Original Article

Factors associated with internet addiction among school-going adolescents in Vadodara

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Abstract

Introduction: The internet is an important modern means of obtaining information and communicating with others which has converted the world into a global village. At the same time, increasing internet use among adolescents is also likely to pose a major public health concern that is internet addiction (IA). The aim was to assess the prevalence of IA among school-going adolescents and factors associated with IA. **Methods:** A cross-sectional study was designed to survey adolescents studying in 8th to 11th standard of five schools of Vadodara. Information regarding sociodemography and various patterns of internet use were obtained using survey forms. IA test (IAT) was used to screen for IA. Descriptive analysis, univariate analysis, and logistic regression were done to analyze the data. **Results:** Seven hundred and twenty-four participants that completed IAT were analyzed. Internet use prevalence was 98.9%. Prevalence of IA was 8.7%. Male gender, owning a personal device, hours of internet use/day, use of smartphones, permanent login status, use of internet for chatting, making online friends, shopping, watching movies, online gaming, searching information online and instant messaging were found to be associated significantly with IA in univariate analysis. Internet use for online friendships was found to be a significant predictor of IA (odds ratio [OR] =2.4), and internet use for searching information was found to be protective (OR = 0.20) against IA on logistic regression. **Conclusions:** IA is prevalent in the adolescent population and requires awareness and intervention. Characteristics of internet usage found to be associated with IA needs to be considered while developing strategies for interventions.

Keywords: Adolescent, internet addiction, school

Introduction

Internet is an important means of obtaining information and communicating with others. However, it can prove to be problematic owing to its dysfunctional use. It has been recommended to include internet addiction (IA) in Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM 5).[1] Prevalence for IA in adolescents varies between 2% and 18% worldwide and from 0.3% to 11.8% in India.[2-9] IA is associated with male gender, continuous online availability, online friendships and relationships, depression, low self-esteem, attention deficit hyperactivity disorder, and social maladjustment.[3,4,10-13] This study was conducted with an aim to study prevalence and correlates associated with IA among school-going adolescents.

Subjects and Methods

A cross-sectional study was planned. The sample size was calculated to be 865 considering the prevalence of IA as 10% and taking acceptable difference as 2% for our study. Five English medium schools in Vadodara were selected on convenience basis. All students studying in grades 8–11 were approached for the study. Before survey, permission was sought from respective school

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authorities. Data were collected using self-administered survey forms which included sociodemographic information such as age, gender, class, and another questionnaire to seek information regarding patterns of internet use. This included information such as beginning age of internet use, owning personal device, duration of internet use per day, most used medium to access internet, login status, using internet for purposes such as chatting, online friendships, online relationships, shopping, for coursework, watching movies, watching news, online gaming, instant messaging, and searching information. The information regarding watching adult content was removed from the questionnaire as most schools did not permit for the same. IA test (IAT) was used to screen for IA. It is a 20-item self-report questionnaire answered on the five-point Likert-type scale (0= "Does not apply," 1= "Rarely" to 5= "Always"). Items on the IAT measures in relation to internet use, compulsive behavior, academic difficulties, lack of competence at home, problems in interpersonal relations, and emotional problems. It has been validated for use in adult and adolescent populations and has good internal consistency as well as concurrent validity. In item seven of IAT, "How often do you check your E-mail before something else that you need to do?" we added the term instant messaging along with E-mail keeping in mind the current patterns of communication through internet. Total IAT score of ≥50 was categorized as IA.[9,14] Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS Version 14, SPSS Inc, Chicago IL; 2005). Chi-square tests were applied to find an association between IA and various categorical variables, and logistic regression analysis to find predictive factors for IA. Anonymity and confidentiality of the participants were maintained throughout the study. The study was conducted after obtaining prior approval from Ethics Committee of the institution.

Results

In total, 836 adolescents were surveyed. Nine reported not having used internet ever, so they were excluded from analysis. Internet use prevalence was 98.9%. Only 724 participants completed the IAT and were included in the subsequent analysis.

