ORIGINAL RESEARCH ARTICLE

Unveiling the Connection Between Video Games and Mental Health Among College Students in South India

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ABSTRACT

Introduction: Playing Video Games without control can lead to Gaming Disorder (GD) which is also called a problematic gaming pattern or video game addiction. This study is to determine the prevalence of video game disorders and the various associated factors leading to them.

Methodology: This cross-sectional study was done among 930 medical students studying MBBS in a private medical college in Chengalpattu district, Tamil Nadu. Data was collected by pre-tested semi-structured questionnaire. Gaming disorder was assessed by Internet Gaming Disorder Short Form – 9 (IGD-SF 9), depression by Patient Health Questionnaire – 9, and anxiety by Generalized Anxiety Disorder - 7 Questionnaire. Data were analysed using SPSS version 26.

Results: Among the study participants, 37% were males, and 63% were females. The prevalence of Internet Gaming Disorder (IGD) was 9.7%. Greater than 2 hours of gaming per day, online game genre, having academic impact due to gaming, sleep problems, and neck pain/back pain due to gaming were found to be important predictors of gaming disorder.

Conclusion: Awareness has to be created among students and stakeholders regarding gaming disorders among medical college students. Further research should be done to understand the relationship between GD and psychological problems like depression and anxiety.

Keywords: Depression, Gaming disorder, Anxiety, online games, medical

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INTRODUCTION

Video game addiction can be described as a gaming disorder or game-playing behavioural pattern that involves both online and offline video games. It is considered pathological when the gamer has pertinacious resistance to control the habit despite serious negative consequences, which can affect the gamer's life. It is called many names, namely, gaming disorder (GD), pathological gaming and Internet Gaming Disorder (IGD).[1] World Health Organization (WHO) has included "gaming disorder" under mental health conditions in the International Classification of Diseases (ICD-11).[2] Gaming disorder is characterised by "impaired control" over gaming, which causes it to take precedence over other interests and activities such as interpersonal relationships, academic performance, or employment.[3,4]

The global prevalence of gaming disorders ranges from 0.7% to 27.5%. In India, about 99.59 per cent of teenagers utilise technology in some capacity.[5,6]A substantial correlation was found between game addiction and several individuals, family, and institutional risk factors.[7]

Literature reviews have associated intense gaming with personality traits like impulsivity, penchant for violence, and poorer social skills. Mental conditions like attention deficit hyperactivity disorder (ADHD), sadness, and anxiety are closely related to problematic gaming.[8,9] Gamers who play for fun or to socialise appear to be less prone to become addicted than those who play for status or as a means of problem-solving.[10] Increased screen time associated with video gaming may hamper the quantity and quality of sleep, which may indirectly impact mental health.[11,12,13]

A plethora of literature has linked increased anxiety and stress with problematic video gaming.[14,15] According to brain imaging studies, people with Internet gaming disorder exhibit significant abnormalities in the brain regions that mediate impulse control and decision-making.[16] Addictive video gamers with low social or self-control skills are more prone to act aggressively.[17]

Though video games have been linked to violence, addiction and depression, evidence emerges linking videogame to a vast array of psychosocial benefits in four major domains, namely, cognitive, emotional, motivational, and social domains.[18-22]

As young people in other affluent nations, adolescents in India are likely to have access to and utilise electronic devices. Estimates of the prevalence of gaming disorders vary significantly since they are characterised and assessed using various criteria.[23] Knowledge of this condition may help the allocation of healthcare resources, as well as decision-making on public health policy measures.[24,25]

Medical Curriculum in India is challenging and requires a lot of time, sincerity, and dedication to complete the course. Playing video games as a diversion can lead to a reduction in academic performance, leading to anxiety and depression among medical students. There are only a few studies done in India which have assessed the epidemiology of pathological video gaming among medical students.

To address the knowledge gap, this is one of few studies done among medical students in India to find the prevalence of gaming disorders and their various factors and predictors and also to assess the impact of video games on the psychological well-being of the students.

