Heliyon 9 (2023) e13340

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Research article

Internet addiction and loneliness among school-going adolescents in Bangladesh in the context of the COVID-19 pandemic: Findings from a cross-sectional study

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ARTICLE INFO

Keywords:
Internet addiction
Internet use
Mental health
Loneliness
School-going adolescents
COVID-19 pandemic
Cross-sectional study

ABSTRACT

Internet addiction (IA) by children and adolescents is a concern for parents. The intensity of this problem has increased in the context of COVID-19 pandemic across the world. Here we aimed to evaluate internet usage patterns, addiction to internet use, and mental health among Bangladeshi school-going adolescents during the COVID-19 pandemic. We conducted this cross-sectional study among 502 school-going adolescents. Pre-structured questionnaire was used to collect information related to demographics and the internet usage pattern. We assessed the prevalence of IA and loneliness using the internet addiction test (IAT) scale and UCLA-3 loneliness scale. The prevalence of IA and loneliness among Bangladeshi school-going adolescents were 88.25% and 72.51%, respectively. Individuals with English-medium education, higher classes, high economic status, mobile internet connection, online gaming habits, and living without family showed significantly higher levels of IA. Moreover, a high proportion of loneliness was observed among individuals with high financial conditions, mobile internet connection, and who watch movies on the internet. The present study findings suggest a strong association between demographics, internet usage patterns, IA, and the mental health of adolescents. These results would have practical inferences in clinical psychology, psychotherapy, and related fields. Based on this finding, the healthcare authorities and professionals can develop an inclusive interventional approach for adolescents who suffer from IA and mental health disorders.

1. Introduction

The emerging coronavirus disease 2019 (COVID-19) has spread worldwide creating an alarming impact on the physical and mental health [1]. Bangladesh is a populated country, the number of people is 5 times that of any other mega-country, and with so many people living together, public health problems are becoming more concerning day by day [2]. In the capital city, Dhaka, Bangladesh, the earliest three cases of COVID-19 were reported on March 8, 2020 [3]. The government of Bangladesh had announced a public holiday from March 26, 2020 to help combat the spread of the pandemic [4]. Bangladesh's government retaliated by suspending

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https://doi.org/10.1016/j.heliyon.2023.e13340
Received 27 June 2022; Received in revised form 16 January 2023; Accepted 26 January 2023
Available online 1 February 2023

several activities such as imposing mandatory quarantine and lockdown [5]. According to UNESCO, school closures have touched 87% of students globally, or more than 1.5 million children and young people residing in 165 countries as of March 26, 2020 [6]. A significant psychological impact stroked Bangladesh due to the COVID-19, expanding the need for initiatives for mental health support and services, more importantly for women and the younger generation [7–11]. Bangladeshis had to prepare for isolation and at the same time had to suffer from the fear of infection, putting a significant additional strain on their mental health at a time when they already have a higher rate of mental illness than those in other nations [12–14].

Technological advancements have made communication and reach to information more accessible, over usage of the internet and cell phones can lead to a variety of mental and physical health problems [15–18]. Adolescence is a phase of rapid development that encompasses physical, sexual, social, and emotional changes as a person transition from childhood to adulthood. Adolescents may feel different during this time due to the changes they are going through in these areas. They may also have trouble interacting with their family and others [19]. Adolescents' lives are becoming increasingly influenced by the internet. Addiction is characterized as abnormal behaviors that hurt a person's biological, mental, and bodily functions, as well as their daily activities, causing them to lose their balance [20,21]. There are dangers associated with binge drinking and addiction [22]. Excessive internet use is referred to as internet addiction (IA), internet dependency, or problematic internet usage (PIU) [23,24]. According to IA, psychological functioning, feelings, interpersonal relationship, and academic achievement are all affected by the failure to set limits on internet use [25,26]. The incidence of IA scores ranges from 0 to 47.4% in a survey of 38 studies from countries classified by the authors as Southeast Asia (with the majority coming from India) [27]. Loneliness is defined as an uncomfortable sensation that is also a complex scenario that is experienced differently by each individual and is frequently accompanied by worry, anger, despair, and emotions. Loneliness is a depressing personal experience or psychological condition marked by a lack of relationships that are satisfactory [28,29]. Although it affects teenagers and young adults more frequently, it can affect anyone at any age. Researchers claim that lonely people tend to withdraw from time constraints, personal and social commitments, associations, and social engagements [26]. Scientist discovered a link between internet use and loneliness in several studies [26]. To put it another way, people who use the internet frequently are lonelier than those who do not [30]. These findings, however, are paradoxical, showing that IA and loneliness have either a positive or negative association [31]. Adolescents may be motivated to use the internet to change their mood as a result of the COVID-19 difficulties [32,33]. They spend an average of 7 h and 22 min each day on media rather than sleeping or attending school. Gambling, excessive gaming, IA, and smartphone overconsumption are frequent [34]. Therefore, the current study seeks to assess IA and loneliness among adolescents in Bangladesh during the COVID-19 pandemic.

