



Correlates of Problematic Internet Use among college and university students in eight countries: An international cross-sectional study

Yatan Pal Singh Balhara^{a,*}, Ana Doric^b, Dejan Stevanovic^c, Rajna Knez^d, Swarndeep Singh^e, Mita Rani Roy Chowdhury^f, Helin Yilmaz Kafali^g, Pawan Sharma^h, Zahir Vallyⁱ, Tuong Vi Vu^j, Sidharth Arya^k, Aishita Mahendru^l, Ramdas Ransing^m, Gamze Erzinⁿ, Huynh Le Thi Cam Hong Le^o

^a Associate Professor of Psychiatry, Behavioral Addictions Clinic (BAC), Department of Psychiatry and National Drug Dependence Treatment Center (NDDTC), All India Institute of Medical Sciences (AIIMS), New Delhi, India

^b Professional Associate, Center for Applied Psychology, Department of Psychology, Faculty of Humanities and Social Sciences, Croatia

^c Clinic for Neurology and Psychiatry for Children and Youth, Dr Subotica 6a, 11000 Belgrade, Serbia

^d Department of Women's and Children's health, Skaraborgs Hospital, Skövde, Sweden; University of Gothenburg, Sahlgrenska Academy, Institute of Neuroscience and Physiology, Blå stråket 15, 413 45 Göteborg, Sweden

^e Senior Resident, Department of Psychiatry and National Drug Dependence Treatment Center (NDDTC), All India Institute of Medical Sciences (AIIMS), New Delhi, India

^f Clinical Psychologist and UNSS External Counselor, Bangladesh

^g Ankara Children's Hematology and Oncology Training and Research Hospital Department of Child and Adolescent Psychiatry, Ankara, Turkey

^h Lecturer, Department of Psychiatry, Patan Academy of Health Sciences, Nepal

ⁱ Assistant Professor, Psychology & Counseling - (CHSS), United Arab Emirates University, United Arab Emirates

^j South Vietnam HIV Addiction Technical Transfer Centre - University of Medicine and Pharmacy at Ho Chi Minh City, Viet Nam

^k Postdoctoral fellow in Addiction Medicine & Senior Resident Centre for Addiction Medicine, National Institute of Mental Health and Neuroscience, Bengaluru, India

^l Clinical Psychologist, South Asian University, India

^m Department of Psychiatry, B K L Walawalkar Rural Medical College, Sawarde, Ratnagiri - 415 606, Maharashtra, India

ⁿ Diskapi Training and Research Hospital, Turkey

^o Faculty of Public Health, University of Medicine and Pharmacy at Ho Chi Minh City, Viet Nam

ARTICLE INFO

Keywords:
Internet
Distress
Anxiety
Depression
Students

ABSTRACT

Background and aims: Internet use has increased worldwide exponentially over the past two decades, with no up-to-date cross-country comparison of Problematic Internet Use (PIU) and its correlates available. The present study aimed to explore the pattern and correlates of PIU across different countries in the European and the Asian continent. Further, the stability of factors associated with PIU across different countries were assessed.

Materials and methods: An international, cross-sectional study with a total of 2749 participants recruited from universities/colleges of eight countries: Bangladesh, Croatia, India, Nepal, Turkey, Serbia, Vietnam, and United Arab Emirates (UAE). Participants completed the Generalized Problematic Internet Use Scale -2 (GPIUS2) assessing PIU, and the Patient Health Questionnaire Anxiety-Depression Scale (PHQ-ADS) assessing the depressive and anxiety symptoms.

Results: A total of 2643 participants (mean age 21.3 ± 2.6 ; 63% females) were included in the final analysis. The overall prevalence of PIU for the entire sample was 8.4% (range 1.6% to 12.6%). The mean GPIUS2 standardized scores were significantly higher among participants from the five Asian countries when compared to the three European countries. Depressive and anxiety symptoms were the most stable and strongest factors

* Corresponding author at: Associate Professor of Psychiatry, Behavioral Addictions Clinic (BAC), Department of Psychiatry and National Drug Dependence Treatment Center (NDDTC), All India Institute of Medical Sciences (AIIMS), New Delhi, India. Tel.: +919868976365

E-mail addresses: Ypsbalhara@gmail.com (Y. Pal Singh Balhara), ana.djoric.cpp@uniri.hr (A. Doric), stevanovic.dejan79@gmail.com (D. Stevanovic), rajna.knez@gu.se (R. Knez), sevisingh@gmail.com (S. Singh), rcmita@yahoo.com (M.R. Roy Chowdhury), helinyilmaz136@gmail.com (H.Y. Kafali), pawan60@gmail.com (P. Sharma), zahir.vally@uaeu.ac.ae (Z. Vally), tuongvipac@gmail.com (T. Vi Vu), draryasid3188@gmail.com (S. Arya), ashita@ashitamahendru.com (A. Mahendru), ramdas_ransing123@yahoo.co.in (R. Ransing), gamze.erzin@gmail.com (G. Erzin), hong.le@ump.edu.vn (H. Le Thi Cam Hong Le).

<https://doi.org/10.1016/j.ajp.2019.09.004>

Received 19 July 2019; Received in revised form 3 September 2019; Accepted 3 September 2019

1876-2018/© 2019 Elsevier B.V. All rights reserved.

associated with PIU across different countries and cultures.

Discussion and conclusions: The PIU is an important emerging mental health condition among college/university going young adults, with psychological distress being the strongest and most stable correlate of PIU across different countries and cultures in this study. The present study highlighted the importance of screening university and college students for PIU.

1. Introduction

Internet use has increased exponentially over the past two decades and a large section of the population living in both developed and developing countries has easy and affordable access to Internet (Ioannidis et al., 2018). The use of Internet for sharing information globally since its introduction in 1989, has now evolved to encompass a wide array of activities ranging from academic-related activities such as teaching, learning, research; occupation-related activities such as monetary/document exchanges, business meetings via videoconferencing; leisure/pleasurable activities such as online gaming, gambling, streaming, or pornography; and as a means of social networking through facilitating interaction between people via online texting, calling, social websites, chat applications, or e-mails (Block, 2008). The omnipresent pattern of Internet use has been accompanied by the excessive or dysfunctional Internet use in a significant number of individuals. This pattern of excessive and/ dysfunctional pattern use has been described as Problematic Internet Use (PIU) in the literature. We use the term PIU in this paper to encompass all potentially problematic Internet related behaviours described above, including gaming, gambling, buying, pornography viewing, and social networking, among others. The social, financial, academic, work-related, physical, and psychological health related adverse impact of PIU has now been well documented worldwide (Fineberg et al., 2018).