Out of 724, 411 (56.8%) were males. The mean age of participants was 14.5 years (standard deviation [SD] 0.96, range 13–17). One hundred and thirty (17.9%) were from 8th grade, 251 (34.6%) from 9th, 301 (41.5%) from 10th, and 51 (7%) from 11th grade. A personal device for internet use was owned by 63.6% of the participants. The mean age of onset of internet use was 11.3 years (SD 1.73). Participants who admitted to use internet for more than 4 h/day were 5.4%. Smartphone was owned by 60.6% and 27.9% kept a permanent log-in status. Participants reported using internet for chatting (55.2%), online friendships (22.7%), online relationships (6.6%), shopping (39.9%), preferred way of interacting with friends (23.5%), for doing coursework (34.5%), watching movies (33.1%) and news (19.1%), online gaming (35.4%), instant messaging (21%), and for searching information (73.9%).

The prevalence of IA was found to be 8.7% (63/724). The mean age of participants with IA was 12.5 years (SD 0.93, range 13–17). Male gender, owning a personal device, hours of internet use per day, use of smartphones, permanent login status, use of internet for chatting, online friendships, shopping, watching movies, online gaming, searching information online, and instant messaging were found to be significantly associated with IA on univariate analysis [Table 1]. Internet use for online friendships (odds ratio [OR] =2.4) was found to be a significant predictor of IA and internet use for searching information (OR = 0.20) was found to be protective against IA on logistic regression [Table 2].

Discussion

IA includes symptoms such as preoccupation with the internet, withdrawal symptoms, tolerance, unsuccessful attempts to control internet use, and continued excessive internet use despite the negative consequences. There is a loss of interest in previous hobbies, entertainment as a result of, and with the exception of, internet use. Internet is used to escape or relieve a dysphoric mood, and to hide internet use, person may lie to family members, therapists, or others.[15] The American Psychiatric Association has recently included Internet Gaming Disorder in the appendix of updated version of DSM-5. IA or Problematic Internet use has yet not been officially recognized as a disorder.[16]

IA has been linked to functional brain changes in the prefrontal cortex, temporal cortex, and ventral striatum and structural brain changes in parts of prefrontal cortex. The functional changes in prefrontal and striatal areas are observable when individuals with IA perform tasks measuring executive functions and cue reactivity. The prefrontal control processes are reduced in IA and found to be related to person's loss of control over internet use.[17]

Psychological factors such as using internet to escape from self-dissatisfaction, to deal with stress, having a poor attention control, self-control, and emotional regulation along with individual temperaments have been found to be associated with the development of IA.[18,19] Significant associations have been observed between IA and high-risk behaviors among adolescents.[20]

IAT was designed by Kimberly Young in 1998, and since then the internet usage has changed drastically.[11,14] Social networking sites such as Facebook, Twitter, Instagram, and instant messaging apps have become important means of communication and interaction. While earlier when the IAT was formed the possibility of internet controlling one's mood, etc., was not a consideration, it has now been shown by an experiment using Facebook algorithms that altering what is shown to a user can change the kind of posts the user makes.[21] While the experimental evidence may not occur in real life, it indicates the virtual world comparison to old saying of "you are known by the friends you keep." The IAT scale needs to be modified *in lieu* of changing trends of internet use.

IAT showed a good internal consistency in our study as interpreted from Cronbach's alpha of 0.88. Prevalence of IA

