

Exploring the association between online gaming addiction and academic performance among the school-going adolescents in Bangladesh: A cross-sectional study

Ramisa Anjum¹ | Nodia Hossain Nodi¹ | Proma Rani Das¹  |
A. S. M. Roknuzzaman¹ | Rapyt Sarker¹ | Md. Rabiul Islam² 

¹Department of Pharmacy, University of Asia Pacific, Dhaka, Bangladesh

²School of Pharmacy, BRAC University, Dhaka, Bangladesh

Correspondence

Md. Rabiul Islam, School of Pharmacy, BRAC University, Kha 224, Progati Sarani, Merul Badda, Dhaka 1212, Bangladesh.
Email: robi.ayaan@gmail.com

Abstract

Background and Aims: The pervasive nature of online gaming, notably accentuated during the COVID-19 pandemic, has spurred concerns regarding gaming addiction among children. This study explores the intricate ramifications of online gaming addiction on the academic performance and social dynamics of children in Bangladesh. Our primary objective is to gauge the extent of online gaming addiction and unravel its profound effects on academic performance.

Methods: Conducting a nationwide survey from January 1, 2023, to June 30, 2023, we analyzed 502 responses from participants aged 6–17 years. The survey encompassed sociodemographic details, gaming addiction assessment, and academic performance following a simple random sampling method. We analyzed participant demographics utilizing descriptive statistics, chi-square tests, and logistic regression.

Results: Key findings revealed a majority within the 13–17 age bracket (75.50%), predominantly male (58.57%), and enrolled in secondary education (83.27%). A robust inverse relationship showed that nonaddicted students towards online gaming had higher academic performance. Therefore, it is important to implement targeted strategies to address online gaming addiction among Bangladeshi children.

Conclusion: Recommending early intervention, academic initiatives, and holistic therapy, we advocate for collaboration among educational institutions, mental health professionals, parents, and policymakers. All of these initiatives are essential to navigate the evolving challenges presented by gaming addiction. Furthermore, our call for ongoing research seeks to deepen our understanding of enduring consequences on academic and social dimensions, fostering a digitally supportive environment conducive to the holistic well-being of children.

KEYWORDS

academic performance, addiction, digital environment, internet addiction, online gaming, school going adolescents

Ramisa Anjum and Nodia Hossain Nodi are co-first authors.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Author(s). *Health Science Reports* published by Wiley Periodicals LLC.

1 | INTRODUCTION

Online gaming is a dynamic and pervasive form of digital entertainment that has gained immense popularity in recent years. It is a diverse range of video games played over the internet, spanning various genres and platforms.¹ What distinguishes online gaming is its interactive and often multiplayer nature, enabling players to engage with others in real time. Whether through action-packed battles, collaborative adventures, or intellectually stimulating challenges, online gaming offers a rich tapestry of experiences that cater to a broad spectrum of interests.²⁻⁴ It has evolved into a global phenomenon, fostering communities, competition, and camaraderie among players of all ages and backgrounds, transcending geographical boundaries, and becoming a defining feature of modern leisure and entertainment.⁵ The COVID-19 pandemic significantly altered the way of entertainment, especially for children because they usually like online gaming most.⁶ With lockdowns and restrictions confining individuals to their homes and limiting physical interactions, the appeal of virtual worlds provided by online games became increasingly enticing.⁷⁻⁹ Children engaged themselves in the immersive digital landscapes of gaming during social isolation and uncertainty due to the COVID-19 pandemic.^{7,10} It heightened engagement with online gaming, however, brought forth the alarming issue of addiction and its profound consequences on various facets of their lives.¹¹

Online gaming addiction, often characterized by an intense and compulsive urge to play games excessively, gained traction during the pandemic.¹² The ease of access to games, the increase in free time, and the potential emotional comfort that virtual worlds may offer in the middle of the epidemic are some of the causes driving this rise in addiction.^{9,11,13} Children, particularly susceptible to the allure of video games, often find themselves engrossed in these digital realms for extended periods. The closure of schools disproportionately affects all children, especially those most at risk, who may encounter further obstacles.^{14,15} Academic performance was one of the most important areas where children's addiction to internet gaming had a negative impact.^{14,16} As gaming addiction deepened, academic responsibilities often took a back seat, posing challenges for children to maintain their educational focus. Nonetheless, research indicates that fostering a supportive school environment and effective teacher guidance can significantly enhance students' academic performance.¹⁷ Their grades and level of educational involvement suffer from the continual distraction of gaming achievements and the need to stay updated with virtual pals. Their immediate academic progress was hampered by this distraction from their studies, and there may have been long-term negative effects on their chances.^{11,13,18,19} The addiction affected the children's social life in addition to their academic performance. Their feeling of community and camaraderie is often fostered by online gaming, which can have both positive and negative effects.²⁰⁻²² Encouraging interactions among teachers fosters personal growth and development, which can translate into better support for students. By creating a supportive school climate and promoting teacher leadership, schools can help mitigate the negative effects of online gaming addiction, improve students' focus

on their studies, and enhance overall academic performance.¹⁷ In Oman, a training program based on international studies like Trends in International Mathematics and Science Study (TIMSS) was used to develop better thinking and reasoning skills among future math teachers, showing significant positive results. Similarly, applying structured programs and interventions based on established international studies could help address online gaming addiction among adolescents. By providing targeted training and support, we can help students manage their gaming habits, improve their focus on studies, and ultimately enhance their academic performance.²³⁻²⁵ While technology facilitates social connectivity, it concurrently fosters a detachment from face-to-face interactions. Undeniably, the progression of mobile technology and its pervasive integration into various facets of society, particularly within educational environments, profoundly alter human experiences through digital augmentation.^{26,27} Youngsters who used to be engaged in a lot of physical social activities could have discovered that they are withdrawing more into the virtual world, which has caused them to lose touch with their friends and family. Their general development and emotional health are impacted by this breakdown of real-world social ties.²⁷ Addiction affects kids' skill development as well. While excessive gaming tends to restrict their talents, gaming can also help children develop cognitive skills including problem-solving, spatial awareness, and collaboration.²⁸ Instead of online gaming, they could spend their time on constructive activities, like sports, arts, or academic pursuits that potentially stunt their holistic skill development. The over-emphasis on gaming skills at the expense of a broader skillset may hinder their adaptability and competencies in various real-world scenarios. Emotional development also bore the brunt of online gaming addiction.²⁹ The immersive nature of games can act as a refuge from stress, anxiety, and emotional challenges, making them an attractive coping mechanism.³⁰ Relying on gaming as a crutch for emotions could hinder children's development of healthy coping skills and resilience. Studies suggest it's important to limit adolescents' screen time, monitor their exposure to violent media, and raise community awareness.³¹ Additionally, the highs and lows experienced during intense gaming sessions can lead to emotional instability and mood swings, impacting their overall emotional well-being.^{27,32} The prevalence of online gaming addiction has been a subject of concern and extensive research in recent years.^{3,33-36} While it varies across different regions and age groups, several studies have shed light on the growing issue of gaming addiction worldwide. During the COVID-19 pandemic, the prevalence of online gaming addiction increased significantly.^{37,38} With lockdowns and restrictions limiting physical activities and social interactions, people, including children and adolescents, turned to online games for entertainment and social connection.⁶ This surge in gaming activity led to a heightened risk of addiction for some individuals. Specific prevalence rates vary depending on the population studied and the criteria used to define addiction.³⁴⁻³⁶ However, various studies have reported that a significant percentage of gamers exhibit symptoms of addiction. For example, a study published that around 10%-15% of adolescents in Asia showed signs of gaming addiction. In South

Korea, for instance, the government has implemented policies and programs to address the issue, and studies have estimated that the prevalence of gaming addiction among adolescents in South Korea ranges from.^{5,39} It's important to note that online gaming addiction can affect individuals of all ages. Adolescents and young adults are often considered more vulnerable due to their developmental stage and the amount of time they spend gaming.⁴⁰ The design of some games, their accessibility, social influences, and underlying psychological aspects are some of the variables that contribute to the prevalence of online gaming addiction.^{2,29} Excessive internet and gaming use negatively impacts mental health, reducing sleep and emotional control, which in turn disrupts learning and academic achievement. This can lead to poor school performance and neglected responsibilities, including skipping meals and suffering from decreased physical health and disrupted social interactions. The COVID-19 pandemic has worsened this situation due to social restrictions and school closures, which increased reliance on the internet for academic activities but also led to higher rates of internet addiction and online gaming disorder. Research indicates how adolescents' mental health and academic performance, have significant increases in issues like mental health, reduced sleep, and emotional control across Asian countries during the pandemic.⁴¹⁻⁴⁵ Public awareness efforts, educational initiatives, and initiatives to support responsible gaming are frequently used in conjunction with one another in attempts to solve this problem. We can't overlook the significance of this research. If neglected, an addiction to online gaming can lead to several negative outcomes. Long-term inactivity can have negative effects on mental and physical health, including social isolation, anxiety, and depression.^{8,46} Due to an overwhelming addiction to internet gaming, prospects for education may be hampered. The possibility of damaged family ties and less social connections outside gaming are as worrisome.^{47,48} This problem takes on new dimensions because of the Bangladeshi background. Bangladesh is a heavily populated nation where the majority of people are young.⁴⁹ The study of how online gaming addiction affects the academic performance of school-going adolescents in Bangladesh can greatly benefit from using expert systems and advanced AI. These systems can analyze large amounts of data and make smart decisions, even when there is a lot of uncertainty. They protect sensitive information with encryption, though traditional methods have some weaknesses. To improve security, an AI system called Artificial General Intelligence-based Rational Behavior Detection Agents (AGI-RBDA) can be used to predict and stop cyber threats, much like how the human mind works. This ensures the data is safe and helps to provide more accurate and useful results, guiding parents and educators in managing gaming addiction.⁵⁰ Therefore, it is essential to comprehend how online gaming addiction affects kids in this country to develop interventions and policies that are in keeping with the social, cultural, and economic context of the country as well as for the youth's overall wellbeing.

We aim to address these important problems in light of the increasing incidence of online gaming addiction among youngsters worldwide and its possible implications. This study's main objectives

were to assess the prevalence of online gaming addiction among Bangladeshi youth and investigate the impact on their academic performance. Through an analysis of the incidence, causes, and effects of this problem, we want to provide insightful information that may guide the development of treatments, policies, and instructional plans that are specifically adapted for Bangladesh.

