Internet. Adolescents who were less than 15 years of age have 1.1 odds of having Internet addiction when compared to those who were 20 years and above (AOR = 1.1; 95% CI: 0.4–2.8). The respondents who were of the low socioeconomic class were 1.2 times more likely to have Internet addiction when compared with those in the high socioeconomic class (AOR = 1.2; 95% CI: 0.9–1.7). About 20.1% of adolescents were always depressed when they are not using the Internet, while 16.3% of adolescents who were addicted to the Internet developed insomnia. **Conclusion:** There is a rising prevalence of Internet addiction among secondary school adolescents. Younger adolescents tend to be more addicted to the Internet than their older counterparts. A small number of them had severe Internet addiction. A subpopulation of adolescents who were addicted to the Internet presents with depression and sleep disorders.

KEYWORDS: *Adolescents, Internet addiction, secondary school*

INTRODUCTION

In this dispensation, the use of the Internet is part of our daily activity.^[1] Among adolescents, the frequency and number of Internet users have increased exponentially.^[2,3] This is because Internet use has become the most appropriate tool for worldwide information, communication, technology, and source of infotainment.^[1] The concept of Internet addiction

disorder (IAD) was coined by Kimberly Young in 1996^[2] and is currently in the Diagnostic and Statistical Manual of Mental Disorders (DSM).^[4]


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Internet addiction occurs when the adolescent child had lost total control of Internet use with attendant negative outcomes that could be deleterious to life,^[5] which persists over a significant period.^[6,7] About 35% of the world's population are Internet users.^[8] In China, Internet users have reached 751 million, and 19.4% of them were adolescents whose ages ranged between 10 and 19 years.^[8-10] Over the last three years, Internet subscribers had reached 83 million in Bangladesh, constituting 50% of the overall population. Among these subscribers, 77.5 million are mobile Internet users.^[11,12] The prevalence of Internet addiction had shown some variation worldwide. For instance, prevalence rates had been documented as 7.9% and 25.2% in Europe and the United States, respectively.^[12] While prevalence rates of 17.3% and 23.6% were reported in the Middle East and Africa, respectively.^[13,14] The prevalence rate of Internet addiction ranging from 8.1% to 50.9%^[15] has been documented among adolescents in Asia, while in China, the rates ranged from 6% to 10%.^[16]

Internet addiction may cause psychological and social impediments, school absenteeism, and poor school performance among adolescents. It has also been reported to be associated with alcohol abuse, anxiety, depression, and stress.^[16-18] A meta-analysis had shown that problematic Internet use is often associated with low self-esteem, which affects the quality of life of adolescents.^[19]

Internet addiction among adolescent children is characterized by overuse and withdrawal as well as anger or depression when Internet services are not available.^[8] Musetti *et al.*^[20] and Spada^[8] also noted the symptoms of Internet addiction to include withdrawal, intolerance, concern over Internet use, and heavier or more frequent Internet use than intended. The untoward effects of Internet addiction among adolescents cannot be overemphasized. Today, adolescents are distant from their parents, and very close to their peers, this is even made worse by the increased rates of family schism and divorce.^[11,21]

Internet addiction among adolescents is also characterized by maladaptive patterns leading to clinically significant impairment or distress.^[22] Internet addiction has a significant link with psychological and interpersonal problems, such as inability to relate to other people, loss of control of own behavior, withdrawal from social activities, difficulty maintaining a regular schedule, disturbance of sleep, and decline in sleep hours.^[22-25]

Studies abound on Internet addiction among adolescents in Nigeria, but this is mostly among adults and undergraduate students.^[26,27] These studies used fewer

sample sizes, and the predictors of adolescent addiction were not elicited. For instance, the study by Ofole *et al.*^[26] was performed among undergraduates where psychological and contextual factors including parenting styles were correlated with Internet addiction among undergraduates. The sample size, was, however, less than 500, and it was carried out in a single location. Similarly, Olusoji *et al.*^[27] in their study to determine the prevalence of Internet addiction and its effects on academic performances among 150 college students of health sciences and technology in western Nigeria noted that the majority of the students were minimal users of the Internet. Again, the work was not performed among adolescents and the sample size was small.