2. Methods

2.1. Study design and participants

A cross-sectional online survey was conducted which included Bangladeshi high school students. Data collecting responses from high school students started on September 1, 2021, and proceeded through October 16, 2021, with the help of the Google survey tool (Forms by Google). Purposive sampling was employed to acquire primary data from the participants in this study. We set the confidence interval, the margin of error, and expected prevalence to 95%, 5%, and 30%, respectively. The required sample size, according to our calculations, was 303. We estimated that the response rate would be around 20%, so we invited 1516 people to take part in the poll. However, with 568 responses, the real response rate was 47%. We eliminated 66 responses after screening due to missing or incomplete information. Finally, we looked at 502 people, 205 males, and 297 females, who were between the ages of 10 and 16. Participants were briefed about a summary of the questionnaire, eligibility requirements, procedures, and an electronic permission form before taking part in the survey. Informed consent, the IA scale, the mental health evaluation scale, and socio-demographic data were all incorporated into a self-administered questionnaire. We provided support and counseling via video conferences or phone calls to clear up any concerns or ensure that the questionnaire was thoroughly understood. Participants read and agreed to a summary of the survey, eligibility conditions, procedures, and an electronic consent form before taking part in the survey. We obtained signed electronic consent from all participants. The study's subjects were all of the Bangladeshi descent and were residing in Bangladesh at the time. All of the participants gave their information freely. We did not compensate the participants for their time or participation in the poll. Exclusion criteria for the participants were the presence of any physical and mental illness. Also, we excluded subjects with a history of addiction. Participants were not compensated for their participation to this study.

2.2. Estimations

For this survey, we employed two sets of questionnaires. The first was a structured questionnaire created by the researchers that included informed permission as well as sociodemographic data. The second set consisted of a structured self-reported questionnaire based on various psychometric evaluation scores. Both sets of questionnaires were written in English and then translated into Bangla. To begin, all surveys were translated into Bangla by a medical graduate and a layperson who were both native Bangla speakers and English speakers. To create a single Bangla forward version, an impartial researcher collated and corrected differences. This Bangla version was translated back to English by a professional translator with experience in medical translation and a medical graduate who was not involved in the forward translation [35]. These back-translated versions were also prepared by an independent researcher in the same manner. We tested the questionnaire on a small group of people who were chosen at random to ensure that it was clear and understandable. For an appropriate understanding of the questions, we distributed the questionnaire in both English and Bengali versions. We tested the questionnaire on a small group of people who were chosen at random to ensure that it was clear and

understandable. For the appropriate understanding of the questions, we distributed the questionnaire in both English and Bengali versions. Participants were supplied the link to the customized Google Forms via email and social media sites.

2.3. Demographics of the study population

A pre-designed structured questionnaire was used as a prototype to collect socio-demographic data from respondents. The socio-demographic parameters were age, gender, BMI, education medium, school class, economic level, domicile, living condition, division of residence, smoking habit, internet connection, internet usage device, and most time spent goods on the internet.

2.4. loneliness scale

The UCLA Loneliness Scale-3 (UCLA-3) is a condensed version of the UCLA Loneliness Scale that has three questions. Each item is rated from 1 to 3 depending on the respondent's response: 1 (hardly ever), 2 (some of the time), and 3 (often). The total score ranges from 3 to 9. A higher score indicates a greater level of loneliness [36,37].

