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Effects of massively multiplayer online role-playing games on psychological health and inter-personal relationships of the male youth: A cross-sectional study in sub-urban Kolkata, West Bengal, India

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ABSTRACT: Gaming related experiences and addictive behaviours are emerging causes of adverse psycho-social health such as depression, anxiety, in adolescents and young adults around the world. Nonetheless, there remains a dearth of information relating to adolescents and young adults in India, a country which has millions of gamers.

Present study examined the effects of massively multiplayer online role-playing games on the psychological health and inter-personal relationships of adolescents and young male adults of sub-urban Kolkata, West Bengal, India.

Questionnaires were used to collect data on socio-economic and lifestyle traits, psychological health and inter-personal relationships were obtained from both gamers (n = 150) and non-gamers (n = 150). Data on gaming experiences and addiction were obtained only from gamers. MANCOVA and linear regression were performed to understand the effects of socio-economic and lifestyle traits, gaming experience and addiction traits on psychological health and inter-personal relationships of gamers.

Study findings revealed that both gamers and non-gamers derived from a similar age group (mean age = 19.94 years) and socio-economic cluster. Disparities in psychological health in terms of depression, anxiety and stress and inter-personal relationship in terms of parent and peer attachments were present across social groups and between gamers and non-gamers. Various problematic gaming experiences and gaming related addictive behaviours resulted in poor psychological health and inter-personal relationship with parents and peers.

Male gamers were at high risk to develop adverse psychological health and poor inter-personal relationships with parents and peers due to problematic gaming experience and gaming addiction. Proper education and counselling regarding the beneficial and detrimental sides of gaming may ensure better psycho-social health of adolescents and young adults in India.

KEY WORDS: Gaming addiction, problematic gaming experience, psychological health, social relationship, adolescents, India

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Introduction

Despite the considerable benefits of internet in terms of communicating efficiently, managing daily activities, and gathering knowledge (Akhter 2013), excessive internet use is well-documented as a cause of internet addiction.

An individual's inability to control internet use may often lead to internet addiction (IA) resulting in psychological, social, school, and/or work difficulties in his/her life (Chou and Hsiao, 2000). Growing evidence suggests that IA among users, especially in adolescents and young adults, may lead to adverse health consequences through problematic internet use (PIU). Users with PIU exhibit higher symptoms of distress, anger (Cerniglia et al. 2017) and loneliness (Caplan et al. 2007). These symptoms are often accompanied with several psychological health problems such as depression (Gross 2004; Ha and Hwang 2011), stress (Leung 2006; Yadav et al. 2011), anxiety (Tonioni et al. 2012) sleep disturbance (Cheung and Wong 2011; Lin et al. 2014; Jahan et al. 2019), low quality of life (Bruni et al. 2015), low academic performance (Akhter, 2013; Chandrima et al. 2020), financial and professional difficulties (Achab et al. 2011), and familial conflicts (Bernardi and Pallanti 2009; Cerniglia et al. 2017).

Earlier literature found that adolescents and young adults were a high risk group for developing several kinds of IA since they spend longer time on the internet in order to experience desire fulfilment and release stress (Achab et al. 2011; Hussain et al. 2015). Surprisingly, excessive game-playing of Massively Multiplayer Online Role-Playing Games (MMORPG) is one of the fastest growing forms of IA found among the internet users (Grusser et al. 2007).

Presently, the internet provides a wide range of internet-only gaming experience for gamers through several MMORPG games which are represented by large, sophisticated, attractive and evolving virtual worlds set in different environments (Ducheneaut et al. 2006). As a result, MMORPG games gained immense popularity in adolescents and young adults around the world. Young gamers, however, are unknowingly inclined to develop the detrimental side of excessive online gaming, called 'Gaming addiction' (Grusser et al. 2007; Young 2009). Leung (2004) suggested that individuals with gaming addiction use games as a mean of escape, losing interest in daily activities and isolating themselves from family and friends. Hence, the effect of gaming addiction in users' further leads to adverse physical, mental and social consequences among gaming addicts (Van Rooij et al. 2010; Pontes et al. 2017).

Several literature argues that gaming addiction leads to problems like increased cardiac rhythm (Griffiths and Dancaster 1995; Kaess et al. 2017), sleep disturbance (Achab et al. 2011; Mannikko et al. 2015; Hawi et al. 2018) and poor life satisfaction (Braun et al. 2016; Bargeron and Hormes 2017) among users, especially adolescents and young adults. Moreovoer, these individuals tend to have low mood, nervousness, and irritability (Achab et al. 2011; Brunborg et al. 2014) and show higher level of depression, anxiety, and stress (Hyun et al. 2015; Mannikko et al. 2015; Bargeron and Hormes 2017) compared to non-addicts. They also exhibit social anxiety (Gentile et al. 2011; Hyun et al. 2015), feel more isolated (Carras et al. 2017), maintain low level of interpersonal relationships (Chappell et al. 2006; Kim et al. 2008; Kwon et al. 2011) and perform poorly in tertiary in-

stitutions (Brunborg et al. 2014; Hawi et al. 2018). Evidence supports that males, in comparison to females, are more vulnerable to develop gaming addiction over time (Gross et al. 2004; Huanhuan et al. 2013; Hussain et al. 2015).

