

Relationship of Internet gaming disorder with psychopathology and social adaptation in Italian young adults

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Abstract

Background: When the Internet becomes the only interest in an individual's life and everything else is emptied of importance, the isolation in which the subject closes again produces consequences not only from a psychological but also physical and social point of view. The purpose of this study was: a) to investigate the prevalence of internet gaming disorder (IGD) among Italian young adults, b) to explore the associations between the former and psychopathological symptoms, and c) to explore its consequences in social functioning.

Methods: The sample included 566 young adults, 324 males and 242 females, aged between 18 and 35 years ($M = 22.74$; $SD = 4.83$). They were asked to state their favourite games choice and were administered a demographic questionnaire, the APA symptom checklist based on the diagnostic criteria of IGD in the DSM-5, the Internet Gaming Disorder Scale Short Form (IGD9-SF), the Symptom Checklist-90 Revised (SCL-90 R) and the Social Adaptation Self Evaluation Scale (SASS).

Results: The different game types used are distributed as follows: MMORPG (35.7%), flash games (20.3%), multiplayer games (27%), online gambling (9.9%), other games (6.5%). The results of the study showed high use of videogames (95% of the sample), but low incidence of Internet Gaming Disorder in young adults. Thirty subjects (20 male and 10 female) on 566 (5.3% of the sample) matched five or more criteria for clinical diagnosis of IGD. The data showed a positive correlation between use of online games (total score IGD9-SF), the higher the levels of depression ($r = .501$), anxiety ($r = .361$) and psychoticism ($r = .431$) and the lower the family and extra-family relationships ($r = -.383$). The linear regression analysis showed that somatization ($p = .002$), depression ($p = .000$) and sleep disturbances ($p = .003$) are predictive variables of internet gaming disorder.

Conclusions: This study highlights the need to make a diagnosis of "online gaming addiction" as "independent disorder" to be included in future categorizations according to DSM-5, compared to other addictive behaviors.

Background

Internet addiction is currently considered a worldwide problem and in particular addiction to video games is an area that has attracted particular interest in recent years (1,2). According to recent international literature, online gambling addiction could be considered a subtype of videogame addiction that do not use an Internet connection, as traditional and/or offline games. The use of the connection to a network in online videogames creates a different way of relating with other users both on the social dimension and on the perception of the role (3,4). When the Internet becomes the only interest in an individual's life and everything else is emptied of importance, the isolation in which the subject closes again produces consequences not only from a psychological but also physical and social point of view (5).

Among the different types of online videogames, MMO's (Massive Multiplayer Online Game) seem to be increasingly successful, among the most popular, there are MMORPG's (Massive Multiplayer Online Role

Play Game), flash games and gambling online. MMORPG is an online role-playing game, mainly focused on fantasy narratives or conflict scenarios. It involves creating a digital avatar, defining its identity and appearance and creating virtual worlds where players interact with each other (6–8).

Flash games are played directly from the browser without the need to download additional programs.

Online gambling games are digital transpositions of traditional gambling; their novelty derives from the monetary dimension linked to games, intertwined with risk and the prediction of uncertain results (9).

The recognition of the use of online games as pathological risk behavior is still controversial. The Internet Gaming Disorder (IGD) is not yet classified, by recent psychiatric nosography (DSM-5), as a formal disorder, but requires further research and clinical investigation. The DSM-5 in presenting the Online Gaming Disorder noted that there are no well-studied subtypes for this disorder which very often involves both the use of specific online games and other forms of offline computerized gaming. DSM-5 proposes nine diagnostic criteria for the diagnosis of IGD (10).

Lee and collaborators proposed a classification of types of players with IGD: impulsive/aggressive players, emotionally vulnerable players and socially conditioned players.

Impulsive/aggressive players, typically teenagers, use the game to release their aggressive impulses. They have poor executive control, attention deficit, high impulsivity, tendency to boredom, high search for sensations and fluctuating mood. This type of user prefers to play with MOBA (Multiplayer Online Battle Arena) or First-Person Shooters. Emotionally vulnerable players, usually women, have low self-esteem, poor satisfaction in daily life, mood disorders in comorbidity, nervousness, social avoidance, somatization and feelings of inadequacy. Their favorite games are action videogames that induce a high level of involvement and allow them to escape from the stress of everyday reality and to change their negative emotional states.