2 | METHODS

2.1 | Study design and participants

The present study performed a comprehensive face-to-face survey encompassing a countrywide sample. We conducted this survey from January 1, 2023, to June 30, 2023. A simple random sampling method was employed, wherein we assumed a response rate of 50%, a margin of error of 5%, and a 5% significance level. Based on the above criteria, 385 samples are required to achieve 80% statistical power. We conducted a pilot study among 30 participants for the clarity of questions. Initially, we approached 600 students and got consent from 556 participants for this study. We collected 526 responses from them, and after careful evaluation, we discarded 24 responses due to partial and incomplete information. Finally, we incorporated 502 participants for the final analysis, consisting of 294 males and 208 females ranging from 6 to 17 years old (Figure 1). Each participant exhibited a thorough comprehension of the survey's eligibility requirements, methods, and aims, and they duly granted consent before engaging in the study. The survey used a self-administered questionnaire that included obtaining informed consent, gathering socio-demographic information, assessing

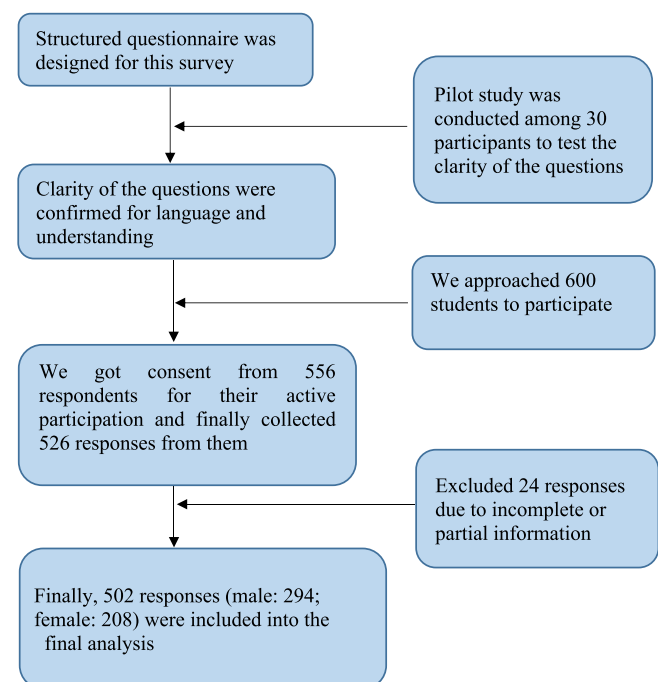


FIGURE 1 Algorithm showing sample selection, enrollment, exclusion, and final analysis.

gaming addiction, and evaluating academic performance. The inclusion criterion consisted of participants who engaged in online games and expressed their willingness to participate, regardless of their demographic features. We excluded samples out of our target age range and where we failed to obtain consent for participation. The primary objective of the study was to evaluate the prevalence of gaming addiction among students in Bangladesh and examine its association with their academic performance. All individuals involved in the study were of Bangladeshi descent and currently reside within the borders of Bangladesh. It is worth mentioning that the participants willingly provided their information without receiving any remuneration for their time and participation in the survey.

2.2 | Preparation of survey questionnaire

We adopted a comprehensive approach for data collection using three unique sets of questionnaires. To initiate this procedure, we devised an initial systematic questionnaire that integrated fundamental socio-demographic data and obtained informed consent from the subjects. We developed this self-reported questionnaire based on a range of psychometric examinations. The primary objective of this survey was to collect information regarding the demographic, followed by the assessment of online gaming addiction and academic performances of the participants. Additionally, the questionnaire incorporated measurement scales to evaluate the extent of gaming addiction and academic achievement. To enhance comprehensibility and promote inclusion, we initially devised all inquiries in the English language and subsequently translated them into Bangla. The translation process involved two individuals who are native speakers of Bangla, one possessing a medical doctor and the other from a non-medical background. Through their collaborative efforts, we completed a final translation in Bangla. Then, we retranslated the initial Bangla version into two English versions by a proficient medical translator and an additional individual holding a medical degree. We reconciled and merged these two English versions to make a cohesive English version under the supervision of the author of this research. Subsequently, we performed a pilot study among a limited sample of participants picked at random to assess the validity of the questionnaires in terms of readability and comprehension. We discarded this pilot data from the final data set. To ensure a comprehensive understanding of the survey questions among participants, we conscientiously administered the questionnaire in both Bangla and English. We took all decisions regarding the translation process with the utmost consideration for the significance of accessibility and inclusivity in our research methodology.

2.3 | Survey measures and data collection

The researchers employed a pre-existing, meticulously designed questionnaire as a prototype to collect socio-demographic data from the subjects. The study investigated many socio-demographic

variables, encompassing age, sex, BMI, medium of education, level of education, financial status, residential area, living conditions, smoking behavior, gaming patterns, and time spent on various academic works. We used a structured questionnaire as a data collection instrument. We circulated this self-administered survey tool among the participants and briefed them about it through a face-to-face interview. Furthermore, we assisted the participants throughout data collection to enhance their comprehension and accuracy in addressing the survey inquiries. We focused on gathering extensive demographic information from the participants. We reached out to the participants through physical visits to their respective schools.

2.4 | Gaming addiction scale

The Gaming Addiction Scale (GAS), a 7-item short form, is used to assess a person's gaming frequency and effects.⁵¹ The sentence "During the last 6 months, how often..." was used with each question, and respondents were asked to rate their responses on a 5-point Likert scale (never = 1, rarely = 2, sometimes = 3, often = 3, and very often = 5). The total score in GAS can be varied from 7 to 35; higher scores suggest a higher degree of gaming addiction. Topics covered in the GAS include attending class, choosing gaming over daily duties, and the ramifications for one's physical and emotional health. Cumulative ratings provide a quantitative evaluation of gaming tendencies without setting a dependent threshold, which is relevant when considering the potential impacts of gaming on other aspects of an individual's life.

2.5 | Academic performance rating scale

A quick evaluation instrument to measure several aspects of academic performance and focus is the 19-item Academic Performance Rating Scale (APRS).⁵² The respondents rate the frequency with which they come across items related to their study using a five-point Likert-type scale that runs from 1 to 5, with "never or poor" to "very often or excellent." Among the 19 items, seven APRS items (no. 12, 13, 15–19) were reverse keyed in scoring so that the higher total scores represent a good academic impression. The APRS tackles problems such as difficulty focusing, lack of interest in academic work, and challenges with reading and writing. Additionally, it evaluates the impact of gaming on students' multitasking abilities and academic achievement. The scale offers a quick assessment of attitudes and difficulties related to academics, providing illuminating details about potential problem areas for specific individuals.

2.6 | Statistical analysis

We conducted data processing utilizing Microsoft Excel 2019 and statistical analysis through IBM SPSS version 25.0. Our data processing involved sorting, coding, categorizing, and tabulating raw data.

Subsequently, we imported the Excel data set into IBM SPSS for comprehensive analysis. The study employed descriptive statistics to scrutinize demographic characteristics. For assessing associations among categorical variables, we utilized the nonparametric chi-square test. Furthermore, logistic regression analysis was performed to determine the risk ratios associated with mental health concerns, with a specific emphasis on socio-demographic and lifestyle-related variables. Significance in this study was established at a p -value less than 0.05.

3 | RESULTS

3.1 | Demographic characteristics of the participants

The sociodemographic characteristics of the study population are presented in Table 1. A total of 502 individuals replied to the survey. Of the participants, 24.50% were categorized as belonging to the age group of 6–12, while the remaining 75.50% were within the age range of 13–17. About the gender involved in the study, it was found that 58.57% of participants identified as male, while 41.43% identified as female. The examination of BMI indicated that 52.59% of the participants had a BMI below 18.5, 42.83% fell within the range of 18.5–25.0, and 4.58% had a BMI exceeding 25.0. Coming to the degree of education, the majority of individuals (83.27%) were enrolled in secondary education. The predominant language of instruction for the surveyed population was Bangla, with a significant majority (98.61%) receiving education in this language. Conversely, a mere 1.39% of individuals were taught in English. The educational attainment of mothers exhibited heterogeneity, with approximately 43.43% possessing a secondary level of education. The prevailing family structure seen in the study was primarily joint family, accounting for 36.06% of the participants. Furthermore, a significant majority of respondents (89.24%) indicated that they had siblings. It is worth noting that 94.82% of participants reported residing with their family at the time of the study.

3.2 | Academic performance of participants according to their demographic profiles

The analysis of the age distribution reveals that the predominant demographic among the student population is comprised of individuals aged 13–17, accounting for a substantial majority of 75.50%. Moreover, a noteworthy proportion of 85.22% of these students demonstrate commendable academic performance. Chi-square analysis reveals a significant association between age and academic performance ($\chi^2 = 9.547$, $df = 2$, $p = 0.008$). Regarding sex, it is observed that males (58.57%) have a greater incidence of addiction to gaming, with a statistically significant connection ($\chi^2 = 22.308$, $df = 2$, $p < 0.001$). There is a significant association between BMI and academic performance ($\chi^2 = 11.579$, $df = 4$, $p = 0.021$). Specifically, 80.30% of students with a BMI below 18.5 demonstrate satisfactory

academic performance. The language of instruction (Bangla vs. English) had a substantial impact on academic achievement ($\chi^2 = 15.779$, $df = 2$, $p < 0.001$). There appears to be a correlation between the educational attainment of mothers and their academic achievement; however, this relationship does not reach statistical significance ($\chi^2 = 10.501$, $df = 6$, $p = 0.105$). The relationship between family structure and academic achievement is marginally significant ($\chi^2 = 5.598$, $df = 2$, $p = 0.061$). Specifically, joint families seem to have a slightly higher proportion of strong academic performance. The presence of family members in one's living environment has a significant impact on academic achievement ($\chi^2 = 13.72$, $df = 2$, $p = 0.001$). The timing of going to bed i.e. bedtime has a substantial impact on academic performance ($\chi^2 = 25.993$, $df = 6$, $p < 0.001$), with individuals who go to sleep before 10.00 p.m. demonstrating the highest level of performance.