There is a lack of studies examining various possible correlates of PIU across different countries and cultures (for example, Western versus Eastern countries) (Fineberg et al., 2018). Moreover, the bulk of available literature on correlates of PIU is derived from studies conducted among non-clinical adolescent population, and there is dearth of literature on the pattern and correlates of PIU among young adults, especially the university and college graduate students. The university and college graduate students are particularly vulnerable to develop PIU due to several reasons. They have comparatively easier and wider access to the Internet via campus library, free campus wireless Internet zones and cheaper mobile Internet packages for students. Further, young adults, irrespective of their current living arrangement of living with family or in university dormitories, typically enjoy greater freedom in making their choices and Internet use behaviours. They are at a developmental stage in which one is striving to build his/her own identity, career and partner, and are prone to use Internet to pursue these goals, which in turn may become excessive and maladaptive over time (Lanthier and Windham, 2004). Thus, university/college students were chosen for the present study as the presence of PIU in this group can have far-reaching negative consequences on their academic progress in their fields and in turn impact their professional progress at a larger level.

The existing literature on factors associated with PIU suffers from various methodological limitations as described above, and there is a lack of studies comparing the pattern and correlates of PIU across different countries and cultures (Fineberg et al., 2018; Kuss et al., 2013).

In 2018, the International Child Mental Health Study Group (ICMH-SG; <http://www.icmhsg.org>) initiated a cross-cultural project aiming to explore the patterns of Internet use among college and university students across different European and Asian countries, especially focusing on PIU and Internet gaming disorder as an emerging psychiatric condition. The present study reports on the patterns, prevalence rates, and correlates of PIU across eight countries: Bangladesh, Croatia, India, Nepal, Serbia, Turkey, United Arab Emirates (UAE) and Vietnam. The

focus of the study was on sociodemographic, Internet use pattern, and psychological distress (depressive and anxiety symptoms) associated with PIU.

2. Methods

2.1. Study settings and participants

The data were collected from students pursuing various graduation courses in colleges and universities across a total of eighteen countries throughout the International Child Mental Health Study Group (ICMH-SG; <http://www.icmhsg.org>). An online survey using a cross-sectional design was considered for the present study. Online data collection methodology was chosen due to its benefits regarding ease of access to larger sample pools, opportunity to reach heterogeneous groups, cost-efficiency, and its usefulness and practical advantages for researching behavioral addictions including gaming (Pontes et al., 2017; Singh et al., 2019). The lead authors from different countries were responsible to advertise the study in the respective countries and to send a link of the survey to students pursuing various graduation courses in colleges and universities. As a mode of convenience sampling, students who provided their contacts were contacted to participate in the study directly or via students' organizations. It was decided that across the countries included there should be equal number of students pursuing different scientific branches contacted, at least from biological/medical, physical/mathematics, and social/psychological branches. After excluding countries with less than 150 participants (as decided a priori), nine countries were included. Out of them, data relating to Internet use pattern was not available for one country (Indonesia). The final sample thus included eight countries: Bangladesh, Croatia, India, Nepal, Serbia, Turkey, United Arab Emirates, and Vietnam.

2.2. Instruments

2.2.1. The basic proforma for data collection

A semi-structured questionnaire to assess the basic socio-demographic profile (namely age, gender, and relationship status) and Internet use pattern (number hours spent online in a typical day, the places used for accessing Internet, basic purpose of using Internet, and the predominant time of day for Internet use over the past month) was created. The data collection did not differentiate between essential and non essential internet use and the participants were asked to provide details on overall internet use.

2.2.2. The Generalized Problematic Internet Use Scale-2

The Generalized Problematic Internet Use Scale-2 (GPIUS2) is a multidimensional scale for assessing problematic Internet use (Caplan, 2010). The GPIUS2 has 15 items scored as a Likert-like scale ranging from 1 (strongly disagree) to 7 (strongly agree), where the sum on all answered items is the total score. These items are placed in four different dimensions. However, over the past decade research has showed that the total scale with 15 items might have insufficient psychometric properties if used as a multidimensional scale and that a unidimensional scale should be used (Laconi et al., 2017). Considering that we used a multicultural sample with different language versions, and consistent with our aim to evaluate problematic Internet use in general, we first applied factor analysis with the whole sample to see which items measure problematic Internet as a unidimensional construct. Nine

Table 1
Descriptive profile of participants across included countries.