METHODOLOGY

Study Area and participants: The study was conducted in a tertiary medical college in Chengalpattu district, Tamil Nadu. Medical students studying MBBS courses were included as study participants. A total of 250 students are admitted each year. Combining all academic years, 1000 medical students are studying in the medical college.

The purpose and confidentiality of the study were explained to the students. The study was carried out between the period of July to November 2021. Among the 1000 medical students, 930 gave informed consent and participated in the study. The other 70 students were either not available for data collection or did not give consent or were not above 18 years of age to participate in the study.

Data Collection Tools: Data was collected using a pre-tested semi-structured questionnaire which consisted of 5 parts. The I part included all the questions related to the socio-demographic characteristics, working status of their parents, year of study etc. The II parts had questions related to gaming details and social, physical, and mental health factors related to video gaming disorders. These were developed based on a pilot study conducted among medical students in the Tiruvallur district.[26]

The III parts contained the Internet Gaming Disorder – Short Form (IGD-SF) questionnaire used to assess the gaming disorder behaviour among the study participants.[27] Internet gaming does not imply only online video games, but any type of video game played from any device, either online or offline. It contained nine items corresponding to the nine IGD criteria in the Diagnostic and Statistical Manual (DSM) – V. The nine criteria include preoccupation with gaming, withdrawal symptoms when stopped playing video games, tolerance, inability to quit playing video games, loss of interest in other activities, continuing to play games despite facing problems, deceiving family members regarding gaming patterns, using gaming as solace for feelings of hopelessness, problems in professional/personal life due to gaming.[28] The scale had good construct validity, concurrent validity, cross-cultural validity and good reliability with a Cronbach's alpha of 0.88. All nine

items assessed gaming activity in the past 12 months. It was scored on a Likert Scale ranging from 1 to 5, with 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Very Often. The total score ranged from 9 to 45. For a person to be classified as having a gaming disorder, they must select 5 – Very Often for at least 5 of the nine items in the questionnaire.[29] The scale has been validated for use to measure gaming disorder in more than 15 countries, including India.[30]

The IV parts contained questions to assess Depression using Patient Health Questionnaire – 9 (PHQ – 9). It is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. It scores all 9 DSM – IV criteria on a Likert Scale from 0 – "not at all" to 3 – "nearly every day". Scores of 5,10, 15 and 20 represented cut-off scores for mild, moderate, moderately severe and extremely severe depression.[31] It is a validated scale for use among the Indian population.[32]

The V part contained questions to assess anxiety using the Generalized Anxiety Disorder (GAD – 7) questionnaire. It was developed based on the DSM – IV criteria for diagnosing GAD. It consisted of 7 items and assessed the person's experiences during the past two weeks, scored on a Likert Scale from 0 – "not at all" to 3 – "nearly every day". Scores of 5,10, and 15 were used as a cut-off for mild, moderate and severe anxiety.[33] The scale is validated for use in the Indian population.[32]

Game Genre Classification: [34,35] With the advance in technology and storytelling in games, different genres have emerged in the Video game industry. Different genres must be understood to compare the usage among those addicted to video games. For this purpose, six major video game genres are considered, which are given below.

Action / Adventure Games – This includes First Person Games (FPS) and Third Person Games like Overwatch, Call of Duty, and Gears of War, where the player either sees from the character's point of view or over the shoulder view and uses weapons to attack other characters in the game.

Role Playing Games (RPG) – This includes games like Maple Story, Witcher, and Dragon Age, in which the player takes on the role of a character and does in-game missions and quests to progress the storyline in the game.

Simulation Games – This can include Real-Time Simulation (RTS) games like League of legends, age of empires, in which the player becomes a commander and leads his nation/troops through various tactical battles and casual simulation games like SIMS™.

Online Games – This can include online FPS games like Call of Duty, Apex Legends, and Massively Multiplayer RPGs (MMORPGs) like World of Warcraft and Final Fantasy.