In spite of substantial empirical evidence, the issue of online MMORPG gaming addiction and its effect on psycho-social health has not been systematically addressed in India except from a few national studies (Yadav et al. 2013; Singh 2019; Singh et al. 2020). India remains one of the top five mobile gaming markets in the world in terms of users (Singh et al. 2020). Hence, it is essential to understand how online MMORPG gaming effects the psychological health and inter-personal relationships of male youth to ensure better psycho-social health. The present study is, perchance, the first to explore the issue explicitly.

The aim of this study was to explore the effect of online MMORPG gaming experience and addiction among the male adolescents and young adults on their psychological health and inter-personal relationship in West Bengal, India

Materials and methods

The present cross-sectional study was carried out for six months (Jan,2020–May,2020) taking some popular MMORPG games such as *PUBG*, *Call of Duty*, *Free Fire*, and *Fortnite* into consideration to fulfil the study aim. The study performed purposive sampling to obtain utmost number of volunteers.

The present study was conducted in a sub-urban locality of Kolkata under South Dum Dum municipality of North 24-Parganas district, West Bengal, India. The area was chosen for operational convenience due to prior rapport with the local authorities, as well as to cope with funding and time constraints. Gamers and non-gamers were enrolled as the experimental group and the control group respectively in order to compare their psychological health and inter-personal relationship.

Preliminary criteria for selecting study participants was based on a participant being (1) male, (2) aged between 15–24 years (youth), and (3) having been a MMORPG gamer for at least 1 year or a non-gamer. No ethnic or linguistic restriction was maintained during the selection. Initially, a list was made by visiting every household to identify possible participants. All the enlisted participants (n = 562) were informed about the purpose of the research. Approximately 248 individuals refused to volunteer in the study. In the subsequent stage, 14 individuals (all non-gamers) were further excluded from the study due to some pre-existing diagnosed health problems. The final sample included only 300 participants (response rate = 53.38 per cent) aged between 15 and 24 years. The final data consisted of 150 gamers (*experimental group*) and 150 non-gamers (*control group*). All the participants were either Bengali or Hindi speakers.

Data on socio-economic and lifestyle characteristics of the participants such as age, social group, residential status, house type, number of household members and siblings, monthly income in family (in Indian rupees), as well as occupation and education of the guardian, and other questions were collected using a designed questionnaire. Age of the participants was verified using UIDAI (Unique Identification Authority of India) card. Participants were also asked about the number of MMORPG games they usually played and the duration of playing.

Secondly, data on MMORPG gaming experience in terms of seven domains viz. *Competence*, *Sensory and imaginative immersion*, *Flow*, *Tension and annoyance*, *Challenge*, *Negativity* and *Positivity* were obtained by a bi-lingual (Hindi and Bengali) gaming experience questionnaire (IJsselsteijn et al. 2013), with 33 questions (each with 5-point likert scale) and having high internal consistency (Cronbach's $\alpha = 0.72$). For example, participants were asked: '*Do you feel happy while playing the game?*' which had responses ranged from '*Not at all*' to '*Extremely*'.

Thirdly, data on MMORPG gaming addiction in terms of seven domains viz. *Disengagement*, *Excessive use*, *Lack of control*, *Obsession*, *Distress*, *Over-enthusiasm and impulsion*, and *Escapism* were obtained by a bi-lingual (Hindi and Bengali) gaming addiction questionnaire (D'Souza et al. 2019) with 55 questions (each with 5-point likert scale) and high internal consistency (Cronbach's $\alpha = 0.82$). For example, participants were asked: '*Do you get irritated when someone disturbs you during game?*' which had responses ranged from '*Not at all*' to '*Always*'.

Data on self-reported psychological health parameters relating to depression, anxiety and stress were obtained using the DASS-21 questionnaire (Lovibond and Lovibond 1995) that was based on 21 questions (each with 4-point likert scale) with high internal consistency (Cronbach's $\alpha = 0.76$). All questions had scores ranging from '0' to '3'.

Lastly, data on inter-personal relationships of study participants with their parents and peers were obtained by an Inventory of Parent and Peer Attachment (IPPA) questionnaire, that was based on 75 questions (each with 5-point likert scale), and was used to obtain responses on *Trust*, *Communication* and *Engagement*, separately with father, mother and peers (Armsden and Greenberg 1989). Each question had responses ranging from '*Never*' to '*Always*'. The questionnaire had high internal consistency for Mother attachment (Cronbach's $\alpha = 0.87$), Father attachment (Cronbach's $\alpha = 0.89$), and Peer attachment (Cronbach's $\alpha = 0.92$).

The study was conducted in two phases due to the unforeseen Covid-19 outbreak followed by nationwide lockdown in India. In the first phase, the investigator had the opportunity to conduct direct interviews with a total of 248 participants. Participants either filled in the questionnaires on their own or participated in an interview session. All participants volunteered for the study with written consent (for participants under the age of 18, with parents also signing the consent forms). In order to continue the study amid the lockdown, the investigator took telephone interviews with the rest of the participants (52 individuals) in the second phase of the study. Responses were simultaneously recorded by the interviewer.

