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Association between online gaming addiction and perceived stress: A cross- sectional study among adolescent students

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Abstract

Background: The rise of online gaming among adolescents has raised significant concerns about its potential psychological impacts, particularly its relationship with stress. This study aimed to assess the association between online gaming addiction and perceived stress levels in adolescents from urban and rural settings.

Methods: A cross-sectional analytical study was conducted involving 265 adolescents aged from selected urban and rural schools. Participants completed a semi-structured questionnaire comprising demographic details, the Gaming Addiction Scale (GAS), and the Perceived Stress Scale (PSS-10).

Results: Gaming addiction was present in 12.7% of urban adolescents compared to 2.4% of rural adolescents ($p = 0.017$). High perceived stress was reported by 74 % urban and 68 % rural adolescents, showing no significant difference between the two groups ($p = 0.868$). However, a strong association was observed between gaming addiction and high perceived stress levels ($p = 0.010$). Adolescents with screen time >4 hours were significantly more likely to exhibit gaming addiction and elevated stress levels ($p < 0.001$).

Conclusion: It is concluded that online gaming addiction is significantly associated with high perceived stress among adolescents. Urban adolescents are more affected due to increased screen time and digital access. Early identification, digital wellness education, and stress management strategies are essential to address this emerging behavioural concern.

Keywords: online gaming addiction; perceived stress; adolescents; screen time; urban-rural comparison; behavioural health

Introduction

In recent years, the surge in internet accessibility and smartphone penetration has dramatically transformed recreational activities among adolescents, with online gaming emerging as a dominant form of entertainment [1]. What began as a harmless pastime has evolved into a global phenomenon, where competitive online games like PUBG, Fortnite, and Free Fire have captivated young minds, often blurring the line between leisure and addiction [2]. Online gaming addiction is now increasingly recognized as a behavioural concern, characterized by compulsive gaming behaviour, loss of control, and significant impairment in daily functioning [3]. The World Health Organization's inclusion of "Gaming Disorder" in the ICD-11 reflects a growing acknowledgment of its clinical relevance. Adolescents, being at a critical stage of emotional and cognitive development, are particularly vulnerable to the psychological impacts of excessive gaming [4]. One of the most concerning outcomes is the relationship between online gaming

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addiction and perceived stress. Adolescents may resort to gaming as a coping mechanism to escape academic pressure, family conflicts, or social anxiety [5]. Several studies have pointed toward a strong association where high perceived stress increases gaming frequency, and prolonged gaming further intensifies stress through disrupted sleep patterns, academic decline, and social isolation [6].

The dopamine-driven reward mechanisms embedded within many online games contribute to their addictive nature. These games are often designed with instant rewards, social reinforcements, level progression, and competitive ranking systems that keep adolescents engaged for long hours. Over time, this leads to a behavioural loop where gaming becomes a preferred escape from real-life stressors [7]. Nevertheless, the same escapism will provoke a decline in physical health, the loss of interpersonal communication, emotional imbalances, and mental exhaustion. In addition, some of the negative effects observed by excessive screen time include poor sleep hygiene that leads to more stress, irritability, and even depressive symptoms among adolescents [8]. The other influential force is the sociocultural normalization of gaming. In contrast to substance use, excessive gaming is not subjected to social stigma the way it is currently with substance use; rather, there is a tacit acceptance amongst peers (or even parents) [9].

The current popularity of eSports, game influencers, and game streamers with monetized streams has brought glamor to this lifestyle, especially to adolescents, making self-regulation of this lifestyle harder. The problem is even more dangerous in an absentee digital literacy of parents and teachers. A great number of adolescents also note the presence of withdrawal symptoms, anxiety, frustration, and restlessness when they are not allowed to play games, which are classic signs of an addictive personality [10]. In the countries of Southeast Asia, the issue is further diminished by a lack of awareness and underreporting. Mental health professionals, teachers, and parents usually miscalculate the effect that the gaming scene can have on the mental health of adolescents. With scarce access to psychological services especially in rural areas and aversion to address mental health issues, pressure to succeed in school, adolescents might be trapped in a downward spiral of stress and behavioural addiction [11].

