

Internet addiction and related psychosocial factors among Pakistani population during Covid19

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Abstract

Background

Internet addiction has surfaced as a significant concern to public health in these unprecedented Covid19 times due to social distancing and lockdown. This study aims to determine the burden of internet addiction and related psychosocial factors among the Pakistani population amidst COVID-19

Methods

An analytical cross-sectional survey was broadcasted on internet via google form link which was completed by 1145 Pakistani residents. The outcome variable was Internet addiction and was assessed using the "Young's Internet Addiction Test" (IAT). In addition, symptoms of depression, anxiety, and stress were evaluated using the "Depression, Anxiety, and Stress Scale-21" (DASS-21). The multinomial logistic regression was applied, and adjusted odds ratio along with 95% confidence intervals were reported for significant factors associated with Internet addiction.

Results

The majority of participants were females and youth (between ages 20–24 years). The prevalence of problematic-internet-users (PIU) and addictive-internet-users (AIU) was 27.3% and 11.3%, respectively. The odds of extremely severe anxiety among AIU were approximately three times (Adj OR: 2.6 (1.1–7.1)) followed by the odds of having extremely severe depression was 3.14 (95% C.I.: 1.53–6.44) times greater among PIU and odds of extremely severe stress being about five times higher among AIU (Adj OR: 5.42 (1.66–17.68)) as compared to normal-internet-user (NIU).

Conclusion

Amid Covid 19, the burden of internet addiction was discovered to have surged among the Pakistani populace. This study found that gender, marital status, depression, stress, anxiety, work situation, and mood changes amidst the pandemic are significantly associated with problematic and addictive internet use.

Introduction:

The internet is having an increasing impact on the lives of both adolescents and adults. While there are numerous benefits, there are also hazards associated with excessive use or addiction. An undue obsession or craving towards computer use and internet access is classified as problematic internet addiction, which has been seen as a growing trend among users amidst Covid19(1). Behavioral addictions like this can take on a variety of hidden and appealing forms. These may appear harmless at first, but they can lead to a vicious circle from which it is difficult to recover, often manifested by an increased compulsion to surf the internet, difficulty in withdrawal, dependability, and uncontrollable desires and may sometimes be associated with other comorbidities such as substance abuse, hyperactivity disorders, anxiousness, sadness, and anger(2).

Internet usage has increased dramatically on a worldwide level over the last decade. According to surveys conducted in the United States and Europe, the burden of internet addiction ranges between 1.5 and 8.2 percent. (1). A large European sample of 11,356 adolescents from 11 countries was investigated, and a prevalence of 4.4 percent was observed. This percentage was higher in males, and the most common reported cause was online gaming. In contrast, the most commonly reported use of the internet among females was for social networking (3). Another survey by Siomos indicated that 8.2 percent of Greek adolescents are addicted to the internet, whereas statistics from German studies show that the burden of internet addiction among adolescents ranges from 1.5 percent to 3.5 percent (4–6). Over the past few years, similar patterns of developing internet addiction have been documented in Asian countries. In China, 17.9% of high school students and 12.3% of college students have been found to be addicted to the internet(7, 8). According to research conducted in Taiwan, 18.8% of people are addicted to the internet, with teens accounting for the majority of those affected(9). Another study found that males with internet addiction were primarily involved in online gaming and poor peer relationships (2). Other reported risk factors for internet addiction included computer accessibility, availability of computer gaming's arena, family dysfunction and conflict, and low parental monitoring(10).

The covid-19 pandemic, in addition to having a devastating effect on the healthcare system, has also unquestionably impacted worldwide social structures and ties. To counteract the effects of social distancing and lockdown, the internet has become more popular and widespread among people of all social strata(11). Consequently, internet addiction and behavioral issues have been skyrocketed in these unprecedented times(12). The use of the internet, specifically websites pertaining to pornography and video gaming, has expanded dramatically during the pandemic. (13, 14). Globally, studies done in many European countries have shown an increase of about 50% in the rates of internet addiction during the pandemic when compared to before (15). Another study conducted in China via an online survey stated that 46.8% of the participants had increased internet dependence and the prevalence of dependence on the internet rose by 23% (from 3.55 to 4.3). Similar trends have been observed in India, where excessive internet usage led to increasing amounts of people playing video games and Binge watching. According to surveys in India, during the pandemic, the number of people playing video games has increased 3 times on the Winzio games platform and 200% on Paytm first games (16, 17). During the pandemic, several reasons have contributed to the rise in internet addiction. The COVID-19 pandemic has imposed an overwhelming economic strain on communities and triggered emotional reactions among the general public(18). To combat covid19, the government imposed measures such as home confinement, constant