Finally, socially conditioned players are those who usually play online to meet new people and to socialize. They tend to be sad, peaceful and have few social relationships in daily life. Two further subtypes have been identified of this type of users: the covert subtype, which suffers from social phobia, considers virtual reality as a safe place and uses it as a form of medication, and the overt subtype, with narcissistic personality, who prefers to play MMORPGs and then use the network to reinforce your hypertrophic self. (11).

Various authors suggest the involvement of the brain dopaminergic (DA) reward system in the neurobiology of IGD. This alteration of the dopaminergic circuit would also be responsible for the biological mechanisms underlying GAP and substance dependencies (12–16). Regarding comorbidity with mental disorders, the literature has highlighted an association between online games addiction and anxiety disorders, sleep disturbances, impulse control disorders, dissociative symptoms and other forms of addiction or personality disorders (17–25).

Based on these theoretical premises the aim of the research was to verify the relationship between the use of online games, any psychopathology and alterations in social functioning in a sample of young Italian adults.

Material And Methods

Study Sample

The sample consisted of 566 volunteer participants (324 males and 242 females) aged between 18 and 35 years ($M = 22.74$; $SD = 4.83$) with the following level of education: 34.3% middle school, 51.6% high school diploma and 14.1% degree; and the following employment: 50.5% students, 26.7% employees, 6.5% self-employed, 15.2% unemployed, 1.1% housewives. The sample was enrolled in non-working contexts (pubs, sports associations, recreational places). All participants completed informed consent before being included in the study.

Measures and procedure

The protocol used consisted of a questionnaire comprising a demographic section, a list of questions about game preferences, the Internet Gaming Disorder Scale Short Form (IGD9-SF), a diagnostic interview targeting IGD as of the DSM-5 criteria, the Symptom Checklist-90 Revised (SCL-90 R), and the Social Adaptation Self evaluation Scale (SASS).

The Internet Gaming Disorder Scale Short Form (IGD9-SF) (26) is a tool developed by Orsolya Kiraly and Zsolt Demetrovics, of the Institute of Psychology Eotvos Lorand University and Halley M. Pontes and Mark D. Griffiths, of the University of Nottingham which measures the severity of online gambling disorder according to the nine basic criteria identified by DSM-5 (10). The answers to the IGD9-SF questions are structured on a five-point Likert scale: 1 "never", 2 "rarely", 3 "sometimes", 4 "often", 5 "very often". The score ranges from 9 to 45, with higher scores indicating higher levels of disturbance in the game behavior. In addition, the scale allows you to define "disturbed players", who fall within the range of 36 to 45 points, and "non-disturbed players", who fall within the remaining score range, from 9 to 35 (27).

We assessed the reliability of the instrument using Cronbach's alpha ($\alpha = 0.921$).

We administered an interview following the APA symptoms of the nine IGD criteria in the "yes / no" response format to diagnose the presence of IGD. The disorder was diagnosed when more than 5 out of 9 symptoms are self-reported, in line with DSM-5. (23,27). The Symptom Checklist-90 Revised (SCL-90 R) questionnaire (28), is a self-report tool designed to evaluate any psychopathology. The scale evaluates 10 dimensions: depression (DEP), somatization (SOM), anxiety (ANX), hostility (HOS), obsessive-compulsiveness (OBS), interpersonal sensitivity (INT), phobic anxiety (PHOB), paranoid ideation (PAR), sleep disorders (SLEEP) e psychoticism (PSY). We evaluated the reliability of the instrument using Cronbach's alpha ($\alpha = 0.975$).

The Social Adaptation Self evaluation Scale (SASS) (29) is a psychometric tool made up of 20 multiple choice questions that assesses social adaptation in relation to the following areas: Job and spare time (JT); Family and External relationship (FE); Intellectual interest (II); Social compliance (SC); Control of surroundings (CS). The score, obtained from the sum of the individual scores, provides a social adjustment index (SAI), the higher the score obtained, the better the adaptation. The range of normal social adaptation ranges from 35 to 52. We assessed the reliability of the instrument using Cronbach's alpha ($\alpha = 0.752$).

