

Research Article

Internet Addiction Among Adolescents of Barishal City, Bangladesh: A Comparison Study Between Pre-COVID and Post-COVID Period

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Abstract

Adolescents rely on the internet for various purposes, including education, communication, entertainment, and social engagement. The COVID-19 pandemic has intensified internet reliance due to the shift to online learning, social distancing, and limited access to offline activities. Excessive internet use can lead to internet addiction, causing emotional and psychological problems such as depression, loneliness, anxiety, sleep deprivation, and physical health issues, which are a growing concern. In our study, we investigated internet addiction among the adolescents of Barishal City, Bangladesh, based on a comparative approach through studies conducted before and after COVID-19. We approached 108 students across all grades 7-12 in 2019 and 2023 by following the Young's Internet Addiction Test (IAT) protocols to study changes in internet use and addiction levels. Using cross-sectional research design and the Wilcoxon signed-rank test, we found a significant increase in daily internet use, social media use, and online dependency post-COVID-19. The results showed increased internet addiction and deteriorating academic performance and daily routines. Such findings indicate that targeted interventions are needed to prevent the negative consequences of excessive internet use on the mental health and well-being of adolescents. Promoting balanced internet use, encouraging offline hobbies, and providing resources for effective time management are essential steps in addressing this growing concern.

Keywords

Internet Addiction, Adolescents, Young's Internet Addiction Test (IAT), COVID-19

1. Introduction

The term "Internet addiction" is known as "problematic Internet use", "net addiction," "online addiction," "IA disorder," "cyber disorder" or "pathological Internet use," was first proposed by Dr. Ivan Goldberg in 1995 [9, 28, 39]. "Internet addiction" is frequently used to refer to a situation when someone has lost control over their internet usage, which negatively influences their life [58]. It is a behavioral issue

where an individual struggles to control their internet usage, resulting in psychological and social impairments, increased investment in online activities, unpleasant offline feelings, unintended repercussions, and denial of problematic behaviors particularly among adolescents [51, 53, 64]. Adolescence, which usually spans from the ages of 11 to 18, is the transitional period between puberty and adulthood [25]. Young and

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Griffiths first described the phenomenon of Internet addiction in various papers. In November 1996, the first Internet addiction-related paper was published by Mark D. Griffiths [31]. Online users are becoming addicted to the Internet, similar to drug or alcohol addictions, leading to academic failure, reduced work performance, marital discord poor mental health, low self-esteem, and neglect of real-life relationships [4, 64, 65]. The World Wide Web, launched by CERN in 1990, has turned into a crucial aspect of everyday life by offering a wide range of entertainment, and unlimited space for information exchange with its ubiquitous availability and accessibility through personal communication devices like smartphones and tablets [2, 16, 45, 48].

It is a well-known fact that communication technologies have spread quickly to large numbers of people over the years. When we compare the time it took for other technologies to achieve 50 million users, the Internet reached this milestone within 5 years, whereas radio took 38 years and television took 13 years [55]. By 2023, the number of active internet users has exceeded 5.3 billion worldwide, representing 65.4% of the global population where China leads in the number of internet users with 1.05 billion, followed by India, which has 729 million users. We expect the figure will reach 6.54 billion by 2025. The majority of internet users, 92.1%, primarily use smartphones to go online. The internet interconnects private, public, academic, business, and government networks, effectively turning the world into a global village. It has revolutionized interpersonal communication, enabling email, real-time messaging, and virtual meetings [28]. The advent of social networking sites like Facebook and online games has significantly exacerbated internet usage [2, 47]. In our modern life internet is an integral part, and concerns are raised regarding problematic interactions between people and information & communication technologies [42]. This is particularly significant for adolescents because factors such as the desire for freedom, easy communication, identity creation, and meaningful relationships increase adolescents' internet use rate and lead to Internet addiction [3]. Students are particularly at risk of developing an internet dependency due to its promise of improving student proficiency [46]. The addiction to the internet can disrupt nerve wiring in teenagers' brains, causing damage similar to heavy substance abusers [16]. Teenagers are more susceptible to internet addiction because they often struggle to manage their engagement with online activities. Apart from that, this addiction can lead to emotional and psychological problems like depression, loneliness, anxiety, and sleep deprivation, as well as physical health issues like dry eyes, repetitive motion injuries, carpal tunnel syndrome, and migraine headaches [5, 6, 24]. However, excessive internet users may become overly absorbed in online activities, causing them to lose interest in real-life experiences [42].