This study was carried out to determine the pattern and predictors of Internet addiction among adolescents drawn from several secondary schools in Enugu, southeast Nigeria. The study will help raise awareness and address the issue of Internet addiction, which is prevalent among adolescents.

METHODS

Study area and population

This included 796 secondary school adolescents drawn from six secondary schools from June 2021 to September 2021. The secondary schools enrolled in the study were representative of the population of secondary schools in Enugu City at the time of the study. The subjects were recruited from a frame of private and public schools. Information concerning this study and the contents of the questionnaire were explained to the adolescents.

Study design and sampling

This study was a descriptive cross-sectional study conducted among secondary school adolescents in Enugu City. The timing of the study was selected to avoid the start and end of the term when students were absent from school or preparing for examinations. Adolescents who were active Internet users for at least 1 year, those who gave consent, and those who completed the questionnaire were included in the study, while adolescents who had a prior history of any mental illness or any form of behavioral disorder and those who did not give consent/assent were excluded from the study.

Study instrument

An assessment of Internet addiction was made using the Internet addiction test (IAT).^[28] The IAT was created and validated by Young in 1998 in a North American population.^[28] Frangos *et al.*^[29] also validated this questionnaire in a meta-analysis of the reliability of Young's Internet Addiction Test. Besides, Tania *et al.*^[30] in Spain, Gunathillaka *et al.*^[31] in Sri Lanka, and Siste

et al.^[32] in Indonesia in various instances have also validated the questionnaire. This validated questionnaire consists of 20 variables. Each variable has a 5-point Likert scale response: 0 = not applicable; 1 = rarely; 2 = occasionally; 3 = frequently; 4 = often; and 5 = always. The maximum score that could be obtained by any respondent is 100, while the minimum score obtainable is zero. Total scores that range from 0 to 30 points are equivalent to a normal level of Internet usage; scores of 31 to 49 are an indication of a mild level of Internet addiction. Also, scores from 50 to 79 are regarded as a moderate level of Internet use, and scores of 80 to 100 reveal severe dependence on the Internet.

Sample size estimation

To attain a 95% confidence level and 3% precision for adolescents drawn from six secondary schools whose populations were greater than 2,000, a minimum sample size of 714 was estimated from the tables of sample sizes by Glenn,^[33] which would be necessary for given combinations of precision, confidence level, and variability for different population sizes. However, to increase the precision of the estimate, a sample size of 796 was used for the study.

Social class estimation

The socioeconomic class of the family of the respondent was ascertained using STATA statistical software version 12. Family ownership of household items, such as radio, television, refrigerator, car, and bicycle, availability of electricity, type of residential building, and toilet facility were parameters contained in the principal component analysis (PCA). Quartiles were used for distribution cutoff points and were categorized into two groups, the low socioeconomic class, which included the poorest and very poor, and the high socioeconomic class, which included the poor and least poor groups. Each respondent was assigned the wealth index score of his/her family.

Sampling technique

Three stages were adopted in selecting adolescents who were included in this study. Two local government areas (LGAs) from each urban and rural area of the state were selected by a simple random technique in the first stage of sampling. Five LGAs from the 17 LGAs in Enugu State were classified as urban LGAs.

In the second stage of the sampling technique, two secondary schools were selected from a list of all the secondary schools in each of the selected LGAs by a simple random technique. Ninety adolescents were at least selected from each selected school. The sampling frame was drawn from students in the senior secondary in each of the selected schools, while the sampling interval was obtained by dividing this number by

90. The sampling interval was applied after the first adolescent was selected using a simple random sampling technique of balloting.