Statistical analyses

We performed a series of statistical analyzes on the data, in particular the t test on the group differentials, the correlation of the factors and the linear regression and the reliability of the instruments was assessed with Cronbach's alpha. We employed SPSS 24 in this study.

Results

The descriptive analysis showed that 95% of the sample claims to be a player and to use more than one game. The different game types used are distributed as follows: MMORPG (35.7%), flash games (20.3%), multiplayer games (27%), online gambling (9.9%), other games (6.5%).

Regards gender differences in the use of online games, the following data emerged: the use of MMORPGs is almost equal between males (36.11%) and females (35.12%); flash games are preferred by the female gender (34.30%) compared to the male gender (9.88%), as well as the online gambling preferred in the male gender (12.65%) compared to the female gender (6.20%); the use of multiplayer is also higher in males (32.41%) than in women (19.83%).

Our sample presented a score of 11,918 in the IGDS9-SF test, suggesting the presence of low IDG risks. The total scores in the IGD9-SF (compared with the normative cut-offs previously described in the Instrument section) showed relevant gender differences towards gaming, as shown in Table 1. Specifically, the item 1 ($p = 0.005$), 2 ($p = 0.021$), 6 ($p = 0.001$) and 9 ($p = 0.029$) are more represented in the male gender.

Table 1

Comparison of male and female subsamples on Internet Gaming Disorder (IGD9-SF test)

IGD9-SF	male		female		p	t
	M	DS	M	DS		
1. Do you feel preoccupied with your gaming behavior?	1.373	1.183	0.661	1.031	0.006	7.483
2. Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity?	1.333	1.096	0.694	0.984	0.025	7.167
3. Do you feel the need to spend increasing amount of time engaged gaming in order to achieve satisfaction or pleasure?	1.441	1.146	0.868	1.145	0.368	5.895
4. Do you systematically fail when trying to control or cease your gaming activity?	1.173	1.017	0.591	0.894	0.257	7.087
5. Have you lost interests in previous hobbies and other entertainment activities as result of your engagement with the game?	1.219	1.15	0.628	1.056	0.106	6.262
6. Have you continued your gaming activity despite knowing it was causing problems between you and other people?	1.244	1.224	0.541	1.01	0.002	7.269
7. Have you deceived any of your family members, therapists or others because the amount of your gaming activity?	0.972	0.987	0.467	0.916	0.991	6.212
8. Do you play in order to temporarily escape or relieve a negative mood?	1.802	1.409	1.227	1.352	0.289	4.888
9. Have you jeopardised or lost an important relationship, job or an educational or career opportunity because of your gaming activity?	0.873	0.893	0.351	0.715	0.03	7.479
Total Score	12.81	6.879	10.71	8.224	0.04	3.3
IGD9-SF, internet gaming disorder scale short form; t, t test statistic; p, probability value; M, mean; SD, standard deviation						

Concerning the results obtained in SCL-90R the descriptive analysis of our sample showed a significant presence ($p < .05$) in woman of somatization ($p = 0.019$), interpersonal sensitivity ($p = 0.000$), anxiety ($p = 0.001$), phobic anxiety ($p = 0.004$) and paranoid ideation ($p = 0.000$), as shown in Table 2.

Table 2

Comparison of male and female subsamples on psychopathological conditions (SCL-90R)

	maschio		femmina		p	t
	M	DS	M	DS		
SOM	6.609907	6.622203	8.824268	7.471689	0.019722	-3.70971
OC	8.414861	7.458042	9.715481	7.76781	0.265544	-2.00803
INT	6.204334	6.061413	7.974895	7.338699	0.000295	-3.12783
DEP	9.386997	8.906454	11.07113	9.761395	0.124751	-2.1271
ANX	5.702786	5.970286	7.263598	7.053932	0.001079	-2.83474
HOS	4.408669	4.588013	4.736402	4.755533	0.350586	-0.82427
PHOB	1.829721	2.791755	2.401674	3.33522	0.004985	-2.20894
PAR	4.987616	4.496358	5.753138	5.030343	0.002388	-1.89656
PSY	4.925697	5.720242	5.761506	6.305062	0.073499	-1.63925
SLEEP	2.668731	2.847879	2.924686	2.997649	0.875537	-1.02999
t, t test statistic; p, probability value; M, mean; SD, standard deviation; DEP, depression; SOM, somatization; ANX, anxiety; HOS, hostility; OBS, obsessive-compulsiveness; INT, interpersonal sensitivity; PHOB, phobic anxiety; PAR, paranoid ideation; SLEEP, sleep disorders; PSY, psychoticism.						

