ORIGINAL ARTICLE

Problematic Internet Use Among Adolescent School Attendees: A School-based Study From Tamil Nadu, India

Lakshmi Shanthi,[1] Jeyashree Ashwath,[1] Mohan Kumar Raju,[2] Sudha Ramalingam[3]

[1]Teen Wellness Centre, Shadow Clinics, Coimbatore, Tamil Nadu, India
[2]Safetynet India Epidemiology Services, New Delhi, India
[3]PSG Institute of Medical Sciences and Research, Coimbatore, Tamil Nadu, India

ABSTRACT

Objectives: To investigate the prevalence of problematic internet use (PIU) among adolescents and determine the associated factors contributing to PIU.

Methods: In April/May 2023, a cross-sectional study was conducted among adolescents studying in grades 9 to 12 in government and private non-residential schools in Western Tamil Nadu, India. Participants completed a semi-structured questionnaire assessing demographic characteristics, behavioral patterns, and internet usage. The Problematic and Risky Internet Use Screening Scale (PRIUSS) was employed to quantify PIU.

Results: Out of 1795 participants, 398 (24.5%) were identified with PIU. Prevalence rates of PIU were similar between adolescents studying in English (n = 189; 25.4%) and Tamil medium (n = 209; 23.7%), with no significant differences based on gender [boys (n = 270, 25.4%) and girls (n = 121, 22.2%)]. Students possessing personal gadgets showed higher PIU [n = 287 (27%) Vs. n = 111 (20%)]. Specific risk factors for PIU identified students in English medium and scoring below 80% [OR (95%CI) 1.5 (1.1, 2.3); P = 0.029] and those with multiple gadgets at home [1.3 (1.01, 1.7); P = 0.04].

Conclusion: Adolescents have a high prevalence of PIU. Implementing school-based educational programs will mitigate excessive internet usage.

Keywords: *Adolescent health, Gadget use, Internet addiction, PRIUSS*

Published online: Sep 10, 2024; ***PII***: S097475591600689

INTRODUCTION

Technological advances and increased internet connectivity have increased the use of mobile phones and other gadgets amongst children and adolescents. Consequently, several new disorders, more so linked to digital wellness, have come to the fore. Problematic internet use (PIU) is one such recent-onset disorder that has been seen more commonly among adolescents and young adults. Beard and Wolf have defined PIU as the use of the internet that creates psychological, social, school, and work difficulties in a person's life [1]. It includes various activities like online gaming, social media use, web-streaming, pornography viewing, and shopping. Internet gaming disorders among adolescents and young adults have been included under the Diagnostic and Statistical Manual [DSM 5-2013], which is a part of PIU.

Correspondence to: Mohan Kumar Raju, Senior Technical Officer, Safetynet, ICMR-National Institute of Epidemiology, Chennai, Tamil Nadu, India
mohankumar@safetynet-web.org
Received: Apr 16, 2024; Initial review: May 14, 2024;
Accepted: Aug 02, 2024

The global prevalence of PIU ranges from 1-10% [2]. Studies showed homogenous online activities in 15 countries [3,4]. Among South-east Asian students, the prevalence of internet addiction varies from 0-47.4%, and online pornography viewing ranges from 20-40% [5]. A meta-analysis covering nine Indian cities reported PIU in 22% adolescents in 2015 [6,7]. In a school-based study from Delhi, PIU was reported in 19% children [8].

Excessive use of the internet leads to various health concerns including addictive behaviors, sleep disorders, anxiety, and cognitive difficulties.Hence, there is a need to detect PIU and initiate timely therapy. Unfortunately, most of the screening tools for PIU are not robust and there is a lack of scientific evidence to support their use. Additionally, most of them have been designed for use in adults, have varied/random cutoffs, and are not validated. One of the pediatric-focused validated tools is the Problematic and Risky Internet Use Screening Scale

(PRIUSS) [9]. Hence, we conducted a study to estimate the prevalence of PIU among boys and girls of government and privately run schools in the western city of Tamil Nadu in 2023 and to determine the factors contributing to PIU.

METHODS

A cross-sectional study was conducted among the boys and girls of classes 9th to 12th in selected government and private non-residential schools. The city limit had 678 higher secondary schools handling 9 to 12 standard classes where all have English as a medium of education, and 259 also had Tamil language as a medium of instruc-tion. We identified six schools each from English and Tamil medium by purposive sampling. Students who had spent at least one year in the current school were included in the study. Students who did not attend school on the survey date were excluded.