Data analysis

IBM Statistical Package for Social Sciences (SPSS) statistical software was used for data entry and analysis. Categorical variables were summarized using frequencies and proportions, while continuous variables were presented using the mean and standard deviation. The Chi-square test and multivariate analysis using binary logistic regression were used in the analysis, and the level of statistical significance was determined by a *P* value of <0.05.

In determining factors associated with Internet addiction, variables that had a *P* value of <0.2 after bivariate analysis were entered into the logistic regression model. The result of the logistic regression analysis was presented using an adjusted odds ratio and 95% confidence interval.

RESULTS

Table 1 shows the sociodemographic characteristics of the respondents. The mean age of the respondents was 15.6 ± 1.8 years. A higher proportion of the respondents (51.8%) were females.

Table 1: Sociodemographic characteristics of respondents

Variable	Frequency (n=796)	Percentage
Age of respondents		
Mean±(SD)	15.6±1.8	
Age of respondents in groups		
<15 years	198	24.9
15–19 years	577	72.5
≥20 years	21	2.6
Gender		
Male	384	48.2
Female	412	51.8
Religion		
Christianity	718	90.2
Islam	55	6.9
Traditional religion	23	2.9
Educational attainment of mother		
No formal education	29	3.6
Primary education	168	21.1
Secondary education	247	31.0
Tertiary education	352	44.2
Employment status of father		
Self-employed	580	72.9
Salaried employment	216	27.1
Family socioeconomic class		
Poorest	213	26.8
Very poor	185	23.2
Poor	306	38.4
Least poor	92	11.6

Table 2: Assessment of Internet addiction among the respondents

Variable	Not applicable n (%)	Rarely n (%)	Occasionally n (%)	Frequently n (%)	Often n (%)	Always n (%)
How often (n=796)						
You stay online longer than intended	233 (29.3)	135 (17.0)	76 (9.5)	67 (8.4)	130 (16.3)	155 (19.5)
You neglect house chores to spend time online	258 (32.4)	180 (22.6)	111 (13.9)	105 (13.2)	101 (12.7)	41 (5.2)
You prefer the excitement of the Internet to intimacy of your partner	320 (40.2)	107 (13.4)	88 (11.1)	121 (15.2)	78 (9.8)	82 (10.3)
You form new relationships with fellow online users	246 (30.9)	112 (14.1)	130 (16.3)	94 (11.8)	111 (13.9)	103 (12.9)
Do others in your life complain to you about time spent online?	260 (32.7)	167 (21.0)	66 (8.3)	110 (13.8)	90 (11.3)	103 (12.9)
Schoolwork suffers because of the time you spent online	376 (47.2)	150 (18.8)	69 (8.7)	51 (6.4)	71 (8.9)	79 (9.9)
You check your email before something else	293 (36.8)	122 (15.3)	75 (9.4)	100 (12.6)	128 (16.1)	78 (9.8)
Your job performance suffers because of the Internet	372 (46.7)	156 (19.6)	92 (11.6)	66 (8.3)	63 (7.9)	47 (5.9)
You become defensive when anyone asks you what you do online	279 (35.1)	114 (14.3)	115 (14.4)	96 (12.1)	91 (11.4)	101 (12.7)
You block out disturbing thoughts about your life with thoughts of the Internet	273 (34.3)	131 (16.5)	97 (12.2)	89 (11.2)	84 (10.6)	122 (15.3)
You find yourself anticipating when you will go online again	252 (31.7)	127 (16.0)	93 (11.7)	75 (9.4)	124 (15.6)	125 (15.7)
You fear that life without the Internet will be boring and empty	266 (33.4)	115 (14.4)	69 (8.7)	65 (8.2)	104 (13.1)	177 (22.2)
You snap or act annoyed if someone bothers you while you are online	251 (31.5)	108 (13.6)	96 (12.1)	106 (13.3)	95 (11.9)	140 (17.6)
You lose sleep due to being online	260 (32.7)	116 (14.6)	104 (13.1)	92 (11.6)	94 (11.8)	130 (16.3)
You feel preoccupied with the Internet when offline	291 (36.6)	132 (16.6)	101 (12.7)	76 (9.5)	119 (14.9)	77 (9.7)
You find yourself saying just “a few more minutes” when online	250 (31.4)	98 (12.3)	75 (9.4)	92 (11.6)	100 (12.6)	181 (22.7)
You try to cut down the amount of time you spend online and fail	271 (34.0)	106 (13.3)	98 (12.3)	63 (7.9)	113 (14.2)	145 (18.2)
You try to hide how long you have been online	282 (35.4)	107 (13.4)	92 (11.6)	100 (12.6)	108 (13.6)	107 (13.4)
You choose to spend more time online over going out with others	279 (35.1)	109 (13.7)	116 (14.6)	72 (9.0)	100 (12.6)	120 (15.1)
You feel depressed or nervous when you are offline and goes away when back	276 (34.7)	135 (17.0)	97 (12.2)	60 (7.5)	68 (8.5)	160 (20.1)