3.3 | Online gaming addiction of participants according to their demographic profiles

Table 2 presented the correlation between demographic factors and the level of gaming addiction. The age range of 6–12 exhibits a low occurrence of addiction, with a notable correlation identified ($\chi^2 = 9.057$, $df = 3$, $p = 0.029$), showing 68.29% with no online gaming addiction, and 26.83% with mild, 4.07% with moderate and 0.81% with severe online gaming addiction. There is a disparity in the occurrence of gaming addiction between males and females, with males having a considerably higher prevalence rate of 69.73%. This discrepancy demonstrates a statistically significant correlation, as evidenced by the chi-square test ($\chi^2 = 28.448$, $df = 3$, $p < 0.001$). There exists a notable correlation between the amount of education and the occurrence of gaming addiction ($\chi^2 = 8.304$, $df = 3$, $p = 0.040$), with primary education level individuals, exhibiting a greater prevalence. The occupation of the mother has a weak correlation with gaming addiction ($\chi^2 = 13.639$, $df = 9$, $p = 0.136$), while service and self-employed women demonstrate a higher incidence. The occupation of the father has a strong correlation with gaming addiction ($\chi^2 = 33.334$, $df = 12$, $p = 0.001$), with individuals in service and business professions showing a higher prevalence. The findings suggest a weak correlation between family structure and gaming addiction ($\chi^2 = 3.403$, $df = 3$, $p = 0.334$), indicating that joint families exhibit a higher prevalence of this issue. The variables of bedtime, time taken to fall asleep, and duration of sleep at night showed significant associations with gaming addiction, as indicated by the chi-square tests conducted. The chi-square statistic for bedtime is 33.382 with 9 degrees of freedom, resulting in a p -value of < 0.001 . Similarly, the chi-square statistic for the time needed to fall asleep is 8.452 with $df = 9$, yielding a p -value of 0.489. Lastly, the chi-square statistic for sleep time at night is 27.364 with $df = 12$ yielding a p -value of 0.007. There is a strong association between gaming addiction and family income status ($\chi^2 = 16.256$, $df = 6$, $p = 0.012$), wherein low-income families have a higher incidence of this issue. There is a substantial association between smoking habit ($\chi^2 = 25.269$, $df = 3$, $p < 0.001$) and

TABLE 1 Proportion of demographic variables and their association with academic performance of students.

	Academic performance				Chi-square value	df	p-Value
	Total (%)	Good (%)	Average (%)	Poor (%)			
Age in years							
6–12	123 (24.50)	90 (73.17)	31 (25.20)	2 (1.63)	9.547	2	0.008
13–17	379 (75.50)	323 (85.22)	51 (13.46)	5 (1.32)			
Sex							
Male	294 (58.57)	222 (75.51)	66 (22.45)	6 (2.04)	22.308	2	<0.001
Female	208 (41.43)	191 (91.83)	16 (7.69)	1 (0.48)			
BMI (kg/m ²)							
Below 18.5	264 (52.59)	212 (80.30)	51 (19.32)	1 (0.38)	11.579	4	0.021
18.5–25.0	215 (42.83)	184 (85.58)	25 (11.63)	6 (2.79)			
Above 25.0	23 (4.58)	17 (73.91)	6 (26.09)	0 (0.00)			
Level of education							
Primary	84 (16.73)	67 (79.76)	15 (17.86)	2 (2.38)	0.924	2	0.630
Secondary	418 (83.27)	346 (82.78)	67 (16.03)	5 (1.20)			
Medium of education							
Bangla	495 (98.61)	411 (83.03)	77 (15.56)	7 (1.41)	15.779	2	<0.001
English	7 (1.39)	2 (28.57)	5 (71.43)	0 (0.00)			
Mother's education level							
Illiterate	36 (7.17)	28 (77.78)	8 (22.22)	0 (0.00)	10.501	6	0.105
Primary	101 (20.12)	75 (74.26)	23 (22.77)	3 (2.97)			
Secondary	218 (43.43)	189 (86.70)	28 (12.84)	1 (0.46)			
Graduation and above	147 (29.28)	121 (82.31)	23 (15.65)	3 (2.04)			
Mother's profession							
Service	113 (22.51)	86 (76.11)	24 (21.24)	3 (2.65)	14.259	6	0.027
Business	12 (2.39)	7 (58.33)	5 (41.67)	0 (0.00)			
Self-employed	32 (6.37)	24 (75.00)	8 (25.00)	0 (0.00)			
Housekeeping	345 (68.73)	296 (85.80)	45 (13.04)	4 (1.16)			
Father's education level							
Illiterate	72 (14.34)	60 (83.33)	10 (13.89)	2 (2.78)	6.156	6	0.406
Primary	78 (15.54)	64 (82.05)	14 (17.95)	0 (0.00)			
Secondary	144 (28.69)	121 (84.03)	23 (15.97)	0 (0.00)			
Graduation or above	208 (41.43)	168 (80.77)	35 (16.83)	5 (2.40)			
Father's profession							
Service	236 (47.01)	194 (82.20)	39 (16.53)	3 (1.27)	11.004	8	0.201
Business	171 (34.06)	138 (80.70)	31 (18.13)	2 (1.17)			
Self-employed	12 (2.39)	9 (75.00)	3 (25.00)	0 (0.00)			
Unemployed	10 (1.99)	6 (60.00)	4 (40.00)	0 (0.00)			
Others	73 (14.54)	66 (90.41)	5 (6.85)	2 (2.74)			

TABLE 1 (Continued)

	Academic performance				Chi-square value	df	p-Value
	Total (%)	Good (%)	Average (%)	Poor (%)			
Family type							
Joint	181 (36.06)	146 (80.66)	35 (19.34)	0 (0.00)	5.598	2	0.061
Nuclear	321 (63.94)	267 (83.18)	47 (14.64)	7 (2.18)			
Having siblings							
Yes	448 (89.24)	369 (82.37)	72 (16.07)	7 (1.56)	1.025	2	0.599
No	54 (10.76)	44 (81.48)	10 (18.51)	0 (0.00)			
Family structure							
Adopted	10 (1.99)	4 (40.00)	5 (50.00)	1 (10.00)	21.105	4	<0.001
Single parent	41 (8.17)	29 (70.73)	12 (29.27)	0 (0.00)			
Both parents	451 (89.84)	380 (84.26)	65 (14.41)	6 (1.33)			
Currently living with family							
Yes	476 (94.82)	398 (83.61)	71 (14.92)	7 (1.47)	13.72	2	0.001
No	26 (5.18)	15 (57.69)	11 (42.31)	0 (0.00)			
Time of going to bed							
Before 10.00 p.m.	194 (38.65)	164 (84.54)	28 (14.43)	2 (1.03)	25.993	6	<0.001
10.00 p.m.–12.00 a.m.	196 (39.04)	166 (84.69)	28 (14.29)	2 (1.02)			
12.01 a.m.–2.00 a.m.	92 (18.33)	74 (80.43)	17 (18.48)	1 (1.09)			
After 2.00 a.m.	20 (3.98)	9 (45.00)	9 (45.00)	2 (10.00)			
Time to fall asleep at bedtime							
Less than 15 min	232 (46.22)	198 (85.34)	31 (13.36)	3 (1.29)	8.221	6	0.222
15–30 min	175 (34.86)	144 (82.29)	29 (16.57)	2 (1.14)			
31–60 min	58 (11.55)	41 (70.69)	15 (25.86)	2 (3.45)			
More than 60 min	37 (7.37)	30 (81.08)	7 (18.92)	0 (0.00)			
Time of waking up							
Before 5.00 a.m.	85 (16.93)	66 (77.65)	16 (18.82)	3 (3.53)	6.93	6	0.327
5.00 a.m.–7.00 a.m.	314 (62.55)	266 (84.71)	46 (14.65)	2 (0.64)			
7.01 a.m.–9.00 a.m.	70 (13.94)	56 (80.00)	13 (18.57)	1 (1.43)			
After 9.00 a.m.	33 (6.57)	25 (75.76)	7 (21.21)	1 (3.03)			
Duration of sleep at night							
Less than 4 h	37 (7.37)	24 (64.86)	10 (27.03)	3 (8.11)	18.569	8	0.017
4–6 h	149 (29.68)	126 (84.56)	22 (14.77)	1 (0.67)			
7–8 h	238 (47.41)	199 (83.61)	37 (15.55)	2 (0.84)			
More than 8 h	78 (15.54)	64 (82.05)	13 (16.67)	1 (1.28)			
Time spends in bed							
Less than 5 h	100 (19.92)	82 (82.00)	15 (15.00)	3 (3.00)	21.847	8	0.005
5–7 h	172 (34.26)	158 (91.86)	13 (7.56)	1 (0.58)			
8–10 h	161 (32.07)	121 (75.16)	38 (23.60)	2 (0.84)			
More than 10 h	69 (13.75)	52 (75.36)	16 (23.19)	1 (1.45)			

(Continues)

TABLE 1 (Continued)

	Academic performance				Chi-square value	df	p-Value
	Total (%)	Good (%)	Average (%)	Poor (%)			
Family economic impression							
High	84 (16.73)	64 (76.19)	15 (17.86)	5 (5.95)	19.683	4	0.001
Medium	172 (34.26)	136 (79.07)	35 (20.35)	1 (0.58)			
Low	246 (49.00)	213 (86.59)	32 (13.01)	1 (0.41)			
Smoking habit							
0					17.491	2	<0.001
Nonsmoker	468 (93.23)	394 (84.19)	68 (14.53)	6 (1.28)			
Smoker	34 (6.77)	19 (55.88)	14 (41.18)	1 (2.94)			
Need lenses to see and read							
Yes	92 (18.33)	75 (81.52)	16 (17.39)	1 (1.09)	0.161	2	0.923
No	410 (81.67)	338 (82.44)	66 (16.10)	6 (1.46)			
Physical disability							
Yes	45 (8.96)	31 (68.89)	12 (26.67)	2 (4.44)	7.604	2	0.022
No	457 (91.04)	382 (83.59)	70 (15.32)	5 (1.09)			
Perform physical exercise							
Yes	297 (59.16)	253 (85.19)	43 (14.48)	1 (0.34)	8.121	2	0.017
No	205 (40.84)	160 (78.05)	39 (19.02)	6 (2.93)			
Area of residence							
Rural	247 (49.20)	202 (81.78)	41 (16.60)	4 (1.62)	0.212	2	0.900
Urban	255 (50.80)	211 (82.75)	41 (16.08)	3 (1.18)			

Abbreviation: df, degree of freedom.