Variable	Croatia (n = 437)	Serbia (n = 316)	India (n = 490)	UAE (n = 199)	Nepal (n = 159)	Bangladesh (n = 176)	Turkey (n = 249)	Vietnam (n = 617)	Total (N = 2643)	Test statistic of difference; (p-value)
Age, mean (SD) years	21.9 (2.5)	22.3 (2.5)	20.5 (3.1)	20.6 (1.9)	21.9 (2.4)	21.6 (1.8)	21.5 (2.6)	21.0 (2.3)	21.3 (2.6)	F = 21.46 ^b ; (< 0.01)**
#Gender, N (%) male	101 (23.1%)	91 (28.8%)	246 (50.2%)	57 (28.6%)	88 (55.3%)	127 (72.2%)	95 (38.2%)	173 (28.0%)	978 (37.0%)	χ ² = 226.78 ^b ; (< 0.01)**
Average time spent online/day, mean (SD) hours	4.4 (2.8)	3.9 (2.5)	4.9 (3.9)	6.5 (4.7)	4.0 (2.5)	4.4 (2.8)	5.3 (3.5)	4.3 (2.9)	4.6 (3.3)	F = 15.86 ^b ; (< 0.01)**
Main purpose of internet use, N (%)										
Academic	369 (84.4%)	240 (75.9%)	354 (72.2%)	134 (67.3%)	140 (88.1%)	104 (59.1%)	119 (47.8%)	553 (89.6%)	2013 (76.2%)	χ ² = 241.82 ^b ; (< 0.01)**
Gaming	250 (57.2%)	169 (53.5%)	177 (36.1%)	72 (36.2%)	42 (26.4%)	45 (26.4%)	76 (30.5%)	253 (41.0%)	1084 (41.0%)	χ ² = 117.13 ^b ; (< 0.01)**
Shopping	147 (33.6%)	67 (21.2%)	179 (36.5%)	98 (49.2%)	17 (10.7%)	34 (19.3%)	75 (30.1%)	221 (35.8%)	838 (31.7%)	χ ² = 100.40 ^b ; (< 0.01)**
Social networking	355 (81.2%)	253 (80.1%)	404 (82.4%)	157 (78.9%)	141 (88.7%)	153 (86.9%)	216 (86.7%)	546 (88.5%)	2225 (84.2%)	χ ² = 25.41 ^b ; (< 0.01)**
Dating	12 (2.7%)	8 (2.5%)	48 (9.8%)	11 (5.5%)	13 (8.2%)	20 (11.4%)	28 (11.2%)	69 (11.2%)	209 (7.9%)	χ ² = 48.27 ^b ; (< 0.01)**
Pornography	30 (6.9%)	13 (4.1%)	39 (8.0%)	3 (1.5%)	10 (6.3%)	16 (9.1%)	9 (3.6%)	40 (6.5%)	160 (6.1%)	χ ² = 18.63 ^b ; (< 0.01)**
Others (news, movies, job)	19 (4.3%)	9 (2.8%)	32 (6.5%)	9 (4.5%)	14 (8.8%)	6 (3.4%)	31 (12.4%)	85 (13.8%)	205 (7.8%)	χ ² = 65.48 ^b ; (< 0.01)**
Predominant time of day for internet use, N (%)										
Morning	23 (5.3%)	21 (6.6%)	13 (2.7%)	183 (92.0%)	1 (0.6%)	4 (2.3%)	3 (1.2%)	21 (3.4%)	104 (3.9%)	χ ² = 35.31 ^b ; (< 0.01)**
Afternoon	118 (27.0%)	74 (23.4%)	67 (13.7%)	98 (49.2%)	2 (1.3%)	12 (6.8%)	34 (13.7%)	440 (71.3%)	784 (29.7%)	χ ² = 728.20 ^b ; (< 0.01)**
Evening	229 (52.4%)	173 (54.7%)	147 (30.0%)	49 (24.6%)	81 (50.9%)	17 (9.7%)	109 (43.8%)	41 (6.6%)	861 (32.6%)	χ ² = 420.03 ^b ; (< 0.01)**
Night	34 (7.8%)	36 (11.4%)	250 (51.0%)	49 (24.6%)	73 (45.9%)	138 (78.4%)	92 (36.9%)	90 (14.6%)	784 (29.6%)	χ ² = 555.54 ^b ; (< 0.01)**
Other (differs, always)	33 (7.6%)	12 (3.8%)	13 (2.7%)	10 (5.0%)	2 (1.3%)	5 (2.8%)	11 (4.4%)	25 (4.1%)	110 (4.2%)	χ ² = 19.74 ^b ; (< 0.01)**
Main location of internet use, N (%)										
Home	428 (97.9%)	308 (97.5%)	438 (89.4%)	183 (92.0%)	132 (83.0%)	164 (93.2%)	240 (96.4%)	600 (96.4%)	2493 (94.3%)	χ ² = 91.02 ^b ; (< 0.01)**
Class	149 (34.1%)	39 (12.3%)	146 (29.8%)	98 (49.2%)	35 (22.0%)	31 (22.0%)	89 (35.7%)	234 (37.9%)	821 (31.1%)	χ ² = 121.75 ^b ; (< 0.01)**
Internet café	76 (17.4%)	53 (16.8%)	67 (13.7%)	49 (24.6%)	9 (5.7%)	13 (7.4%)	42 (16.9%)	91 (14.7%)	400 (15.1%)	χ ² = 37.14 ^b ; (< 0.01)**
Friend's house	110 (25.2%)	58 (18.4%)	42 (8.6%)	49 (24.6%)	7 (4.4%)	13 (7.4%)	16 (6.4%)	202 (32.7%)	497 (18.8%)	χ ² = 189.74 ^b ; (< 0.01)**
Others (public transport, mobile)	27 (6.2%)	13 (4.1%)	55 (11.2%)	10 (5.0%)	30 (18.9%)	14 (8.0%)	20 (8.0%)	36 (5.8%)	205 (7.8%)	χ ² = 48.35 ^b ; (< 0.01)**
PHQ-ADS score, mean (SD)	12.78 (9.81)	12.42 (10.00)	15.26 (11.26)	16.70 (10.60)	10.84 (10.18)	15.84 (9.46)	17.10 (10.31)	12.62 (8.61)	13.95 (10.15)	F = 13.54 ^b ; (< 0.01)**

SD Standard deviation; ^a One-way analysis of variance; ^b Chi-square statistic; * p-value < 0.05; ** p-value < 0.01; Patient Health Questionnaire Anxiety-Depression Scale (PHQ-ADS).

items (“prefer online interaction”, “talk with others when feeling isolated”, “preoccupied with the thought of going online”, “difficulty controlling the amount of time spent online”, “Internet use has made it difficult for me to manage my life”, “online social interaction is more comfortable”, “used the Internet to make myself feel better”, “feel lost if unable to go online”, “missed social engagements or activities”) loaded on one factor explaining 48.7% of the total variance, with Cronbach’s alpha of 0.87. A range for a total summated score for these 9 items was 10–63. We converted these scores to T-scores so that T-scores have a mean of 50 and a standard deviation of 10. A T-score as a standardized score that was calculated from the total distribution of raw scores within the sample. Since the GPIUS2 is not a diagnostic instrument, we used a T-score of 65, following the analogy for most psychological tests, as indicative of clinical or elevated levels of PIU since this score or above represents around the top 6% of the population (Maruish, 2004).

2.2.3. Patient Health Questionnaire Anxiety-Depression Scale (PHQ-ADS)

The Patient Health Questionnaire 9 (PHQ-9) was designed to assess depressive symptoms as per the criteria for major depression in the DSM-IV (American Psychiatric Association, 1994). It comprises of nine items scored on a scale of 0 to 3, with total scores ranging from 0 to 27. Higher scores indicate greater symptom severity. The Generalized Anxiety Disorder 7 (GAD-7) questionnaire was designed to assess anxiety symptoms following criteria for generalized anxiety disorder in the DSM-5. It comprises of 7 items scored from 0 to 3 each, with total scores ranging from 0 to 21. Higher scores indicate greater symptom severity. Both PHQ-9 and GAD-7 have strong internal and test-retest reliability as well as construct and factor-structure validity (Spitzer et al., 1999, 2006). The PHQ-ADS is the sum of the PHQ-9 and GAD-7 scores and thus can range from 0 to 48, with higher scores indicating higher levels of depression and anxiety symptomatology. The PHQ-ADS as a composite measure of depression and anxiety, showed good construct and structural validity with sufficiently unidimensional factor structure accounting for about 84% of the explained variance, and has been used as a measure to screen for psychological distress in participants (Chilcot et al., 2018). Cronbach’s alpha of the PHQ-9 and GAD-7 in the present study were 0.88 and 0.91 respectively.

2.3. Statistical analysis

Statistical analysis was done using SPSS version 23.0 (Armonk, NY, IBM Corp). Descriptive statistics using mean, standard deviation, frequency and percentage were used to tabulate the sample characteristics, Internet use patterns and assessment scale scores. One-way analysis of variance (ANOVA) was carried out to assess differences between mean GPIUS2 transformed total scores across countries. Bivariate analysis using Pearson’s correlation and independent t-test was conducted to examine the associations between continuous and categorical variables respectively with the total transformed GPIUS2 score. A hierarchical three-step linear regression was conducted with all the variables showing significant relationship with GPIUS2 total score in

bivariate analysis entered as independent variables (predictors) and the GPIUS2 T-scores as the dependent variable (outcome variable). The selected independent variables were divided into three groups of sociodemographic (age, gender, relationship status), Internet use behaviors (time spent online/day, main purpose of Internet use for gaming or shopping or social networking or dating or pornography, main location of Internet use as classroom/lecture hall or friend’s house or Internet cafe, predominant Internet use during evening or night timings), and psychological (PHQ-ADS scores) variables. The whole sample was used for this analysis. Multiple linear regression analyses were run separately for each country sample. The level of statistical significance was set at p value < .05 for all the tests. Missing value imputation was not conducted.