Coronavirus, first identified in Wuhan, China in December 2019, has become the largest public health catastrophe. The World Health Organization declared it a pandemic in

March 2020 [43]. The massive number of COVID-19 cases—16,523,815 globally as of July 29, 2020—sparked national alarm and eventually developed into a pandemic that affected every continent [42]. WHO emphasized limiting physical contact [57] and encouraged self-isolation. This resulted in greater internet dependency and a higher reliance on the internet for daily activities as well as increased mental health risks for adolescents because during this time adolescents enjoyed unrestricted internet access, flexible living schedules, and freedom from parental intervention that made them more susceptible to addictive behaviors [4, 22, 48, 56]. Nevertheless, prolonged online time during isolation and quarantine has led to addiction, especially in online games, gambling, and shopping [50]. During the initial COVID-19 outbreak, school children were encouraged to stay home, engage in everyday activities, and use the Internet for teaching, learning, socializing, and leisure. The digital revolution has significantly impacted the 21st-century digital millennial generation, who often experience anxiety when separated from their devices. They prioritize quick tasks, staying updated, and staying connected with friends, leading to less quality time with families [52]. Students who spend excessive time online are at a higher risk of developing internet-related problems [4, 11]. A meta-analysis of pre-pandemic studies found 13.6% of adolescents were internet addicted, while 24.4% were addicted during the pandemic [49].

According to a statistic published on June 30, 2014, worldwide internet users numbered 3 billion, with approximately 1.4 billion of them originating from Asia. [28]. The Internet has significantly impacted Bangladesh's culture, particularly among the young generation [21]. In Bangladesh, a study conducted among 475 university undergraduate students found various levels of Internet addiction where 47.7% of male students and 44.5% of female students exhibited severe internet addiction, 27.1% of male and 33.9% of female students had moderate addiction, and 20.7% of male and 7.7% of female students exhibited mild addiction [59]. Internet addiction is becoming more prevalent in Bangladesh due to the government's initiatives to expand digital technology. According to a study, at the end of January 2021, about 112.7 million people using the Internet, with 103.2 million of those being mobile Internet subscribers [58]. However, this number may pose a problem for the young adult population, who spend approximately 3 hours online daily [19]. Among school-going children and teenagers, Internet addiction is highly prevalent in Bangladesh as a result of the COVID-19 epidemic [7, 21]. The government has placed various limits on public transportation, schools, businesses, and all public and private offices, except for emergency services—since discovering the country's first COVID-19 case. Due to these limitations, people seemed to spend more time online and were forced to stay at home more, using the internet as a substitute for offline activities like work and leisure which led to internet addiction [58].

In this technological era, internet addiction is a matter of great concern [60] in the realm of public health, as the number of internet users steadily rises. This has led to the development of the Internet Addiction Test (IAT) by Young [23]. It is an early diagnostic scale used to investigate internet addiction and its association with other addictions, psychiatric comorbidity, and related factors [9, 35]. This test is designed to evaluate whether internet usage is considered addictive and to measure the severity of the associated problems [65]. It may be applied in a variety of circumstances, including schools, private practice clinics, hospitals, and residential programs [30]. The results of the Internet Addiction Test (IAT) can determine whether an individual may need to consult a mental health professional for internet addiction or not. Studies have demonstrated that Internet addiction (IA) can be influenced by factors such as age [12, 14, 27, 40, 41], gender [1, 5, 12, 17, 40, 62], daily duration of internet use [34, 41], aim of internet use [8, 34, 41], academic performance [5, 12, 41], parent's educational level [12, 37], socioeconomic status [12]. The Internet has expanded globally, but the majority of research on internet addiction has predominantly focused on developed countries. To get a more comprehensive understanding of this phenomenon, it is also essential to conduct studies in less-developed countries. Bangladesh, where Internet connectivity started in 1996, is an example of such a country. Despite a late start, Internet growth in Bangladesh has been rapid [26].