All the data were entered into a PASW electronic database. Descriptive statistics (Mean and Standard deviation), frequency distribution, MANCOVA and linear regression analysis were performed. A number of variables were categorised prior to analysis for statistical expediency. The variables and their respective categories are mentioned in their respective tables.

The results of MANCOVA presented how mean scores of depression, anxiety, stress and IPPA scores separately for mother, father and peers differed across groups after controlling the effect of age. The results of linear regression presented the effects of gaming experience and gaming addiction traits (used as inde-

pendent variables) on depression, anxiety, stress and IPPA scores (used as dependent variables).

Results

In Table 1, the mean age of the gamers was (Mean = 19.91 years) and non-gamers (Mean = 19.98 years). The majority of gamers (76.67%) and non-gamers (81.33%) were freeholders. A total of 110 gamers (73.33%) and 127 non-gamers (84.66%) were the single child in the family. The family incomes, reported by the gamers (Mean = INR 38166.67) was higher than for the non-gamers (INR 34813.34). Almost all the study participants recognised their father as the primary guardian. The majority of the study participants, irrespective of a gamer or non-gamer, reported their guardians to be private job employees. Additionally,, almost all the guardians had education above higher secondary.

Furthermore,, the majority of gamers (75.33%) and non-gamers (66.67%) played indoor games. However, both gamers (63.33%) and non-gamers (95.33%) also engaged in outdoor games, while both gamers (84.67%) and non-gamers (95.33%) had friends in their locality. A majority of non-gamers (79.33%) attended tertiary institutions with friends compared to gamers (36.67%). Only a few gamers (18.00%) and non-gamers (28.00%) earned money.

A majority of gamers (86%) had no separate gaming platform their except smartphone. However, many of them (81.33%) played multiple numbers of MMORPG games on an average of 3.52 hours per day.

Results also show a significant association of gaming status (Gamer/ Non-gamer) of the study participants with house type (p = 0.007), presence of sibling (p = 0.016), playing outdoor games (p = 0.001), having friends in locality (p = 0.002) and earning money (p = 0.040).

From Table 2, a majority of the gamers experienced high competence (67.33%), high sensory and imaginative immersion (75.33%), higher positivity (75.33%) and higher flow (81.33%) through MMORPG game-playing. Almost half the gamers experienced a sense of challenge (52.67%) and higher negativity (56.00%), but only a handful of them experienced tension and annoyance (22.00%).

The results further revealed that a majority of the gamers excessively played the game (63.33%), lacked control over the game (85.33%), were mildly obsessed (70.00%) or extremely distressed (83.33%). Fifty four percent of gamers were found to be extremely disengaged from their surroundings. Remarkably, a good proportion of gamers played games as a means of escape.

In Table 3, MANCOVA results demonstrate that there was a significant difference in mean only among occupational groups of guardian (F (6,588) = 4.009, p = 0.001), among various transportation use (F (6,588) = 4.487; p = 0.001) and between gamers and non-gamers (F (3,295) = 8.567; p = 0.001) when considered jointly on the variables depression, anxiety and stress.

Table 4 demonstrated that there was a significant difference in the mean among social groups (F (9,679) = 2.245; p = 0.010), between personal and rent residential status (F (3,279) = 2.691; p = 0.012), between pakka and semi-pakka house (F (3,279) = 4.763; p = 0.005), among various transportation use (F (6,558) = 2.136; p = 0.021), between earners and non-earners (F (3,279) = 5.671;

Table 1. Percentage distribution of the study group in terms of background characteristics

Background characteristics		Gamers (n = 150)	Non-gamers (n = 150)	Value for $\chi 2$ test	t-test
Age (in years)*		19.91±2.11	19.98±1.91		0.3012
Residential status	Personal	115 (76.67)	122 (81.33)	0.984	
	Rent	35 (23.33)	28 (18.67)		
House type	Pukka	132 (88.00)	114 (76.00)	7.317†	
	Semi-Pukka	18 (12.00)	36 (24.00)		
Household size	≤4	45 (30.00)	49 (32.67)	0.247	
	>4	105 (70.00)	101 (67.33)		
Has sibling(s)	Yes	40 (26.67)	23 (15.33)	5.806†	
	No	110 (73.33)	127 (84.66)		
Family income*		38166.67±24877.26	34813.34±13112.52		1.460
Guardian	Father	141 (94.00)	144 (96.00)	0.631	
	Mother	9 (6.00)	6 (4.00)		
Occupation of guardian	Business	24 (16.00)	21 (14.00)	1.170	
	Private job	102 (68.00)	98 (65.33)		
	Govt. job	24 (16.00)	31 (20.67)		
Education of guardian	Literate	3 (2.00)	0 (0.00)	–	
	Up to high secondary	16 (10.67)	2 (1.33)		
	Above high secondary	131(87.33)	148 (98.67)		
Plays indoor game	Yes	113 (75.33)	100 (66.67)	2.736	
	No	37 (24.67)	50 (33.33)		
Plays outdoor game	Yes	95 (63.33)	143 (95.33)	46.842†	
	No	55 (36.67)	7 (4.67)		
Has friends in locality	Yes	127 (84.67)	143 (95.33)	9.481†	
	No	23 (15.33)	7 (4.67)		
Transportation used to reach institute	Walking	26 (17.33)	12 (8.00)	–	
	Private cars/ Pool cars	23 (15.33)	0 (0.00)		
	Public transports	101 (67.34)	138 (92.00)		
Goes to institute	With friends	55 (36.67)	119 (79.33)	56.048†	
	Alone	95 (63.33)	31 (20.67)		
Shares tiffin with friends	Yes	143 (95.33)	137 (91.33)	1.928	
	No	7 (4.67)	13 (8.67)		
Earns money	Yes	27 (18.00)	42 (28.00)	4.234†	
	No	123 (82.00)	108 (72.00)		
Use of separate gaming platforms Other than smartphone	Yes	21 (14.00)	n.a.	–	
	No	129 (86.00)			
Number of MMORPG games played	Single	28 (18.67)	n.a.	–	
	Multiple	122 (81.33)			
Duration of game played (Hrs.)*		3.52±0.77	n.a.	–	