Racing Games – This can include racing games like Kart Rider, in which a player chooses a vehicle and races through various tracks requiring good hand-eye coordination.

Sports games include games like FIFA, cricket, and baseball in which the user partakes in sports as a player or e team and plays strategically to win the game.

Casual Games include multiplayer games like Ludo, chess and carrom, which are increasingly being played by a group of 4 people in Local Multiplayer. It also contains mobile puzzle games like candy crush saga, endless runners like temple run, hidden objects games and mobile card games.

Data Collection Method: On a prefixed time, every weekend, the students were approached by the investigators at varying places in the medical college, like the canteen, lecture theatres, hostel, and mess. Data were collected by face-to-face interviews in which the participants filled out the questionnaire in front of the investigator and clarified doubts as and when required.

Data Analysis: Data was entered in Microsoft Excel and analysed using SPSS version 26. Descriptive statistics were used to present data in the form of tables. A Chi-square test was used to find the association between gaming disorder and related variables. Logistic regression Analysis was used to eliminate the confounders and determine the predictors of gaming disorder.

Ethical Approval and Informed Consent: Ethical approval was obtained from the Institutional Human Ethical Committee of the Sree Balaji Medical College (Approval number SBMCH/IHEC/2023/78, Approval Date: 05.1.23). Informed consent was obtained from each study participant before enrolling them.

RESULTS

All of the study participants were in the age group of 18 to 22 years. Around 51.2% of the study participants played video games. There was an almost equal distribution of video gamers between males and females (nearly 50%). Almost 39.6% of mothers of those who play video games were employed. (Table 1)

According to the PHQ-9 questionnaire, the frequency of those who play and do not play video games was distributed equally from moderate to severe depression (around 50%). Regarding anxiety, 56.9% of those with severe anxiety played video games. But depression and anxiety did not have any statistically significant relationship with playing video games. (Table 2)

According to the IGDSF – 9 scale, the prevalence of gaming disorder was 9.7% among the study participants and 18.8% among those who played video games.

Table 1: Sociodemographic Characteristics of the study participants:

Variable	Plays Video Game (n = 482)(%)	Does not play Video games (n = 448)(%)	Total (n = 930) (%)
Gender			
Male	250 (51.9)	94 (21)	344 (37)
Female	232 (48.1)	354 (79)	586 (63)
Year of Study			
1st Year	69 (14.3)	160 (35.7)	229 (24.6)
2nd Year	182 (37.8)	53 (11.8)	235 (25.3)
3rd year	96 (19.9)	136 (30.4)	232 (24.9)
4th year	135 (28)	99 (22.1)	234 (25.2)
Type of Family			
Nuclear Family	354 (73.4)	371 (82.8)	725 (78)
Joint Family	98 (20.3)	65 (14.5)	163 (17.5)
3 generation	30 (6.2)	12 (2.7)	42 (4.5)
Tobacco Consumption			
Yes	8 (1.7)	7 (1.6)	15 (1.6)
No	474 (98.3)	441 (98.4)	915 (98.4)
Alcohol Consumption			
Yes	19 (3.9)	13 (2.9)	32 (3.4)
No	463 (96.1)	435 (97.1)	898 (96.6)
Profession of Mother			
Employed	191 (39.6)	144 (32.1)	335 (36)
Housewife	291 (60.4)	304 (67.9)	595 (64)

Table 2: Depression and Anxiety Severity among the study participants

Variable	Plays Video Game (n=482) (%)	Does not play Video games (n = 448)(%)	*P* Value
Depression (PHQ-9)			
Mild	131 (27)	99 (22)	0.348
Moderate	168 (35)	170 (38)	
Moderately Severe	116 (24)	112 (25)	
Severe	67 (14)	67 (15)	
Anxiety (GAD-7)			
No Anxiety	309 (64.1)	285 (63.6)	0.817
Mild	92 (19)	93 (20.7)	
Moderate	48 (10)	45 (10)	
Severe	33 (7)	25 (5.5)	