Initially, we trained identified school teachers on the consent process and the data collection methods. A consent form was distributed to the parents of students who agreed to participate in the study. Subsequently, the teachers distributed the participant information sheet, the assent form for the student, and the PRIUSS tool in the student's preferred language. We used a pilot-tested semi-structured questionnaire to collect information on demographic characteristics and behavioral and health-related information. We used the 18-item PRIUSS tool to assess/ quantify PIU; a score of 0 to 4 was given for each item and a score of 25 out of 72 was required for PIU. The tool assessed three domains: social impairment, emotional impairment and risky/compulsive internet use. The filled-up forms were collected in a sealed box, and the responses were evaluated using a key kept with the principal investigator.

Statistical analysis: Statistical analysis was performed using Epi Info version 7.2.5. The PRIUSS tool with at least one blank was excluded from analysis. We compared the frequencies of PIU based on the institution type (government vs private) and medium of education (English Vs Tamil). We performed univariate analysis and calculated the odds ratio with 95% confidence intervals for the factors associated with PIU.

RESULTS

Of the 1795 participants, 851 (47%) were from the English medium of education and 944 (53%) from the Tamil-medium (**Fig.1**). 1626 (91%) students entered all 18 responses in the PRIUSS tool. One-tenth of the students (*n* = 169, 9%) had left at least one blank and were excluded from the analysis. Among the 1626 study participants, 1062 (66%) were boys and 544 (34%) were girls. The median age of the participants was 15 (IQR 14, 16) years. 881 (49%) students were from government schools, and 745 were from private schools (**Table I**). Four-fifths of the study participants were living in a nuclear family structure (*n* = 1272, 78%), and the rest (*n* = 353,12%) in a joint family. Four-fifths (*n* = 1312, 82%) of students had digital classrooms. 1541 (95%) students had access to a mobile at home, and 1067 (66%) admitted to having a personal gadget, out of which a smartphone was the most common [905 (86%)]. A total of 1331 students had a Whats App account, and 99 students (6%) admitted to watching porn.

Out of the 1626 responses, the mean (SD) PIU score was 16.5 (13.4). 398 (24.5%) children PIU with similar PIU among English medium schools (*n* = 189, 25.4%) and Tamil medium schools (*n* = 209, 23.7%). There was no statistically significant difference in PIU among boys (*n* = 270, 25.4%) and girls (*n* = 121, 22.2%).

Of the 398 students who scored positive for PIU, there was no difference in PIU prevalence between nuclear and joint families (24% vs 26%). PIU prevalence increased with an increase in family members from 23% in up to four

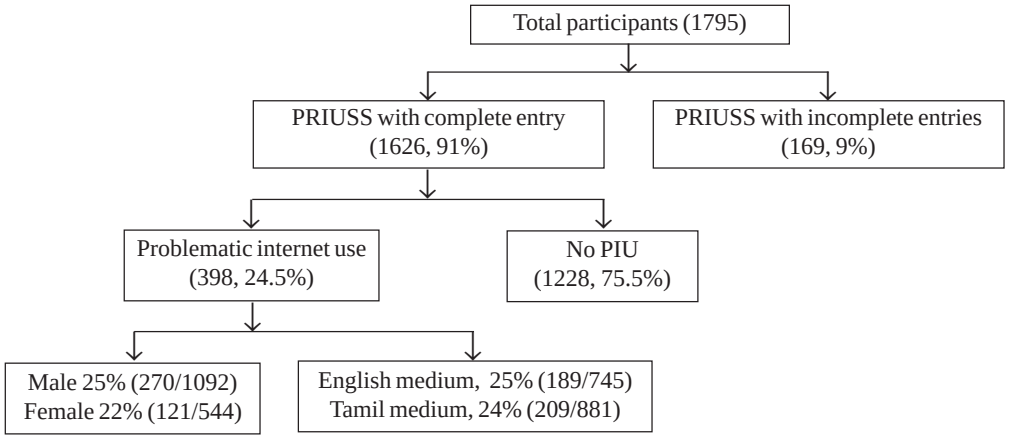

Fig. 1 Problematic internet use among the study participants in the western district of Tamil Nadu, 2023