Table 1: Internet addiction and internet use patterns - univariate analysis

	Univariate analysis		
	Normal internet usage, *n* (%)	Internet addiction, *n* (%)	*P*
Personal device			
No	249 (37.96)	12 (19.68)	0.005
Yes	407 (62.04)	49 (80.32)	
Duration of use (h)			
0-2	533 (83.67)	34 (53.97)	<0.0001
2-4	77 (12.08)	18 (28.57)	
>4	27 (4.23)	11 (17.46)	
Desktop use			
No	518 (78.84)	56 (88.89)	0.058
Yes	139 (21.16)	7 (11.11)	
Laptop use			
No	521 (78.94)	44 (69.54)	0.095
Yes	139 (21.06)	19 (30.16)	
Tablet use			
No	540 (82.19)	54 (85.71)	0.482
Yes	117 (17.81)	9 (14.29)	
Smartphone use			
No	271 (41.00)	14 (22.22)	0.004
Yes	390 (59.00)	49 (77.78)	
Login status			
Intermittent login	458 (73.99)	33 (53.23)	0.001
Permanent logged in	161 (26.01)	29 (46.77)	
Chatting			
No	304 (45.99)	20 (31.75)	0.030
Yes	357 (54.01)	43 (68.25)	
Online friendships			
No	525 (79.43)	34 (54.84)	<0.0001
Yes	136 (20.57)	28 (45.16)	
Online relationships			
No	620 (93.80)	56 (88.89)	0.177
Yes	41 (6.20)	7 (11.11)	
Online shopping			
No	407 (61.57)	28 (44.44)	0.008
Yes	254 (38.43)	35 (55.56)	
Online movies			
No	454 (68.68)	30 (47.62)	0.001
Yes	207 (31.32)	33 (52.38)	
Online news			
No	536 (81.09)	50 (80.96)	0.739
Yes	125 (18.91)	13 (19.04)	
Searching information online			
No	166 (25.11)	23 (36.50)	0.049
Yes	495 (74.89)	40 (63.49)	
Online gaming			
No	434 (65.65)	34 (53.91)	0.064
Yes	227 (34.35)	29 (46.09)	
Instant messaging			
No	537 (81.24)	35 (55.56)	<0.001
Yes	124 (18.67)	28 (44.44)	
Gender			
Male	365 (55.2)	46 (73)	0.007
Female	296 (44.8)	17 (27)	

Table 2: Internet addiction and internet use patterns - logistic regression

	Logistic regression
	Internet addiction Adjusted OR (95% CL)
Personal device	
No	1.00 (reference)
Yes	1.56 (0.60-4.11)
Duration of use (h)	
0-2	1.00 (reference)
2-4	1.04 (0.39-2.74)
>4	2.04 (0.60-6.94)
Desktop use	
No	1.00 (reference)
Yes	0.72 (0.24-2.22)
Laptop use	
No	1.00 (reference)
Yes	1.91 (0.80-4.53)
Tablet use	
No	1.00 (reference)
Yes	0.74 (0.23-2.37)
Smartphone use	
No	1.00 (reference)
Yes	1.62 (0.63-4.21)
Login status	
Intermittent login	1.00 (reference)
Permanent logged in	1.80 (0.78-4.17)
Chatting	
No	1.00 (reference)
Yes	1.06 (0.43-2.62)
Online friendships	
No	1.00 (reference)
Yes	2.43 (1.03-5.78)
Online relationships	
No	1.00 (reference)
Yes	0.84 (0.25-2.87)
Online shopping	
No	1.00 (reference)
Yes	2.11 (0.86-5.19)
Online movies	
No	1.00 (reference)
Yes	2.25 (0.89-5.64)
Online news	
No	1.00 (reference)
Yes	0.43 (0.16-1.18)
Searching information online	
No	1.00 (reference)
Yes	0.20 (0.08-0.52)
Online gaming	
No	1.00 (reference)
Yes	1.27 (0.55-2.95)
Instant messaging	
No	1.00 (reference)
Yes	1.78 (0.63-5.01)
Gender	
Male	1.00 (reference)
Female	0.99 (0.44-2.20)

CI: Confidence interval; OR: Odds ratio

was found to be 8.7%. This finding is similar to the prevalence reported in recent Indian studies considering the same cutoff for IAT (7.7%–11.8%).[6,9] This raises concern to address IA as an important emerging mental health issue among adolescents.

Earlier studies from India recruited participants from 16 to 19 years age group.[6,9,10,22] A recent study by Grover *et al.* reported the time lag between first exposure to internet and developing IA as 6 years.[23] Compared to previous studies, we chose to conduct a study in a younger population as children are getting access to internet use at a very young age.