Table 3: Internet addiction among the respondents

Variable	Frequency (n=796)	Percentage
Internet addiction		
Normal level of Internet usage	258	32.4
Mild level of Internet addiction	232	29.1
Moderate level of Internet addiction	289	36.3
Severe dependence on the Internet	17	2.1

Table 2 shows Internet addiction among the respondents. The highest proportion of the respondents (32.4%) does not neglect house chores to spend time online, while the least proportion (5.2%) does that always. The highest proportion of the respondents (46.7%) noted that their job performance does not suffer because of the Internet, while the least proportion (5.9%) noted that their job performance always suffers. A high proportion of the respondents (20.1%) always feel depressed or nervous when they are offline, which goes away when they go

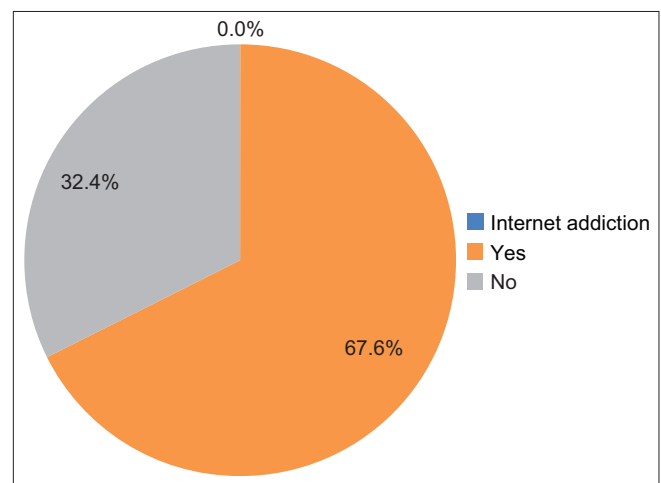


Figure 1: Internet addiction among the respondents

online, while the least proportion (7.5%) have such feelings frequently. About 16.3% of adolescents lose sleep when they are online.

Table 4: Factors associated with Internet addiction among the respondents

Variable	Internet addiction (n=796)		P on bivariate analysis	**AOR (95% confidence interval)
	Yes (n (%))	No (n (%))		
Age of respondents in groups				
<15 years	145 (73.2)	53 (26.8)	0.125	1.1 (0.4–2.8)
15–19 years	378 (65.5)	199 (34.5)		0.7 (0.3–1.9)
≥20 years	15 (71.4)	6 9 (28.5)		1
Gender				
Male	262 (68.2)	122 (31.8)	0.709	NA
Female	276 (67.0)	136 (33.0)		
Educational attainment of mother				
Tertiary education	226 (64.2)	126 (35.8)	0.069	0.8 (0.6–1.1)
Others*	312 (70.3)	132 (29.7)		1
Employment status of father				
Self-employed	390 (67.2)	190 (32.8)	0.732	NA
Salaried employment	148 (68.5)	68 (31.5)		
Family socioeconomic class				
Low socioeconomic class	278 (69.8)	120 (30.2)	0.173	1.2 (0.9–1.7)
High socioeconomic class	260 (65.3)	138 (34.7)		1