TABLE 2 Distribution of demographic variables and their association with degree of gaming addiction.

	Online gaming addiction				Chi-square value	df	p-Value
	No addiction (%)	Mild (%)	Moderate (%)	Severe (%)			
Age in years							
6–12	84 (68.29)	33 (26.83)	5 (4.07)	1 (0.81)	9.057	3	0.029
13–17	307 (81.00)	63 (16.62)	8 (2.11)	1 (0.26)			
Sex							
Male	205 (69.73)	78 (26.53)	9 (3.06)	2 (0.68)	28.448	3	<0.001
Female	186 (89.42)	18 (8.65)	4 (1.92)	0 (0.00)			
BMI (kg/m ²)							
Below 18.5	204 (77.27)	51 (19.32)	9 (3.41)	0 (0.00)	7.203	6	0.302
18.5–25.0	172 (80.00)	38 (17.67)	3 (1.40)	2 (0.93)			
Above 25.0	15 (65.22)	7 (30.43)	1 (4.35)	0 (0.00)			
Level of education							
Primary	56 (66.67)	24 (28.57)	3 (3.57)	1 (1.19)	8.304	3	0.040
Secondary	335 (80.14)	72 (17.22)	10 (2.39)	1 (0.24)			

TABLE 2 (Continued)

	Online gaming addiction				Chi-square value	df	p-Value
	No addiction (%)	Mild (%)	Moderate (%)	Severe (%)			
Medium of education							
Bangla	390 (78.79)	91 (18.38)	12 (2.42)	2 (0.40)	17.621	3	0.001
English	1 (14.29)	5 (71.43)	1 (14.29)	0 (0.00)			
Mother's education level							
No formal education	27 (75.00)	8 (22.22)	1 (2.78)	0 (0.00)	12.715	9	0.176
Primary	71 (70.30)	25 (24.75)	3 (2.97)	2 (1.98)			
Secondary	178 (81.65)	36 (16.51)	4 (1.83)	0 (0.00)			
Graduation and above	115 (78.23)	27 (18.37)	5 (3.40)	0 (0.00)			
Mother's profession							
Service	83 (73.45)	27 (23.89)	2 (1.77)	1 (0.88)	13.639	9	0.136
Business	7 (58.33)	5 (41.67)	0 (0.00)	0 (0.00)			
Self-employed	22 (68.75)	10 (31.25)	0 (0.00)	0 (0.00)			
Housekeeping	279 (80.87)	54 (15.65)	11 (3.19)	1 (0.29)			
Father's education level							
No formal education	55 (76.39)	14 (19.44)	2 (2.78)	1 (1.39)	6.303	9	0.709
Primary	59 (75.64)	18 (23.08)	1 (1.28)	0 (0.00)			
Secondary	116 (80.56)	26 (18.06)	2 (1.39)	0 (0.00)			
Graduation and above	161 (77.40)	38 (18.27)	8 (3.85)	1 (0.48)			
Father's profession							
Service	189 (80.08)	40 (16.95)	7 (2.97)	0 (0.00)	33.334	12	0.001
Business	127 (74.27)	39 (22.81)	5 (2.92)	0 (0.00)			
Self-employed	6 (50.00)	6 (50.00)	0 (0.00)	0 (0.00)			
Unemployed	5 (50.00)	4 (40.00)	1 (10.00)	0 (0.00)			
Others	64 (87.67)	7 (9.59)	0 (0.00)	2 (2.74)			
Family type							
Joint	136 (75.14)	41 (22.65)	4 (2.21)	0 (0.00)	3.403	3	0.334
Nuclear	255 (79.44)	55 (17.13)	9 (2.80)	2 (0.62)			
Having siblings							
Yes	349 (77.78)	86 (19.20)	11 (2.46)	2 (0.45)	0.543	3	0.909
No	42 (77.78)	10 (18.52)	2 (3.70)	0 (0.00)			
Family structure							
Adopted	3 (30.00)	7 (70.00)	0 (0.00)	0 (0.00)	22.621	6	0.001
Both parents	361 (80.04)	76 (16.85)	12 (2.66)	2 (0.44)			
Single parent	27 (65.85)	13 (31.71)	1 (2.44)	0 (0.00)			
Currently living with family							
Yes	377 (79.20)	84 (17.65)	13 (2.73)	2 (0.42)	13.33	3	0.004
No	14 (53.85)	12 (46.15)	0 (0.00)	0 (0.00)			

(Continues)

TABLE 2 (Continued)

	Online gaming addiction				Chi-square value	df	p-Value
	No addiction (%)	Mild (%)	Moderate (%)	Severe (%)			
Time of going to bed							
Before 10.00 p.m.	151 (77.84)	39 (20.10)	3 (1.55)	1 (0.52)	33.382	9	<0.001
10.00 p.m.–12.00 a.m.	160 (81.63)	33 (16.84)	3 (1.53)	0 (0.00)			
12.01 a.m.–2.00 a.m.	70 (76.09)	15 (16.30)	7 (7.61)	0 (0.00)			
After 2.00 a.m.	10 (50.00)	9 (45.00)	0 (0.00)	1 (5.00)			
Time needed to fall asleep							
Less than 15 min	190 (81.90)	35 (15.09)	6 (2.59)	1 (0.43)	8.452	9	0.489
15–30 min	135 (77.14)	34 (19.43)	5 (2.86)	1 (0.57)			
31–60 min	41 (70.69)	16 (27.59)	1 (1.72)	0 (0.00)			
More than 60 min	25 (67.57)	11 (29.73)	1 (2.70)	0 (0.00)			
Time of waking up							
Before 5.00 a.m.	62 (72.94)	21 (24.71)	1 (1.18)	1 (1.18)	15.018	9	0.090
5.00 a.m.–7.00 a.m.	255 (81.21)	51 (16.24)	8 (2.55)	0 (0.00)			
7.01 a.m.–9.00 a.m.	50 (71.43)	17 (24.29)	3 (4.29)	0 (0.00)			
After 9.00 a.m.	24 (72.73)	7 (21.21)	1 (3.03)	1 (3.03)			
Duration of sleep at night							
Less than 4 h	21 (56.76)	11 (29.73)	4 (10.81)	1 (2.70)	27.364	12	0.007
4–6 h	121 (81.21)	25 (16.78)	3 (2.01)	0 (0.00)			
7–8 h	189 (79.41)	45 (18.91)	4 (1.68)	0 (0.00)			
More than 8 h	60 (76.92)	15 (19.23)	2 (2.56)	1 (1.28)			
Time spends in bed							
Less than 5 h	77 (77.00)	17 (17.00)	5 (5.00)	1 (1.00)	32.454	12	0.001
5–7 h	154 (89.53)	16 (9.30)	2 (1.16)	0 (0.00)			
8–10 h	116 (72.05)	42 (26.09)	3 (1.86)	0 (0.00)			
More than 10 h	44 (63.77)	21 (30.43)	3 (4.35)	1 (1.45)			
Family economic impression							
High	57 (67.86)	22 (26.19)	4 (4.76)	1 (1.19)	16.256	6	0.012
Medium	127 (73.84)	38 (22.09)	7 (4.07)	0 (0.00)			
Low	207 (84.15)	36 (14.63)	2 (0.81)	1 (0.41)			
Smoking habit							
Nonsmoker	375 (80.13)	80 (17.09)	12 (2.56)	1 (0.21)	25.269	3	<0.001<
Smoker	16 (47.06)	16 (47.06)	1 (2.94)	1 (2.94)			
Need lenses to see and read							
Yes	72 (78.26)	17 (18.48)	3 (3.26)	0 (0.00)	0.671	3	0.880
No	319 (77.80)	79 (19.27)	10 (2.44)	2 (0.49)			
Physical disability							
Yes	29 (64.44)	13 (28.89)	3 (6.67)	0 (0.00)	6.982	3	0.072
No	362 (79.21)	83 (18.16)	10 (2.19)	2 (0.44)			

TABLE 2 (Continued)

	Online gaming addiction				Chi-square value	df	p-Value
	No addiction (%)	Mild (%)	Moderate (%)	Severe (%)			
Perform physical exercise							
Yes	238 (80.13)	51 (17.17)	8 (2.69)	0 (0.00)	4.848	3	0.183
No	153 (74.63)	45 (21.95)	5 (2.44)	2 (0.98)			
Area of residence							
Rural	191 (77.33)	49 (19.84)	6 (2.43)	1 (0.40)	0.198	3	0.978
Urban	200 (78.43)	47 (18.43)	7 (2.75)	1 (0.39)			

Abbreviation: df, degree of freedom.

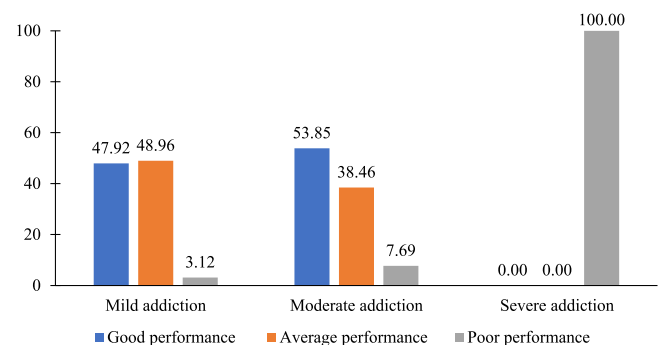
TABLE 3 Correlation between academic performance and degree of gaming addiction.

		Total	No addiction	Mild	Moderate	Severe	Pearson's correlation	
							r	p
Academic performance	Good	413 (82.27)	360 (87.17)	46 (11.14)	7 (1.69)	0 (0.00)	0.357	<0.001
	Average	82 (16.33)	30 (36.59)	47 (57.32)	5 (6.10)	0 (0.00)	0.299	0.006
	Poor	7 (1.40)	1 (14.29)	3 (42.86)	1 (14.29)	2 (28.57)	0.12	0.797

physical handicap ($\chi^2 = 6.982$, $df = 3$, $p = 0.072$) with gaming addiction. There is no significant correlation observed between engaging in physical exercise, place of residence, and the requirement for corrective lenses for visual acuity about the occurrence of gaming addiction.