Table 3 shows the association between gaming disorder and sociodemographic variables. From now on, only those who play video games and have and don't have gaming disorders are used as dependent variables. Gaming disorder was found to be comparatively higher among males (26%) when compared to females (11.2%), with a statistically significant association (P<0.05) and an odd's ratio of 2.78. There was a statistically significant association between gaming disorder and gender and type of family (P<0.05). (Table 3)

Around 38% of the study participants with gaming disorder played them in the evening and night hours. The most played genre of video games was Action/Adventure games (63.9%), followed by Online games (33.4%). Most gamers played video games on their mobile phones (88.8%). On Bivariate analysis, playing video games in the afternoon, gamers having a preferred genre of action/adventure, online games, roleplaying games, casual games, and usually playing games on their computer were found to have a statistically significant association with gaming disorder. (Table 4)

It was found that 23% of those who played video games alone and with friends and 36% of those playing video games with strangers had gaming disorders. Around 50% of gamers who felt their gaming patterns were affecting their academic performance had gaming disorders. Playing Video games alone, with friends/strangers, those with gaming patterns affecting their academic life, playing without their parent's knowledge, parental supervision, and playing during class hours were found to have a statistically significant association with gaming disorder (P<0.05). (Table 5)

Almost 31.4% of gamers who consumed junk food/snacks during gaming hours were problem gamers.

Table 3: Association between gaming disorders and Sociodemographic variables

Variable	Gaming Disorder		*P* Value	Odd's Ratio (95% CI)
	Present (n = 91)	Absent (n = 391)		
Gender				
Male	65 (71.4)	185 (47.3)	.000*	2.78 (1.69-4.57)
Female	26 (28.6)	206 (52.7)		Reference
Year of Study				
Year 1	11 (12.1)	58 (14.8)	Reference	Reference
Year 2	48 (52.7)	134 (34.3)	3.027	1.88 (0.91-3.89)
Year 3	8 (8.8)	88 (22.5)	0.13	0.47 (0.18-1.26)
Year 4	24 (26.4)	111 (28.4)	0.742	1.14 (0.52-2.48)
Type of Family				
Joint / Three generation family	33 (36.3)	97 (24.8)	0.027*	1.72 (1.06-2.80)
Nuclear Family	58 (63.7)	294 (75.2)		Reference
Tobacco Consumption				
Yes	2 (2.2)	6 (1.5)	0.656	1.44 (0.28-7.26)
No	89 (97.8)	385 (98.5)		Reference
Alcohol Consumption				
Yes	5 (5.5)	14 (3.6)	0.398	1.56 (0.54-4.46)
No	86 (94.5)	377 (96.4)		Reference

* - P<0.05, statistically significant at 95% Confidence Interval (CI).

Table 4: Association between gaming disorders and Gaming details

Variable	Gaming Disorder		*P* Value	Odd's Ratio (95% CI)
	Present (n = 91)	Absent (n = 391)		
Time for gaming (Multiple Response)				
Morning	6 (6.5)	10 (2.6)	0.053	2.68 (0.95-7.60)
Afternoon	24 (26.4)	39 (10)	.000*	3.23 (1.82-5.72)
Evening	48 (52.7)	248 (63.4)	0.059	0.64 (0.40-1.02)
Night	47 (51.6)	160 (40.9)	0.063	1.54 (0.97-2.43)
Average hours of gaming per day				
> 2 hours	70 (76.9)	180 (46)	.000*	3.90 (2.30-6.61)
< 2 hours	21 (23.1)	211 (54)		Reference
Preferred Genre of Videogame played (Multiple Response)				
Action/Adventure	69 (75.8)	239 (61.1)	.009*	1.99 (1.18-3.35)
Role-Playing	27 (29.7)	67 (17.1)	.007*	2.04 (1.21-3.43)
Simulation	19 (20.9)	65 (16.6)	0.335	1.32 (0.74-2.34)
Racing Games	3 (3.3)	26 (6.6)	0.226	0.47 (0.14-1.61)
Online Games	48 (52.7)	113 (28.9)	.000*	2.74 (1.72-4.37)
Casual Games	42 (46.2)	97 (24.8)	.000*	2.59 (1.62-4.16)
Sports Games	23 (25.3)	134 (34.3)	0.099	0.64 (0.38-1.08)
The usual type of Videogame played (Multiple responses)				
Mobile games	77 (18)	351 (82)	0.16	0.62 (0.32—1.20)
PC Games	31 (31.6)	67 (68.4)	.000*	2.49 (1.50-4.14)
Console games	22 (24.2)	69 (75.8)	0.152	1.48 (0.86-2.56)