lockdown, and the closure of all schools, colleges, universities, offices, businesses, and markets, which resulted in work from home and unemployment, all of which have significantly contributed to the factors that cause internet addiction(19).

The trend of internet addiction in times of the pandemic is also observed a rise in Pakistan. Various press articles and data from the telecom industry indicated a surge in internet usage. The Pakistan Telecommunication Authority claimed a 15% rise in internet usage, whereas telecom companies reported a 25% increase in data usage(20, 21). However, no evidence-based research has been conducted to observe the rising Internet addiction during the pandemic and the factors associated with it. This increasing trend of internet addiction is an eye-opener amidst the already challenging times of the pandemic. At a period when countries are unprepared to face what Covid-19 has to bring and are already on the verge of economic exhaustion, having to deal with another pandemic in the form of internet addiction would be gruesome. Therefore, it is imperative that this trend is identified for the Pakistani population for which minimal data exists. This study aims to determine the burden of internet addiction among the Pakistani population amidst COVID-19 and the psychosocial factors associated with internet addiction, including sociodemographic factors, health-related factors, and behavioral and environmental factors.

Methods:

A cross-sectional survey was carried out to determine the burden of internet addiction during the pandemic and the effect of various psychological factors, including depression, anxiety, and stress, onto internet addiction. This was a web-based survey circulated on the internet via different social media platforms such as 'WhatsApp' groups, Facebook pages, Twitter, email, etc., using google form link. To ensure adequate survey translation in the local language, the English version was reviewed by the psychiatrist and translated in Urdu and back-translated in English to substantiate comparability of meaning and context. Individuals aged 13 years and above with competency to comprehend English or Urdu language, currently residing in any province of Pakistan, having access to questionnaire, and willing to participate were eligible to participate. Overseas Pakistanis were excluded from the study. Electronic consent was obtained from all the participants, including parental consent for participants underage of 18 years to participate in the study. Assent was further verified by taking the contact information of parents/guardians. Ethical approval was obtained from the institutional ethical review board (Aga Khan University Ethical Review Board).

Dependent variable:

The outcome of this study was Internet addiction and was assessed by the "Young's Internet Addiction Test (IAT)" to screen symptoms of internet addiction and related disruption in psychosocial functioning. This screening tool is a self-assessment scale with a total of 20 questions, each of which is graded on a 6-point scale from 0 to 5. Participants having an IAT score of 70 and above were categorized as an "addictive-internet-users (AIU)" coded as 2, IAT score of 40 to 69 were categorized as "problematic-internet-users (PIU)" coded as 1, and IAT score of 39 or less were classified as "normal-internet-users (NIU)" coded as 0. This instrument has shown acceptable psychometric properties and was previously validated in a Pakistani setting showing Cronbach alpha of 0.88, indicating excellent reliability(22).

Independent Variable:

Symptoms of depression, anxiety, and stress were screened using the "Depression, Anxiety and Stress Scale-21 (DASS-21)". This scale has been used for the clinical assessment using the symptomatology approach of depression, anxiety, and stress; however, it doesn't indicate the diagnosis of cases. This tool measures severity/frequency of symptoms and is a 4-point scale from 0 to 3 where: 0= "it does not apply to me at all," 1= "it applies to me to some degree or some of the time," 2= "it applies to me to a considerable degree or a good part of the time," and 3= "it applies to me very much, or most of the time." To compute the final score for each psychological condition(depression, anxiety, and stress), scores for items related to each condition were summed and further multiplied by 2. Scores for all psychological conditions ranged from 0–42. Each participant's responses were grouped into one of the five categories: normal, mild, moderate, severe, and extremely severe for depression, anxiety and stress separately. For depression, participants with a score of 0 to 9 were categorized as 'normal,' a score of 10 to 13 as 'mild,' a score of 14 to 20 as 'moderate,' a score of 21 to 27 as 'severe,' and a score of 28 or higher as 'extremely severe.' For anxiety, participants with a score of 0 to 7 were categorized as 'normal,' a score of 8 to 9 as 'mild,' a score of 10 to 14 as 'moderate,' a score of 15 to 19 as 'severe,' and a score of 20 or higher as 'extremely severe.' For stress, participants with a score of 0 to 14 were categorized as 'normal,' a score of 15 to 18 as 'mild,' a score of 19 to 25 as 'moderate,' a score of 26 to 33 as 'severe,' and a score of 34 or higher as 'extremely severe.' This instrument has shown excellent psychometric properties and has been previously used in Pakistani settings showing internal consistency (Cronbach's α) of 0.84 to 0.97(23).

Other variables, including sociodemographic, health-related, and behavioral and environmental factors related to the pandemic, were also collected.

Sample Size

The estimated sample size came to be a minimum of 1,145 for determining the burden and related psychological factors of internet addiction. For the burden of internet addiction (PIU and AIU) among the Pakistani population, the burden was expected in the range from 9.7–47% with 2.5% of absolute precision and a level of significance of 5%; found a minimum sample of 379 individuals was required. For assessing the effect of depression, anxiety, and stress on internet addiction, a minimum sample of 994 individuals was required to achieve 80% power and at 95% level of significance, with the range of non-diseased (normal internet user) with depression, anxiety and stress ranging from 28–33% and an anticipated odd ratio of 1.5. As it was a web-based study, 15% of refusals and incomplete forms were anticipated. The final sample size came to be 1145, including 15% of refusals and incomplete forms. A non-probability purposive sampling technique was adopted.

Statistical analysis was done using Stata version 16. Mean and standard deviation were computed for all continuous variables and frequencies, and percentages were computed for all categorical variables. All descriptive statistics were reported based on internet addiction. Overall mean and standard deviation were reported for depression, anxiety and stress and were stratified based on internet addiction and gender. Multinomial logistic regression was used to assess the effect of psychological conditions (Depression, Anxiety, and stress) and other factors on the internet addiction amidst Covid19. Adjusted odds ratio along with the confidence interval of 95% were reported. A p-value of less than 5% was considered significant.

Results:

Among 1145 participants, 703 (61.4%) had IAT score 39 or below and hence were found to be normal internet users, 313 (27.3%) were problematic internet users (IAT score 40–69), and 129 (11.3%) were addictive internet users having IAT score 70 or above. The majority of the participants were females (about 60%) in each of the three groups of internet users, and the majority were youth, i.e., having age 20 to 24 years in each group. Among normal internet users, 79.8% were single, i.e., never married, whereas, among problematic and addictive users, proportions of never-married participants were 87.5% and 84.5%, respectively (p -value < 0.01). Most of the participants belonged to the nuclear family system, and this distribution was not found to be significantly different in the three groups (p -value = 0.65). About 21% of the normal users, about 16% of the problematic users, and 18.6% of the addictive users had a post-graduate degree (p -value = 0.03). Moreover, 13.2% of the addictive users had a family income of rupees less than 50 thousand compared to 23.3% of problematic users and 33.7% of normal users (p -value < 0.001). (Table 1a)

DASS-21 results showed that 47.3% of the addictive internet users were found to be extremely severely depressed as compared to only 6.8% of the normal internet users. Similarly, 55.8% of the addictive internet users versus 11.4% of the normal internet users were having extremely severe anxiety, and 25.6% of the addictive vs. 2.3% of the normal internet users were extremely severely depressed. All these differences were found to be highly significant (p -value < 0.01) (Table 1b)

About 41% of the addictive internet users (vs. 37% of the normal internet users) had a history of mental health problems. Moreover, 27.9% of the addictive users versus 20.7% of the normal users reported that their family members suffered from mental issues during COVID. (Table 1c)