Table 3 and Table 4 reported the Pearson correlations between the SCL-90R variables, SASS subscales scores and IGD9-SF test. Specifically, worry for gaming behavior (item 1 IGD-9SF), loss of interest in other activities (item 5 IGD-9SF) and loss of significant relationships (item 9 IGD-9SF) are related to the increased levels of depression (item 1 / $r = .213$; item5 / $r = .272$; item9 / $r = .249$), anxiety (item5 / $r = .230$), obsessiveness (item5 / $r = .256$), decrease in family and extra-family relationships (item 1 / $r = -.248$; item5 / $r = -.246$) and poor social adaptation (item1 / $r = -.223$; item5 / $r = -.202$; item9 / $r = -.253$). Furthermore, the continuous use of online games (total score IGD-9SF) correlates significantly with sleep disturbances ($r = .249$) and moderate difficulties in social adaptation ($r = -.355$).

Table 3
Correlations (Pearson r) between SCL-90R scores and IGD9-SF scores

IGD9-SF	SOM	OC	INT	DEP	ANX	HOS	PHOB	PAR	PSY	SLEEP
Item 1	.111**	.181**	.169**	.213**	.133**	.115**	.168**	.141**	.135**	.174**
Item 2	.127**	.154**	.141**	.190**	.157**	.137**	.146**	.126**	.118**	.149**
Item 3	.078	.123**	.058	.138**	.135**	.080	.108**	.081	.063	.112**
Item 4	.105*	.170**	.081	.149**	.155**	.110**	.120**	.089*	.087*	.103*
Item 5	.182**	.256**	.203**	.272**	.230**	.174**	.204**	.175**	.186**	.170**
Item 6	.046	.119**	.113**	.156**	.113**	.061	.134**	.088*	.108**	.102*
Item 7	.083*	.138**	.080	.146**	.129**	.100*	.111**	.068	.080	.137**
Item 8	.050	.165**	.120**	.210**	.124**	.110**	.104*	.163**	.125**	.146**
Item 9	.126**	.203**	.184**	.249**	.203**	.126**	.147**	.126**	.174**	.146**
Total score	.123**	.261**	.230**	.313**	.228**	.214**	.233**	.199**	.248**	.249**

*, p < .05; **, p < .001; IGD9-SF, internet gaming disorder scale short form; t, t test statistic; p, probability value; M, mean; SD, standard deviation; DEP, depression; SOM, somatization; ANX, anxiety; HOS, hostility; OBS, obsessive-compulsiveness; INT, interpersonal sensitivity; PHOB, phobic anxiety; PAR, paranoid ideation; SLEEP, sleep disorders; PSY, psychoticism.

Table 4
Correlations (Pearson r) between SASS scores and IGD9-SF scores

IGD9-SF	JT	FE	II	SC	CS	SAI
Item 1	-.053	-.248**	-.051	-.199**	-.094*	-.223**
Item 2	-.028	-.205**	.032	-.134**	-.089*	-.160**
Item 3	.009	-.197**	.020	-.100*	-.087*	-.136**
Item 4	-.052	-.220**	-.026	-.148**	-.090*	-.192**
Item 5	-.083*	-.246**	-.019	-.141**	-.081	-.202**
Item 6	.037	-.179**	.006	-.108*	-.035	-.117**
Item 7	-.031	-.223**	-.011	-.084*	-.083*	-.163**
Item 8	.016	-.189**	-.038	-.140**	-.101*	-.153**
Item 9	-.072	-.297**	-.051	-.170**	-.119**	-.253**
Total score	-.064	-.425**	-.090*	-.280**	-.119**	-.355**

*, $p < .05$; **, $p < .001$; IGD9-SF, internet gaming disorder scale short form; t, t test statistic; p, probability value; M, mean; SD, standard deviation; JT, Job and spare time; FE, Family and External relationship; II, Intellectual interest; SC, Social compliance; CS, Control of surroundings; SAI, Social adjustment index.