* - *P*<0.05, statistically significant at 95% Confidence Interval (CI). For Multiple Responses, not doing/playing that particular activity was taken as the reference value. Eg: In the case of playing Mobile Games, not playing mobile games was taken as the reference value. For morning gamer, not playing morning games was taken as reference value.

Table 5: Association between gaming disorder and social factors

Variable	Gaming Disorder		*P* Value	Odd's Ratio (95% CI)
	Present (%) (n = 91)	Absent (%) (n = 391)		
Social Circle with whom the person plays video games with (Multiple Response)				
Alone	53 (58.2)	175 (44.8)	0.020*	1.72 (1.08-2.73)
Friends	61 (67)	199 (50.9)	0.005*	1.96 (1.21-3.17)
Family members	9 (9.9)	68 (17.4)	0.079	0.52 (.25-1.08)
Strangers (Online)	19 (20.9)	33 (8.4)	0.001*	2.86 (1.54-5.31)
Gaming patterns have affected academic performance.				
Yes	15 (16.5)	15 (3.8)	0.000*	4.94 (2.32-10.54)
No	76 (83.5)	376 (96.2)		Reference
I was playing video games during Class hours.				
Yes	24 (26.4)	15 (3.8)	0.000*	8.97 (4.47-8.55)
No	67 (73.6)	376 (96.2)		Reference
Family members supervised the type of games I played.				
Yes	52 (57.1)	160 (40.9)	0.005*	1.925 (1.21-3.05)
No	39 (42.9)	231 (59.1)		Reference
I am playing Videogames without my parent's knowledge.				
Yes	36 (39.6)	44 (11.3)	0.000*	5.16 (3.05-8.72)
No	55 (60.4)	347 (88.7)		Reference

* - *P*<0.05, statistically significant at 95% Confidence Interval (CI). For Multiple Responses, not doing/playing that particular activity was taken as the reference value. Eg: In the case of playing Videogames alone, not playing videogames alone was taken as the reference value.

Variables like consumption of junk foods when gaming, spending money on video games and facing economic burdens due to gaming patterns, sleep getting affected due to gaming patterns, and getting angry/frustrated while playing video games had a statistically significant association with gaming disorder (*P*<0.05). (Table 6)

Regarding depression and anxiety severity among those playing video games, around 92.9% of those who had moderate depression and 67.2% of those with moderately severe depression did not have gaming disorders. The association between gaming disorder and moderately severe to severe depression and all the severities of anxiety were statistically significant. (*P*<0.05). (Table 7)

All the variables found to be statistically significant in bivariate analysis were analyzed using Logistic regression analysis to eliminate the confounders. Regarding the genre of video games, action/adventure, online and open world games were associated with gaming disorder, with online games having an Adjusted Odd's Ratio (AOR) of 3.31 (95% CI – 1.80-9.64).