The work situation of the participants was also found to be significantly different (p -value < 0.01) among the three groups of internet users, showing 53.5% of the addictive users were not working as compared to 45.7% of the normal users who were not working. However, workload and financial impact on budget due to the pandemic was not found to be significantly different in the three groups (Table 1d)

The mood of participants during the pandemic was significantly different (p -value < 0.001) in the three groups of internet users with 74.4% of addictive users having negative moods compared to 45.7% of the normal users. (Table 1d)

Table 1
 showing sociodemographic factors, health related factors and behavioral and environmental factors of participants (n = 1145)

	Normal Internet Users N = 703 (61.4%)	Problematic Internet Users N = 313 (27.3%)	Addictive Internet Users N = 129 (11.3%)	χ^2	p value
Socio-demographic factors (Table 1a)					
	n (%)	n (%)	n (%)		
Gender					
Male	286 (40.7)	119 (38.0)	54 (41.9)	0.8	0.66
Female	417 (59.3)	194 (62.0)	75 (58.1)		
Age					
Teenager	140 (19.9)	76 (24.3)	28 (21.7)	5.6	0.46
Youth	349 (49.6)	160 (51.1)	62 (48.1)		
Young adult	133 (18.9)	50 (16.0)	27 (20.9)		
Middle/older adult	81 (11.5)	27 (8.6)	12 (9.3)		
Marital status					
Never married	561 (79.8)	274 (87.5)	109 (84.5)	9.4	<0.01
Ever Married	142 (20.2)	39 (12.5)	20 (15.5)		
Education					
Less than higher secondary	57 (8.1)	11 (3.5)	12 (9.3)	14.0	0.03
Higher secondary	234 (33.3)	126 (40.3)	46 (35.7)		
Under grad degree	265 (37.7)	126 (40.3)	47 (36.4)		
Post grad degree	147 (20.9)	50 (16.0)	24 (18.6)		
Family system					
Extended	250 (35.6)	120 (38.3)	49 (38.0)	0.8	0.65
Nuclear family	453 (64.4)	193 (61.7)	80 (62.0)		
Family income					
< 50k	237 (33.7)	73 (23.3)	17 (13.2)	28.9	0.00
50-100k	134 (19.1)	63 (20.1)	32 (24.8)		
100-200k	124 (17.6)	65 (20.8)	30 (23.3)		
> 200k	208 (29.6)	112 (35.8)	50 (38.8)		
Family size					
Small	162 (23.0)	72 (23.0)	30 (23.3)	8.1	0.08
Medium	419 (59.6)	166 (53.0)	68 (52.7)		
Large	122 (17.4)	75 (24.0)	31 (24.0)		
Health related factors					
Depression Anxiety Stress Scale – 21 items (DASS-21) (Table 1b)					
Depression					
Normal	367 (52.2)	78 (24.9)	26(20.2)	219.4	< 0.01
Mild	119 (16.9)	33(10.5)	8(6.2)		
Moderate	119 (16.9)	79(25.2)	17(13.2)		
Severe	50 (7.1)	44(14.1)	17(13.2)		
Extremely severe	48 (6.8)	79 (25.2)	61(47.3)		