Table I Characteristics of Study Participants Diagnosed With and Without Problematic Internet Use

Characteristics	*Total (n = 1626)*	*With PIU (n = 398)*	*Without PIU (n =1228)*	*P value*
Gender				
Male	1062	270	792	0.186
Female	544	121	423	
Not specified	13	5	8	
Family type				
Nuclear	1272	305	967	0.364
Joint	353	93	260	
Family size				
Up to 4	1092	254	838	0.253
5 & 6	435	118	317	
7 to 10	75	21	54	
More than 10	12	2	10	
Class of study				
9	439	98	341	0.063
10	392	92	300	
11	389	115	274	
12	402	92	310	
Gadget				
Desktop	380	108	272	0.283
Laptop	684	177	507	
Tablet	379	111	268	
Mobile	1541	387	1154	
Having personal gadget	1067	287	780	< 0.001
Having online classes	634	155	479	< 0.001
Schools with digital classroom	1312	317	995	< 0.001
Predominant gadget use				
Studying	458	92	366	0.379
Socialisation / Chatting	333	83	250	
Gaming	192	45	147	
Browsing	123	31	92	
Watching videos	192	50	142	
Watch porn	99	40	59	0.001
Having a headache, dry eye or visual disturbance	792	250	542	< 0.001

Values expressed as n (%); PIU Problematic internet use

family members to 28% in 7 to 10 family member groups. PIU prevalence was higher in participants studying in 11th standard (30%) compared to students in 9th, 10th, and 12th standards (22%, 24%, and 23%, respectively). PIU was higher among participants with a personal gadget (27%) than those without personal gadgets (20%). There was no difference in the prevalence of PIU among study participants having access to digital classrooms (25%) or not (24%). Participants who reported using gadgets for studying (20%) had statistically significantly lower PIU prevalence compared to those watching videos (26%), socialising/chatting (25%), browsing(25%), and gaming (24%). Most PIUs used WhatsApp (85%) and Instagram (71%), followed by Facebook, Snapchat, Josh, etc. Among children with PIU, reporting of health issues like headache, dry eye, or visual disturbance was higher (32%) compared to non-PIU study participants (18%)

In risk factor analysis, although there was no association between PIU and the medium of education and the gender of the study participants, we could find risk factors with stratified analysis (**Table II**). Studying in 11th standard and studying in English medium were associated with PIU. Studying in 12 standard was protective. Participants scoring below 80% had a 1.5 times higher chance of having PIU. There was no association between studying in Tamil medium and PIU. When stratified by the medium of education, among the children studying in English medium, participants with a self-reported bad academic performance showed an eight times higher chance of being PIU compared to others.

Having a desktop or tablet PC at home had a higher chance of being PIU (**Table III**). Although having a mobile phone at home had two times higher chance of being PIU, having a mobile phone at home in English medium study participants had double the chance of being PIU compared to the Tamil medium counterpart. Study participants using gadgets predominantly for studying showed less chance of having PIU.

Regarding the behavioral aspects of study participants, doing yoga/exercise has a lesser chance of having PIU. Study participants eating fried items/junk food had a twice higher chance of having PIU than students not eating them. Also, study participants who reported watching porn showed a two times higher chance of having PIU compared to others.

DISCUSSION

One-fourth of adolescent participants in our study had PIU using the PRIUSS scale. Before the COVID-19 pandemic, the global prevalence of PIU among the teenage population was 9-11% [6,10]. Sinduja et al revealed a prevalence of 18% using the PRIUSS scale in the USA during the COVID-19 pandemic [11].

In our study, participants were equally distributed among Tamil and English medium schools, and both groups showed an equal prevalence of PIU. Also, there was no significant difference in PIU between boys and girls. A previous meta-analysis in India showed higher PIU

Table II Educational Factors Associated With PIU Among the Study Participants in the Western District of Tamil Nadu