Table 6: Association between gaming disorder and physical and mental health factors

Variable	Gaming Disorder		*P* Value	Odd's Ratio (95% CI)
	Present (%) (n = 91)	Absent (%) (n = 391)		
Consumption of Junk food/snacks when gaming				
Yes	54 (59.3)	118 (30.2)	.000*	3.37 (2.10-5.40)
No	37 (40.7)	69.8 (88)		Reference
I Spend money buying from app stores/digital game stores / in-app purchases.				
Yes	32 (35.2)	52 (13.3)	.000*	3.53 (2.10-5.94)
No	59 (64.8)	339 (86.7)		Reference
My sleep gets affected due to my gaming pattern.				
Yes	59 (64.8)	62 (15.9)	.000*	9.78 (5.88-12.27)
No	32 (35.2)	329 (84.1)		Reference
I face an increased economic burden due to the money spent on Videogames.				
Yes	25 (27.5)	7 (1.8)	.000*	20.77 (8.63-32.88)
No	66 (72.5)	384 (98.2)		Reference
I have developed neck pain/back pain due to long gaming hours.				
Yes	64 (70.3)	101 (25.8)	.000*	6.80 (4.11-11.26)
No	27 (29.7)	290 (74.2)		Reference
I take it personally when someone curses me in online games.				
Yes	13 (14.3)	15 (3.8)	.000*	4.17 (1.91-9.12)
No	78 (85.7)	376 (96.2)		Reference
I get frustrated/angry when I repeatedly die in competitive single-player/multiplayer games.				
Yes	60 (65.9)	138 (35.3)	.000*	3.54 (2.19-5.73)
No	31 (34.1)	253 (64.7)		Reference

* - *P*<0.05, statistically significant at 95% Confidence Interval (CI)

Table 7: Association between gaming disorder and depression, anxiety severity

Variable	Gaming Disorder		*P* Value	Odd's Ratio (95% CI)
	Present (%) (n = 91)	Absent (%) (n = 391)		
Depression Severity (PHQ – 9)				
Mild	17 (18.7)	114 (29.2)	Reference	Reference
Moderate	12 (13.2)	156 (39.9)	0.09	0.51 (0.23-1.22)
Moderately Severe	38 (41.8)	78 (19.9)	.000*	3.26 (1.72-6.19)
Severe	24 (26.4)	43 (11)	.000*	3.74 (1.83-7.63)
Anxiety Severity (GAD – 7)				
No anxiety	38 (41.8)	271 (69.3)	Reference	Reference
Mild	21 (23.1)	71 (18.2)	.012*	2.10 (1.16-3.81)
Moderate	21 (23.1)	27 (6.9)	.000*	5.54 (2.85-10.77)
Severe	11 (12.1)	22 (5.6)	.001*	3.56 (1.60-7.93)

* - *P*<0.05, statistically significant at 95% Confidence Interval (CI).

Consumption of junk food while gaming, disturbed sleep, and neck pain due to gaming had a statistically significant association with gaming disorder with an AOR of 2.26 (95% CI – 1.07-4.77), 2.90 (95% CI – 1.24-6.75) and 3.50 (95% CI – 1.56-7.86) respectively. Playing Role-playing games had a statistically significant association with gaming disorder with a negative B value of -1.13 and AOR of 0.32, offering protection against gaming disorder. Depression and anxiety did not have any statistically significant relationship with gaming disorder, with moderate and severe depression having a negative B value of -0.40 and -0.96, respectively. Around 56% of the variance in gaming disorder could be explained due to the predictor variables in table 7, as indicated by the R^2 value. The goodness of fit Hosmer and Lemeshow test for this logistic regression model showed a chi-square value of 11.80 with P>0.05, indicating a good fit. (Table 8)

DISCUSSION

Video games have been with us since 1980. With technological advancements, video games have advanced to a level where games have come up with photo-realistic graphics, playable from mobile phones to consoles. This has led to pathological gaming behaviours affecting adolescents' social and psychological well-being. The study done among medical college students yielded exciting results, which are discussed below in comparison with studies done within India and elsewhere.