2.5. Internet addiction test scale

Excessive internet use might result in "IA." There has been a significant increase in the number of internet users among adolescents in Bangladesh recently, which could have detrimental health repercussions. We applied internet addiction test (IAT) scale to evaluate the internet addiction among the respondents. IAT questionnaire has 20 statements. After carefully reading each question on the 5-point Likert scale, choose the response (0, 1, 2, 3, 4, or 5) that best describes you. If two options appear to be equally applicable, circle the one that best describes your actions over the past month. Before making a decision, make sure to read all of the statements thoroughly. The remarks, unless otherwise noted, pertain to offline events or actions. The overall IAT score is calculated by adding the examinee's values for the 20-item responses. Each item is rated from 0 to 5 on a 5-point scale. There are a total of 100 points available. Our ailment becomes more serious as our score rises. A normal amount of internet usage is regarded to be between 0 and 30 points; 31

Table 1
Distribution of socio-demographic variables and their association with internet addiction and loneliness among school-going adolescents in Bangladesh.

Socio-demographic parameters	Total (N = 502)		Internet addiction (N = 443)					Loneliness (N = 364)				
	n	%	n	%	χ2	df	p-value	n	%	χ2	df	p-value
Age in years												
10–13	71	14.14	60	84.51	1.115	1	0.291	50	70.42	0.181	1	0.671
14–16	431	85.86	384	73.32				314	73			
Sex												
Female	297	59	266	89.56	1.213	1	0.271	222	74.74	1.827	1	0.177
Male	205	41	177	86.34				142	69.27			
BMI (kg/m2)												
Below 18.5 (CED)	31	6	27	87.09	0.124	2	0.940	25	80.64	1.121	2	0.571
18.5–25 (normal)	423	84	373	88.18				304	71.87			
Above 25 (obese)	48	10	43	89.6				35	72.92			
Education level												
Six	06	1.19	3	50	35.582	4	**<0.001**	4	66.66	6.490	4	0.165
Seven	30	6	27	90				23	76.67			
Eight	114	23	101	89				85	74.56			
Nine	214	42.31	205	95.79				163	76.17			
Ten	138	27.5	107	77.54				89	64.49			
Medium of education												
Bangla	312	62	257	82.37	27.435	1	**<0.001**	217	69.55	3.620	1	0.057
English	190	38	186	98				147	77.4			
Economic impression												
High	166	33.07	163	98.19	24.887	2	**<0.001**	132	79.52	7.311	2	**0.026**
Medium	325	64.74	272	83.69				226	69.54			
Low	11	2.19	8	72.72				6	54.54			
Residence area												
Urban	464	92	411	88.6	0.646	1	0.422	334	72	.855	1	0.355
Rural	38	8	32	84.21				30	79			
Living status												
With family	391	78	338	86.45	5.536	1	**0.019**	276	70.59	3.276	1	0.070
Without family	111	22	105	94.6				88	79.27			
Smoking habit												
Non-smoker	472	94.02	417	88.35	0.077	1	0.782	345	73.09	1.348	1	0.246
Smoker	30	5.98	26	86.67				19	66.33			

p-values are significant at 95% confidence interval ($p < 0.05$). Significant p-values are shown in bold. χ2, chi-square; df, degree of freedom; BMI, body mass index; CED, chronic energy deficiency; N, number.

to 49 points suggest mild IA; 50 to 79 points indicate moderate IA, and 80 to 100 points indicate severe IA.

2.6. Statistical analysis

We used Microsoft Excel 2016 and SPSS (version 25.0) data processing and analysis. The characteristics of the respondents were analyzed using descriptive statistics. We used the Chi-square test to see if there were any variations in respondents' internet addiction and loneliness status (yes or no) with other variables. Using binary logistic regression analysis with a 95% confidence interval, we looked at the relationships between risk factors and psychometric measures (e.g., internet addiction and loneliness). At a p-value 0.05 or less, statistically significant results were considered.

2.7. Ethics approval statement

The protocol was approved by the Research Ethics Committee, University of Asia Pacific, Dhaka, Bangladesh (Ref: UAP/REC/2021/103). We conducted this study following the principles stated in the Declaration of Helsinki. Also, we obtained informed electronic consent from all the participants.