Within this subgroup, we found that the mean age of those having IA was less than study population mean age. At very young age, adolescents are vulnerable to develop IA because of their psychological characteristics, limited supervision, and getting into online friendships.[10]

Male gender, owning a personal device, hours of internet use per day, use of smartphones, permanent login status, use of internet for chatting, online friendships, shopping, watching movies, online gaming, searching information online and instant messaging were found to be significantly associated with IA at the univariate level. These associations are in agreement with similar findings from previous studies.[6,9,10] Males are more susceptible to IA as they are primarily using internet for entertainment purposes such as gaming and watching sexually explicit material as compared to females.[24]

Sites such as Facebook and Twitter have become important platforms for chatting and developing online friendships. A study by Hong *et al.* reports that depressive character and Facebook usage significantly predict Facebook addiction which is a subset of IA.[25]

Internet use for online friendships was found to be a significant predictor of IA. This is in keeping with the findings of previous studies.[10] A review by Kuss and Griffiths reports that extroverts use such sites to increase their social network and friendships and introverts engage more into online friendships to compensate for their real life deficits.[26]

Internet use for searching information is found to be protective against IA. A study conducted in Bengaluru by Krishnamurthy and Chetlapalli states that using internet less for coursework predicted IA.[10] Adolescents using internet for information seeking are using their time constructively as compared to those using it for entertainment and social networking purposes. Engaging into more constructive work is shielding them from getting addicted.

Inappropriate internet use may lead to various legal problems such as being arrested for posting hateful posts on Facebook, Twitter, cyber-bullying, deaths while taking selfies, illegal online gambling, cyber-stalking, committing technological crimes, posting threats online, and being recruited by extremist agencies.[27,28]

This was a cross-sectional study which limits the interpretation to factors associated with IA. To further explore the risk factors contributing to IA, longitudinal studies need to be planned. There is a possibility of recall bias in the current study as the information was collected using self-reported questionnaires. A convenient sampling was used which limits the generalizability of these results.

Conclusion

With the rapidly increasing internet use among adolescents, IA is soon likely to emerge as a global health issue. Any adolescent presenting to primary care physician with behavioral issues and poor academic performance with a history of internet use needs to be screened for IA. Early interventions may include counseling regarding monitoring of internet use either by self or involving family members, encouraging face-to-face socialization, ensuring an adequate amount of sleep, exercise, and a balanced diet.[29]

Guidelines for interventions need to be developed to address IA among adolescents at the primary health-care level. Characteristics of internet usage found to be associated with IA needs to be considered while developing strategies for interventions. There need to be guidelines regarding what should be the age for exposure for internet, at what age a personal device for internet use should be provided to children, and permissible hours of internet use. Monitoring of hours and purpose of internet usage by parents and school authorities may help in controlled internet use. Policymakers may think of including "Responsible Internet Use" in curriculum keeping in mind the major public health issue IA is turning out to be.

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Conflicts of interest

There are no conflicts of interest.

References

1. Block JJ. Issues for DSM-V: Internet addiction. Am J Psychiatry 2008;165:306-7.
2. Ge Y, Se J, Zhang J. Research on relationship among internet-addiction, personality traits and mental health of urban left-behind children. Glob J Health Sci 2014;7:60-9.
3. Bahrainian A, Khazaee A. Internet addiction among students: The relation of self esteem and depression. Bull Environ Pharmacol Life Sci 2014;3:1-6.
4. Kormas G, Critselis E, Janikian M, Kafetzis D, Tsitsika A. Risk factors and psychosocial characteristics of potential problematic and problematic internet use among adolescents: A cross-sectional study. BMC Public Health 2011;11:595.
5. Kamal NN, Mosallem FA. Determinants of problematic internet use among el-minia high school students, Egypt. Int J Prev Med 2013;4:1429-37.
6. Sharma A, Sahu R, Kasar PK, Kasar PK, Sharma R. Internet addiction among professional courses students: A study from central India. Int J Med Sci Public Health

2014;3:1069-73.