3.4 | Correlation between academic performance and severity of online gaming addiction

The relationship between academic achievement and gaming addiction is presented in Table 3, reveals significant findings of interest. Among the students categorized as "no addiction," a majority, 87.17%, showed commendable academic performance. Conversely, a smaller proportion of students, namely 11.14%, exhibited mild addiction tendencies, while we saw just 1.69% as having moderate addiction (Figure 2). Notably, no participants reported experiencing severe addiction. The obtained Pearson correlation coefficient ($r = -0.357$, $p < 0.001$) provides evidence of a statistically significant inverse relationship between gaming addiction and academic achievement. A more detailed analysis of academic performance categories reveals that 82.27% of pupils who demonstrated high academic success indicated no addiction, whereas 16.33% reported average performance, and a mere 1.40% showed poor performance. Within the category labeled as "no addiction," we observed that 36.59% of individuals exhibited average performance, while 57.32% had mild addiction belonging to the average performance group. The results of the study reveal a conspicuous adverse pattern, indicating that there is a correlation between the severity of gaming addiction and a decline in academic achievement.

**FIGURE 2** Distribution of academic performance based on the severity of addiction among the addicted individuals.

3.5 | Regression analysis

The regression analysis examines the association between demographic characteristics and academic performance (Table 4). One of the main findings of this study is that students between the ages of 6 and 12 have an odds ratio (OR) of 0.898 (95% CI: 0.173–4.658) for poor performance and an OR of 0.898 (95% CI: 1.668–3.307) for average performance when compared to the reference group of students with high performance. The OR for poor performance is 3.930 (95% CI: 0.871–17.724) among males, indicating a higher likelihood than females. According to this study's findings, there is a significant correlation between primary education and learning in the Bangla language and an increased likelihood of poor academic performance. The ORs observed in this study range from 0.638 to 10.014, suggesting a wide range of impact. The results also reveal that greater levels of maternal education are related to a decreased

TABLE 4 Regression analysis of demographic variables by academic performance of students.

	OR	Poor versus good			OR	Average versus good		
		95% CI				95% CI		
		Lower bound	Upper bound	p-Value		Lower bound	Upper bound	p-Value
Age in years								
6–12	0.898	0.173	4.658	0.898	1.668	0.842	3.307	0.143
13–17	1				1			
Sex								
Male	3.930	0.871	17.724	0.075	1.772	0.856	3.668	0.123
Female	1				1			
Level of education								
Primary	0.638	0.095	4.296	0.644	0.558	0.240	1.295	0.175
Secondary	1				1			
Medium of education								
Bangla	10.014	0.003	29768.164	0.572	0.044	0.003	0.743	0.030
English	1				1			
Mother's education level								
No formal education	5.965	0.235	151.492	0.279	0.607	0.175	2.101	0.431
Primary	23.874	0.596	956.733	0.092	0.541	0.130	2.257	0.399
Secondary	5.687	0.128	252.389	0.369	0.330	0.073	1.493	0.150
Graduation and above	1				1			
Mother's profession								
Business	0.450	0.006	31.757	0.713	4.063	0.761	21.704	0.101
Service	1.270	0.218	7.391	0.791	1.901	0.835	4.325	0.126
Self-employed	1.425	0.077	26.333	0.812	2.599	0.719	9.390	0.145
Unemployed	1.509	0.291	7.814	0.624	1.469	0.689	3.134	0.320
Others	1				1			
Father's education level								
No formal education	0.103	0.005	2.090	0.139	1.028	0.298	3.549	0.965
Primary	0.744	0.062	8.899	0.815	1.554	0.467	5.169	0.473
Secondary	0.906	0.063	13.039	0.942	1.976	0.585	6.675	0.273
Graduation and above	1				1			
Father's profession								
Business	0.980	0.086	11.183	0.987	1.230	0.443	3.416	0.691
Service	1.105	0.091	13.451	0.938	1.576	0.582	4.264	0.371
Self-employed	0.048	0.001	13.703	0.293	0.634	0.067	5.998	0.691
Unemployed	1.267	0.008	193.498	0.927	2.454	0.360	16.753	0.360
Others	1				1			
Family type								
Nuclear	5.278	1.266	22.009	0.022	0.870	0.438	1.729	0.692
Joint	1				1			

TABLE 4 (Continued)

	OR	Poor versus good			OR	Average versus good		
		95% CI				95% CI		
		Lower bound	Upper bound	p-Value		Lower bound	Upper bound	p-Value
Number of siblings								
Zero	0.818	0.055	12.206	0.884	0.952	0.356	2.540	0.921
One	2.129	0.550	8.245	0.274	0.978	0.514	1.861	0.947
Two	1.594	0.029	88.650	0.820	0.968	0.185	5.065	0.969
More than two	1				1			
Family structure								
Adopted	464.039	11.139	19330.802	0.001	2.814	0.166	47.802	0.474
Single parent	0.871	0.061	12.357	0.919	1.940	0.741	5.084	0.177
Both parents	1				1			
Currently living with family								
Yes	4.258	0.220	82.561	0.338	0.367	0.120	1.120	0.078
No	1				1			
Time of going to								
Before 10.00 p.m.	0.101	0.007	1.446	0.091	0.159	0.031	0.810	0.027
10.00 p.m.–12.00 a.m.	0.205	0.016	2.719	0.230	0.218	0.046	1.043	0.056
12.01 a.m.–2.00 a.m.	0.206	0.013	3.276	0.263	0.267	0.056	1.274	0.098
After 2.00 a.m.	1				1			
Time needs to fall asleep at night								
Less than 15 min	4.159	0.160	108.189	0.391	1.859	0.594	5.813	0.287
15–30 min	3.014	0.112	81.193	0.511	1.517	0.472	4.877	0.484
31–60 min	11.845	0.410	341.939	0.150	2.950	0.812	10.719	0.100
More than 60 min	1				1			
Time of waking up								
Before 5.00 a.m.	9.031	0.306	266.931	0.203	1.207	0.291	5.005	0.795
5.00 a.m.–7.00 a.m.	5.261	0.208	133.322	0.314	1.050	0.311	3.545	0.937
7.00 a.m.–9.00 a.m.	7.331	0.220	244.018	0.265	0.885	0.219	3.577	0.864
After 9.00 a.m.	1				1			
Duration of sleep at night								
Less than 4 h	6.118	0.414	90.476	0.188	1.206	0.290	5.010	0.796
4–6 h	0.455	0.034	6.075	0.551	1.159	0.415	3.235	0.779
7–8 h	0.833	0.078	8.853	0.880	1.021	0.420	2.485	0.963
More than 8 h	1				1			
Time spends in bed								
Less than 5 h	9.317	1.095	79.261	0.041	0.912	0.329	2.528	0.859
6–7 h	5.013	0.609	41.269	0.134	0.714	0.275	1.850	0.488
8–10 h	4.125	0.563	30.204	0.163	1.136	0.470	2.745	0.777
More than 8 h	1				1			

(Continues)

TABLE 4 (Continued)

	OR	Poor versus good			OR	Average versus good		
		95% CI				95% CI		
		Lower bound	Upper bound	p-Value		Lower bound	Upper bound	p-Value
Family economic impression								
Low	0.030	0.004	0.213	<0.001	1.537	0.542	4.358	0.419
Medium	0.056	0.009	0.333	0.002	1.931	0.712	5.240	0.196
High	1				1			
Smoking habit								
Nonsmoker	7.891	0.373	166.840	0.185	0.499	0.179	1.388	0.183
Smoker	1				1			
Need lenses to see and read								
Yes	0.596	0.094	3.784	0.583	1.270	0.533	3.026	0.590
No	1				1			
Physical disability								
Yes	10.317	1.734	61.363	0.010	1.523	0.512	4.530	0.449
No	1				1			
Perform physical exercise								
Yes	0.223	0.057	0.873	0.031	0.631	0.339	1.175	0.147
No	1				1			
Area of residence								
Rural	5.681	0.949	34.008	0.057	1.209	0.541	2.704	0.643
Urban	1				1			

likelihood of poor academic performance. There is a positive correlation between maternal occupations and better academic performance. The presence of nuclear family structures, having two siblings, being adopted, and experiencing irregular sleep patterns are correlated with higher likelihoods of experiencing poor performance. The ORs for these associations range from 0.818 to 464.039. There are correlations between lower and moderate financial status, abstinence from smoking, and a reduced likelihood of experiencing subpar performance. Physical factors, such as impairments and insufficient engagement in physical exercise, also demonstrate substantial ORs.

4 | DISCUSSION

Within our comprehensive exploration of the intricate interplay between gaming addiction and academic performance among participants, compelling patterns emerged within the sociodemographic landscape. A noticeable pattern emerged in the increased incidence of gaming addiction among male participants, in contrast to their female counterparts. The presence of a sex-based distinction suggests the existence of potential subtle aspects that may influence gaming habits. Moreover, the analysis of age distribution revealed a remarkable correlation, as the 13–17 age group exhibited a

substantial connection to the phenomenon of gaming addiction. This discovery implies the presence of a potential developmental component within the relationship. The most notable finding of the study was the identified inverse relationship between excessive gaming addiction and academic performance. Significantly, students who reported no addiction demonstrated a significantly greater prevalence of academic achievement. This finding emphasizes how important it is to look at the intricate relationships that exist between digital leisure and academic achievement. Regression analysis gave us a more thorough picture of the sociodemographic environment and revealed several significant aspects of academic attainment. Many components, such as early childhood education, instructional language, family dynamics, and sleeping habits, demonstrated different purposes. All of the above points indicate a complex web of relationships, highlighting the need for a thorough understanding of the many relationships between gaming addiction and academic success. These findings impact public health initiatives and instructional tactics, resulting in a more knowledgeable conversation.