Indicator	*With PIU*	*Without PIU*	*Odds Ratio (95% CI)*	*P value*
Studying in 12 standard (*n* = 487)	92 (19)	310 (25)	0.69 (0.53, 0.90)	0.004
Studying 11 standard (*n* = 389)	115 (29)	274 (22)	1.42 (1.1, 1.8)	0.008
Studying 11 standard (English medium) (*n* = 168)	59 (31)	119 (21)	1.67 (1.15, 2.41	0.007
Studying 11 Std (Tamil medium) (*n* = 211)	56 (27)	155 (23)	1.22 (0.86, 1.74)	0.271
Scoring marks < 80% (*n* = 966/1313)	231 (76)	735 (73)	1.2 (0.89, 1.63)	0.230
Scoring marks < 80% (English medium) (*n* = 338)	96 (64)	242 (53)	1.54 (1.1, 2.25)	0.026
Scoring marks < 80% (Tamil medium) (*n* = 628)	135 (89)	493 (89)	1.0 (0.57, 1.8)	0.980
Bad academic performance (*n* = 27)	16 (4)	11 (1)	4.6 (2.11, 10.31)	< 0.001
Very good academic performance (*n* = 224)	68 (19)	156 (14)	1.41 (1.03, 1.92)	0.035
Bad academic performance (English) (*n* = 15)	11 (6)	4 (1)	8.44 (2.74, 30.98)	< 0.001
Bad academic performance (Tamil) (*n* = 12)	5 (3)	7 (1)	2.32 (0.67, 7.59	0.175
Very good academic performance (English) (*n* = 46)	12 (6)	34 (6)	1.03 (0.51, 2.01)	0.908
Very good academic performance (Tamil) (*n* = 178)	56 (32)	122 (22)	1.68 (1.15, 2.45)	0.007

Values expressed as n (%); PIU Problematic internet use

Table III Behavioural and Gadget Usage Factors Associated with PIU Among the Study Participants in the Western District of Tamil Nadu

Indicator	*With PIU*	*Without PIU*	*Odds Ratio (95% CI)*	*P value*
Doing yoga/exercise	156 (39)	550 (45)	0.79 (0.62, 0.99)	0.041
Having a desktop at home	108 (27)	272 (21)	1.31 (1.01, 1.7)	0.042
Having tablet pc at home	111 (28)	268 (22)	1.39 (1.07, 1.79)	0.014
Having a mobile at home	387 (95)	1154 (89)	2.41 (1.51 – 4.0)	< 0.001
Having mobile at home (English Medium)	187 (99)	539 (94)	5.54 (1.55, 34.66)	0.004
Having a mobile at home (Tamil Medium)	200 (92)	615 (85)	2.02 (1.22, 3.50)	0.005
Having a personal gadget	287 (72)	780 (64)	1.48 (1.16, 1.90)	0.002
Having a personal gadget (English Medium)	170 (90)	426 (77)	2.71 (1.64, 4.63)	< 0.001
Having a personal gadget (Tamil Medium)	117 (56)	354 (53)	1.14 (0.84, 1.56)	0.405
Predominant use (Study)	92 (31)	366 (37)	0.76 (0.57, 0.99)	0.050
Watching porn	40 (10)	59 (5)	2.23 (1.46, 3.38)	< 0.001
Fried items/ Junk food items consumption	232 (58)	475 (39)	2.19 (1.74, 2.76)	< 0.001

Values expressed as n (%); PIU Problematic internet use

among males, five of which state that the PIU is now becoming more generalised rather than gender-based. We found an equal risk of PIU among nuclear and joint families [12]. These findings indicate the rising internet use for various purposes in this age group, like academics, entertainment, chatting, online gaming, etc., irrespective of underlying demographic factors. Owning a personal gadget like a mobile phone showed twice the risk of PIU. Also, owning more than one gadget was an apparent risk factor for PIU in our study. Watching porn was a significant risk factor for PIU, as indicated in previous studies too [13].

Our study found a significant association between PIU and bad academic performances (fewer children scoring more than 80%) among English medium students. At the same time, students who reported very good academic performance had a higher chance of being problematic Internet users, probably due to excess Internet use for academic purposes.

In our study, exercise/yoga was identified as a protective factor for PIU. PIU students were more inclined to junk intake as they watched television or gadgets while consuming unhealthy snacks. In a systematic review and

WHAT THIS STUDY ADDS ?

- One fourth of adolescents studying in 9 to 12 standard had problematic internet use (PIU).
- The prevalence of PIU was not different in children studying in government and private institutions, and also between the male and female adolescents

meta-analysis, PIU was confirmed to predict eating disorders in students [14]. It is observed that PIU affects physical and psychological health, in turn affecting their academic performance. Our adolescent population urgently needs anticipatory guidance on healthy and safe Internet use.