3. Results

Table 1 shows the socio-demographic variables and their association with IA and loneliness of the respondents. Of the 502 respondents, 40.84% and 59.16% were men and women, respectively. A total of 85.86% study population belonged to the age group of 14–16, whereas 14.14% of the study population were in the 10–13 age group. Of the respondents, 84.26% had normal BMI and about 9.56% of the study population were obese. The respondents belonged from various educational level starting from class six, seven, eight, nine, ten were 1.20%, 5.98%, 22.71%, 42.63%, 27.48%, respectively. We observed that two-thirds of the medium of education were Bangla and one-third English (62.15% and 37.85%). The percent of economic impression were high (33.07%), medium (64.74%) and low, (2.19%) respectively. The prevalence of IA was found to be none (11.75%), mild (51.59%), moderate (35.66%), severe (1.00%) compared to loneliness none (27.49%), mild (31.08%), moderate (36.06%), severe (5.38%) shown in Fig. 1. The proportion of respondents experiencing IA was higher in (1) people living without family members versus with family members (94.59% vs. 86.45%, $p = 0.019$) (2) Economic impressions high vs. medium (98.19 vs. 83.69%, $p < 0.001$) (3) English versus Bangla education medium (97.89% versus 82.37%, $p < 0.001$) (4) ninth versus eight grade (95.79% versus 88.60%, $p < 0.001$) respectively Table 1. The proportion of respondents experiencing IA were higher in Mobile data vs. Wi- Fi users (94.59% vs. 84.54%, $p < 0.001$), purpose of internet use-higher games verses education (95.73% vs. 84.21%, p, 0.001) as shown in Table 3. The proportions of respondents suffering from loneliness were higher in (i) aged 14–16 versus 10–13 (72.85% vs. 70.42%, $p = 0.671$), (ii) females versus males (74.75% vs. 69.27%, $p = 0.177$), (iii) BMI (kg/m2) Below 18.5 versus above 25 (80.65% vs. 72.92%, $p = 0.571$), (iv) education level seven versus eight (76.65% vs. 74.56%, $p = 0.165$), (v) English versus Bangla (77.37% vs. 69.55%, $p = 0.057$), (vi) high vs. medium economic status (79.52% vs. 69.54%, $p = 0.026$) , (vii) rural versus urban (78.95% vs. 71.98%, $p = 0.355$), (viii) without family versus with family (79.28% vs. 70.59%, $p = 0.070$), (vii) non-smoker versus smoker (73.09% vs. 63.33%, $p = 0.246$)) respectively (Table 1). The proportions of respondents suffering from loneliness were higher in (viii) movie versus games (88.00% vs. 79.26%, $p < 0.001$) (x) Mobile data vs. Wi-Fi (81.08% vs. 67.51%, $p < 0.001$) (Table 3).

Binary logistic regression analysis was performed to measure the associations between dependent and independent variables (Table 2). The sixth graders were 5.337 more likely to suffer from IA compared to any of the other school-going adolescents (OR = 5.337%, 95% CI 2.327 to 12.238, p=<0.001). Adolescents studying at Bangla medium are 0.208% less likely to suffer from IA as compared to English medium (OR = 0.208, 95% CI 0.071 to 0.608, $p = 0.004$). Respondents with higher economic status were 8.366 times more likely to suffer from IA compared to medium status (OR = 8.366, 95% CI 2.487 to 28.139, $p = 0.001$). From Table 4 Wifi users are 3.221times more likely to suffer IA compared to mobile users (OR = 3.221, 95% CI 1.499 to 6.922, $p = 0.003$). Smartphone

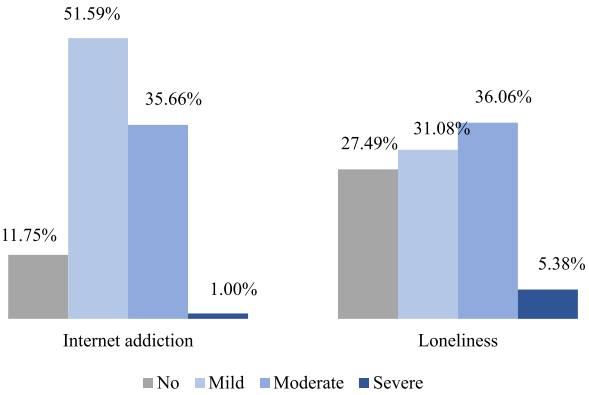

Fig. 1. Prevalence and severity of internet addiction and loneliness among school-going adolescents in Bangladesh.

Table 2
Regression analysis of socio-demographic variables by internet addiction and loneliness among school-going adolescents in Bangladesh.