When placing our findings into context, it is crucial to consider the large body of research concerning gaming addiction and its influence on academic achievement.^{53–56} Upon examining past studies, it becomes evident that there are significant commonalities and surprising distinctions.⁵⁷ Consistent with previous research, our

study found a greater incidence of gaming addiction among male participants.^{2,58} This observation is consistent with the existing body of scholarly research that indicates the presence of a gendered aspect in gaming behaviors.^{2,58} Moreover, the observed inverse association between addiction to gaming and academic performance aligns with previous research, hence strengthening the argument for a consistent association between excessive gaming and poor academic performance.^{53,55} The distinctiveness of our study is in its comprehensive examination of sociodemographic variables. The recognition of the 13-17 age group as being particularly vulnerable to gaming addiction introduces a developmental aspect that has not been extensively explored in previous scholarly investigations. This understanding of age-related factors offers a unique and valuable addition to the current body of information. Moreover, our study explores particular sociodemographic variables, including language of instruction, family structure, and sleep, to provide a better understanding of how these factors influence the association between gaming addiction and academic performance. The meticulous examination conducted in this study distinguishes it from others, providing a more extensive comprehension of the complex characteristics inherent in this relationship.

A complex interplay of psychological, social, and environmental factors accounts for the root causes of the patterns of gaming addiction that have been documented and their effects on academic success.⁵⁹ A possible factor contributing to the higher prevalence of gaming addiction in men might be associated with gendered norms and expectations in society, which may have an impact on different recreational behavior patterns.^{60,61} The greater susceptibility seen in individuals between the ages of 13 and 17 might be linked to developmental processes, such as increased independence and the pursuit of identity, which make using digital escapism as a coping strategy more alluring.⁶² Given that there is a negative relationship between gaming addiction and academic achievement, it is necessary to consider potential explanations. The intense and time-consuming nature of gaming might cause excessive involvement, which can divert attention and reduce the amount of energy and attention that is directed toward academic pursuits.⁶³ The allure of virtual worlds and instant gratification found in gaming may inadvertently affect students' focus, study habits, and time management skills, ultimately impairing their academic performance. The possible impact of instructional language on academic performance might be linked to various cognitive demands or cultural factors associated with different teaching approaches. A family's structure and customs around bedtime may be used to gauge how supportive and stable the family is, which can have an effect on a student's overall health and readiness to engage in academic activities.⁶⁴ Understanding the intricate interplay between these elements is essential to understanding how gaming addiction affects academic performance. A negative correlation suggests that there could be a barrier, but it's important to take individual differences, relationship moderators, and the reciprocal nature of the association into account. It is conceivable to conclude that students who struggle academically can turn to gaming as a coping mechanism, creating a vicious cycle that calls for a thorough understanding.^{53,54,56}

Anticipating potential outcomes entails thinking through the likely academic and social consequences of the patterns of gaming addiction that have been documented. From an academic standpoint, the inverse relationship between gaming addiction and academic accomplishment suggests that educational objectives may be impeded. When gaming addiction is not adequately addressed, it can lead to a subset of adolescents experiencing challenges with their academic endeavors, especially in their teen years.⁶⁵ This effect could have consequences that go beyond a person's specific academic achievements and include more significant educational metrics like graduation rates and disparities in academic performance.⁶⁶ In addition, it is critical to understand that the formative years of adolescence are critical for skill acquisition and the creation of a solid educational foundation.⁶⁷ As noted by Weinstein and Ding et al., excessive gaming addiction in this day and age might hinder the development of critical cognitive skills and the acquisition of basic learning capacities. The social repercussions are numerous and intricate.^{68,69} A gender gap in gaming addiction can maintain or exacerbate pre-existing gender-based disparities, which may then influence people's choices about their futures and jobs.^{58,62} Moreover, the prevalence of gaming addiction among the 13 to 17-year-old group may also have an impact on social interactions and the development of interpersonal skills—a necessary skill set for successfully navigating the obstacles of adulthood.⁵¹ Long-term gaming can lead to a propensity to withdraw from social contacts, which can hinder the formation of meaningful relationships with others and the learning of important social skills.^{62,70}

The creation of effective preventative measures and management programs for gaming addiction requires the development of comprehensive and integrated methods. The introduction of comprehensive educational programs inside educational institutions should be the first step toward implementing preventive measures. Special attention should be paid to creating digital literacy and nurturing appropriate gaming habits. Employing the integration of these programs into the academic structure, learners can get a more nuanced understanding of the possible consequences linked to excessive gaming. Furthermore, students may acquire the skills they need to balance their screen time responsibly and still do their coursework. In addition, parents may be equipped with the knowledge and tools needed to identify signs of gaming addiction and promote open communication in family settings by putting in place an awareness program. Management policy should place a strong emphasis on the need for comprehensive methods and early intervention. To detect and assist individuals who may be vulnerable to gaming addiction, educational institutions should include regular screenings for the disorder in addition to counseling services. Cognitive-behavioral therapy is one therapeutic technique that may be used to successfully target and ameliorate the psychological factors that underlie the development and maintenance of gaming addiction. Family-oriented treatments possess the ability to create a supportive home environment by involving parents in the therapy process. People can develop a feeling of community as they move through their recovery journey with the help of peer counseling and

support groups. Insights from educational data mining can inform strategies for managing screen time and balancing academic responsibilities, particularly in the context of parental restrictions. By understanding the impact of factors like technology usage on student performance, parents and educators can implement targeted measures to encourage healthier habits, both in online gaming and academic pursuits.⁷¹

Moreover, the integration of an Artificial General Intelligence-based Rational Behavior Detection Agent (AGI-RBDA) into online gaming systems could enhance both online safety and academic performance. By leveraging human-like rationality, this system can effectively detect unauthorized users and potential threats in real time, thereby safeguarding sensitive information and protecting against cyber-attacks. For online gaming, this means a safer and more secure environment, reducing the risks associated with harmful interactions or malicious activities. Additionally, by analyzing the behavior of intruders and overcoming encryption weaknesses, AGI-RBDA can contribute to the development of more robust parental control mechanisms. Parents can utilize this technology to monitor and restrict their children's online gaming activities, ensuring they are not exposed to inappropriate content or spending excessive amounts of time gaming at the expense of their academic responsibilities.⁵⁰

The study on the link between online gaming addiction and academic performance among school-going adolescents in Bangladesh reveals several key mechanisms and suggests directions for future research. Excessive gaming negatively impacts mental health, reducing sleep and emotional regulation, disrupting learning, and lowering academic achievement. Increased gaming often results in reduced sleep, causing fatigue that hampers concentration and learning. The study found a higher incidence of gaming addiction among boys and adolescents aged 13-17, suggesting that developmental and social factors might influence gaming habits. Those without gaming addiction generally performed better academically, highlighting the need to balance digital leisure and studies. Developmental factors, like increased independence and identity formation in this age group, may make digital escapism more attractive. Moreover, a supportive school climate and strong teacher leadership can mitigate these negative effects. Schools should promote positive teacher-student interactions and create structured programs to help students manage gaming habits. Future research should explore the influence of sociodemographic factors, such as family dynamics, instructional language, and sleep habits, on gaming addiction and academic performance. Preventive measures should include comprehensive educational programs to promote digital literacy and responsible gaming, regular screenings, counseling services, and cognitive-behavioral therapy. Additionally, integrating Artificial General Intelligence-based Rational Behavior Detection Agents (AGI-RBDA) into online gaming systems can enhance online safety and academic performance by monitoring and restricting excessive gaming. Policymakers should establish guidelines for healthy screen time habits and age-appropriate gaming, ensuring responsible access to video games. Continuous research is essential to understand the long-term effects of gaming addiction on academic and social outcomes. A

collaborative approach involving academic institutions, mental health professionals, and policymakers is crucial to addressing gaming addiction while promoting a balanced digital environment. Looking ahead, it is advised that a future strategy involve the continued collaboration of academic institutions, mental health professionals, and lawmakers. It is of utmost importance to revise the standards about maintaining healthy screen time habits and age-appropriate engagement in gaming to effectively respond to the ever-changing digital environments. Policymakers ought to contemplate the implementation of laws that are consistent with age limitations imposed on other kinds of media, thereby guaranteeing responsible access to video games. In addition, it is imperative to do continuous research to enhance our comprehension of the enduring consequences associated with gaming addiction, encompassing its influence on academic and social aspects. By cultivating a comprehensive approach that covers the domains of prevention, therapy, and continuous research, society can strive towards ameliorating the issues presented by gaming addiction, while concurrently advocating for a digitally conducive environment that promotes the well-being and equilibrium of persons across all age groups.

4.1 | Strength and limitations

Our study possesses various aspects that enhance the reliability and validity of our findings. A large sample size of 502 participants makes it easier to fully analyze the relationship between gaming addiction and academic achievement across a range of sociodemographic factors. Our study's broad participant pool enhances the generalizability of our conclusions and provides insightful viewpoints on potential trends across a range of age, sex, and educational backgrounds. Moreover, our analysis is strengthened by the incorporation of extensive sociodemographic characteristics such as sleep habits, family structure, and language of instruction. This helps us understand the environmental factors that affect gaming habits and academic achievement in a more sophisticated way. Furthermore, the utilization of robust statistical procedures, such as regression analysis and chi-square analysis, improves the reliability of our findings by using an organized approach to exploring associations and correlations.

However, it is crucial to acknowledge particular limitations that are present in our study. First of all, there is a chance of response bias when using self-reported information on gaming habits and academic achievement since participants might be prone to exaggerate or underestimate particular activities. Moreover, the intrinsic cross-sectional nature of our research limits our ability to prove conclusive causal relationships between gaming addiction and academic performance. Longitudinal studies are essential for clarifying the temporal dynamics of these relationships. Furthermore, our results might not apply to a wide range of groups with different sociocultural contexts due to the study's focus on a specific geographic and cultural situation.

Our study provides a thorough analysis of the link between online gaming addiction and academic performance, but it does not address whether certain types of games or gaming behaviors are

more harmful. To answer this, we need detailed data on game types and behaviors. Analyzing factors like game genres, play frequency, and immersion levels could reveal which activities impact academics most. Exploring game content and mechanics, and how they affect engagement and time management, could also inform intervention strategies. While the text gives a good overview, more research on specific gaming elements is necessary for targeted interventions.

Despite these limitations, our study adds a great deal to the body of knowledge by offering varied viewpoints on the intricate relationship between academic achievement and gaming addiction.