2.4. Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. The respective country leads received the ethical approvals/exemptions from the respective ethics committee and review board.

3. Results

A total of 2749 participants from eight countries were included in the present study. Out of these, 106 participants (3.8%) either did not provide responses to the questions on one or more set of variables including demographic profile, Internet use pattern, items of GPIUS2, PHQ-9, GAD-7, and were excluded from the analysis. Thus, the final study sample comprised of 2643 participants. The descriptive profile of study sample is described in Table 1.

There was significant difference between the mean GPIUS2 transformed total score between various countries, as shown in Table 2. The proportion of participants classified as PIUs based on the cut-off T-score value of 65 for the entire study sample was 8.4%. Further, the proportion of participants classified as PIUs based on the cut-off T-score value of 65 varied between 1.6% for Serbia to 12.6% for Nepal.

The means of GPIUS2 transformed scores across different countries was compared for any significant differences among each other using the one-way analysis of variance (ANOVA), followed by pairwise comparisons using the Bonferroni correction for multiple comparisons (Table 2). The pairwise comparisons between countries using a Bonferroni adjusted 5% significance level showed that the mean GPIUS2 scores in the three European countries (Croatia, Serbia and Turkey) were significantly lesser than all other five Asian countries (India, UAE, Nepal, Bangladesh, Turkey and Vietnam) included in this study. The bivariate analysis assessed the relationship of different socio-demographic, Internet use pattern, and psychological variables with the GPIUS2 transformed total score (T-score). There was a significant association between age, gender, relationship status, time spent online perday, certain specific Internet use behaviours, and PHQ-ADS score with the GPIUS2 T-scores (Table 3).

Hierarchical linear regression analysis was performed to determine

Table 2
Comparison of GPIUS2 transformed scores and number PIUs across countries.

	Croatia (C)	Serbia (S)	India (I)	UAE (U)	Nepal (N)	Bangladesh (B)	Turkey (T)	Vietnam (V)	Test statistic; p-value
GPIUS2 T-score, Mean (SD)	46.80 (8.97)	45.09 (8.28)	51.27 (10.26)	52.27 (10.59)	52.98 (9.70)	52.46 (10.60)	46.16 (9.65)	53.24 (9.04)	#F = 41.86 ^a ; < 0.01**
PIUs, N (%)	11 (2.5%)	5 (1.6%)	60 (12.2%)	24 (12.1%)	20 (12.6%)	19 (10.8%)	12 (4.8%)	72 (11.7%)	χ ² = 68.98 ^b ; < 0.01**

SD Standard deviation; ^a One-way analysis of variance; ^b Chi-square statistic; GPIUS2 Generalized problematic internet use scale-2; PIUs Problematic internet users; * p-value < 0.05; ** p-value < 0.01. #11 participants chose not to disclose their gender and were excluded for this analysis.

#Pairwise comparisons of mean GPIUS2 T-scores by countries: C v/s S, p = 0.42; C v/s I, p < 0.01**; C v/s U, p < 0.01**; C v/s N, p < 0.01**; C v/s B, p < 0.01**; C v/s T, p = 0.99; C v/s V, p < 0.01**; S v/s I, p < 0.01**; S v/s U, p < 0.01**; S v/s N, p < 0.01**; S v/s B, p < 0.01**; S v/s T, p = 0.99; S v/s V, p < 0.01**; I v/s U, p = 0.99; I v/s N, p = 0.99; I v/s B, p = 0.99; I v/s T, p < 0.01**; I v/s V, p = 0.01*; U v/s N, p = 0.99; U v/s B, p = 0.99; U v/s T, p < 0.01**; U v/s V, p = 0.99.

Table 3
Variables having significant bivariate associations with GPIUS2 total transformed score (T-scores; N = 2643).

Variable	Mean GPIUS2 T-score (SD)	Test statistic (p-value)
Age (in years)	31.7 (12.9)	-0.09 ^a (< 0.01) **
Time sent online/day (in hours)	31.7 (12.9)	0.20 ^a (< 0.01) **
PHQ-ADS score	31.7 (12.9)	0.38 ^a (< 0.01) **
Gender		
Male	50.5 (10.0)	2.24 ^b (0.02) *
Female	49.6 (9.9)	
Relationship status		
Yes	48.8 (9.8)	4.48 ^b (< 0.01) **
No	50.6 (10.0)	
Predominant time of IU in evening		
Yes	48.2 (9.6)	6.56 ^b (< 0.01) **
No	50.9 (10.0)	
Predominant time of IU in night		
Yes	52.0 (10.2)	6.69 ^b (< 0.01) **
No	49.1 (9.7)	
Main purpose for IU is gaming		
Yes	50.7 (9.8)	2.97 ^b (< 0.01) **
No	49.5 (10.0)	
Main purpose for IU is shopping		
Yes	51.0 (10.1)	3.40 ^b (< 0.01) **
No	49.5 (9.9)	
Main purpose for IU is social networking		
Yes	50.5 (9.8)	6.04 ^b (< 0.01) **
No	47.3 (10.5)	
Main purpose for IU is dating		
Yes	53.5 (10.1)	5.39 ^b (< 0.01) **
No	49.7 (9.9)	
Main purpose for IU is pornography		
Yes	54.3 (10.7)	5.67 ^b (< 0.01) **
No	49.7 (9.9)	
Main location of IU is class		7
Yes	52.3 (10.0)	.98 ^b (< 0.01) **
No	49.0 (9.8)	
Main location of IU is friend's house		
Yes	51.2 (9.8)	2.63 ^b (0.009) **
No	49.8 (10.0)	
Main location of IU is internet cafe		
Yes	51.6 (9.8)	4.05 ^b (< 0.01) **
No	49.6 (10.0)	

SD Standard deviation; ^a Pearson correlation coefficient; ^b Independent t-test; GPIUS2 Generalized problematic internet use scale-2; IU Internet use; * p-value < 0.05; ** p-value < 0.01.

Table 4
Hierarchical linear regression: Factors associated with excessive generalized problematic internet use (N = 2643).