Note: Figures in the parenthesis are percentage. *Mean±SD. †Significant at 0.05 level.

p = 0.010) and between gamers and non-gamers (F (3,295) = 94.927; p = 0.001) when considered jointly on the variables of mother attachment (trust, communication and engagement). Additionally, there was a significant difference in the mean among social groups (F (9,679) = 2.616; p = 0.001), between pakka and semi-pakka houses (F (3,279) = 2.852; p = 0.006), having sibling(s) or not (F (3,279) = 2.882; p = 0.002), various transportation use (F (6,558) = 2.621; p = 0.003), playing outdoor games (F (3,279) = 6.959; p = 0.001) and between gamers and non-gamers (F (3,295) = 142.619; p = 0.001) when considered jointly on the variables of father attachment. Again, there was a significant difference between the mean among social groups (F (9,679) = 2.267;

Table 2. Percentage distribution of the gamers in terms of gaming experience and addiction (n = 150)

Gaming experience and addiction		Gamers (n = 150)	Mean score±SD
	Gaming experience		
Competence	Low	49 (32.67)	1.33±0.42
	High	101 (67.33)	
Sensory and imaginative immersion	Low	37 (24.67)	1.45±0.53
	High	113 (75.33)	
Flow	Low	28 (18.67)	1.59±0.56
	High	122 (81.33)	
Tension and annoyance	Low	117 (78.00)	0.92±0.43
	High	33 (22.00)	
Challenge	Low	71 (47.33)	1.27±0.54
	High	79 (52.67)	
Negativity	Low	66 (44.00)	1.31±0.66
	High	84 (56.00)	
Positivity	Low	17 (11.33)	1.84±0.58
	High	133 (75.33)	
	Gaming addiction		
Disengagement	Mild	69 (46.00)	3.09±0.70
	Extreme	81 (54.00)	
Excessive use	Mild	55 (36.67)	3.14±0.59
	Extreme	95 (63.33)	
Lack of control	Mild	22 (14.67)	3.71±0.67
	Extreme	128 (85.33)	
Obsession	Mild	105 (70.00)	2.79±0.83
	Extreme	45 (30.00)	
Distress	Mild	25 (16.67)	3.65±0.53
	Extreme	125 (83.33)	
Escapism	Mild	60 (40.00)	3.20±0.69
	Extreme	90 (60.00)	
Over-enthusiasm and impulsion	Mild	58 (38.66)	3.25±0.47
	Extreme	92 (61.33)	

Note: Figures in the parenthesis are percentage.

Table 3. Differences in mean values of psychological health traits in terms of background characteristics