This study examines internet addiction among adolescents at Barishal, a southern city in Bangladesh by employing Young's Internet Addiction Test (IAT), comparing pre- and post-COVID periods, and examining potential relationships between internet addiction and variables such as gender and age groups. By comparing the levels of internet addiction before and following the COVID-19 pandemic, this study seeks to shed light on the potential effects of the unprecedented lockdowns and remote learning on the online behavior of adolescents. Furthermore, examining the correlation between internet addiction and parameters like age and gender can provide important insights into the possible vulnerabilities and risk factors related to this problem. The research's conclusions may help educators, legislators, and medical experts create specialized programs to deal with adolescent internet addiction in Barishal City. Additionally, the study may provide valuable insights into internet addiction and its implications for mental health and overall well-being.

2. Literature Review

Over the past 20 years, internet usage has increased dramatically, owing to its ability to provide extensive information and a convenient communication platform. According to a report from March 2020, there were approximately 4.57 billion internet users globally, with millions more joining each day. Internet addiction can arise from excessive or unrestricted Internet usage. This condition may lead to signifi-

cant distress and impairments in daily functioning, as well as it is often associated with co-occurring psychiatric disorders such as depression, attention deficit hyperactivity disorder, and substance abuse [39]. Many Asian countries, notably Vietnam (21.2%) and the Philippines (21%), as well as China (16.4%), South Korea (20%), and Bangladesh, with a prevalence rate of 32.6%, have experienced a significant increase in internet addiction and its effect on mental health [39, 58]. In the United States, the rate of internet addiction among college students is documented at 12%, while Iranian medical students exhibit a significantly higher prevalence rate of 31.2% and Taiwan college students report a 5.9% incidence rate [55]. The Internet's increasing reliance worldwide, particularly among the younger population, has contributed to Internet Addiction (IA), with a global prevalence of 6% where the largest percentage (10.9%) is seen in the Middle East, followed by North America (8%) and Asia (7.1%) [21]. The rapid growth of Internet usage in daily life and the widespread accessibility have raised concerns about the excessive use of the Internet among adolescents in recent years. The rapid growth of internet usage in daily life and its widespread accessibility have raised concerns about excessive internet use among adolescents in recent years. In China, where there are 588 million internet users, including 287 million teenagers, these concerns are especially prominent [13]. Fitria et al. conducted a study on 853 adolescents and revealed that a staggering 97.6% of them were categorized as suffering from internet addiction [15]. A meta-analysis study involving 48,000 adolescents found the rate of excessive internet usage to be 13.6% [24]. Another study investigated internet addiction in Lebanon, focusing on adolescents, and found that 4.2% of the participants had significant problems related to internet usage [20]. Whereas 11.6% of teenagers in Turkey were considered online addicts, 36.7% of adolescents in Italy showed symptoms of problematic internet usage. In Norway, 4.1% of girls and 19% of men were identified as having online addiction or being at risk, while in Greece, 11% of individuals aged 12 to 18 fulfilled the criteria for internet addiction [32]. Internet addiction increases in adolescents with decreasing age and females, according to various studies. In Turkey, males have a higher rate of addiction, while in Nepal and Korea, both males and females experience increased rates [9]. According to Sargin [55], an Internet connection is a significant risk for 12-18-year-olds, with adolescent males using the Internet more and getting addicted compared to females. Another study conducted by Parajuli [50] in Indonesia, found that 14.4% of adults are suffering from internet addiction, and the time spent online has risen by 52%. Males are more involved in gaming and erotic platforms, while urban areas have a higher risk of internet addiction. By studying 56,086 Korean adolescents aged between 12-18 years, it was found that 2.8% of students were addicted, with boys having higher rates [18]. These findings strongly suggest that juveniles are particularly vulnerable to developing Internet addiction.