Also, the COVID-19 pandemic enhanced this issue. Schools are temporally closed, and adolescents are outside less, thus making them spend significantly more time on the screen through games, as they became the main source of interaction and entertainment. Although as the problem is becoming more common, online gaming addiction remains unsystematically screened in the school health curriculum, Adolescents assessments at clinics especially in low- and middle-income areas are lacking uniform tools of diagnosis, counselling and support to handle this behavioural problem [12].

This study aimed to determine the prevalence and assess the association between online gaming addiction and perceived stress levels in adolescents from urban and rural settings.

Methodology

A cross-sectional study was conducted over a period of three months from March 2024 to May 2024 among students enrolled in government schools located in urban and rural field practice areas of with Calcutta National Medical College. Permission was obtained from the school authorities and ethical clearance was granted by the Institutional Ethical Committee of the medical college.

The details and necessity of the study were explained to the school authority. School records obtained from both schools revealed a total of 421 students enrolled in secondary, and higher secondary classes (9th to 12th grade).

All students currently enrolled in any of the selected schools, in grade nine to twelve having smart phone were included in study. Students who were absent, unwilling, or had confirmed mental disabilities were excluded.

On the day of data collection, students were explained the study purpose and necessary consent was taken from the participants. A total of 265 students were included in the study fitting inclusion and exclusion criteria, among them, 142 were from the urban and 123 were from the rural area school.

A predesigned, pretested, semi structured questionnaire was used for data collection. The validation of the questionnaire was done with the assistance of three public health experts. Standardised and reliable tools were used to assess online gaming addiction and perceived stress among students.

In the Questionnaire the first section recorded demographic details such as age, class grade, type of family, residency and number of hours spent gaming per day. Section two involved Gaming addiction, which was assessed with a 7-item Game Addiction Scale (GAS) which were salience, tolerance, mood modification, withdrawal, relapse, conflict, and problems. Each item

was assessed with a 5-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often). A participant who responded "sometimes" or higher on at least four items was considered addicted to gaming. The GAS has been tested and has had high reliability (Cronbach alpha: 0.82–0.87) in various settings [10].

Stress was assessed with the Perceived Stress Scale (PSS), validated scale that assesses the degree to which life events are appraised as stressful. It has 10 items rated on a 5-point Likert scale, ranging from 0 (never) to 4 (very often). The items consisted of both positive and negative factors; the score of the negative items were reversed and re-coded during analysis. Total scores ranged from 0 to 40, with higher scores indicating higher levels of stress. Participants were categorized as having low score (≤13), moderate score (14–26), or high score (≥27). The Bengali version (local language) was validated and reported to have an internal consistency of 0.61. Co-variables selected from literature review for the analysis were age, gender, type of family, per capita income, current smoking status (non-smoker, smoker), self-reported physical activity (active, inactive) and screen time per day.

Statistical analysis

The collected data were entered into Microsoft excel and analysed using SPSS Inc. (version 16.0). The set of co-variables were compared and contrasted across the levels of gaming addiction and perceived stress. Chi-square, t tests, or analysis of variance were used to determine nature of outcome and association, if any.

Results

Data were collected from 265 participants,142 rural and 123 urban. There was no significant difference in age or gender between the two groups, with p-values of 0.359 and 0.841, respectively. Social class distribution was also significantly different, with the upper, upper middle, and middle class more prevalent in urban areas (37.32%) compared to rural areas (21.13%) ($p < 0.001$). In terms of family type, urban and rural both had more nuclear family structure ($p = 0.011$). Furthermore, rural areas showed higher rates of physical activity among adolescents 54.5% as compared to 34.5% in urban areas. 71% urban adolescents reported > 3 hours of screentime compared to 39.9% in rural students, $p < 0.001$ (Table 1).

A total of 10.56% urban residents had gaming addiction, while only 2.43% rural adolescents, reported gaming addiction ($p = 0.017$). Perceived stress levels did not differ significantly between those with and without gaming addiction, with a roughly equal distribution of low, moderate, and high stress levels across both groups ($p = 0.868$) (Table 2 and Figure 1).