Variables	Depression	Anxiety	Stress	MANCOVA*
	Mean±SD			F-value (*df*), *p*-value
Social group				
General	17.34±5.49	17.44±4.54	18.17±5.09	0.839 (9,713), 0.619
SC	15.22±6.51	16.66±7.79	17.22±7.23	
ST	16.76±3.60	19.53±5.30	19.53±4.48	
OBC	17.04±5.14	18.30±5.28	18.26±4.72	
Residential status				
Personal	17.05±5.31	17.48±4.94	18.15±5.15	0.211 (3,295), 0.811
Rent	17.49±5.91	18.12±4.94	18.31±5.19	
House type				
Pakka	17.40±5.42	17.73±4.83	18.39±5.04	1.400 (3,295), 0.244
Semi pakka	15.96±5.39	17.07±5.43	17.25±5.58	
Has sibling(s)				
Yes	16.92±5.09	17.39±5.32	17.65±5.29	0.304 (3,295), 0.831
No	17.20±5.53	17.67±4.85	18.32±5.11	
Guardian				
Father	17.26±5.35	17.64±4.93	18.21±5.04	0.803 (3,295), 0.452
Monther	14.93±6.71	17.20±5.22	17.73±7.12	
Occupation of guardian				
Business	16.00±6.04	19.28±4.15	19.15±4.66	4.009* (6,588), 0.001
Private Job	17.56±5.25	17.58±4.92	18.57±5.09	
Govt. Job	16.58±5.49	16.40±5.29	16.00±5.23	
Education of guardian				
Literate	14.66±9.86	13.33±5.03	17.33±5.03	0.772 (6,598), 0.539
Up to H.S.	16.11±5.95	18.77±5.74	18.77±6.54	
Above H.S.	17.24±5.36	17.59±4.88	18.15±5.07	
Use of transportation				
Walking	18.26±5.60	17.31±4.67	18.47±5.26	4.487* (6,588), 0.001
Private cars/Pool cars	20.00±5.39	22.08±5.44	21.21±5.68	
Public transports	16.69±5.32	17.23±4.74	17.84±5.00	
Friends in locality				
Yes	17.05±5.35	17.53±4.82	18.11±5.12	0.488 (3,295), 0.717
No	18.00±6.14	18.40±5.92	18.80±5.47	
Earn money				
Yes	17.68±5.54	17.85±4.93	17.36±5.55	1.929 (3,295), 0.186
No	16.98±5.40	17.54±4.95	18.43±5.01	
Indoor games				
Yes	16.91±5.35	17.67±5.18	18.26±5.08	0.558 (3,295), 0.548
No	17.72±5.61	17.49±4.31	18.00±5.35	
Outdoor games				
Yes	17.27±5.28	17.48±4.56	17.97±5.03	1.309 (3,295), 0.273
No	16.67±6.01	18.12±6.21	19.00±5.56	
Gaming status				
Gamer	16.34±6.20	17.94±5.19	19.13±5.47	8.567* (3,295), 0.001
Non-gamer	17.95±4.41	17.29±3.90	17.24±4.64	

*Depression, anxiety and stress considered jointly for MANCOVA & controlled for Age.

Table 4. Differences in mean values of inter-personal relationship traits in terms of background characteristics

Variables	Mother attachment			MANCOVA*	Father attachment			MANCOVA*	Peer attachment			MANCOVA*
	Trust	Communication	Engagement	F-value, (*df*), *p*-value	Trust	Communication	Engagement	F-value, (*df*), *p*-value	Trust	Communication	Engagement	F-value, (*df*), *p*-value
	Mean±SD				Mean±SD				Mean±SD			
Social group												
General	34.55±4.47	30.60±4.14	20.29±3.74		32.47±4.53	29.12±4.43	20.23±4.25		33.83±4.72	28.72±3.89	24.00±3.85	
SC	30.16±4.47	28.72±3.46	17.88±3.37	2.245* (9,679), 0.010	28.72±6.40	24.94±5.40	17.44±3.29	2.616* (9,679), 0.001	32.50±5.31	25.27±2.84	25.27±2.84	2.267* (9,679), 0.006
ST	33.38±3.42	29.46±3.84	19.76±4.16		31.84±3.05	27.15±3.67	21.15±3.43		33.00±4.69	26.07±4.62	22.69±3.52	
OBC	35.28±4.00	31.08±4.24	20.50±3.56		33.71±4.62	28.97±3.89	19.95±3.59		35.30±6.35	29.36±4.08	24.91±3.78	
Residential status												
Personal	34.28±4.48	30.16±4.00	20.20±3.73	2.691* (3,279), 0.012	32.53±4.74	28.80±4.54	20.12±4.08	0.212 (3,279), 0.828	34.07±5.20	28.51±4.04	24.16±3.63	1.022 (3,279), 0.421
Rent	34.58±4.52	31.87±4.33	20.00±3.81		31.95±4.64	28.61±4.31	19.84±4.27		33.46±4.46	28.42±3.94	23.53±4.37	
House type												
Pakka	34.00±4.42	30.45±4.12	19.89±3.79	4.763* (3,279), 0.005	32.41±4.27	28.63±4.33	19.86±4.07	2.852* (3,279), 0.006	33.80±4.59	28.30±3.94	23.91±3.57	0.831 (3,279), 0.336
Semi pakka	35.94±4.45	30.79±4.14	21.35±3.29		32.42±6.43	29.33±5.17	21.00±4.25		34.61±6.80	29.37±4.23	24.57±4.72	
Has sibling(s)												
Yes	34.03±4.65	29.92±4.53	19.84±3.60	1.850 (3,279), 0.603	32.06±5.10	26.96±3.66	19.14±3.75	2.882* (3,279), 0.002	33.88±3.16	28.01±4.08	23.20±3.52	2.242 (3,279), 0.085
No	34.43±4.44	30.67±4.00	20.24±3.78		32.50±4.62	29.24±4.57	20.31±4.18		33.96±4.74	28.62±3.99	24.4±3.85	
Guardian												
Father	34.31±4.46	30.47±4.03	20.23±3.65	0.781 (3,279), 0.232	32.58±4.41	28.87±4.33	20.15±4.07	1.757 (3,279), 0.082	33.91±4.99	28.51±3.91	23.96±3.72	1.101 (3,279), 0.347
Mother	35.00±4.95	31.46±5.64	18.80±5.64		29.06±8.29	26.73±6.68	18.33±4.80		34.60±6.33	28.26±5.81	25.20±5.15	
Occupation of guardian												
Business	33.95±4.88	30.60±4.32	19.93±3.22	1.910 (6,558), 0.071	32.91±4.53	29.75±3.85	20.11±3.87	0.945 (6,558), 0.258	33.91±3.57	28.44±3.97	23.97±3.46	0.120 (6,558), 0.990
Private Job	34.04±4.27	30.16±3.86	20.23±3.79		32.24±4.61	28.60±4.67	20.21±3.97		33.96±5.29	28.45±3.94	24.04±3.81	
Govt. Job	35.80±4.70	31.76±4.68	20.09±3.99		32.63±5.29	28.54±4.26	19.50±4.81		33.92±5.29	28.70±4.36	24.03±4.09	