7. Srijampana VV, Endreddy AR, Prabhath K, Rajana B. Prevalence and patterns of internet addiction among medical students. Med J Dr DY Patil Univ 2014;7:709.
8. Goel D, Subramanyam A, Kamath R. A study on the prevalence of internet addiction and its association with psychopathology in Indian adolescents. Indian J Psychiatry 2013;55:140-3.
9. Yadav P, Banwari G, Parmar C, Maniar R. Internet addiction and its correlates among high school students: A preliminary study from Ahmedabad, India. Asian J Psychiatr 2013;6:500-5.
10. Krishnamurthy S, Chetlapalli SK. Internet addiction: Prevalence and risk factors: A cross-sectional study among college students in Bengaluru, the Silicon Valley of India. Indian J Public Health 2015;59:115-21.
11. Young KS, Rogers RC. The relationship between depression and internet addiction. Cyberpsychol Behav 1998;1:25-8.
12. Morrison CM, Gore H. The relationship between excessive internet use and depression: A questionnaire-based study of 1,319 young people and adults. Psychopathology 2010;43:121-6.
13. Yen JY, Ko CH, Yen CF, Wu HY, Yang MJ. The comorbid psychiatric symptoms of internet addiction: Attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility. J Adolesc Health 2007;41:93-8.
14. Widyanto L, McMurran M. The psychometric properties of the internet addiction test. Cyberpsychol Behav 2004;7:443-50.
15. Tao R, Huang X, Wang J, Zhang H, Zhang Y, Li M. Proposed diagnostic criteria for internet addiction. Addiction 2010;105:556-64.
16. Kuss DJ, Lopez-Fernandez O. Internet addiction and problematic internet use: A systematic review of clinical research. World J Psychiatry 2016;6:143-76.
17. Brand M, Young KS, Laier C. Prefrontal control and internet addiction: A theoretical model and review of neuropsychological and neuroimaging findings. Front Hum Neurosci 2014;8:375.
18. Koo HJ, Kwon JH. Risk and protective factors of internet addiction: A meta-analysis of empirical studies in Korea. Yonsei Med J 2014;55:1691-711.
19. Li W, O'Brien JE, Snyder SM, Howard MO. Characteristics of internet addiction/pathological internet use in U.S. university students: A qualitative-method investigation. PLoS One 2015;10:e0117372.
20. Durkee T, Carli V, Floderus B, Wasserman C, Sarchiapone M, Apter A, *et al.* Pathological internet use and risk-behaviors among European adolescents. Int J Environ Res Public Health 2016;13. pii:E294.
21. Kramer AD, Guillory JE, Hancock JT. Experimental evidence of massive-scale emotional contagion through social networks. Proc Natl Acad Sci U S A 2014;111:8788-90.
22. Meena PS, Mittal PK, Solanki RK. Problematic use of social networking sites among urban school going teenagers. Ind Psychiatry J 2012;21:94-7.
23. Grover S, Chakraborty K, Basu D. Pattern of internet use among professionals in India: Critical look at a surprising survey result. Ind Psychiatry J 2010;19:94-100.
24. Siomos KE, Dafouli ED, Braimiotis DA, Mouzas OD, Angelopoulos NV. Internet addiction among Greek adolescent students. Cyberpsychol Behav 2008;11:653-7.
25. Hong FY, Huang DH, Lin HY, Chiu SL. Analysis of the psychological traits, Facebook usage, and Facebook addiction model of Taiwanese university students. Telematics Inform 2014;31:597-606.
26. Kuss DJ, Griffiths MD. Online social networking and addiction – a review of the psychological literature. Int J Environ Res Public Health 2011;8:3528-52.
27. Recupero PR. Forensic evaluation of problematic internet use. J Am Acad Psychiatry Law 2008;36:505-14.
28. Flaherty GT, Choi J. The 'selfie' phenomenon: Reducing the risk of harm while using smartphones during international travel. J Travel Med 2016;23:tav026.
29. Loton D, Lubman DI. Just one more level: Identifying and addressing internet gaming disorder within primary care. Aust Fam Physician 2016;45:48-52.