The COVID-19 epidemic has pushed people to engage

more with technology, particularly the internet. However, excessive internet use can have serious consequences, affecting brain development, identity formation, social skills, emotional regulation, and academic achievement, and also contributing to symptoms of anxiety, hostility, and depression [23]. Research conducted in the United States during the pandemic revealed a link between poor physical or mental health and internet addiction [29]. During COVID-19, the prevalence of Internet Addiction (IA) among adults reached 14.4%, driven by prolonged online use for gaming, entertainment, information seeking, and social media use [7]. Nevertheless, in the context of the pandemic, very few studies have looked at the effects of problematic internet use. In Mexico, for example, a study indicated that 2% of respondents may have been internet addicts, scoring 70 or higher on the Internet Addiction Test (IAT). In Indonesia, however, the rate of internet addiction was found to be 14.4%, with scores of 108 or above on a self-developed scale. In China, the rate of internet addiction was 2.68%, defined as an IAT score of 70 or higher [22]. Given these studies, there exists hardly any research that investigates whether the COVID-19 pandemic has led to increased Internet Addiction (IA), especially in Bangladesh perspective. This study exploits that research gap and intends to explore the changes in Internet Addiction (IA) among adolescents fueled by the COVID-19 pandemic.

3. Methodology

3.1. Data Collection and Study Design

The research design used for the study was cross-sectional. The study was conducted in person in different schools and colleges in Barishal City, Bangladesh after obtaining institutional consent. Among them Udayan Secondary School, Shahid Arju Moni Government Secondary School, M. M. Girls High School, Govt. Syed Hatem Ali College, Amrita Lal De College are noteworthy. For this study, 108 students of 7 to 12 grades were selected by simple random sampling technique among the students who fulfilled the selection criteria. It was the same cohort of students who participated in both surveys, which helped establish comparability across time. Data were collected by administering the tool to the participants after proper explanation of the questionnaire and ensuring supervision to avoid potential bias.

The tool used for data collection is “The Internet Addiction Test (IAT) by Kimberly Young”, a self-reported 20-item scale designed to assess Internet Addiction. It includes questions reflecting typical addiction behaviors and has good reliability with Cronbach's alpha values ranging from 0.82 to 0.54 [19, 21, 36, 53, 60]. The scale contains 20 questions that reflect typical addictive behavior among internet users. The test measures six dimensions of online addiction: salient preoccupation, overuse of the Internet, neglecting work responsibilities, expectation, lack of self-control, and neglecting social life [25].

A 5-point Likert scale was used to analyze the responses which denotes that answers to each question resulted in a score from 1 to 5 points—very rarely (1), rarely (2), often (3), very often (4), and always (5). This scale measures the mild, moderate and severe level of internet addiction. The minimum score possible for this test is 20 and the maximum score possible is 100. The scale also shows that the higher the score, the higher the level of internet addiction. A score below 20 indicates a normal user while a score between 20-49 suggests a mild level of internet addiction, and a between 50-79 suggests a moderate level of internet addiction. With these scores users may face occasional problems due to internet usage and a score of 80-100 represent severe internet addiction and, in this score range, a user faces a significant physical and mental problems [10]. To know the purpose of internet use and how adolescents spend their leisure time, we added two questions with Young’s IAT test to the questionnaire employed in this study. After collecting data, it was analyzed according to the objectives of the study. For this study, data is collected in two phases: first, before COVID-19 in 2019, and second, after COVID-19 in 2023.

3.2. Data Analysis

We first checked for normality by performing the Shapiro-Wilk test, which is known to be more potent with smaller sample sizes and gives a good indication of whether the data deviates from a normal distribution given the nature of the data [38, 44, 63]. The findings showed that, excluding question 7 and question 16 in 2019, the data of all variables were normally distributed (see table 1).

Table 1. Shapiro-Wilk Test Results.