5 | CONCLUSION

In summary, this study's findings, which came from a thorough sociodemographic analysis, point to a vulnerability in the teenage population. This claim highlights the inherent gender prejudice that permeates gaming activities and draws a link between excessive gaming and lower academic performance. The observed patterns demonstrate an intricate nature that can be ascribed to the convergence of psychological, social, and environmental elements. Although the negative correlation between gaming addiction and academic achievement may appear to hinder educational goals, individual nuances, moderating variables, and the bidirectional nature of this association must be considered. Predicting future outcomes, the identified tendency towards gaming addiction has significant ramifications for social and academic spheres, affecting not only individual academic achievements but also broader educational indicators and interpersonal interactions. Strategic preventive and management initiatives must prioritize educational campaigns, timely interventions, and comprehensive therapeutic approaches. Involving policymakers, educational institutions, mental health professionals, and parents in collaborative endeavors is crucial for effectively tackling the ever-changing challenges presented by gaming addiction. Implementing recommendations to address gaming addiction in Bangladesh may encounter challenges due to socio-cultural norms, resource limitations, and coordination issues among stakeholders. Cultural attitudes towards gaming and mental health, along with limited access to resources and mental health services, could impede the effectiveness of interventions. Collaboration among policymakers, educational institutions, mental health professionals, and parents may be difficult to achieve. However, the study's findings and recommendations could apply to other countries facing similar challenges, with adaptations needed to accommodate local contexts. Looking ahead, longitudinal research to assess long-term impacts would provide deeper insights into the effects of gaming addiction on academic and social outcomes. While implementing recommendations in Bangladesh may face challenges due to cultural norms and resource constraints, international collaboration can adapt and share effective strategies to address gaming addiction globally. Continuous investigation into these issues is crucial for refining approaches and fostering digitally inclusive environments that prioritize the well-being of all individuals.

AUTHOR CONTRIBUTIONS

Ramisa Anjum: Conceptualization; data curation; writing—original draft. **Nodia Hossain Nodi:** Conceptualization; data curation; writing—original draft. **Proma Rani Das:** Validation; visualization. **A. S. M. Roknuzzaman:** Writing—review and editing. **Rapty Sarker:** Writing—review and editing. **Md. Rabiul Islam:** Writing—review and editing; supervision; conceptualization; visualization.

ACKNOWLEDGMENTS

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

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data supporting the present study findings are within this article. All the relevant data and information can be obtained from the corresponding author upon reasonable request.

ETHICS STATEMENT

The protocol received approval from the Research Ethics Committee of the University of Asia Pacific in Dhaka, Bangladesh (Ref: UAP/REC/2022/107). The study was done as per the principles outlined in the Declaration of Helsinki. Furthermore, informed consent was obtained from all participants.

TRANSPARENCY STATEMENT

The lead author Ramisa Anjum, Md. Rabiul Islam affirm that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Proma Rani Das  <http://orcid.org/0009-0001-8867-7918>

Md. Rabiul Islam  <http://orcid.org/0000-0003-2820-3144>

REFERENCES

1. Kuss D. Internet gaming addiction: current perspectives. *Psychol Res Behav Manag.* 2013;6:125-137. doi:10.2147/PRBM.S39476
2. Ko CH, Yen JY, Chen CC, Chen SH, Yen CF. Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *J Nerv Ment Dis.* 2005;193(4):273-277. doi:10.1097/01.nmd.0000158373.85150.57
3. Mutlu C, Birinci T, Senel A, et al. A multi-dimensional assessment of Internet gaming disorder in children and adolescents: a case-control study. *Work.* 2024;77:1089-1099. doi:10.3233/WOR-220652
4. Dai J, Zhao Z, Dong H, Du X, Guang-Heng D. The severity of addiction mediates loneliness and cortical volume in internet gaming disorder. *Neuroreport.* 2024;35(1):61-70. doi:10.1097/WNR.0000000000001975
5. Seok S, DaCosta B. The world's most intense online gaming culture: addiction and high-engagement prevalence rates among South Korean adolescents and young adults. *Comput Human Behav.* 2012;28(6):2143-2151. doi:10.1016/j.chb.2012.06.019

6. Nahar Z, Sohan M, Supti KF, et al. Prevalence and associated risk factors for mental health problems among female university students during COVID-19 pandemic: a cross-sectional study findings from Dhaka, Bangladesh. *Heliyon*. 2022;8(10):e10890. doi:10.1016/j.heliyon.2022.e10890
7. King DL, Delfabbro PH, Billieux J, Potenza MN. Problematic online gaming and the COVID-19 pandemic. *J Behav Addict*. 2020;9(2):184-186. doi:10.1556/2006.2020.00016
8. Amin KP, Griffiths MD, Dsouza DD. Online gaming during the COVID-19 pandemic in India: strategies for work-life balance. *Int J Ment Health Addict*. 2022;20(1):296-302. doi:10.1007/s11469-020-00358-1
9. Islam MR, Hasan Apu MM, Akter R, et al. Internet addiction and loneliness among school-going adolescents in Bangladesh in the context of the COVID-19 pandemic: findings from a cross-sectional study. *Heliyon*. 2023;9(2):e13340. doi:10.1016/j.heliyon.2023.e13340
10. Donati MA, Guido CA, De Meo G, et al. Gaming among children and adolescents during the COVID-19 lockdown: the role of parents in time spent on video games and gaming disorder symptoms. *Int J Environ Res Public Health*. 2021;18(12):6642. doi:10.3390/ijerph18126642
11. Han T, Cho H, Sung D, Park MH. A systematic review of the impact of COVID-19 on the game addiction of children and adolescents. *Front Psychiatry*. 2022;13:976601. doi:10.3389/fpsy.2022.976601
12. Islam MR, Tushar MI, Tultul PS, et al. Problematic internet use and depressive symptoms among the school-going adolescents in Bangladesh during the COVID-19 pandemic: a cross-sectional study findings. *Health Sci Rep*. 2023;6(1):e1008. doi:10.1002/hsr.2.1008
13. Imataka G, Sakuta R, Maehashi A, Yoshihara S. Current status of Internet gaming disorder (IGD) in Japan: new lifestyle-related disease in children and adolescents. *J Clin Med*. 2022;11(15):4566. doi:10.3390/jcm11154566
14. van den Eijnden R, Koning I, Doornwaard S, van Gorp F, Ter Bogt T. The impact of heavy and disordered use of games and social media on adolescents' psychological, social, and school functioning. *J Behav Addict*. 2018;7(3):697-706. doi:10.1556/2006.7.2018.65
15. Tashtoush MA, Wardat Y, Elsayed AM. Mathematics distance learning and learning loss during COVID-19 pandemic: teachers' perspectives. *J Higher Educ Theory Pract*. 2023;23(5):162-178.
16. Alotaibi M, Fox M, Coman R, Ratan Z, Hosseinzadeh H. Smartphone addiction prevalence and its association on academic performance, physical health, and mental well-being among university students in Umm Al-Qura University (UQU), Saudi Arabia. *Int J Environ Res Public Health*. 2022;19(6):3710. doi:10.3390/ijerph19063710
17. Gningue SM, Peach R, Jarrah AM, Wardat Y. The relationship between teacher leadership and school climate: findings from a teacher-leadership project. *Educ Sci*. 2022;12(11):749.
18. Chia DXY, Ng CWL, Kandasami G, et al. Prevalence of Internet addiction and gaming disorders in Southeast Asia: a meta-analysis. *Int J Environ Res Public Health*. 2020;17(7):2582. doi:10.3390/ijerph17072582
19. Li AY, Chau C, Cheng C. Development and validation of a parent-based program for preventing gaming disorder: the game over intervention. *Int J Environ Res Public Health*. 2019;16(11):1984. doi:10.3390/ijerph16111984
20. Rosendo-Rios V, Trott S, Shukla P. Systematic literature review online gaming addiction among children and young adults: a framework and research agenda. *Addict Behav*. 2022;129:107238. doi:10.1016/j.addbeh.2022.107238
21. Dieris-Hirche J, Böttel L, Pape M, et al. Effects of an online-based motivational intervention to reduce problematic internet use and promote treatment motivation in Internet gaming disorder and internet use disorder (OMPRIS): study protocol for a randomised controlled trial. *BMJ Open*. 2021;11(8):e045840. doi:10.1136/bmjopen-2020-045840
22. Che D, Hu J, Zhen S, et al. Dimensions of emotional intelligence and online gaming addiction in adolescence: the indirect effects of two facets of perceived stress. *Front Psychol*. 2017;8:1206. doi:10.3389/fpsyg.2017.01206
23. Tashtoush MA, Wardat Y, Aloufi F, Taani O. The effect of a training program based on TIMSS to developing the levels of habits of mind and mathematical reasoning skills among pre-service mathematics teachers. *EURASIA J Math Sci Technol Educ*. 2022;18(11):em2182.
24. Jarrah AM, Almassri H, Johnson JD, Wardat Y. Assessing the impact of digital games-based learning on students' performance in learning fractions using (ABACUS) software application. *EURASIA J Math Sci Technol Educ*. 2022;18(10):em2159.
25. Wardat Y, Jarrah AM, Stoica G. Understanding the meaning of the equal sign: a case study of middle school students in the United Arab Emirates. *European J Educ Res*. 2021;3:1505-1514.
26. Hidayat R, Wardat Y. A Systematic Review of Augmented Reality in Science, Technology, Engineering and Mathematics Education. *Education and Information Technologies*; 2023:1-26.
27. Fong TCT, Cheng Q, Pai CY, et al. Uncovering sample heterogeneity in gaming and social withdrawal behaviors in adolescent and young adult gamers in Hong Kong. *Soc Sci Med*. 2023;321:115774. doi:10.1016/j.socscimed.2023.115774
28. Adachi PJC, Willoughby T. More than just fun and games: the longitudinal relationships between strategic video games, self-reported problem solving skills, and academic grades. *J Youth Adolesc*. 2013;42(7):1041-1052. doi:10.1007/s10964-013-9913-9
29. Young K. Understanding online gaming addiction and treatment issues for adolescents. *Am J Fam Ther*. 2009;37(5):355-372. doi:10.1080/01926180902942191
30. Pallavicini F, Pepe A, Mantovani F. Commercial off-the-shelf video games for reducing stress and anxiety: systematic review. *JMIR Ment Health*. 2021;8(8):e28150. doi:10.2196/28150
31. Tashtoush MA, Wardat Y, AlAli R, Al-Saud K. The impact of cyberbullying on student motivation to learn: insights from Abu Dhabi Emirate schools. *Humanit Soc Sci Lett*. 2023;11(4):461-474.
32. Cena L, Rota M, Calza S, et al. Prevalence and types of video gaming and gambling activities among adolescent public school students: findings from a cross-sectional study in Italy. *Ital J Pediatr*. 2022;48(1):108. doi:10.1186/s13052-022-01299-2
33. Feng W, Ramo DE, Chan SR, Bourgeois JA. Internet gaming disorder: trends in prevalence 1998-2016. *Addict Behav*. 2017;75:17-24. doi:10.1016/j.addbeh.2017.06.010
34. Zaman M, Babar MS, Babar M, et al. Prevalence of gaming addiction and its impact on sleep quality: a cross-sectional study from Pakistan. *Ann Med Surg*. 2022;78:103641. doi:10.1016/j.amsu.2022.103641
35. Ahmed GK, Abdalla AA, Mohamed AM, Mohamed LA, Shamaa HA. Relation between Internet gaming addiction and comorbid psychiatric disorders and emotion avoidance among adolescents: A cross-sectional study. *Psychiatry Res*. 2022;312:114584. doi:10.1016/j.psychres.2022.114584
36. Tso WWY, Reichert F, Law N, et al. Digital competence as a protective factor against gaming addiction in children and adolescents: a cross-sectional study in Hong Kong. *Lancet Reg Health West Pac*. 2022;20:100382. doi:10.1016/j.lanwpc.2022.100382
37. Mokshathaa NB, Vishwas S. Internet addiction and gaming disorder during the COVID-19 pandemic among young people in Southern Karnataka. *Cureus*. 2023;15(7):e42159. doi:10.7759/cureus.42159
38. Aydin MK, Kuş M. Nomophobia and smartphone addiction amidst COVID-19 home confinement: the parallel mediating role of digital gaming and social media tools usage across secondary school students. *Front Psychol*. 2023;14:1175555. doi:10.3389/fpsyg.2023.1175555
39. Kim D, Nam JK, Keum C. Adolescent Internet gaming addiction and personality characteristics by game genre. *PLoS One*. 2022;17(2):e0263645. doi:10.1371/journal.pone.0263645