	Normal Internet Users N = 703 (61.4%)	Problematic Internet Users N = 313 (27.3%)	Addictive Internet Users N = 129 (11.3%)	χ^2	p value
Anxiety					
Normal	350 (49.8)	80 (25.6)	24 (18.6)	199.6	< 0.01
Mild	83 (11.8)	22 (7.0)	4 (3.1)		
Moderate	156 (22.2)	67 (21.4)	19 (14.7)		
Severe	34 (4.8)	39 (12.5)	10 (7.8)		
Extremely severe	80 (11.4)	105 (33.6)	72 (55.8)		
Stress					
Normal	532 (75.7)	144 (46.0)	39(30.2)	234.3	< 0.01
Mild	51 (7.3)	35 (11.2)	4 (3.1)		
Moderate	63 (9.0)	54 (17.3)	14(10.9)		
Severe	41 (5.8)	53 (16.9)	39 (30.2)		
Extremely severe	16 (2.3)	27 (8.6)	33 (25.6)		
History of any mental health problems (Table 1c)					
No	366 (52.1)	119 (38.0)	58 (45.0)	17.9	< 0.01
Yes	260 (37.0)	146 (46.7)	53 (41.1)		
I don't know	77 (11.0)	48 (15.3)	18 (14.0)		
Family members suffering from mental problem during Covid (Table 1c)					
No	485 (69.0)	173 (55.3)	74 (57.4)	23.4	< 0.01
Yes	146 (20.8)	82 (26.2)	36 (27.9)		
I don't know	72 (10.2)	58 (18.5)	19 (14.7)		
Behavioral and environmental factors during pandemic (Table 1d)					
Work situation during pandemic					
No, I do not work	321 (45.7)	172 (55.0)	69 (53.5)	21.8	< 0.01
No, looking for job	62 (8.8)	19 (6.1)	5 (3.9)		
No, short time work	55 (7.8)	29 (9.3)	16 (12.4)		
Yes, on work site and teleworking	98 (13.9)	46 (14.7)	12 (9.3)		
Yes, on worksite exclusively	167 (23.8)	47 (15.0)	27 (20.9)		
Workload during pandemic					
Not working	221 (31.4)	121 (38.7)	48 (37.2)	11.3	0.18
Higher than before	137 (19.5)	62 (19.8)	27 (20.9)		
Highly variable	66 (9.4)	31 (9.9)	15 (11.6)		
Less than before	164 (23.3)	51 (16.3)	23 (17.8)		
Same as before	115 (16.4)	48 (15.3)	16 (12.4)		
Financial impact on budget due to pandemic					
No	214 (30.4)	82 (26.2)	33 (25.6)	7.0	0.13
Yes a little	336 (47.8)	146 (46.7)	57 (44.2)		
Yes a lot	153 (21.8)	85 (27.2)	39 (30.2)		
Describe your mood during pandemic					
Negative	321 (45.7)	178 (56.9)	96 (74.4)	43.6	< 0.01

	Normal Internet Users N = 703 (61.4%)	Problematic Internet Users N = 313 (27.3%)	Addictive Internet Users N = 129 (11.3%)	χ^2	p value
No change	224 (31.9)	70 (22.4)	14 (10.9)		
Positive	158 (22.5)	65 (20.8)	19 (14.7)		

Overall, the mean depression score of participants among addictive users was 23.4 ± 12.9 compared to 18.2 ± 11.4 and 10.5 ± 9.5 in the problematic and normal internet users, respectively. Similarly, the overall mean anxiety score was much higher in the addictive internet users than problematic and normal users (20.2 vs. 15.1 and 8.6). Overall mean stress score was also found to be significantly higher in addictive internet users as compared to problematic and normal internet users (p -value < 0.01) (Table 2). Moreover, we found that mean scores for depression, anxiety, and stress were significantly higher in females as compared to males (Table 2, Fig. 1)

Table 2
showing DASS - 21 scores of participants as a function of gender. (M = male; F = female; SD = standard deviation)

	Normal Internet Users Mean (SD)			Problematic Internet Users Mean (SD)			Addictive Internet Users Mean (SD)			F factor		P value			
	M	F	Overall	M	F	Overall	M	F	Overall	M	F	Overall	M	F	Overall
Depression Anxiety Stress Scale - 21 (DASS-21) scores															
Depression score	9.1 (8.2)	11.4 (10.1)	10.5 (9.5)	17.3 (10.8)	18.8 (11.8)	18.2 (11.4)	21.0 (13.3)	25.2 (12.4)	23.4 (12.9)	53.1	67.1	117.4	< 0.01	< 0.01	< 0.01
Anxiety score	7.8 (7.1)	9.2 (8.5)	8.6 (8.0)	14.3 (9.2)	15.6 (10.5)	15.1 (10.0)	17.9 (12.2)	22.0 (11.9)	20.2 (12.1)	48.0	72.2	118.6	< 0.01	< 0.01	< 0.01
Stress Score	9.5 (7.9)	11.6 (9.4)	10.8 (8.9)	17.0 (10.0)	18.3 (10.6)	17.8 (10.4)	20.6 (12.8)	25.5 (11.8)	23.5 (12.4)	50.2	75.7	123.2	< 0.01	< 0.01	< 0.01