Socio-demographic parameters	Internet addiction (N = 443)				Loneliness (N = 364)			
	OR	df	95% CI	p-value	OR	df	95% CI	p-value
Age in years								
10–13	0.692	1	0.251–1.904	0.475	1.291	1	0.663–2.513	0.452
14–16	1				1			
Sex								
Female	1.081	1	0.566–2.063	0.813	1.193	1	0.775–1.837	0.422
Male	1				1			
BMI (kg/m2)								
Below 18.5 (CED)	1.063	1	0.215–5.270	0.940	0.561	1	0.177–1.77	0.326
18.5–25 (normal)	0.678	1	0.226–2.032	0.488	1.160	1	0.574–2.342	0.680
Above 25 (obese)	1				1			
Education level								
Six	2.405	1	1.018–5.683	0.045	0.573	1	0.312–1.053	0.073
Seven	5.337	1	2.327–12.238	**<0.001**	0.609	1	0.368–1.008	0.054
Eight	2.642	1	0.621–11.243	0.189	0.471	1	0.174–1.278	0.139
Nine	0.451	1	0.059–3.459	0.443	0.811	1	0.118–5.583	0.831
Ten	1				1			
Medium of education								
Bangla	0.208	1	0.071–0.608	**0.004**	1.084	1	0.683–1.719	0.732
English	1				1			
Economic impression								
High	8.366	1	2.487–28.139	**0.001**	0.596	1	0.372–0.954	**0.031**
Medium	0.636	1	0.125–3.230	0.585	2.034	1	0.541–7.644	0.293
Low	1				1			
Residence area								
Urban	1.143	1	0.391–3.343	0.807	53.1	1	22.2–1.268	0.154
Rural	1				1			
Living status								
With family	0.509	1	0.198–1.303	0.159	1.489	1	0.879–2.523	0.139
Without family	1				1			
Smoking habit								
Non-smoker	0.653	1	0.188–2.263	0.502	0.672	1	0.290–1.557	0.354
Smoker	1				1			

p-values are significant at 95% confidence interval ($p < 0.05$). Significant p-values are shown in bold. BMI, body mass index; CED, chronic energy deficiency; CI, confidence interval; df, degree of freedom; N, number; OR, odds ratio.

Table 3
Description of internet use and their association with internet addiction and loneliness among school-going adolescents in Bangladesh.

Internet use pattern	Total (N = 502)		Internet addiction (N = 443)					Loneliness (N = 364)				
	n	%	n	%	χ2	df	p-value	n	%	χ2	df	p-value
Internet connection												
WiFi	317	63.15	268	84.54	11.38	1	**<0.001**	214	67.51	10.797	1	**<0.001**
Mobile data	185	36.85	175	94.59				150	81.08			
Device used for internet												
Desktop	49	9.76	45	91.84	6.48	3	0.090	37	75.51	0.38	3	0.945
Laptop	60	11.95	54	90.00				44	73.33			
Smart phone	346	68.93	298	86.13				250	72.25			
TV	47	9.36	46	97.87				33	70.21			
Purpose for internet use												
Education	76	15.14	64	84.21	89.43	4	**<0.001**	53	69.73	22.25	4	**<0.001**
Games	164	32.67	157	95.73				130	79.26			
Movie	25	4.98	21	84.00				22	88.00			
Social media	204	40.64	188	92.16				145	71.08			
Others	33	6.57	13	39.39				14	42.42			

p-values are significant at 95% confidence interval ($p < 0.05$). Significant p-values are shown in bold. χ2, chi-square; df, degree of freedom; TV, television; N, number.

users are 0.045 less likely to suffer from IA compared to TV users (OR = 0.045, 95% CI 0.016 to 0.952, p = 0.045). Respondents were 0.033 times less likely to use internet and get addicted (OR = 0.404, 95% CI 0.176 to 0.931, p = 0.045). Respondents were 0.069 times less likely to suffer from IA compared to gamers (OR = 0.069, 95% CI 0.028 to 0.168p < 0.001). Adolescents from the higher economic class were 0.596 times less likely to suffer from loneliness than the medium class (OR = 0.596, 95% CI 0.372 to 0.954, p = 0.031) (Table 2). Wi-Fi users were 0.518 less likely to suffer from loneliness as compared to cellular data users (OR = 0.518, 95% CI 0.329 to 0.813, p = 0.004). Social medial users are 2.970 times more likely to suffer from loneliness (OR = 2.970, 95% CI 1.378–6.401, p =

Table 4
Regression analysis of internet usage pattern by internet addiction and loneliness among school-going adolescents in Bangladesh.