Question	Year	Obs	W	V	z	P-value
q1	2019	108	0.96	3.37	2.71	0.0
q1	2023	108	0.96	3.15	2.56	0.01
q2	2019	108	0.93	6.19	4.06	0.0
q2	2023	108	0.94	5.07	3.62	0.0
q3	2019	108	0.95	4.58	3.39	0.0
q3	2023	108	0.94	5.16	3.66	0.0
q4	2019	108	0.91	8.14	4.67	0.0
q4	2023	108	0.89	9.73	5.07	0.0
q5	2019	108	0.94	5.03	3.6	0.0
q5	2023	108	0.97	2.8	2.29	0.01
q6	2019	108	0.97	2.92	2.38	0.01
q6	2023	108	0.97	2.31	1.86	0.03
q7	2019	108	0.98	1.73	1.22	0.11

Question	Year	Obs	W	V	z	P-value
q7	2023	108	0.97	2.34	1.89	0.03
q8	2019	108	0.96	3.72	2.92	0.0
q8	2023	108	0.97	2.95	2.41	0.01
q9	2019	108	0.91	8.18	4.68	0.0
q9	2023	108	0.86	12.31	5.59	0.0
q10	2019	108	0.92	7.18	4.39	0.0
q10	2023	108	0.9	8.45	4.76	0.0
q11	2019	108	0.95	4.27	3.23	0.0
q11	2023	108	0.9	8.56	4.78	0.0
q12	2019	108	0.94	5.43	3.77	0.0
q12	2023	108	0.92	6.64	4.22	0.0
q13	2019	108	0.91	7.77	4.57	0.0
q13	2023	108	0.89	9.26	4.96	0.0
q14	2019	108	0.94	5.1	3.63	0.0
q14	2023	108	0.92	7.46	4.48	0.0
q15	2019	108	0.9	8.68	4.82	0.0
q15	2023	108	0.89	9.34	4.98	0.0
q16	2019	108	0.98	1.71	1.19	0.12
q16	2023	108	0.97	2.5	2.04	0.02
q17	2019	108	0.97	3.0	2.45	0.01
q17	2023	108	0.97	2.3	1.86	0.03
q18	2019	108	0.92	6.78	4.26	0.0
q18	2023	108	0.9	9.15	4.93	0.0
q19	2019	108	0.94	5.64	3.85	0.0
q19	2023	108	0.92	6.9	4.3	0.0
q20	2019	108	0.92	6.68	4.23	0.0
q20	2023	108	0.91	7.78	4.57	0.0

We used the Wilcoxon signed-rank test because our data

were not normally distributed, and the data were paired. The Wilcoxon signed-rank test is, therefore, a non-parametric test that applies to comparing two related samples or repeated measurements on a single sample to assess whether their population mean ranks differ from each other [54, 61]. We chose this test because it can handle non-normally distributed ordinal data without assuming normality, which fits our study's requirements perfectly [33].

3.3. Statistical Procedures

1. Shapiro-Wilk Test for Normality: We performed the Shapiro-Wilk test for each variable to verify whether the data followed a normal distribution. Test statistics and their associated probability values were estimated for each variable. The Shapiro-Wilk test results indicated significant deviations from normality where p-values were below 0.05, confirming non-normality.
2. Wilcoxon Signed-Rank Test: Since the data indicated non-normality, the Wilcoxon signed-rank test was used to compare pre-Covid and post-Covid internet addiction scores. This test ranks the differences between the paired observations, accounting for both the magnitude and direction of the differences.

Such decisive statistical measures will, therefore, provide a clear and accurate analysis of the change in internet addiction levels among the adolescents in Barishal City due to the Covid-19 pandemic. Such research insights would guide wider teenage behavioral repercussions of the pandemic and aid interventions that deal with internet addiction within the same scope.

4. Results and Discussion

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the study. 108 participants contributed to the research: 55.56% were male (n = 60), and 44.44% were female (n = 48). This slightly indicates an over-representation of male students in our study sample.

Table 2. Descriptive Statistics.

Variable	Category	Frequency	Percent
Gender	Female	48	44.44
	Male	60	55.56
Purpose of Internet Uses	For Online Games	6	5.56
	For Study	18	16.67
	Recreational Purpose	30	27.78

Variable	Category	Frequency	Percent
How to Spend Leisure Time	Using Social Media	54	50.00
	Participate in outdoor activities	9	8.33
	Reading Story Books or Novels	19	17.59
	Sleeping	11	10.19
	Spending Time with Family	11	10.19
	Using Internet	45	41.67
	Watching Television	13	12.04

The primary purposes of using the internet were diversified for participants. The most common activity on the internet was social media (Facebook, WhatsApp, Instagram, etc.), accounting for 50% (n=54); the second highest was recreational through watching YouTube and movies at 27.78% (n=30). A small portion was used for studying (16.67%, n=18) and playing online games (5.56%, n=6).