Our final multinomial logistic regression model showed that gender was significantly associated with internet use. The odds of being male were higher (Adj OR: 1.7 (1.1–2.7)) in addictive users compared to normal users when controlled for other variables. Similarly, being single was found to have higher odds with problematic internet use (Adjusted OR: 1.6 (1.1–2.5)). Moreover, the odds of having extremely severe depression were 3.1 (95% C.I.: 1.5–6.4) times greater in problematic users than normal internet users. Anxiety was also significantly associated with internet use, odds of extremely severe anxiety being about 3 times higher in addictive users (Adj OR: 2.6 (1.1–7.1)) as compared to normal users. Stress was also significantly associated with internet use, odds of extremely severe stress being about five times higher in addictive users (Adj OR: 5.4 (1.7–17.7)). Furthermore, participants who do not work had greater odds of being addictive users (Adj OR: 2.2 (1.1–4.6)). Mood changes during the pandemic were also significantly associated with internet use, with odds of negative mood change being greater (Adj OR: 2.9 (1.5–5.6)) in addictive internet users as compared to normal internet users (Table 3)

Table 3

showing crude and adjusted odds ratio (OR) along with 95% confidence interval (CI) of factors associated with internet addiction using multinomial logistic regression. * indicates results with P value < 0.05.

Variable	Problematic internet User (PIU)	Addictive Internet User (AIU)
	Adjusted OR (95% CI)	Adjusted OR (95% CI)
Sociodemographic factors		
Gender		
Male	1.2 (0.8–1.6)	1.7 (1.1–2.7) *
Marital status		
Never married	1.6 (1.0-2.5) *	1.5 (0.8–2.8)
Family income		
50-100k	1.3 (0.9–2.1)	2.8 (1.4–5.7) *
100-200k	1.3 (0.9–2.1)	2.6 (1.3–5.2) *
>200k	1.3 (0.9-2.0)	2.3 (1.2–4.4) *
Family size		
Small	1.2 (0.8–1.7)	1.1 (0.7-2.0)
Large	1.8 (1.3–2.7) *	1.8 (1.1–3.2) *
Health related factors		
Depression Anxiety Stress Scale – 21 (DASS-21)		
Depression		
Mild	1.1 (0.7–1.8)	0.8 (0.3–1.8)
Moderate	2.0(1.3–3.2) *	1.1 (0.4–2.3)
Severe	2.1 (1.1–3.9) *	1.1 (0.4–3.3)
Extremely severe	3.1 (1.5–6.4) *	1.9 (0.7–5.7)
Stress		
Mild	1.2 (0.7-2.0)	0.5 (0.2–1.7)
Moderate	1.1 (0.6–1.9)	1.2 (0.5-3.0)
Severe	1.2 (0.6–2.5)	3.3 (1.2–8.9) *
Extremely severe	1.2 (0.5–3.2)	5.4 (1.7–17.7) *
Anxiety		
Mild	1.1 (0.6–1.7)	0.7 (0.2–2.2)
Moderate	1.2 (0.8–1.9)	1.4 (0.7–3.1)
Severe	2.6 (1.4–4.9) *	2.1 (0.7–6.3)
Extremely severe	2.0 (1.1–3.9) *	2.6 (1.1–7.1)
Family members suffering from mental problem during Covid		
Yes	1.4(1.0–2.0)	1.1 (0.7–1.9)
I don't know	1.7 (1.1–2.6) *	1.3 (0.7–2.5)
Behavioral and environmental factors during pandemic		
Work situation during pandemic		
Do not work	1.3 (0.8-2.0)	2.2 (1.0-4.6) *
Looking for job	0.7 (0.3–1.3)	0.7 (0.2–2.2)
Part-time job	1.2 (0.7–2.3)	2.6 (1.0-6.5) *
Work in person	0.7 (0.4–1.1)	1.5 (0.7–3.4)