*Secondary education and below, **adjusted odds ratio, NA - not applicable

Table 5: Predictors of Internet addiction

Variable	Adjusted odds ratio	P	95% confidence interval	
			Lower	Upper
Age of respondents in groups				
<15 years	1.031	0.952	0.378	2.809
15–19 years	0.706	0.480	0.268	1.857
≥20 years	1			
Educational attainment of mother				
Tertiary education	0.790	0.126	0.584	1.068
Others	1			
Family socioeconomic class				
Low socioeconomic class	1.245	0.157	0.919	1.686
High socioeconomic class	1			

Table 3 shows Internet addiction among the respondents. The highest proportion of the respondents (36.3%) had a moderate level of Internet addiction, while the least proportion (2.1%) had severe dependence on the Internet.

Figure 1 shows Internet addiction among the respondents. A higher proportion of the respondents (67.6%) had Internet addiction.

Table 4 shows factors associated with Internet addiction among the respondents. The respondents who were <15 years of age were 1.1 times more likely to have Internet addiction when compared to those who were 20 years and above (AOR = 1.1; 95% CI: 0.4–2.8). The respondents whose families were of the low socioeconomic class were 1.2 times more likely to have Internet addiction when compared with those whose families were of the high socioeconomic class (AOR = 1.2; 95% CI: 0.9–1.7). Table 5.

DISCUSSION

Adolescents of this present age have been given several phenomenal names, such as digital natives, new millennial students, the Y generation, and the Internet generation.^[33] Never in world history has the quest for the pursuit of Internet services been highly emphasized like this present generation.^[34] This work is aimed at ascertaining the pattern and predictor of Internet addiction among secondary school adolescents.^[34]

This study revealed a high prevalence of Internet addiction among secondary school adolescents. This is higher than the prevalence of 27.1% obtained in a study in Bangladesh.^[34] However, the prevalence rates of Internet addiction range from one sociodemographic and geographic region to another. In the Middle East, prevalence rates of 40%, 39.6%, and 18.3% in Jordan, Iran, and Taiwan were documented, respectively, while a prevalence of 18.3% was seen in Britain.^[35-37] This

varying prevalence could be explained by sociocultural factors and variations in the questionnaires and diagnostic criteria used in the study. A sixfold increase in the use of the Internet has been reported worldwide over the last decade.^[38-40] Xin *et al.*^[40] had shown prevalence rates of 7.9% and 25% in Europe and the United States; 8.1 and 50.9% in the Middle East and Africa; and 23.6% in Asia. In Nigeria, the prevalence of Internet addiction among students attending a certain university was noted to be 14%.^[41] The wide range of prevalence rates of Internet use/addiction and the variance seen in various earlier studies compared with this study could be explained by the fact that some study instruments were based on past-year time frames, while other studies used a lifetime scenario. A lifetime scenario may yield a higher rate. Besides, the reportage highlighted above used different screening tools to assess the prevalence of Internet addiction.

This study showed that adolescents in low socioeconomic class were more likely to have Internet addiction when compared with those in the high socioeconomic class. This supports the findings from earlier studies that documented adolescents from low socioeconomic backgrounds as having lower tendencies for Internet addiction.^[42,43] A meta-analysis had shown some overwhelming evidence that adolescents from low socioeconomic class rarely experience Internet addiction, though about 45.5% of them were in a risk group and 48.7% of them were not addicted to the Internet.^[44-46] On the contrary, another study noted that high socioeconomic class was inversely associated with Internet addiction. A previous Greek study and another conducted in Bangladesh corroborated these findings.^[46,47]