Independent variables/ Predictors	Model 1		Model 2		Model 3	
	B	β (p-value)	B	β (p-value)	B	β (p-value)
Constant	55.71		49.84		44.00	
Age	-0.30	-0.08 (< 0.001) **	-0.21	-0.05 (0.003) **	-0.11	-0.03 (0.08)
Male gender	0.91	0.04 (0.02) *	0.08	0.04 (0.8)	0.56	0.02 (0.13)
Relationship present	-1.34	-0.06 (0.001) **	-1.44	-0.06 (< 0.01) **	-1.44	-0.06 (< 0.01) **
Time spent online/day			0.46	0.15 (< 0.01) **	0.30	0.10 (< 0.01) **
Main purpose for IU is gaming			0.23	0.01 (0.54)	0.19	0.009 (0.60)
Main purpose for IU is shopping			0.32	0.01 (0.43)	0.31	0.01 (0.42)
Main purpose for IU is social networking			2.27	0.08 (< 0.01) **	2.42	0.08 (< 0.01) **
Main purpose for IU is dating			2.20	0.05 (0.003) **	2.46	0.06 (< 0.01) **
Main purpose for IU is pornography			2.49	0.05 (0.003) **	1.96	0.04 (< 0.01) **
Main location of IU is class			2.44	0.11 (< 0.01) **	2.02	0.09 (< 0.01) **
Main location of IU is friend's house			-1.36	-0.04 (0.02) *	-1.45	-0.05 (0.01) *
Main location of IU is internet cafe			0.93	0.03 (0.09)	0.90	0.03 (0.08)
Predominant time of IU in evening			-1.38	-0.06 (0.002) **	-1.52	-0.07 (< 0.01) **
Predominant time of IU in night			1.50	0.06 (0.001) **	0.50	0.02 (0.25)
PHQ-ADS score					0.33	0.34 (< 0.01) **
R ²	0.015		0.103		0.211	
Δ R ²	0.015		0.088		0.108	
Adjusted R ²	0.014		0.098		0.206	
Model characteristics	F = 13.52 (p-value < 0.01) **		F = 21.49 (p-value < 0.01) **		F = 47.73 (p-value < 0.01) **	

GPIUS2 Generalized problematic internet use scale-2, IU Internet use, B Unstandardized coefficient, β Standardized coefficient, * p-value < 0.05, ** p-value < 0.01.

the contribution of sociodemographic, Internet use pattern, and psychological distress (depressive and anxiety symptoms severity) related variables with significant bivariate relationship to independently predict the GPIUS score. As shown in Table 4, the strongest factor associated with excessive problematic Internet use was presence of more severe depressive and anxiety symptoms indicated by higher scores on the PHQ-ADS scale. The socio-demographic variables explained only 1.5% of the total variance observed in GPIUS2 scores (Model 1). The addition of variables related with Internet usage pattern explained about 10% of the variance in GPIUS2 scores (Model 2). However, after incorporating the PHQ-ADS score (proxy marker used for assessing the depressive and anxiety symptoms severity in participants) in the analysis (Model 3), about 21.1% of the variance in GPIUS2 scores was explained. Thus, this linear regression model was also conducted for each of the eight countries separately to assess the variance in the strength of association for socio-demographic, Internet use pattern, and psychological variables with GPIU on a country level (see Table 5). The most consistent and strongest predictor of GPIU across countries was the PHQ-ADS score. The proposed regression model seemed to be most suitable for the participants from Nepal, with predictor variables able to explain about 38.1% of the variance. Further, standardized regression coefficients (β) for different predictor variables have been described for each country separately in Table 5. The relative strength of association of the predictor variable can be interpreted as β > 0.3 high, 0.2-0.3 = middle, and 0.1-0.2 = low.

4. Discussion

The present study explored the pattern of PIU among college/university students across different countries and cultures. In addition, the extent to which PIU could be predicted by the sociodemographic, Internet use pattern, and psychological distress (depressive and anxiety symptoms) related characteristics of the participants was examined. The correlates of PIU were identified, and their relative strength and stability across different countries were described. The mean age of study sample was 21.3 years (standard deviation of 2.6 years), indicating that the study participants were young adults. The females represented about two-thirds (63%) of the entire study sample. However, the males outnumbered the females among participants in three countries (Bangladesh, Nepal and India).

The findings of this study indicated that 8.4% of the study

Table 5
Power of the predictors for PIU across countries included.

Variable	Croatia β (p-value)	Serbia β (p-value)	India β (p-value)	UAE β (p-value)	Nepal β (p-value)	Bangladesh β (p-value)	Turkey β (p-value)	Vietnam β (p-value)
Age	-0.012 (0.77)	-0.103 (0.04)*	-0.001 (0.98)	0.075 (0.25)	0.006 (0.93)	-0.041 (0.55)	0.024 (0.69)	-0.025 (0.50)
Male gender	-0.049 (0.26)	0.017 (0.74)	0.159 (< 0.01)**	-0.093 (0.19)	0.161 (0.03)*	0.000 (0.99)	-0.010 (0.87)	-0.040 (0.30)
Relationship present	-0.048 (0.25)	-0.068 (0.19)	0.066 (0.98)	0.111 (0.11)	-0.121 (0.10)	0.125 (0.09)	-0.026 (0.67)	-0.084 (0.03)*
Time spent online/day	0.109 (0.01)*	0.163 (0.003)**	0.146 (0.001)**	0.021 (0.76)	0.129 (0.06)	0.254 (0.001)**	0.209 (< 0.01)**	0.061 (0.12)
Main purpose for IU is gaming	0.124 (0.004)**	0.154 (0.004)**	-0.025 (0.56)	0.025 (0.72)	0.066 (0.34)	-0.048 (0.55)	0.019 (0.77)	0.006 (0.87)
Main purpose for IU is shopping	-0.049 (0.24)	-0.008 (0.87)	-0.037 (0.40)	-0.116 (0.08)	-0.043 (0.54)	0.128 (0.12)	-0.012 (0.85)	0.113 (0.003)**
Main purpose for IU is social networking	0.114 (0.007)**	0.076 (0.14)	0.083 (0.053)	0.165 (0.02)*	0.037 (0.59)	0.044 (0.55)	0.171 (0.005)**	0.083 (0.02)*
Main purpose for IU is dating	0.060 (0.16)	0.109 (0.03)*	0.012 (0.81)	0.062 (0.41)	0.050 (0.56)	0.069 (0.38)	0.104 (0.08)	0.017 (0.67)
Main purpose for IU is pornography	0.054 (0.20)	-0.015 (0.77)	0.081 (0.09)	-0.002 (0.97)	0.055 (0.48)	-0.070 (0.41)	-0.060 (0.31)	0.094 (0.015)*
Main location of IU is class	0.079 (0.07)	0.093 (0.08)	0.061 (0.18)	0.273 (< 0.01)**	-0.130 (0.06)	0.031 (0.66)	0.129 (0.055)	0.074 (0.06)
Main location of IU is friend's house	0.034 (0.51)	-0.069 (0.24)	-0.039 (0.46)	-0.124 (0.14)	0.097 (0.20)	0.031 (0.66)	0.017 (0.79)	0.019 (0.66)
Main location of IU is internet cafe	-0.018 (0.72)	-0.010 (0.86)	-0.028 (0.59)	0.024 (0.77)	-0.014 (0.85)	0.008 (0.91)	0.013 (0.83)	-0.006 (0.88)
Predominant time of IU in evening	-0.014 (0.74)	0.096 (0.07)	0.044 (0.42)	0.004 (0.96)	0.339 (0.11)	-0.010 (0.91)	0.204 (0.01)*	0.008 (0.83)
Predominant time of IU in night	-0.003 (0.94)	0.054 (0.33)	0.064 (0.26)	0.134 (0.08)	0.430 (0.04)*	0.066 (0.47)	0.080 (0.33)	0.016 (0.66)
PHQ-ADS score	0.454 (< 0.01)**	0.381 (< 0.01)**	0.356 (< 0.01)**	0.399 (< 0.01)**	0.502 (< 0.01)**	0.336 (< 0.01)**	0.300 (< 0.01)**	0.340 (< 0.01)**
R ²	0.333	0.277	0.217	0.277	0.381	0.300	0.237	0.213
Adjusted R ²	0.309	0.241	0.192	0.281	0.316	0.234	0.188	0.193
Model characteristics	F = 13.9 (< 0.01)**	F = 7.65 (< 0.01)**	F = 8.73 (< 0.01)**	F = 4.67 (< 0.01)**	F = 5.86 (< 0.01)**	F = 4.56 (< 0.01)**	F = 4.81 (< 0.01)**	F = 10.81 (< 0.01)**