Regarding how the students spend their free time, 41.67% (n=45) said using the internet was the primary activity. The other popular activities were reading storybooks or novels (17.59%, n=19) and watching television (12.04%, n=13). A

significant minority of them went in for outdoor activities (8.33%, n=9), spent time with family (10.19%, n=11), or liked to sleep (10.19%, n=11).

4.2. Wilcoxon Signed-Rank Test Results

Given that the normality assumption did not hold for our data (as confirmed by the Shapiro-Wilk test), we analyzed differences in internet addiction-related behaviors between periods (pre-Covid/2019 vs. post-Covid/2023) using the Wilcoxon signed-rank test - see [Table 3](#).

Table 3. Wilcoxon Signed-Rank Test Results.

Question	Obs	Positive Sum Ranks	Negative Sum Ranks	Zero	z	P-value	Exact Prob
q1	108	1779.50	3853.50	22	-3.21	0.00	0.00
q2	108	1778.00	3730.00	27	-3.04	0.00	0.00
q3	108	2471.50	3204.50	20	-1.14	0.26	0.26
q4	108	2445.50	2845.50	34	-0.63	0.53	0.53
q5	108	2038.50	3616.50	21	-2.44	0.01	0.01
q6	108	2197.50	3583.50	14	-2.15	0.03	0.03
q7	108	2194.50	3481.50	20	-1.99	0.05	0.05
q8	108	1815.50	3880.50	19	-3.20	0.00	0.00
q9	108	2093.50	3516.50	23	-2.23	0.03	0.03
q10	108	1903.50	3706.50	23	-2.82	0.00	0.00
q11	108	2626.50	3049.50	20	-0.66	0.51	0.51
q12	108	1888.50	3672.50	25	-2.77	0.01	0.01
q13	108	1610.00	3898.00	27	-3.58	0.00	0.00
q14	108	2372.00	3049.00	30	-1.06	0.29	0.29
q15	108	1832.00	3844.00	20	-3.12	0.00	0.00
q16	108	1915.50	3717.50	22	-2.78	0.01	0.01
q17	108	1942.50	3790.50	17	-2.85	0.00	0.00

Question	Obs	Positive Sum Ranks	Negative Sum Ranks	Zero	z	P-value	Exact Prob
q18	108	2365.00	3221.00	24	-1.33	0.18	0.18
q19	108	1887.00	3621.00	27	-2.71	0.01	0.01
q20	108	1793.50	3714.50	27	-3.00	0.00	0.00

The total number of hours spent on a typical day online significantly increased from 2019 to 2023 ($z = -3.211$, $p = 0.0013$). This means that post-Covid, students have more than doubled their time online. The reason for the excessive use of the internet also changed significantly ($z = -3.035$, $p = 0.0024$).

The perceived influence of pathological internet use on school performance increased significantly ($z = -2.443$, $p = < 0.0146$), suggesting that more students attributed their poor academic performance to how they practiced on the internet during the post-COVID period. There was also a significant rise in the daily mean time spent on social media ($z = -2.149$, $p = < 0.0317$), signifying an increase in social media usage by students on average per day after the onset of the pandemic. This growth of Internet usage showed a more significant interference with daily activities post-Covid ($z = -1.988$, $p = 0.0468$); that is, the students find their Internet use more often disrupts their daily routines.

There was a marked increase in the preference for online interaction over socializing with friends and family ($z = -3.203$, $p = 0.0014$). This implies that more time is spent online at the expense of face-to-face interactions. They also showed a significant increase in thinking about how often they used the internet when offline ($z = -2.232$, $p = 0.0256$), indicating increased preoccupation with internet activities. Efforts to find new hobbies or interests to reduce time on the internet changed significantly: ($z = -2.821$, $p = 0.0048$), with more students stating an attempt to diversify their post-COVID activities.