Variable	Problematic internet User (PIU)	Addictive Internet User (AIU)
	Adjusted OR (95% CI)	Adjusted OR (95% CI)
Describe your mood changes during pandemic		
Negative	1.2 (0.8–1.7)	2.9 (1.5–5.6) *
Positive	1.1 (0.7–1.8)	1.5 (0.7–3.3)

Discussion:

This study indicates that the majority are normal internet users (61.4%), whereas the prevalence of problematic and addictive internet use is 27.3% and 11.3%, respectively. The factors that are found to be significantly associated with internet use are gender, marital status, depression, stress, work situation, and mood changes during the COVID-19 pandemic.

While the majority were normal internet users in our study, the proportions of problematic and addictive internet use are not considerably less. Moreover, the literature reveals that measures to curb the COVID-19 pandemic such as lockdowns, closure of educational institutions, closure of entertainment clubs, and promotion of work from home practices have led to an increase in time spent at home and have contributed remarkably in increased and possibly addictive use of the internet(13, 14, 19).

In this study, males are found to be more addictive users. This finding is consistent with many previous studies(24, 25)with the possible reason that males are more involved in online gaming and are more prone to use the internet for entertainment and leisure activities in comparison to females. However, some studies show females are more addicted to internet use attributing it to online shopping addiction, especially in the recent few years with the advent of more online shopping websites(26, 27).

This study further revealed that single participants have greater odds of being addictive internet users. This finding is compatible with few studies (28). The possible explanation could be that married life poses certain responsibilities and demands more time towards family, limiting many leisure activities like internet use. On the other hand, unmarried individuals may spend more time on the internet to compensate for family life and social interaction, especially during the lockdown in pandemics where internet use can serve to communicate and develop a virtual friendship. However, we also found studies where marital status had no association with internet use(29).

Our results show that severe depression, severe stress, and negative mood changes during a pandemic are significantly associated with addictive internet use. These findings are in line with the literature(30, 31). Behaviors like internet addiction may serve as a coping strategy to reduce stress and depression and to avoid negative thoughts(32, 33). Another finding of this study is that not working situation is significantly associated with addictive use of the internet. Literature shows that unemployment during the COVID-19 pandemic has markedly contributed to the factors responsible for internet addiction(19).

Our study was unique in our settings, with quite a large sample size and considering several variables. However, it has some limitations. Firstly, it was a web-based survey, so the sample may not be representative, and findings may not be generalized to the entire population. Also, information bias and selection bias cannot be eliminated in a web-based study. Moreover, due to the cross-sectional design of the study, the temporal relationship cannot be studied. However, future such research in this area can make use of prospective, longitudinal designs to establish temporal associations.

Conclusion

While the Internet is increasingly becoming an integral part of our lives in the modern era, its excessive use has potentially addictive effects that lead to serious mental health problems. Moreover, with the COVID-19 pandemic, increased use of the internet possibly leading to addictive behaviors that need to be carefully monitored. This study, unique of its kind in Pakistan, identified that gender, marital status, depression, stress, anxiety, work situation, and mood changes during the COVID-19 pandemic are significantly correlated with problematic and addictive internet use. These findings could serve as a preliminary step towards early awareness and preventing measures against the addictive use of the internet to avoid or mitigate any serious mental health problems that we may run into, especially during these crucial times of the COVID-19 pandemic.

Declarations

Ethics approval and consent to participate: Ethical approval was taken from The Aga Khan University Ethical Review Committee (2020-5750-14980). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional committee.

Informed consent: Before data collection (access to electronic form), all participants were asked to electronically sign a form of consent to be included in this study.

Consent for publication: The authors consent for publication of this paper. All authors have read and approved the final manuscript. This manuscript has not been published and is not under consideration for publication elsewhere.

Availability of data and materials: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to information that could compromise the privacy of research participants.

Competing interests: The authors declare that they have no competing interests. The authors report no conflict of interest.