Variables	Mother attachment			MANCOVA*	Father attachment			MANCOVA*	Peer attachment			MANCOVA*
	Trust	Communication	Engagement		Trust	Communication	Engagement		Trust	Communication	Engagement	
	Mean±SD			F-value, (*df*), *p*-value	Mean±SD			F-value, (*df*), *p*-value	Mean±SD			F-value, (*df*), *p*-value
Education of guardian												
Literate	37.66±9.45	32.66±3.21	18.66±5.77		32.00±14.42	27.33±10.50	17.66±2.51		33.00±11.13	24.00±6.24	20.33±6.50	
Up to H.S.	34.50±5.17	30.61±5.11	18.94±3.33	0.700 (6,558), 0.430	30.22±7.34	26.22±5.59	16.77±3.55	1.286 (6,558), 0.197	35.44±10.22	27.88±4.12	24.27±5.27	1.294 (6,558), 0.150
Above H.S.	30.34±4.38	30.49±4.07	20.25±3.74		32.55±4.34	28.94±4.30	20.30±4.07		33.86±4.48	28.58±3.97	24.05±3.66	
Use of transportation												
Walking	34.84±4.91	31.13±4.72	19.42±4.22		31.34±5.34	27.65±5.46	18.81±3.70		32.92±6.89	27.31±4.86	23.68±5.46	
Private/ Pool cars	31.82±2.47	28.21±2.79	20.00±1.53	2.136* (6,558), 0.021	29.60±4.06	25.91±2.19	18.34±2.51	2.621* (6,558), 0.003	31.95±3.33	26.17±2.20	23.21±2.64	1.996 (6,558), 0.068
Public transports	34.51±4.50	30.64±4.07	20.29±3.80		32.85±4.57	29.21±4.36	20.43±4.23		34.30±4.80	28.91±3.90	24.16±3.57	
Friends in locality												
Yes	34.51±4.47	30.57±4.11	20.28±3.75	1.775 (3,279), 0.430	32.49±4.80	28.94±4.50	20.34±4.11	0.826 (3,279), 0.059	33.95±5.17	28.71±4.03	24.07±3.76	1.642 (3,279), 0.058
No	32.56±4.30	30.00±4.24	19.03±3.55		31.66±3.89	27.13±4.06	17.60±3.37		33.90±3.94	26.56±3.34	23.63±4.17	
Earn money												
Yes	33.26±4.44	30.81±4.48	20.43±3.76	5.671* (3,279), 0.010	32.15±5.06	29.82±5.55	20.10±4.52	2.513 (3,279), 0.781	34.63±6.82	28.81±4.36	24.10±4.45	0.515 (3,279), 0.597
No	34.67±4.45	30.43±4.01	20.07±3.74		32.48±4.62	28.44±4.08	20.05±4.00		33.74±4.40	28.40±3.91	24.00±3.59	
Indoor games												
Yes	34.07±4.52	30.18±3.98	20.00±3.87	0.997 (3,279), 0.145	32.32±4.66	28.61±4.56	19.91±4.07	0.507 (3,279), 0.817	33.90±4.75	28.40±4.06	24.09±3.70	0.763 (3,279), 0.545
No	35.02±4.34	31.33±4.38	20.55±3.39		32.63±4.87	29.13±4.31	20.43±4.24		34.04±5.76	28.73±3.91	23.86±4.06	
Outdoor games												
Yes	3.453±4.28	30.73±4.09	20.47±3.90	1.896 (3,279), 0.059	32.75±4.59	29.37±4.27	20.76±3.98	6.959* (3,279), 0.001	34.25±5.02	29.07±3.75	24.30±3.63	4.416* (3,279), 0.001
No	33.62±5.15	29.67±4.17	18.96±2.79		31.11±4.99	26.40±4.58	17.38±3.51		32.77±5.06	26.29±4.26	22.96±4.25	
Gaming status												
Gamer	32.31±4.69	28.88±3.99	17.76±3.04	94.927* (3,295), 0.001	30.53±4.84	25.99±3.84	17.17±3.12	142.619* (3,295), 0.001	32.26±4.52	26.40±3.54	22.70±3.67	40.243* (3,295), 0.001
Non-gamer	36.38±3.16	32.15±3.57	22.55±2.71		34.29±3.76	31.53±3.20	22.96±2.73		35.62±5.02	30.60±3.30	25.35±3.47	

*Trust, communication and engagement considered jointly for MANCOVA & controlled for Age.