A significantly more positive perception of the internet in making life meaningful, easy, and pleasant was found to have been increased ($z = -2.773$, $p = 0.0056$) in attaining personal fulfillment with the help of the internet. The feeling of uneasiness or anxiety when it is impossible to connect online showed a significant rise ($z = -3.584$, $p = 0.0003$), thus underlining a growing dependency on the internet. Additionally, it was found that the number of times people checked their phones for notifications significantly increased ($z = -2.784$, $p = 0.0054$), meaning an attachment to their mobile devices had been fostered.

Some aspects, in contrast, remained unaffected. For example, the feelings that were experienced by students when they could not get online remained virtually static ($z = -1.137$, $p = 0.2557$), as did any attempts to reduce internet usage ($z = -0.631$, $p = 0.5279$), unplanned online time ($z = -0.655$, $p = 0.5125$), and failed attempts to cut down internet use ($z =$

-1.330 , $p = 0.1836$). That is, while some significant changes were observed in internet use and its impacts from pre- to post-COVID, there were certain behaviors and perceptions about internet use that did not change.

The obtained results demonstrate a remarkable rise in internet utilization and dependency among the adolescents living in Barishal City post-Covid. It has been presented by the data that what are the changes in goals of internet utilization, time spending regarding leisure, and how the change in the internet utilization is affecting life and performance. The significant shifts in several areas, for example, the increase in daily hours online, the more significant interference with daily activities, and the higher level of anxiety when not using the internet, point to the fact that the internet takes on an ever-increasing role in the life of a student during the pandemic.

Our study further highlights the need for targeted intervention that will mitigate the negative impacts of excessive internet use on academic performance and daily responsibilities among adolescents. Mitigating the adverse effects, including balanced internet use, should be necessary while promoting offline hobbies and resource provision in time management.

5. Conclusion

In this study, we examined the impact of the COVID-19 pandemic on adolescent Internet addiction among adolescents residing in Barishal City, Bangladesh. We compared the levels of Internet addiction among the teenage population in Barishal City, Bangladesh, during pre-pandemic and post-pandemic situations and further examined the relationship between Internet addiction and demographic factor such as gender. Our findings indicate a significant increase in internet addiction post-COVID-19, with students spending more time online, particularly on social media, and experiencing more interference with their daily activities and academic performance. The analysis revealed that the total daily hours spent online more than doubled from 2019 to 2023. This surge in internet use correlates with increased feelings of anxiety and restlessness when offline, a heightened preoccupation with online activities, and a preference for online interactions over face-to-face socializing. These changes underline the pandemic's role in exacerbating internet dependency among adolescents, leading to greater disruption in their daily routines and academic pursuits. The corresponding

authorities should take steps to mitigate the adverse effects of excessive internet use on adolescents' academic performance and overall well-being. Promoting balanced internet use, encouraging offline hobbies, and providing resources for effective time management are essential steps in addressing this growing concern. While the findings highlight significant psychological and behavioral impacts, the small sample size implies that more study with a broader and more varied population is required to improve generalizability.

Abbreviations

IA Internet Addiction
IAT Internet Addiction Test

Author Contributions

K M Rahmatullah Rahat: Conceptualization, Data curation, Formal Analysis, Project administration, Resources, Software, Writing - original draft.

Md Tanvir Ahmed: Investigation, Methodology, Supervision, Validation, Writing - review & editing.

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Data Availability Statement

The data that support the findings of this study can be found at:

https://drive.google.com/drive/folders/18ymmiHBmKiN2NDooNZ7gGMtrjBotOyK3?usp=drive_link

Conflicts of Interest

The authors declare no conflicts of interest.

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Research Field

K M Rahmatullah Rahat: Environmental and Resource Economics, Behavioral Economics, Advanced Econometrics Modeling, Development Economics and Policy, Agricultural Economics, Public Health and Public Policy

Md Tanvir Ahmed: Macroeconomics, International Trade, Environmental Economics, Development Economics, Applied Economics, Health Economics