IU Internet use; β Standardized coefficient; * p-value < 0.05; ** p-value < 0.01. (β > 0.3 high, 0.2-0.3 = middle, 0.1-0.2 = low).

participants showed PIU. However, the prevalence of PIU varied between countries, with 1.6% in Serbia to 12.6% in Nepal. The prevalence in three European countries was between 1.6% to 4.8% and its was lesser than in the five Asian countries (10.8% to 12.6%). This is in line with the findings from previous studies, which estimates the prevalence of PIU between 1–9% and 2–18% for European and Asian countries, respectively (Christakis, and Moreno, 2009). Further, the mean GPIUS2 standardized scores representing the severity of PIU were significantly higher among study participants from the five Asian countries when compared with the three European countries (Serbia, Croatia and Turkey). This could be explained by the cultural differences existing between these countries. Further, the differences in the technological and economic advances between countries leading to differential smartphone ownership, Internet penetration, bandwidth availability and pricing offered by local providers could also be responsible behind these differences observed in the pattern of PIU (Mak et al., 2014). Previous studies have also suggested that the problem of PIU was generally more common and severe in Asian countries, compared to European or American countries (Cheng and Li, 2014).

The findings of the three-step hierarchical linear regression with sociodemographic (age, gender, relationship status), Internet use pattern (time spent online/day, main purpose of Internet use for gaming, shopping, social networking, dating or pornography, main location of Internet use as classroom/lecture hall or friend's house or Internet cafe, and predominant Internet use during evening or night timings), and psychological distress (PHQ-ADS scores) variables, revealed their relative contribution in predicting PIU (mean standardized GPIUS2 scores). The sociodemographic variables accounted for a small amount of the variance in PIU, with both age and gender practically having none association with PIU when the effect of Internet use pattern and psychological distress related variables were included in the final model. Although, the participants in a romantic relationship at the time of study had significantly lesser severity of PIU. This might be because of increased loneliness and frustration experienced by participants with a broken romantic relationship, both of which have been reported to increase the risk of PIU (Liu, and Kuo, 2007).

Further, the inclusion of Internet use pattern related variables explained an additional 8.8% of the variance in PIU. The amount of time spent online per day, use of Internet mainly for social networking, dating, or pornography, and main place of Internet use in the class/college, or friend's house, and predominant time of Internet use during evening hours were significantly associated with PIU in the multivariate regression analysis. However, all of these variables tended to vary between countries. For instance, the use of Internet mainly for social networking was significantly associated with PIU in Croatia, UAE, Turkey and Vietnam and not in other countries. The use of Internet mainly for dating and pornography was significantly associated with PIU in Serbia and Croatia, respectively. This suggests strong cultural differences responsible for variations in the Internet use pattern related correlates of PIU. This is supported by the findings of few previous cross-cultural studies, reporting differences in the pattern of Internet use among the students of western countries compared to the Asian countries (Peters et al., 2015; Yin et al., 2018). The same pattern was observed for excessive Internet gaming (Stevanovic et al., 2019). The more collectivistic and interdependent nature of Asian society as compared to the individualistic and independent social style of the Western society might be partly responsible for this.

The PHQ-ADS score was used as a proxy measure of psychological distress in the present study, which is a composite score obtained from adding the PHQ-9 and GAD-7 scores representing the severity of depressive and anxiety symptoms severity respectively. The addition of psychological distress related variable contributed to the maximum amount of variance observed in PIU (10.8%). This was the strongest and most stable correlate of PIU among study participants. This is in line with the bulk of literature available on association of depressive and anxiety disorder or symptoms with increased risk of having PIU (Ho

et al., 2014; Starcevic, and Khazaal, 2017). This was the only correlate of PIU that remained significant across all eight countries included in this study, suggesting that psychological distress was associated with PIU irrespective of the country or culture to which a participant belonged. Further, this association between psychological distress and PIU was not substantially attenuated even after adjusting for the effects of socio-demographic and pattern of Internet use related factors.

The starting of a graduate course in university/college brings a completely new set of challenges with itself and often marks the beginning of transition into young adulthood for most students. This requires them to face everyday challenges of staying out of home, taking care of one's health, forming new interpersonal relationships, and securing newer avenues of social and emotional support. This is also the time when graduates have to shift from student-life to working-life, with many of them still being uncertain about their future career position or fearing the possibility of unemployment. Thus, individuals who are not able to cope with these newer demands are vulnerable to experience loneliness, frustration, boredom, and depression during this phase of transition into young adulthood. The Internet is often viewed by students as a medium to cope with these new challenges, establish new interpersonal relationships, entertain themselves, and seek information and guidance. However, excessive reliance on Internet might lead to neglect of alternative leisure activities, hobbies, social gatherings, outdoor events, sports activities, family events and miss possible offline events, which could have been rewarding in the real world (Kim, and Davis, 2009). Individuals gradually start spending more time doing various different online activities/behaviours, and retreat into a familiar and comfortable virtual world of Internet (Kim, and Haridakis, 2009). This forms a vicious cycle, as often individuals with PIU would be unable to control their Internet use despite of promising to themselves, which would lead to greater psychological distress among them (Tsai, and Lin, 2003). There is some evidence that suggests that the presence of psychiatric symptoms increases the risk of developing PIU prospectively (Ko et al., 2009). In addition, social isolation caused by excessive Internet use among PIUs might also lead to depression (Yao, and Zhong, 2014). Nevertheless, psychological distress and PIU co-occur frequently, and exacerbation of PIU and depression/anxiety could occur when they interact with each other.