Table 5. Gaming experience and addiction traits as potential predictors of psychological health and inter-personal relationship of the gamers

Variable	Psychological health			Mother attachment			Father attachment			Peer attachment		
	Depression	Anxiety	Stress	Trust	Communication	Engagement	Trust	Communication	Engagement	Trust	Communication	Engagement
	Standardized β value			Standardized β value			Standardized β value			Standardized β value		
Duration of gaming	0.94	−0.06	0.16	0.59	0.15	−0.32	0.08	−0.42	−0.26	−0.88	−0.285	−0.18
Gaming experience												
Competence	1.14	0.97	2.28	1.13	2.00	1.09	0.95	1.84	0.25	−0.22	0.27	−1.48
Sensory and Imaginative immersion	1.33	1.07	0.07	1.05	1.06	1.52*	0.26	−0.82	−0.41	2.35*	1.18	2.25 *
Flow	−0.76	−0.74	−0.04	−2.06*	−1.47	0.38	−0.67	−0.24	0.17	0.13	0.14	1.07
Tension and annoyance	3.43*	2.22	2.87*	1.05	0.40	0.81	1.59	0.28	0.95	−0.45	0.45	0.01
Challenge	1.21	0.89	1.38	0.08	−0.32	0.32	−0.53	−0.36	0.84	1.98*	−0.53	−0.54
Negative effect	0.89	1.01	1.10	0.82	0.12	0.70	0.34	−0.32	0.44	−0.02	0.07	−0.14
Positive effect	−4.20*	−0.90	−2.21*	0.86	1.23	−1.72*	1.40	1.60*	−0.10	2.06*	1.04	1.39*
Gaming addiction												
Disengagement	0.92	−0.13	1.78*	−1.71	−1.53	0.56	−3.90*	−2.44*	−0.24	−1.62*	−1.42*	−1.00
Lack of control	2.85	2.05	3.17*	−0.81	−0.01	−0.84	0.12	1.38	1.40*	1.13	0.93	0.41
Excessive use	0.55	−1.29	−1.62*	0.31	0.30	−1.42*	−0.78	−0.30	−0.66	−1.38*	0.16	−0.51
Obsession	1.15	3.71*	1.09	−0.58	−0.63	0.45	0.71	0.83	0.85*	0.08	−0.36	0.59
Distress	−1.26	2.17	2.18*	−1.21	−0.10	−0.32	2.47	1.45*	1.63*	0.95	0.60	0.75
Escapism	−0.49	0.41	−0.17	−0.07	−0.15	−0.29	0.25	0.14	0.16	0.54	0.50	0.52
Overenthusiasm and impulsive use	1.15	−3.34*	−2.60*	2.87*	1.35	1.61*	1.04	−0.50	−1.38*	−1.34	0.13	−0.86

*Significant at 0.05 level.

$p = 0.006$), playing outdoor games (F (3,279) = 4.416; $p = 0.001$) and between gamers and non-gamers (F (3,295) = 40.243; $p = 0.001$) when considered jointly on the variables of peer attachment.

Lastly, Table 5 shows the effect of gaming experience and addiction traits on various of psychological health traits and inter-personal relationship traits of the study participant with father, mother and peers.

The table demonstrates that several gaming experiences such as tension and annoyance and positive effect, while playing game were significant predictors of depression and stress level of the gamers. However, none of the gaming experience traits significantly predicted anxiety level in the gamers. Attachment with mother was significantly predicted by flow towards the game (on trust towards mother), by sensory and imaginative immersion and positive effect (on engagement with mother). Again, attachment with father was significantly predicted by positive effect of gaming (on communication with father). Attachment with peers was significantly predicted by sensory and imaginative immersion (on trust and engagement), by challenge in game (on trust), by positive effect (on trust and engagement).

Level of anxiety was significantly predicted by gaming addiction traits such as obsession and overenthusiasm and impulsive use of gaming. Again, stress level of gamers was significantly predicted by several traits such as disengagement, lack of control, excessive use, distress, over enthusiasm and impulsive use. Attachment with mother was significantly predicted by disengagement (on engagement with mother) and by excessive use and over enthusiasm and impulsive use (on communication with mother). Again, attachment with father was significantly predicted by disengagement (on trust and communication with father), by lack of control and by obsession (on engagement with father), by distress (on communication and engagement with father) and by over enthusiasm and impulsive use of game (on engagement). Lastly, traits such as disengagement significantly predicted trust and communication with peers and excessive use significantly predicted trust towards peers.

Discussion

The present study made an attempt to explore the effects of MMORPG gaming experience and addiction on the psychological health and inter-personal relationships of male adolescents and young adults living in West Bengal, India. The statistical analyses, performed in the study, revealed psychological health and inter-personal relationship disparities between gamers and non-gamers, as well as potential gaming experience and gaming addiction traits as factors of depression, anxiety, stress and parent-peer attachments.