The present study found that, among medical students, 9.7% of them suffered from gaming disorder. In a study done by Rohilla S et al. in Chennai, the prevalence of GD was found to be 22.8%.[36] Lower prevalence was found in studies conducted by Ismail N et al. in Malaysia (2.5%) and Singh S et al. in India (3.6%).[37,25]

Table 8: Multiple Logistic Regression analysis between gaming disorder and related variables

Variable	B	*P* Value	aOR	95% CI
Gender	0.448	0.322	1.56	0.64-3.79
The usual time for Gaming				
Afternoon	0.248	0.607	1.28	0.49-3.29
Night	-0.52	0.19	0.594	0.27-1.29
Genre of Videogame				
Action/Adventure Games	0.894	0.053	2.44	0.98-6.04
Role-Playing Games	-1.13	.015*	0.32	0.13-0.80
Online Games	1.198	.005*	3.31	1.44-7.60
Open-World Games	0.67	0.147	1.955	0.79-4.83
> 2 Hours of gaming per day	0.76	.040*	2.14	1.03-4.43
PC Gamer	0.03	0.944	1.03	0.45-2.36
Social factors				
Whom do you play video games with?				
Alone	0.59	0.187	1.8	0.75-4.34
Friends	0.083	0.864	1.08	0.41-2.83
Strangers (Online)	0.707	0.183	2.02	0.71-5.73
Gaming patterns have affected academic performance.	1.7	.023*	5.52	1.26-24.06
Playing video games during Class hours	-0.57	0.44	0.56	0.12-2.44
Family members supervised the type of games I played.	0.003	0.995	1.003	0.59-2.12
I am playing Videogames without my parent's knowledge.	-0.42	0.377	0.65	0.25-1.68
Factors related to physical health				
Consumption of Junk food/snacks when gaming	0.818	.031*	2.26	1.07-4.77
My sleep gets affected due to my gaming pattern.	1.06	.013*	2.9	1.24-6.75
I have developed neck pain/back pain due to long gaming hours.	1.25	.002*	3.5	1.56-7.86
Economic factors				
I Spend money buying from app stores / digital game stores / in-app purchases.	-0.49	0.28	0.609	0.24-1.49
I face an increased economic burden due to the money spent on Videogames.	2.98	.000*	19.73	9.68-31.45
Factors related to mental health				
I take it personally when someone curses me in online games.	0.41	0.477	1.5	0.48-4.67
I get frustrated/angry when I repeatedly die in competitive single-player/ multiplayer games.	0.75	0.06	2.12	0.96-4.67
Depression Severity (PHQ – 9)				
Moderate	-0.4	0.59	0.66	0.15-2.94
Moderately Severe	0.96	0.069	0.25	0.05-1.11
Severe	-0.96	0.383	1.74	0.50-6.03
Anxiety Severity (GAD – 7)				
Mild	0.527	0.56	1.69	0.27-10.33
Moderate	0.11	0.848	1.11	0.36-3.44
Severe	-0.6	0.336	0.564	0.15-1.87

Nagelkerke $R^2 = 0.566$, B – unstandardized beta Coefficient, * - $P<0.05$, statistically significant at 95% Confidence Interval (CI).
All variables with P<0.05 in bivariate analysis were included for logistic regression analysis. aOR - Adjusted Odds Ratio

In a study by Saquib N et al. and Milani L et al, the prevalence was found to be 16% and 17.3% respectively.[38] These differences in the prevalence of GD may be due to the difference in the quality, affordability, and addictive nature of the various type of video games the participants played in the different study settings. The methodology of the study designs in the other studies would have also played a role as the assessment tools used to assess gaming disorders differed.

According to the present study findings, all participants had some degree of depression according to the PHQ-9 questionnaire. There was no statistically significant relationship between playing video games and psychological problems like depression or anxiety. The prevalence of moderate to severe depression was comparatively lower among those who played video games. These findings are consistent with studies done by Desai V et al., Kowal M et al. and Russoniello CV et al., in which playing video games were found to help alleviate depression and improve cognitive skills in depressed patients.[19,40,41] Another study pointed out that video games help to enhance mood status and reduce stress among individuals.[41] In the present study, although gaming disorder had a statistically significant association with depression and anxiety in bivariate analysis, with logistic regression analysis and eliminating the confounders, no relationship was found. This necessitates further research to understand whether depression and anxiety serve as risk factors for disorders or if other factors like genetics and social situations play a role.[42]