Table 1: Distribution of study population according to sociodemographic factors (n = 265).

Sociodemographic Factor	*Urban n (%)*	*Rural n (%)*	*p-value*
Age			
Age < 16 years	60 (42.25)	45 (36.58)	0.359
Age ≥ 16 years	82 (57.76)	78 (63.42)	
Gender			
Male	85 (59.86)	77 (62.61)	0.841
Female	57 (40.14)	46 (37.39)	
Religion			
Hindu	51(35.91)	85 (69.11)	<0.001
Muslim	91 (64.09)	37 (30.89)	
Socio-economic class			
Upper, upper middle & middle class	53 (37.32)	26 (21.13)	<0.001
Lower middle & lower class	89 (62.68)	97 (78.87)	
Type of family			
Nuclear family	131 (92.25)	121(98.37)	0.011
Joint family	11 (7.75)	2 (1.63)	
Smoking			
Smoker	14 (9.86)	16 (13.01)	0.245
Non smoker	128 (90.14)	107 (86.99)	
Physical activity			
Active	49 (34.51)	67 (54.45)	0.008
Inactive	93 (65.49)	56 (45.55)	
Screen time			
> 3 hours	101 (71.13)	49 (39.84)	<0.001
≤ 3 hours	41 (28.87)	74 (60.16)	

Table 2: Distribution of study population according to gaming addiction and perceived stress (n = 265).

Gaming addiction	*Urban n (%)*	*Rural n(%)*	*p-value*
Present	15 (10.56)	3 (2.43)	0.017
Absent	127 (89.44)	120 (97.56)	
Perceived stress level			
Low	23 (16.19)	18 (14.63)	
Moderate	45 (31.69)	37 (30.08)	0.868
High	74 (52.12)	68 (55.23)	

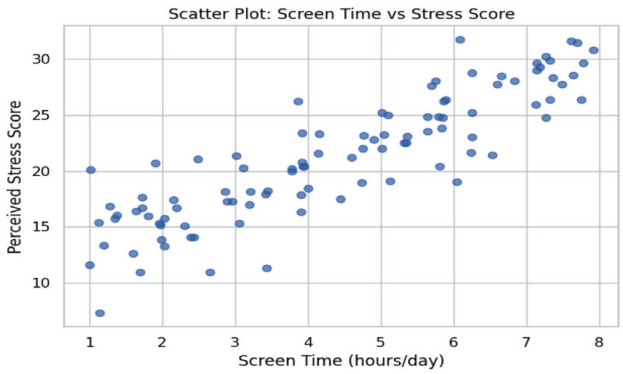

Figure 1: Scatter plot showing relation between screen time with stress score.

In the group with gaming addiction, 83.33% of individuals experienced high perceived stress, compared to 47.58% in the non-addicted group (p = 0.010). Additionally, those with gaming addiction were less likely to report low and moderate stress levels (p = 0.010) (Table 3 and Figure 2).

Table 3: Association between gaming addiction and perceived stress (n=265).

Perceived stress	*Gaming addiction present n (%)*		*Gaming addiction absent n (%)*		*p-value*
	Urban	*Rural*	*Urban*	*Rural*	
Low and Moderate	1 (6.67)	2 (66.67)	35 (47.95)	30 (58.82)	0.010
High	14 (93.33)	1 (33.37)	38 (52.05)	21 (41.18)	

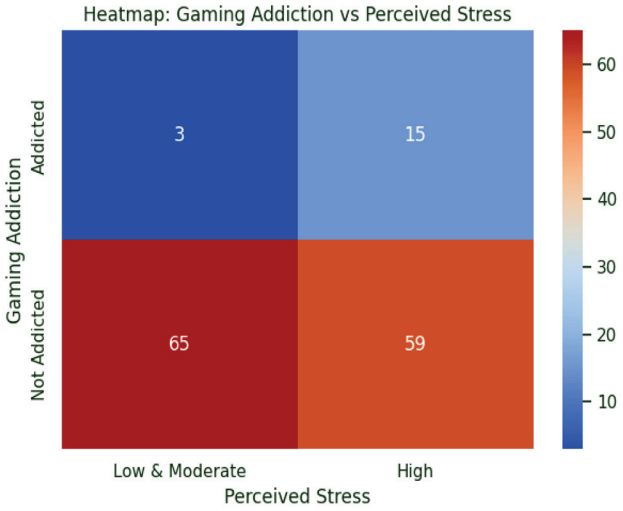

Figure 2: Heatmap showing gaming addiction relation with stress among adolescents.