There has been a growing interest in PIU in the recent years. The same has been explored among different population groups (Balhara et al., 2018; Grover et al., 2019; Jamir et al., 2019; Mamun et al., 2019).

These findings should be interpreted while keeping in mind the strengths and limitations of the present study. The study participants were recruited following non-randomized sampling procedure from few colleges/universities across different countries selected as per the convenience, limiting the generalizability of findings. Also, the study did not collect data on essential and non-essential internet use. Further, only associations and not a causal link with PIU could be established due to the cross-sectional study design. The use of only self-report-based instruments to assess the pattern of Internet use and severity of PIU, depression and anxiety was prone to recall and social biases. The main strength of the present study was that participants were surveyed using consistent procedures, and the use of cross-culturally valid instruments with acceptable measurement invariance for assessment of psychological distress (depression and anxiety symptoms severity) among participants in each country (Doi et al., 2018; Ito et al., 2018).

5. Conclusion

Our study showed that the prevalence rates of problematic Internet use could vary markedly among college/university students across different countries and cultures. Psychological distress (depressive and anxiety symptoms severity) was found to be the most stable and strongest factor associated with PIU. The study suggests that problematic Internet use is an important emerging mental health condition associated with significant psychological distress among college/

university going young adults across different countries and cultures.

This is the first study, to best of our knowledge, which had compared the pattern and correlates of PIU across multiple countries. Future research with a larger and more representative sample size and a longitudinal study design is needed to further establish the findings of the present study and assess the causality between psychological distress and problematic Internet use. However, irrespective of the direction of causality between the two conditions, the present study underscores the importance of screening university students for PIU and psychological distress as there is a high likelihood that they co-occur and magnify each other. This might help in early identification of vulnerable population and timely referral to specialists in providing psychological care. Further, there is need to raise awareness among young adults, faculty, and concerned authority about the possible harms associated with PIU and provide knowledge about healthy patterns of Internet use. An initiative making use of internet facilitated learning modules on screening, identification and early intervention of PIU among students has been found to be effective and acceptable among school teachers and counsellors (Balhara and Singh, 2019). Similar, resources should be developed for the university/college teachers as well. Also, an online resource hub (BehavioR) has been developed with support from World Health Organization, Regional office for South East Asia (Balhara and Anwar, 2019). The BehavioR (the Behavioral Addictions Resource hub) has been established with the aim of offering a one-stop resource centre for behavioural addictions to patients, caregivers, the general public, health-care providers, academics, researchers and policy-makers. Such portal shall be helpful resources on prevention and management of behavioral addictions.

Financial disclosure

None.

Declaration of Competing Interest

None.

Acknowledgement

None.

References

- American Psychiatric Association, 1994. *Diagnostic and Statistical Manual of Mental Disorders, Fourth edition*. American Psychiatric Press, Washington, DC.
- Balhara, Y.P., Anwar, N., 2019. BehavioR: a digital platform for prevention and management of behavioural addictions. *WHO South-East Asia J. Public Health* 8, 101–103. <https://doi.org/10.4103/2224-3151.264854>.
- Balhara, Y.P.S., Harshwardhan, M., Kumar, R., Singh, S., 2018. Extent and pattern of problematic internet use among school students from Delhi: findings from the cyber awareness programme. *Asian J. Psychiatry* 34, 38–42. <https://doi.org/10.1016/j.ajp.2018.04.010>.
- Balhara, Y.P.S., Singh, S., 2019. Online course on basics of management of behavioral addictions involving use of internet: observations from the first batch of participants. *Asian J. Psychiatry* 44, 1–3. <https://doi.org/10.1016/j.ajp.2019.07.013>.
- Block, J.J., 2008. Issues for DSM-5: internet addiction. *Am. J. Psychiatry* 165, 306–307. <https://doi.org/10.1176/appi.ajp.2007.07101556>.
- Caplan, S.E., 2010. Theory and measurement of generalized problematic Internet use: a two-step approach. *Comput. Hum. Behav.* 25, 1089–1097. <https://doi.org/10.1016/j.chb.2010.03.012>.
- Cheng, C., Li, A.Y., 2014. Internet addiction prevalence and quality of (real) life: a meta-analysis of 31 nations across seven world regions. *Cyberpsychol. Behav. Soc. Netw.* 17, 755–760. <https://doi.org/10.1089/cyber.2014.0317>.
- Chilcot, J., Hudson, J.L., Moss-Morris, R., Carroll, A., Game, D., Simpson, A., Hotopf, M., 2018. Screening for psychological distress using the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS): initial validation of structural validity in dialysis patients. *Gen. Hosp. Psychiatry* 50, 15–19. <https://doi.org/10.1016/j.genhosppsych.2017.09.007>.
- Christakis, D.A., Moreno, M.A., 2009. Trapped in the net: will Internet addiction become a 21st-century epidemic? *Arch. Pediatr. Adolesc. Med.* 163, 959–960. <https://doi.org/10.1001/archpediatrics.2009.162>.
- Doi, S., Ito, M., Takebayashi, Y., Muramatsu, K., Horikoshi, M., 2018. Factorial validity