This study showed no significant gender correlation with adolescent Internet addiction. Earlier studies have reported that males are more likely to be addicted to the Internet than females.^[48,49] The higher quest to explore nature, the inquisitive mind, and the propensity to be attracted to addictive objects, such as cybersex, pornography, and online gaming in males, could explain this finding.^[50-52] The finding on gender ambivalence in this study was also not in tandem with that obtained in other European countries where male adolescents were noted to spend more time on the Internet than their female counterparts. Males were rather seen more often on adult sites, while females were seen on social networks.^[52,53]

It was noted in this study that adolescents less than 15 years were more likely to have Internet addiction than adolescents who were 20 years and above. On the contrary, a recent study had shown that older adolescents

displayed more pathological use of the Internet than their younger counterparts.^[53] This had been explained by the older adolescents' developmental dynamics.^[53-56] Massoud and Uyanga^[56] also documented an increase in adolescents' Internet addiction with age.

For instance, they documented that adolescents aged 13–15 years had an 8.1% rate of addiction and 16–18 years had a 30.9% rate of addiction, while 22–24 years had a 35.0% rate of Internet addiction. The reasons for the increased rate of addiction with age could be due to cognitive immaturity, poor development of executive function, and immaturity in self-regulation.^[57]

In this study, adolescents whose mothers attended tertiary institutions had a higher degree of Internet addiction than those whose mothers only attended secondary schools. Higher maternal educational background was associated with regular Internet use.^[58,59]

The most common clinical sequel of Internet addiction seen among adolescents in this study is depression. We noted that 20.1% of adolescents were always depressed when they are not using the Internet. Chi *et al.*^[60] in China, using a total of 532 adolescents from two public schools, documented a similar prevalence of 20.44%.^[60] Ha *et al.*^[61] using a multivariate analysis noted that among all the clinical symptoms seen in adolescents with Internet addiction, depression was the most closely related symptom and they attributed this to biogenetic temperament, high level of harm avoidance, low disconnectedness, high self-transcendence, and low cooperativeness seen in adolescents who had a tendency of Internet addiction.

This study has also shown that a good number of adolescents who were addicted to the Internet develop insomnia. Internet addiction has been linked with several psychological conditions, such as anxiety and insomnia, as studies have shown the disruption of the sleep–wake mechanism among adolescents who are addicted to the Internet.^[62] Insomnia among adolescents with Internet addiction could be caused by emissions from electronic devices, such as smartphones and computers. These emissions suppress melatonin levels, which play a very important role in the sleep–wake cycle.^[63]

CONCLUSION

There is a rising prevalence of Internet addiction among secondary school adolescents. Younger adolescents tend to be more addicted to the Internet than their older counterparts. A small number of them had severe Internet addiction. A subpopulation of adolescents who were addicted to the Internet presents with depression and sleep disorders.

Clinical implications of this study

This study showed a rising prevalence of adolescent Internet addiction. However, depressive episodes and insomnia have been documented as the clinical sequel of Internet addiction among adolescents.

Recommendation

In clinical practice, Internet addiction clinics just as drug addiction clinics should be incorporated into our specialty clinics. Furthermore, screening for Internet addiction and education on its attendant complications should be upheld in schools.

List of abbreviations

- AOR: odds ratio
- DSM: Diagnostic and Statistical Manual of Mental Disorders
- PCA: principal component analysis
- LGAs: local government areas
- SES: socioeconomic status.

Ethical approval and consent to participate

Study approval statement: This study protocol was reviewed and approved by the research and ethical committee of the Enugu State University College of Medicine with approval number ESUTH/C-MAC/RA/034/VOL.W/144.

Author contributions

ATA and JMC conceived the study. ATA, ENO, JMC, PCO, OCN, JIO, and AEA conceived the study. ENO, CNU, and JMC edited the final draft of the manuscript. JMC gave final approval of the published version. ENU processed and analyzed the data.

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Conflicts of interest

There are no conflicts of interest.

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