40. Festl R, Scharnow M, Quandt T. Problematic computer game use among adolescents, younger and older adults. *Addiction*. 2013;108(3):592-599. doi:10.1111/add.12016
41. Putra PY, Fithriyah I, Zahra Z. Internet addiction and online gaming disorder in children and adolescents during COVID-19 pandemic: a systematic review. *Psychiatry Investig*. 2023;20(3):196-204. doi:10.30773/pi.2021.0311
42. Khan AH, Sultana MS, Hossain S, Hasan MT, Ahmed HU, Sikder MT. The impact of COVID-19 pandemic on mental health & wellbeing among home-quarantined Bangladeshi students: A cross-sectional pilot study. *J Affect Disord*. 2020;277:121-128.
43. Guessoum SB, Lachal J, Radjack R, et al. Adolescent psychiatric disorders during the COVID-19 pandemic and lockdown. *Psychiatry Res*. 2020;291:113264.
44. Gómez-Galán J, Martínez-López JÁ, Lázaro-Pérez C, Sarasola Sánchez-Serrano JL. Social networks consumption and addiction in college students during the COVID-19 pandemic: educational approach to responsible use. *Sustainability*. 2020;12(18):7737.
45. Fernandes B, Nanda Biswas U, Tan-Mansukhani R, Vallejo A, Essau CA. The impact of COVID-19 lockdown on Internet use and escapism in adolescents. *Revista de psicología clínica con niños y adolescentes*. 2020;7(3):59-65.
46. Aziz N, Nordin MJ, Abdulkadir SJ, Salih MMM. Digital addiction: systematic review of computer game addiction impact on adolescent physical health. *Electronics*. 2021;10(9):996.
47. Han DH, Kim SM, Lee YS, Renshaw PF. The effect of family therapy on the changes in the severity of on-line game play and brain activity in adolescents with on-line game addiction. *Psychiatry Res Neuroimag*. 2012;202(2):126-131. doi:10.1016/j.psychres.2012.02.011
48. Tariq I, Majeed S. Poor Family-Functioning and lack of interpersonal support as predictors of online gaming addiction in adolescents. *J Profess Appl Psychol*. 2022;3(1):53-68. doi:10.52053/jpap.v3i1.97
49. Khan MR, Huq S, Risha AN, Alam SS. High-density population and displacement in Bangladesh. *Science*. 2021;372(6548):1290-1293. doi:10.1126/science.abi6364
50. Naseem S, Alhudhaif A, Anwar M, Qureshi KN, Jeon G. Artificial general intelligence-based rational behavior detection using cognitive correlates for tracking online harms. *Pers Ubiquitous Comput*. 2023;27(1):119-137.
51. Lemmens JS, Valkenburg PM, Peter J. Development and validation of a game addiction scale for adolescents. *Media Psychol*. 2009;12:77-95. doi:10.1080/15213260802669458
52. DuPaul GJ, Rapport MD, Perriello LM. Teacher ratings of academic skills: the development of the academic performance rating scale. *School Psych Rev*. 1991;20:284-300. doi:10.1080/02796015.1991.12085552
53. Brunborg GS, Mentzoni RA, Frøyland LR. Is video gaming, or video game addiction, associated with depression, academic achievement, heavy episodic drinking, or conduct problems? *J Behav Addict*. 2014;3(1):27-32. doi:10.1556/JBA.3.2014.002
54. Haghbin M, Shaterian F, Hosseinzadeh D, Griffiths MD. A brief report on the relationship between self-control, video game addiction and academic achievement in normal and ADHD students. *J Behav Addict*. 2013;2(4):239-243. doi:10.1556/JBA.2.2013.4.7
55. Hawi NS, Samaha M, Griffiths MD. Internet gaming disorder in Lebanon: relationships with age, sleep habits, and academic achievement. *J Behav Addict*. 2018;7(1):70-78. doi:10.1556/2006.7.2018.16
56. Islam MI, Biswas RK, Khanam R. Effect of Internet use and electronic game-play on academic performance of Australian children. *Sci Rep*. 2020;10(1):21727. doi:10.1038/s41598-020-78916-9
57. Hossain MJ, Ahmmad F, Khan MR, et al. Impact of prolonged COVID-19 lockdown on body mass index, eating habits, and physical activity of university students in Bangladesh: a web-based cross-sectional study. *Front Nutr*. 2022;9:873105. doi:10.3389/fnut.2022.873105
58. Chen KH, Olliffe JL, Kelly MT. Internet gaming disorder: an emergent health issue for men. *Am J Men's Health*. 2018;12(4):1151-1159. doi:10.1177/1557988318766950
59. Chung S, Lee J, Lee HK. Personal factors, Internet characteristics, and environmental factors contributing to adolescent Internet addiction: a public health perspective. *Int J Environ Res Public Health*. 2019;16(23):4635. doi:10.3390/ijerph16234635
60. Lopez-Fernandez O, Williams AJ, Griffiths MD, Kuss DJ. Female gaming, gaming addiction, and the role of women within gaming culture: a narrative literature review. *Front Psychiatry*. 2019;10:454. doi:10.3389/fpsy.2019.00454
61. Kuss DJ, Griffiths MD. Online social networking and addiction—A review of the psychological literature. *Int J Environ Res Public Health*. 2011;8(9):3528-3552. doi:10.3390/ijerph8093528
62. Paulus FW, Ohmann S, von Gontard A, Popow C. Internet gaming disorder in children and adolescents: a systematic review. *Dev Med Child Neurol*. 2018;60(7):645-659. doi:10.1111/dmcn.13754
63. Mihara S, Higuchi S. Cross-sectional and longitudinal epidemiological studies of Internet gaming disorder: a systematic review of the literature. *Psychiatry Clin Neurosci*. 2017;71(7):425-444. doi:10.1111/pcn.12532
64. Kristensen JH, Pallesen S, King DL, Hysing M, Erevik EK. Problematic gaming and sleep: a systematic review and meta-analysis. *Front Psychiatry*. 2021;12:675237. doi:10.3389/fpsy.2021.675237
65. Karaca S, Karakoc A, Can Gurkan O, Onan N, Unsul Barlas G. Investigation of the online game addiction level, sociodemographic characteristics and social anxiety as risk factors for online game addiction in middle school students. *Community Ment Health J*. 2020;56(5):830-838. doi:10.1007/s10597-019-00544-z
66. Tang WSW, Ng TJJ, Wong JZA, Ho CSH. The role of serious video games in the treatment of disordered eating behaviors: systematic review. *J Med Internet Res*. 2022;24(8):e39527. doi:10.2196/39527
67. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: a foundation for future health. *The Lancet*. 2012;379(9826):1630-1640. doi:10.1016/S0140-6736(12)60072-5
68. Weinstein AM. Computer and video game addiction—a comparison between game users and non-game users. *Am J Drug Alcohol Abuse*. 2010;36(5):268-276. doi:10.3109/00952990.2010.491879
69. Ding W, Sun J, Sun Y, et al. Trait impulsivity and impaired prefrontal impulse inhibition function in adolescents with internet gaming addiction revealed by a Go/No-Go fMRI study. *Behav Brain Funct*. 2014;10:20. doi:10.1186/1744-9081-10-20
70. Gentile DA, Choo H, Liau A, et al. Pathological video game use among youths: a two-year longitudinal study. *Pediatrics*. 2011;127(2):e319-e329. doi:10.1542/peds.2010-1353
71. Amjad S, Younas M, Anwar M, Shaheen Q, Shiraz M, Gani A. Data mining techniques to analyze the impact of social media on academic performance of high school students. *Wirel Commun Mob Comput*. 2022;2022:1-11.

How to cite this article: Anjum R, Nodi NH, Das PR, Roknuzzaman ASM, Sarker R, Islam MR. Exploring the association between online gaming addiction and academic performance among the school-going adolescents in Bangladesh: a cross-sectional study. *Health Sci Rep*. 2024;7:e70043. doi:10.1002/hsr.2.70043