Internet use pattern	Internet addiction (N = 443)				Loneliness (N = 364)			
	OR	df	95% CI	p-value	OR	df	95% CI	p-value
Internet connection								
WiFi	3.221	1	1.499–6.922	**0.003**	0.518	1	0.329–0.813	**0.004**
Mobile data	1				1			
Device used for internet								
Desktop	0.208	1	0.023–2.266	0.208	0.776	1	0.308–1.956	0.591
Laptop	0.330	1	0.037–3.020	0.330	0.810	1	0.338–1.946	0.638
Smart phone	0.045	1	0.016–0.952	**0.045**	0.929	1	0.465–1.858	0.835
TV	1				1			
Purpose for internet use								
Education	0.404	1	0.176–0.931	**0.033**	1.014	1	0.561–1.831	0.964
Games	2.136	1	0.849–5.379	0.107	0.626	1	0.384–1.022	0.061
Movie	0.294	1	0.083–1.040	0.058	0.358	1	0.101–1.269	0.112
Social media	0.069	1	0.028–0.168	**<0.001**	2.970	1	1.378–6.401	**0.005**
Others	1				1			

p-values are significant at 95% confidence interval ($p < 0.05$). Significant p-values are shown in bold. CI, confidence interval; degree of freedom; OR, odd ratio; df, TV, television; N, number.

0.005) Table 4.

4. Discussion

Bangladesh is one of the most densely populated (165.5 million) countries in the world and with so many people living together the use of the internet keeps increasing progressively [38]. To date, this is one of the primary research-works done on IA and mental health tests (i.e., the loneliness associated with IA) among school-going adolescents. According to our findings, a correlation has been observed between the over users of the internet and school-going children suffering from loneliness. We observed the overall prevalence of IA was 88.25%. Among them, mild (51.59%), moderate (35.66%), severe (1.00%) compared to overall loneliness (72.51%), mild (31.08%), moderate (36.06%), severe (5.38%) shown in Fig. 1. We observed that IA arising out of loneliness was governed by several factors such as education level, medium of education, economic impression, residence area, and living status. Loneliness is defined as the painful emotional experience of a social contact gap between actual and wanted [39]. The findings, however, showed a much higher prevalence during the pandemic the school-going adolescents. We can compare our findings with another cross-sectional study authors observed the overall prevalence of IA as 29.4% among adults and 34.7% among under-20 participants [40]. Also, we reported the overall prevalence of loneliness among the general population was 71% in Bangladesh in our earlier study [41,42]. During the pandemic, most of the school-going kids were under quarantine, not able to go to school, play outdoors or socialize properly, the adolescents spent most of their time online be it for educational or recreational purposes and this could be a key point for their loneliness and IA [43–47]. The governments of Bangladesh had to implement a lot of measures including school closures, social distancing, and quarantine in response to the COVID-19 epidemic. Children and adolescents were isolated from their friends, educational institutions, peers, teachers, and social networks for long periods. Therefore, social isolation and academic pause made children and adolescents more vulnerable to develop different mental health disorders and IA [48,49]. Children who live with their families are more likely to suffer from IA according to our study. People who are quarantined experience a variety of unpleasant psychological impacts, including disorientation, anger, and posttraumatic stress disorder. Fear of infection, boredom, quarantine, frustration, a lack of essential supplies, a lack of information, financial loss, and stigma all appear to raise the likelihood of bad psychological effects [50]. The children with higher economic impressions were more likely to suffer from IA and loneliness according to our survey. These children had more access to gadgets (smartphones, TV), and Wi-Fi due to belonging to an economically stable family. This has also been observed in students of English medium compared to Bangla Medium. The parents who can afford to teach their child in an English medium school are thought to belong to the higher economic class as they have to pay high tuition fees. Children and adolescents whose regular social contacts are reduced by disease containment measures are likely to become lonelier as a result of social distancing and school closures. Loneliness can have a long-term effect on our brain and behavior and can eventually lead to cases of mortality and morbidity. Loneliness also leads to a huge decline in our cognitive ability and may cause dementia [51]. According to a few studies, proper internet use such as the use of social media can improve mental health by boosting awareness, combating loneliness, and ability to act independently [52]. Children can limit the use of smartphones and they can spend more time on other activities such as playing games outdoors and doing exercise. To get over their IA the children can socialize more often, and invite friends and family members over. The key to overcoming IA is time management. Along with utilizing the internet, children must create a schedule and make time for a variety of other activities. This will eliminate the desire to check the phone at regular intervals. Seeking counseling is another option for adolescents to express themselves about the emotions that drive them to go online over and over again.