The prevalence of video game addiction was higher among participants who felt it affected their sleep patterns. The association was also statistically significant in regression analysis. In a systematic review by Kemp C et al., gamers with higher video game addiction scores had poor sleep quality, sleeping prob-

lems during the daytime and insomnia.[43] Similar findings were found in a systematic review by Lam LT et al.[44] This is a cause of concern as sleep problems and insomnia are some of the major symptoms of psychological issues like clinical depression, anxiety and bipolar disorders.[45]

Around 60% of those addicted to video games consume junk food/snacks during gaming hours, and there was a statistically significant association. Playing video games adds to a person's total sedentary time in a day, leading to adverse health outcomes at a young age.[46] Similar findings were obtained in a study by Puolotaival T et al., in which playing long hours of video games was associated with physical fitness, obesity and poor dietary habits like junk food consumption.[47] Consumption of junk food could lead to obesity and serve as a risk factor for various Non-Communicable Diseases (NCDs).[46]

The dynamics of different genres of video games must be understood as the addictive character of specific genres may have a role in video game addiction which needs to be quantified in further research. The present study explored the role of the video game genre and addiction. It was found that Action/adventure, online and open world genres were found to be predictors of video game addiction, with online games having the highest odds ratio of 4.17. A study by Elliott L et al. found that action-adventure games, online gambling games and MMORPGs were associated with video game addiction.[34]

There was a statistically significant association between neck pain due to long gaming hours and video game addiction. The present study showed that 70% of those addicted to video games developed neck pain. In a study by Burke A et al., gaming for long hours was a significant predictor of headache, neck pain and wrist pain.[48] Similar findings were obtained in a study by Kang JW et al., in which video game use was associated with musculoskeletal disorders of upper limbs.[49] Excessive playing of video games over long hours could lead to musculoskeletal problems, which could be prevented by health promotion programs tailored for video gamers.[50] All these problems would disappear when gaming time is reduced, and healthy lifestyles are adopted.[51]

The study shows that economic burden significantly affected video game addiction. As most of the participants in the present study are a dependent population (students) with no standard income, spending the money given by the parents on video games could lead to an economic burden. This habit of spending money on video games in such a way that it could lead to financial problems is not healthy, as evident from a study done by Castren S et al., in which it was found that using money to buy digital/physical games increases the risk of gambling and substance abuse in the future.[52] Parents must keep track of their child's money spending patterns and advise their children if they spend too much on video games.

Playing video games for more than 2 hours per day played a significant role in video game addiction, as evident from this study's findings. Similar results were obtained in a study done by Esposito MR et al., in which gaming time had a positive correlation with gaming addiction scores.[53] Though these factors play a role, growing evidence suggests that factors like peer pressure, commitments and other activities must be considered better to evaluate the impact of increased gaming hours per day.[54,55] Gaming disorder was also observed more among males when compared to females, which is consistent with the study done by Wang CW et al. and Choo H et al.[56,57]

Though gaming disorder is prevalent in this study, analysing the various risk factors identified, it may not be the video games alone causing addictive behaviours and psychological problems as suggested by James RJE et al.[58] Various other factors may also have a role. Further studies with more significant heterogeneity are needed to understand better the relationship between gaming disorder and the associated behavioural and psychological factors.[59]

Conclusion

The findings of the present study revealed that playing video games per se does not cause physical or psychological problems, but playing for long hours and playing specific genres could lead to the development of gaming disorders leading to an unhealthy lifestyle, musculoskeletal problems, and disordered sleep, which could, in turn, lead to psychological problems like depression and anxiety.

Public health authorities must consider video games a top priority and monitor their use among students, adolescents and teenagers. Further community-based studies on Video game addiction based on a National representative sample could be conducted based on the findings of the present study on the various factors associated with gaming disorder. Longitudinal studies could also be undertaken to identify whether video game usage could lead to any other behavioural problems like substance abuse or any other form of addiction.

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