The APA symptoms checklist allowed the identification of 30 subjects at high risk of addiction (20 male) out 556 (1 out of 18 participants) reported at least 5 of the 9 IGD symptoms, corresponded to 5.3% of the whole sample.

Pearson's r correlations between IGD9-SF/SCL-90R and IGD9-SF/SASS in the 30 subjects at high risk of addiction are shown in Tables 5 and 6. In particular, it emerged that the greater the use of online games (total score IGD9-SF), the higher the levels of depression ($r = .501$), anxiety ($r = .361$) and psychoticism ($r = .431$) and the lower the family and extra-family relationships ($r = -.383$). Specifically, the loss of interest in other activities (item 5 IGD-9SF) is correlated with the increase in somatization levels ($r = .503$), obsessive symptoms ($r = .574$), depression ($r = .452$), anxiety ($r = .405$) and psychoticism ($r = .371$) and that the difficulty in reducing or stopping playing (item 2 IGD9-SF) is related to interpersonal difficulty ($r = .371$), paranoia ($r = .512$) and psychoticism ($r = .437$).

Table 5

Correlations (Pearson r) between SCL-90R scores and IGD9-SF scores in High risk sample

IGD9-SF	SOM	OC	INT	DEP	ANX	HOS	PHOB	PAR	PSY	SLEEP
Item 1	.259	.070	.318	.235	.056	.308	.023	.240	.133	.288
Item 2	.234	.196	.371*	.293	.261	.258	.204	.512**	.437*	-.066
Item 3	-.031	-.092	-.094	.047	.178	.041	-.123	-.073	-.128	.149
Item 4	.202	.134	-.004	-.013	.187	-.014	-.108	.063	.020	-.098
Item 5	.503**	.574**	.318	.452*	.405*	.224	.139	.203	.371*	.154
Item 6	.156	.207	.219	.362*	.116	.057	.015	.214	.236	-.016
Item 7	.241	.182	.142	.226	.372*	.288	.249	.178	.166	.286
Item 8	-.095	.062	.030	.262	-.006	-.003	.180	.115	.077	.127
Item 9	.267	.214	.374*	.327	.200	-.022	.056	.165	.276	.053
Total Score	.341	.299	.339	.501**	.361*	.235	.188	.330	.431*	.175
<p>*, p < .05; **, p < .001; IGD9-SF, internet gaming disorder scale short form; t, t test statistic; p, probability value; M, mean; SD, standard deviation; DEP, depression; SOM, somatization; ANX, anxiety; HOS, hostility; OBS, obsessive-compulsiveness; INT, interpersonal sensitivity; PHOB, phobic anxiety; PAR, paranoid ideation; SLEEP, sleep disorders; PSY, psychoticism.</p>										

Table 6

Correlations (Pearson r) between SASS scores and IGD9-SF scores in high risk sample

IGD9-SF	JT	FE	II	SC	CS	SAI
Item 1	.328	-.402*	.070	-.367*	.022	-.262
Item 2	-.181	-.142	-.036	-.219	.070	-.191
Item 3	.146	-.042	.058	-.075	-.235	-.021
Item 4	-.165	-.259	.081	-.076	-.316	-.283
Item 5	-.087	-.177	.142	.089	-.057	-.077
Item 6	.016	-.153	.206	-.101	.199	-.018
Item 7	-.217	-.192	.138	.142	-.312	-.186
Item 8	-.099	-.110	-.317	-.352	-.321	-.339
Item 9	-.203	-.214	-.056	.059	.193	-.176
Total score	-.067	-.383*	-.016	-.087	-.159	-.318
<p>*, $p < .05$; **, $p < .001$; IGD9-SF, internet gaming disorder scale short form; t, t test statistic; p, probability value; M, mean; SD, standard deviation; JT, Job and spare time; FE, Family and External relationship; II, Intellectual interest; SC, Social compliance; CS, Control of surroundings; SAI, Social adjustment index.</p>						
<p>The linear regression analysis conducted in the total sample between the variables of the IGD9-SF and the SCL-90R showed that somatization ($p = .002$), depression ($p = .000$) and sleep disturbances ($p = .003$) are predictive variables of the online game, as shown in Table 7.</p>						