Although, we stratified the analysis by gender and provided gender-based PIU, the number of female participants was fewer. We could not contact every participant individually for follow-up and counselling as we did not collect any personal identifiers. However, through our study we did raise general awareness about PIU among the study participants. The problems of cyberbullying and internet fraud among PIU users were not studied in the present study. We followed purposive sampling, and hence the results cannot be generalised to the country.

We conclude that PIU is high among the school-going students of the western district of Tamil Nadu, with no difference in PIU among the gender and medium of education. Awareness on PIU and education on lifestyle modifications will help reduce PIU among the school students.

Ethics clearance: Institutional Human Ethics Committee, PSG Institute of Medical Sciences & Research, Coimbatore, India, IHEC proposal number: 23/027, dated Mar 31, 2023

Contributors: LS, JA: Conceptualisation, investigation, formal analysis, initial draft, technical inputs, refining the critical appraisals. MK: Conceptualisation, formal analysis, initial draft, refining of the critical appraisals, final drafting of the manuscript. SR: Technical inputs, ethics approval for the study, drafting the manuscript. All authors were involved in the conception, development of the methodology study and approval of the final manuscript.

Funding: None. *Competing interest:* None stated

REFERENCES

1. Pettorruso M, Valle S, Cavic E, et al. Problematic Internet use (PIU), personality profiles and emotion dysregulation in a cohort of young adults: trajectories from risky behaviors to addiction. Psychiatry Res. 2020;289:113036.
2. Cash H, Rae CD, Steel AH, Winkler A. Internet Addiction: A brief summary of research and practice. Curr Psychiatry Rev. 2012;8:292-8.
3. Young KS. Internet addiction: The emergence of a new clinical disorder. Cyberpsychol Behav. 1998;1:237-44.
4. Kaess M, Parzer P, Brunner R, et al. Pathological internet use is on the rise among european adolescents. J Adolesc Health Off Publ Soc Adolesc Med. 2016;59:236-9.
5. Balhara YPS, Mahapatra A, Sharma P, Bhargava R. Problematic internet use among students in South-East Asia: Current state of evidence. Indian J Public Health. 2018; 62: 197-210.
6. Davey S, Davey A, Singh J. Emergence of problematic internet use among indian adolescents: A multi method study. J Indian Assoc Child Adolesc Ment Health. 2016; 12:60-78.
7. Joseph J, Varghese A, Vijay VR, et al. Problematic internet use among school-going adolescents in India: A systematic review and meta-analysis. Indian J Community Med. 2022; 47:321.
8. Balhara YPS, Harshwardhan M, Kumar R, Singh S. Extent and pattern of problematic internet use among school students from Delhi: Findings from the cyber awareness programme. Asian J Psychiatry. 2018;34:38-42.
9. Jelenchick LA, Eickhoff J, Christakis DA, et al. The Problematic and Risky Internet Use Screening Scale (PRIUSS) for Adolescents and Young Adults: Scale Development and Refinement. Comput Hum Behav. 2014;35.
10. Moreno MA, Eickhoff J, Zhao Q, Young HN, Cox ED. Problematic internet use: A longitudinal study evaluating prevalence and predictors. J Pediatr X. 2019;1:100006.
11. Lakkunarajah S, Adams K, Pan AY, Liegl M, Sadhir M. A trying time: Problematic internet use (PIU) and its association with depression and anxiety during the COVID-19 pandemic. Child Adolesc Psychiatry Ment Health. 2022;16:49.
12. Islam MdS, Sujan MdSH, Tasnim R, et al. Problematic internet use among young and adult population in Bangladesh: Correlates with lifestyle and online activities during the COVID-19 pandemic. Addict Behav Rep. 2020;12: 100311.
13. Kumar V, Sachdeva A, Khullar S, Ali E, Abbas SZ. Internet pornography use among medical students in India: Extent and effect. Journal of Psychosexual Health 2022;4:14-9. Accessed Mar 25, 2024. Available from: *https://journals.sagepub.com/doi/full/10.1177/26318318211065648*
14. Hinojo-Lucena FJ, Aznar-Díaz I, Cáceres-Reche MP, Trujillo-Torres JM, Romero-Rodríguez JM. Problematic internet use as a predictor of eating disorders in students: A systematic review and meta-analysis study. Nutrients. 2019;11:2151.