Discussion

The findings of this study demonstrate a significant association between online gaming addiction and high levels of perceived stress among adolescents, particularly in urban settings. With 10.5% urban participants and only 2.4% rural participants meeting criteria for gaming addiction (Table 2, p = 0.017), the data suggests that urban adolescents are more prone to excessive gaming behaviour. This could be attributed to greater access to digital devices, faster internet connectivity, and increased screen time, as observed in Table 1 where 71.1% of urban adolescents reported screen time exceeding 3 hours daily, compared to only 39.8% in rural areas (p < 0.001). A notable trend observed in this study is that adolescents with gaming addiction overwhelmingly reported high levels of perceived stress. Table 3 shows that 83.33% of gaming-addicted individuals fell into the high perceived stress category, while only 16.67 % of those with low or moderate stress were addicted to gaming (p = 0.010) [13]. These results support existing literature that positions online gaming not only as a coping mechanism but also a stress amplifier. Excessive gaming, especially competitive formats, can contribute to increased psychological strain through disrupted sleep, reduced physical activity, and emotional dysregulation [14].

Interestingly, although rural participants generally reported less screen time and lower gaming addiction rates, the levels of perceived stress were not significantly different from those of urban adolescents (Table 3, p = 0.868).Our study shows findings similar to study done by Kumar P, Patel VK, et al , that while the **sources** of stress might differ, academic pressure and digital overload in urban areas versus socioeconomic hardships and limited access to support services in rural settings, the **intensity** of perceived stress remains comparable [15].

Sociodemographic analysis revealed findings similar to the of study by Singh S, Dahiya et al socioeconomic status differed notably between urban and rural populations, with urban adolescents more likely to belong to upper or middle classes [16, 17]. However, Canale N, Marino, et al. study suggest that despite the economic advantage, higher addiction and screen time among urban adolescents suggest that digital exposure, rather than poverty, is a more dominant driver of online gaming behaviour [13].

Self-rated physical inactivity was significantly higher among urban adolescents (65.49%) than rural adolescents, highlighting how sedentary lifestyles in urban areas may fuel screen-based habits. Physical inactivity has long been linked to poor stress coping mechanisms, compounding the risk of addiction-related stress in this group which is corroborative with the study of Javed S, Kakul F et al [18]. The significant association between gaming addiction and stress levels reinforces the need for early identification of high-

risk adolescents [19]. Schools, parents, and healthcare providers should be educated about the behavioural warning signs of gaming addiction [20]. Psychological screening and digital wellness education should be integrated into adolescent health programs, especially in urban centers [21].

Limitations: Despite the statistical findings, certain limitations should be acknowledged. The study employed a cross-sectional design with a small sample size. Additionally, the reliance on self-reported data by adolescents introduces the possibility of recall bias. Future research could benefit from longitudinal designs and include objective behavioural tracking to better understand the relationship between gaming and stress.

Conclusion

It is concluded that online gaming addiction is significantly associated with elevated levels of perceived stress among adolescents, particularly those residing in urban areas. Adolescents who spent more time gaming, especially over three hours daily, were more likely to report high stress levels and meet the criteria for gaming addiction. Urban adolescents demonstrated both higher addiction rates and screen time, likely due to greater access to technology and more sedentary lifestyles. The findings highlight the urgent need for targeted interventions that promote digital hygiene, stress management, and awareness among school-going youth. Incorporating screening tools for gaming addiction and stress into school health programs could help identify at-risk adolescents early.

Conflicts of interest

Authors declare no conflicts of interest.

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