Table 7

Linear Model of Predictors SCL-90R variable of IGD-9SF total score with 95% Bias Corrected and Accelerate Confidence Intervals

	Unstandardized coefficients		Standardized coefficients	t	p	BCa 95% Confidence Interval	
	B	Std. Error	Beta			Lower	Upper
Constant	9.629	.501		19.235	.000	8.646	10.613
OC	.087	.076	.088	1.147	.252	-.062	.235
SOM	-.203	.066	-.191	-3.092	.002	-.332	-.074
INT	-.163	.101	-.145	-1.612	.107	-.361	.036
DEP	.310	.076	.384	4.079	.000	.161	.459
ANX	-.037	.100	-.032	-.376	.707	-.233	.158
HOS	.121	.099	.075	1.227	.220	-.073	.316
PHOB	.229	.141	.093	1.626	.105	-.048	.505
PAR	-.202	.116	-.128	-1.752	.080	-.429	.025
PSY	.069	.093	.055	.741	.459	-.113	.251
SLEEP	.375	.127	.145	2.951	.003	.125	.625

Dependent variable: IGD-9SF total score; DEP, depression; SOM, somatization; ANX, anxiety; HOS, hostility; OBS, obsessive-compulsiveness; INT, interpersonal sensitivity; PHOB, phobic anxiety; PAR, paranoid ideation; SLEEP, sleep disorders; PSY, psychoticism.

Discussion & Conclusion

Griffiths and other authors have argued that videogame addiction "really exists" and affects some players (30). Our study showed that 95% of the total sample is a user of online games and that 5.3% (1 out of 18 participants) can be defined as at high risk of addiction, according to the recent psychiatric nosography (DSM-5). Compared to gender differences, the use of flash games is preferred by the female gender (34.30%), while online gambling by the male gender (12.65%) according to the international literature (31,32). Various studies tend to emphasize that videogames are used to contrast various difficulties in a person's life. In fact, playing MMORPG games requires a high degree of commitment and investment of time at the expense of professional, social and other activities and relationships. The basic difficulties of these players are "relational", related to the lack of self-esteem, and connected to the inability to implement adequate coping strategies where necessary (33). Regarding the association between online game addiction and some mental disorders, our study has shown that the constant use of online games leads to high levels of depressive symptoms, obsessiveness, anxiety and sleep disturbances with a

decrease in significant relationships (family and extrafamily) and loss of interest in other activities, as suggested by recent literature (34-37).

Some studies have also shown that individuals characterized by a propensity to act impulsively use the game as an escape from reality to get away from painful emotions that derive from distorted beliefs relating to self, others and the surrounding world (38,39). In our study it emerged that somatization, depression and sleep disturbances are predictive in online gambling addiction behaviors, according to some literature data (33, 40,41).

In conclusion, the study of online gambling disorder is fundamental for public health. Future researches are needed for the implementation of measures that allow to deepen different types of online games with specific risk behaviors. Furthermore, it appears necessary to make a diagnosis of "online gaming addiction" as "independent disorder" to be included in future categorizations according to DSM-5, compared to other addictive behaviors.

Declarations

Ethics approval and consent to participate

All participants to the study gave granted informed consent. This study was approved by ethic committee of Department of Education Science, University of Catania.

Consent for publication

The material was collected anonymously after obtaining the consent of the participants. **Availability of data and materials section of manuscript**

The dataset used in this study is published together with this article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

CDP conceived the study, participated in its design and coordination, helped to draft the manuscript and performed the statistical analysis of the study.

FS participated in the design of the study, administered the questionnaires, helped to draft the manuscript, and performed the statistical analysis of the study.

CD participated in the design of the study, administered the questionnaires and helped to draft the manuscript.

ZH participated in the design of the study, performed the statistical analysis of the study and helped to draft the manuscript.

SD participated in the design of the study and helped to draft the manuscript.

All authors read and approved the final manuscript.

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