Previous research findings demonstrated that problematic internet users lack social skills and assistance. Social media use was also greater among problematic internet users, indicating a social desire to communicate with others. Internet addicts' propensity for virtual relationships, on the other hand, could be linked to a lack of social skills, low self-esteem, and loneliness [53]. Another research

concluded that with increasing levels of loneliness, adolescent IA develops. Teenagers who felt mild loneliness had a low level of IA [54]. Loneliness and internet use are mutually advantageous in the sense that loneliness drives people to spend more time online, just as the internet promotes people to spend more time online [55]. In fact, according to the current study, 67.4% of adolescent participants used the internet to cope with their loneliness throughout the pandemic. As a result, it is argued that when teenagers perceive they are unable to meet their social demands, they resort to digital means to easily meet these needs. This is one of many reasons why the digital world has grown in importance for adolescents over time, to the point that it has become a cause of dependency and addiction. Loneliness and other associated mental health issues, which are considered taboo, are not given any priority in countries like Bangladesh [56,57]. The rate of suicide claimed was 14,436 and the number of deaths resulting from the coronavirus was 8,462, this data was reported between the COVID-19 between March 2020 to February 2021 [58]. And the normal society does not even think or give any importance to this fatal underlying issue. And as a result, issues such as loneliness, depression, and anxiety remain undiscovered [59,60]. The sufferers of mental health do not even understand that IA can be a vital issue that is to blame for the mental health problems and should be given major concern. Also, the Bangladeshis living in the urban and rural areas have become more prone to social hazards [61]. This study can convey a message to the world regarding the IA and mental health status (loneliness) of Bangladeshi population.

The findings of this study have a wide range of implications in the disciplines of medicine psychology and academia. Academic institutions, together with parents, may use these findings to allow their kids to ensure proper use of internet, particularly those who already have mental health issues. To limit potentially addictive usage, regulatory organizations may implement tactics such as controlling certain servers every day or night at a specific time. While providing treatment, psychotherapists may get ideas from these studies. The government should place a high priority on this issue in order to protect the children's mental health.

In addition, there are some significant points in this study. To begin, the current study assessed psychological difficulties like loneliness associated to excessive internet use among the young Bangladeshi population. Second, during the COVID19 pandemic, the Google forms allowed for quick data gathering from people of various socioeconomic backgrounds and educational levels. During the pandemic, however, we saw it as a safe and useful instrument. Finally, we employed a translated Bangla version of questionnaire, which ensured that the questions were properly understood. Fourth, the findings of this study are applicable to the development of context-specific studies related to loneliness as one of the major mental health implications. This study emphasizes the importance of adequate mental health assessment and future research among school-aged teenagers during the COVID-19 pandemic to investigate their underlying mental health state throughout this pandemic situation.

4.1. Limitations

There are a few weaknesses in this research. The study's cross-sectional nature is in and of itself a restriction. If we could examine the same metrics among more school going students of other age groups and compare them, we would be able to get more reliable results. We did this study using an online self-reported survey, the use of a Google Form to conduct an online investigation may not be the ideal way for gathering data and may have biases. Because of the nature of this study, it is impossible to track these mental health difficulties such as loneliness, anxiety, depression throughout time.

5. Conclusion

The COVID-19 epidemic severely impacted the health and wellbeing of children and adolescents. In the present study, we observed a high prevalence of IA and loneliness among school-going children and adolescents in Bangladesh. The long-closure off schools and COVID-19 responses might be associated with this increased abnormality in internet use and mental health disorder. Therefore, healthcare authorities and policymakers should pay more attention to promoting the good mental health of children and adolescents in Bangladesh. Parents' awareness, mental health support, and outdoor activities facilities would reduce this high level of IA and loneliness among school-going children. Also, clinical psychiatrists and psychotherapists should consider this issue while interacting with their patients and during their intervention in practice.

Author contribution statement

Md. Rabiul Islam; Md. Mehedi Hasan Apu; Rabeya Akter; Papia Sen Tultul: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Md. Mehedi Hasan Apu; Ramisa Anjum; Zabun Nahar: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Mohammad Shahriar; Mohiuddin Ahmed Bhuiyan: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

All the authors are thankful to the participants for their cooperation in this study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e13340.

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