Authors' contributions: Conception or design of the work: MPL; Proposal development: MPL, ANH, MA, MTN, MMHK; Proposal review: GP, AA, SIA; Data collection: MPL, ANH, MA, MTN, MMHK, GP; Data Cleaning: MPL, ANH, MA, MTN, MMHK, AA and Data Coding: MPL, ANH, MA, MTN, MMHK, SIA; Data analysis and interpretation: MPL, ANH, FBH; Table formulation: MPL, ANH, FBH; Prepared figure: MPL, ANH; Drafting the article: MPL, ANH, FBH; Critical revision of the article: MPL, GP, SIA; Final approval of the version to be published: MPL, ANH, MA, MTN, MMHK, FBH, GP, AA, SIA. All authors read and approved the final manuscript.

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34. <background-color:#CCCCFF;bu>Internet addiction and factors associated with internet addiction during COVID-19</background-color:#CCCCFF;bu>

Figures

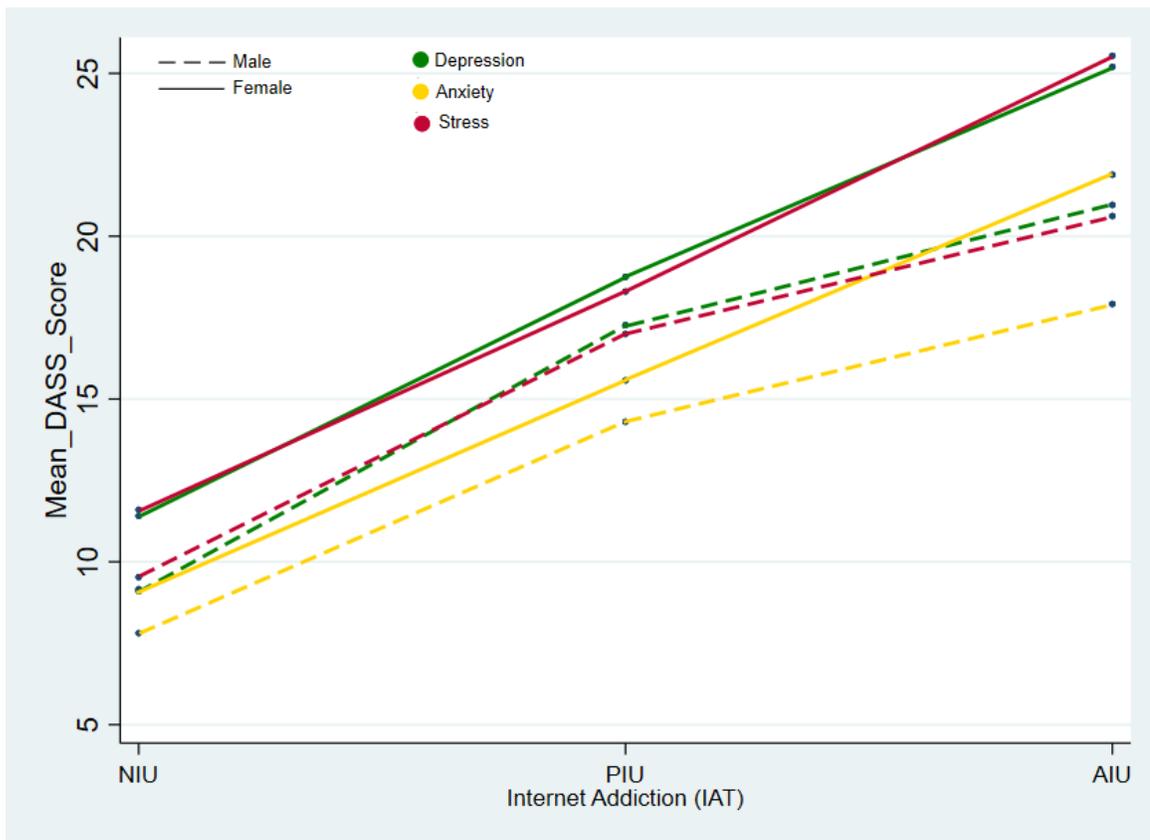


Figure 1

showing mean DASS scores of participants as a function of gender.

Supplementary Files

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