Furthermore, the study revealed that both gamers and non-gamers belonged to similar socio-economic clusters. Male adolescents and young adults, under study, showed significant psychological health disparities in terms of depression, stress and anxiety across social groups, and across groups having different transportation use. The study also identified that attachment with parents differed across social groups, residential status, earning status and across groups having different transportation use. However, attachment with peers differed only across social groups. Due to the novel-

ty of these findings they are not found in existing literature. Additionally, non-gamers were highly engaged in indoor and outdoor activities (playing games), mostly had friends in their locality and often went to the institute with friends while gamers had less involvement with people in their social environment. This finding validates the results of current studies, conducted in China (Dredge and Chen 2020) and Yilmaz and colleagues (2018). However, Chai et al. (2011) argued that playing games did not lead gamers to any conflicts with parents.

Previously, Cole and Griffith (2007) suggested that gamers, in the long term, develop a sense of competence and immerse themselves in the game where they can freely express themselves, and enjoy the virtual environment and feel positive. However, our study explored the gaming experience of gamers more specifically. It was observed that there psychological health disparities were present between gamers and non-gamers in terms of depression, anxiety and stress. Also, gamers showed an increased sense of competence and completely immersed themselves in online games and felt more positive. This finding was in line with a study by Chumbley and Griffiths (2006). Another notable finding was that gamers who had more tension and annoyance and less positivity were also more depressed and stressed. This finding may have been due to their inability from enjoying playing MMORPG games. Previously, Mentzoni et al. (2011) also showed that problematic gaming experiences increase depression and anxiety levels in gamers. Gamers were highly focused on task engagement during games, had a distorted perception of time, made a balance between their skills within game demands and had immediate and unambiguous reactions.

Problematic gaming experiences of gamers also resulted in poor inter-personal relationships with parents and peers. The more a gamer was immersed in online MMORPG gaming and felt a sense of positivity, the less he trusted and engaged with his mother. This finding corroborates with Griffiths et al. (2004), Lo et al. (2005) Gentile et al. (2011) who also proposed that higher engagement in gaming resulted into low social interaction and reduced interpersonal relationships with parents and friends. However, these problematic behaviours did not result in poor relationships with their father and peers. Griffiths and Dancaster (1995), postulated that problematic gaming experiences not only affects inter-personal relationships but also acts as an arousal for playing more and hence, contributes to develop gaming addiction.

Currently, more individuals are becoming attracted to MMORPG games due to their leisure time, detachment from constructive works, peer pressure, and absence of proper counselling (D'Souza et al. 2019). This statement proposes that gamers are inclined to develop gaming addiction as long as they spend longer time in playing online games (Ge et al. 2014), or use it as a mean of escape (Kwon et al. 2011), which often leads to adverse psychological health (Van Rooij 2011; Brunborg et al. 2014; Hyun et al. 2015; Loton et al. 2016; Pontes et al. 2017). Our study indicated that gamers manifested several addictive behaviours such as disengagement from social interaction, excessive use and extreme lack of control over playing online games. They were also mildly obsessed towards MMORPG games. These findings concur with the study of Chappell et al. (2006).

Interestingly, our study also discovered that some of the significant poten-

tial factors behind increased stress and anxiety levels of the gamers were their extreme disengagement from surroundings, lack of control over gameplay and increased obsession. There was no effect of addictive behaviours of gamers on their depression level. However, earlier studies showed that playing online games reduced depression level in gamers (Lemola et al. 2011, Carras et al. 2017).

The inter-personal relationships of gamers with parents and peers were also affected by a few gaming related addictive behaviours. The more a gamer was disengaged with surroundings or excessively played online MMORPG games, the less they trusted and communicated with their parents and peers. The findings corroborated with a number of studies which proposed that gaming related addictive behaviours such as excessive use (Bargeron and Hormes 2017) leads to lower interpersonal relationship with parents and peers (Kwon et al. 2009; Zhu et al. 2015; Pontes et al. 2017) and reduce engagement with people (Braun et al. 2016; Carras et al. 2017).

In spite of a number of notable findings, our study is cautious in drawing any conclusions due to some limitations. Firstly, while the sample size may have been sufficient for this small-scale study, a larger sample could reveal other findings. Secondly, acquisition of additional data (other forms of addictions, physical activity and diet) and inclusion of females might further contribute to the study findings. Lastly, the cross-sectional nature of the present study is another shortcoming of this small-scale study. Researchers, in the future, should take a longitudinal approach in order to gain an in-depth knowledge on the issue.

In sum, this study highlighted that male gamers and non-gamers had both disparities and moderate differences in terms of inter-personal relationships. Next, the study significantly showed that gamers are becoming more alienated from society and are at risk in having adverse psychological health status. Therefore, it is imperative that proper education and counselling regarding games, their beneficial and detrimental aspects , are given a social platform in order to address psycho-social health of adolescents and young adults in India.

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The Authors' contribution

Both SB and SM initiated the concept and design of the study. SM solely collected the data. AM prepared the manuscript, analysed and interpreted the data. All the authors went through the manuscript prior to the proceeding for publication.

Conflict of interest

The authors declare that there is no conflict of interest.

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