- and invariance of the Patient Health Questionnaire (PHQ)-9 among clinical and non-clinical populations. *PLoS One* 13 (7), e0199235. <https://doi.org/10.1371/journal.pone.0199235>.
- Fineberg, N.A., Demetrovics, Z., Stein, D.J., Ioannidis, K., Potenza, M.N., Grünblatt, E., Brand, M., Billieux, J., Carmi, L., King, D.L., Grant, J.E., 2018. Manifesto for a European research network into Problematic Usage of the Internet. *Eur. Neuropsychopharmacol.* 28 (11), 1232–1246. <https://doi.org/10.1016/j.euroneuro.2018.08.004>.
- Grover, S., Sahoo, S., Bhalla, A., Avasthi, A., 2019. Problematic internet use and its correlates among resident doctors of a tertiary care hospital of North India: a cross-sectional study. *Asian J. Psychiatr.* 39, 42–47. <https://doi.org/10.1016/j.ajp.2018.11.018>.
- Ho, R.C., Zhang, M.W., Tsang, T.Y., Toh, A.H., Pan, F., Lu, Y., Cheng, C., Yip, P.S., Lam, L.T., Lai, C., Watanabe, H., Mak, K., 2014. The association between Internet addiction and psychiatric co-morbidity: a meta-analysis. *BMC Psychiatry* 14, 183. <https://doi.org/10.1186/1471-244X-14-183>.
- Ioannidis, K., Treder, M.S., Chamberlain, S.R., Kiraly, F., Redden, S.A., Stein, D.J., Lochner, C., Grant, J.E., 2018. Problematic Internet use as an age-related multifaceted problem: evidence from a two-site survey. *Addict. Behav.* 81, 157–166. <https://doi.org/10.1016/j.addbeh.2018.02.017>.
- Ito, M., Takebayashi, Y., Muramatsu, K., Horikoshi, M., 2018. Factorial validity and invariance of the 7-item Generalized Anxiety Disorder Scale (GAD-7) among populations with and without self-reported psychiatric diagnostic status. *Front. Psychol.* 9, 1741. <https://doi.org/10.3389/fpsyg.2018.01741>.
- Jamir, L., Duggal, M., Nehra, R., Singh, P., Grover, S., 2019. Epidemiology of technology addiction among school students in rural India. *Asian J. Psychiatr.* 40, 30–38. <https://doi.org/10.1016/j.ajp.2019.01.009>.
- Kim, H.K., Davis, K.E., 2009. Toward a comprehensive theory of problematic Internet use: evaluating the role of self-esteem, anxiety, flow, and the self-rated importance of Internet activities. *Comput. Hum. Behav.* 25 (2), 490–500. <https://doi.org/10.1016/j.chb.2008.11.001>.
- Kim, J., Haridakis, P.M., 2009. The role of Internet user characteristics and motives in explaining three dimensions of Internet addiction. *J. Comput. Commun.* 14 (4), 988–1015. <https://doi.org/10.1111/j.1083-6101.2009.01478.x>.
- Ko, C.H., Yen, J.Y., Chen, C.S., Yeh, Y.C., Yen, C.F., 2009. Predictive values of psychiatric symptoms for Internet addiction in adolescents: a 2-year prospective study. *Arch. Pediatr. Adolesc. Med.* 163, 937–943. <https://doi.org/10.1001/archpediatrics.2009.159>.
- Kuss, D., Van Rooij, A., Shorter, G., 2013. Internet addiction in adolescents: prevalence and risk factors. *Comput. Hum. Behav.* 29 (5), 1987–1996. <https://doi.org/10.1016/j.chb.2013.04.002>.
- Laconi, S., Vigouroux, M., Lafuente, C., Chabrol, H., 2017. Problematic internet use, psychopathology, personality, defense and coping. *Comput. Hum. Behav.* 73, 47–54. <https://doi.org/10.1016/j.chb.2017.03.025>.
- Lanthier, R.P., Windham, R.C., 2004. Internet use and college adjustment: the moderating role of gender. *Comput. Hum. Behav.* 20 (5), 591–606. <https://doi.org/10.1016/j.chb.2003.11.003>.
- Liu, C.Y., Kuo, F.Y., 2007. A study of Internet addiction through the lens of the interpersonal theory. *Cyberpsychol. Behav.* 10 (6), 799–804. <https://doi.org/10.1089/cpb.2007.9951>.
- Maruish, M.E., 2004. *The Use of Psychological Testing for Treatment Planning and Outcomes Assessment: Instruments for Adults Volume 3* Routledge.
- Mak, K.K., Lai, C.M., Watanabe, H., Kim, D.I., Bahar, N., Ramos, M., Young, K.S., Ho, R.C., Aum, N.R., Cheng, C., 2014. Epidemiology of Internet behaviors and addiction among adolescents in six Asian countries. *Cyberpsychol. Behav. Soc. Netw.* 17 (11), 720–728. <https://doi.org/10.1089/cyber.2014.0139>.
- Mamun, M.A., Hossain, M.S., Siddique, A.B., Sikder, M.T., Kuss, D.J., Griffiths, M.D., 2019. Problematic internet use in Bangladeshi students: the role of socio-demographic factors, depression, anxiety, and stress. *Asian J. Psychiatr.* 44, 48–54. <https://doi.org/10.1016/j.ajp.2019.07.005>.
- Peters, A.N., Winschiers-Theophilus, H., Mennecke, B.E., 2015. Cultural influences on Facebook practices: a comparative study of college students in Namibia and the United States. *Comput. Hum. Behav.* 49, 259–271. <https://doi.org/10.1016/j.chb.2015.02.065>.
- Pontes, H., Stavropoulos, V., Griffiths, M.D., 2017. Measurement invariance of the internet gaming disorder scale–short-form (IGDS9-SF) between the United States of America, India and the United Kingdom. *Psychiatry Res.* 257, 472–478. <https://doi.org/10.1016/j.psychres.2017.08.013>.
- Singh, S., Dahiya, N., Singh, A.B., Kumar, R., Balhara, Y.P.S., 2019. Gaming disorder among medical college students from India: exploring the pattern and correlates. *Ind. Psychiatry J Manuscript accepted for publication*.
- Spitzer, R.L., Kroenke, K., Williams, J.B., 1999. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. JAMA* 282 (18), 1737–1744. <https://doi.org/10.1001/jama.282.18.1737>.
- Spitzer, R.L., Kroenke, K., Williams, J.B., Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch. Intern. Med.* 166 (10), 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>.
- Starcevic, V., Khazaal, Y., 2017. Relationships between behavioural addictions and psychiatric disorders: what is known and what is yet to be learned? *Front. Psychiatry* 8, 53. <https://doi.org/10.3389/fpsyg.2017.00053>.
- Stevanovic, D., Djoric, A., Balhara, Y.P.S., Cirovic, N., Siddharth, A., Ransing, R., Vi Vu Thi, T., Ngoc Huong, T., Tadic, I., Jovic, J., Radovanovic, S., Yilmaz Kafali, H., Erzin, G., Zahir, V., Rani Roy Chowdhury, M., Sharma, P., Shaky, R., Moreira, P., Olayinka, A., Mohamad, A., Monteiro Campos, L., Monteiro Campos, P., Moreira Silva, C., Carlos Tavares, J., Buoli, M., Burkauskas, J., Ivanovic, I., Szczegielniak, A., Knez, R., 2019. Assessing the symptoms of Internet Gaming Disorder among college/university students: an international, validation study of a self-report. *Psihologija In review*.
- Tsai, C.C., Lin, S.S., 2003. Internet addiction of adolescents in Taiwan: an interview study. *Cyberpsychol. Behav.* 6, 649–652. <https://doi.org/10.1089/109493103322725432>.
- Yao, M.Z., Zhong, Z.J., 2014. Loneliness, social contacts and Internet addiction: a cross-lagged panel study. *Comput. Hum. Behav.* 30, 164–170. <https://doi.org/10.1016/j.chb.2013.08.007>.
- Yin, X.Q., de Vries, D.A., Gentile, D.A., Wang, J.L., 2018. Cultural background and measurement of usage moderate the association between social networking sites (SNSs) usage and mental health: a meta-analysis. *Soc. Sci. Comput. Rev.*, 0894439318784908. <https://doi.org/10.1177/0894439318784908>.