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Articles

Prevalence and Risk Factors for Internet Gaming Disorder (IGD) in a sample of 5,979 Italian Online Gamers

Laura Ferraro [1], Chiara Avanzato [1], Giuseppe Maniaci [1], Crocettarachele Sartorio [1], Marco Daino [1], Fabio Seminerio [1], Giada Tripoli [1], Diego Quattrone [2], Rosa Lo Baido [1], Daniele La Barbera [1], Caterina La Cascia [1]*

Abstract

Background: The prevalence of Internet Gaming Disorder (IGD) in the Italian population of gamers is unknown. Several risk factors, including time spent playing (TSP), are proposed as an epiphenomenon of emotional dysregulation.
Methods: The study estimated the prevalence of IGD in at-risk Italian online gamers, and the interplay between alexithymia and other risk factors.
5,979 responders were surveyed. IGDS-SF9 estimated pathological gaming. TAS-20 measured Difficult in Identifying (DIF) and Describing Feelings (DDF), and Externally Oriented Thinking (EOT).
Results: 43% of participants had pathological IGD scores. Male gender (OR=1.2, 95% C.I.=1, 1.5, p=0.019), TSP (OR=7.6, 95% C.I.=5.5, 10.6, p<0.001), DIF (OR=1.5, 95% C.I.=1.1, 2.1, p=0.003), boredom/loneliness feelings (OR=1.8, 95% C.I.=1.5, 2, p<0.001), recent negative events (OR=1.1, 95% C.I.=1, 1.3, p=0.026), and a behavioral addiction (OR=2.1, 95% C.I.=1.2, 3.9, p=0.009) independently increased its risk.
Conclusions: Almost one on two players joining online communities presented IGD. Some risk factors were crucial, including TSP, independently from emotional dysregulation.

[1] University of Palermo, Psychiatry section, Biomedicine, Neuroscience and advanced Diagnostic (BiND), Palermo, Italy

[2] King's College London, Social, Genetic, and Developmental Psychiatry Centre Institute of Psychiatry, Psychology, and Neuroscience, London, United Kingdom

E-mail corresponding author: laura.ferraro@unipa.it

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1. Introduction

The American Psychiatric Association introduced Internet Gaming Disorder (IGD) in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013), as a new condition worthy of research, characterized by persistent and recurrent participation in online gaming, often with other players, with clinical impairment or distress and symptoms typical of addiction.

At the moment, the only addiction officially included in DSM-5 is pathological gambling; other proposed categories like sex, shopping, and sport-addiction are not considered. It is added at the end of the chapter dedicated to substance-related disorders, justified by its similarity to them in clinical expression, physiology, and treatment needed. Initially, academics were searching a consensus to define pathological video-gaming by withdrawal, loss of control, and conflict with others significant (King et al., 2018). Nonetheless, the available evidence of an IGD withdrawal syndrome, which is central in the definition of dependence, is very underdeveloped (Kaptsis et al., 2016).

Some studies had proposed common characteristics between pathological gambling and IGD, and mediated by aberrant emotional-based learning (Fauth-Bühler & Mann, 2017), which could predispose to both dependencies.

Therefore, the validity of IGD criteria is still questioned. Some authors are sceptical about the classification of IGD as a mental disorder (Deleuze et al., 2017) and propose that it is an epiphenomenon of other conditions (Dullur & Starcevic, 2018; Starcevic & Aboujaoude, 2017). However, they recommend clinical attention and open-minded investigations on this issue. Indeed, online gaming is potentially harmful to a group, but not for the entire population of online gamers (Kuss & Griffiths, 2012b; Saunders et al., 2017).

Young age is considered a risk factor for IGD, alongside male sex, time spent gaming (TSP), belonging to an online gaming community (which holds 28% of players in Italy, by only considering Facebook (AESVI, 2018b), and suffering from chronic health conditions (Rho et al., 2017; Schneider et al., 2017; Wartberg et al., 2017). Vulnerability to perceived stressors is another candidate factor predisposing to IGD (Torres-Rodríguez et al., 2019; Yen et al., 2019). Some of these risk factors are linked to a lower resilience for life stressors, which might lead to downregulate negative emotions by gaming (Canale et al., 2019; Wichstrøm et al., 2019). Additionally, the interpretation of time spent playing as either a diagnostic criterion for IGD, which could subtend the role of the games as a substance addictive *per se*, or a confounder of other characteristics, including emotional dysregulation, still constitutes a debated topic (Griffiths, 2010; Milani et al., 2017; Triberti et al., 2018; Triberti & Argenton, 2013; Wood,

2008). Emotional regulation has been repeatedly studied as a trait predicting IGD by using different measures (Dang et al., 2019; Wichstrøm et al., 2019).

For example, adolescents who play videogames show higher levels of alexithymia (Gaetan et al., 2016; Maganuco et al., 2019), which is characterized by difficulties in recognizing and describing emotional feelings, and externally-oriented thinking (Taylor, 1984).

However, the landscape of game genres is so vast that it is difficult to extend the finding from a group of players to another. The structural characteristics of the games are suggested as of particular importance (Kuss & Griffiths, 2012a). For example, indeed, the need to regulate emotions could be satisfied by a specific game genre, but not from another. Recent research reports that new, potentially addictive features are regularly emerging in modern videogames, such as "Loot-boxes" (Drummond & Sauer, 2018) and "daily rewards," (Grosso, 2016) which could relate to increased risk of dependence (Li et al., 2019). Additionally, free-to-play games, whose business is growing, attract children who can easily access them, without parental control, by lowering the age of first use of videogames (Ipsos Connect, 2017; Vasiliadis et al., 2013). Difficulties in emotional self-regulation could play a more relevant role in adolescent gambling, especially if internet mediates the relationship with the game (Frisone et al., 2020; Griffiths & Parke, 2010). Therefore, by increasing the total percentage of gamers potentially at risk, the number of people addicted could be very high. Despite the wide and constantly changing variety of games, only two studies published in 2015 have investigated whether and how different genres can contribute to the risk of IGD (Braun et al., 2016; Lemmens & Hendriks, 2016).

There are even fewer Italian studies on risk factors for IGD, and they focused on individuals playing *Massive Multiplayer Online Role-Playing Games* (MMORPG) or *Multiplayer Online Battle Arenas* (MOBA) (Di Blasi et al., 2019; Iacolino et al., 2019; Maganuco et al., 2019). Therefore, the prevalence of IGD in the Italian population of gamers is unknown.

1.1. The Current Study

The first aim of this study is to describe the profile of Italian online gamers who participate in online communities and gaming forums, by reaching particularly at-risk people and including a more comprehensive range of game-genres players. It also aims to analyze the weight of different well-known risk-factors, as time-depending playing-habits, perceived stressors, and the presence of any addiction, in determining a high IGD score, and which of the predictors could push a subject over the threshold for pathological gaming. Particularly, it aims to estimate the role of alexithymia, in the contest of these risk-factors. Finally, it aims to estimate the prevalence of IGD in this sample.

2. Methods

2.1. Study design and setting

This study set a descriptive cross-sectional online survey using a self-selection sampling strategy, created through the platform Google Form. Researchers shared the survey on (a) online-games Facebook groups; (b) generic Facebook groups; (c) official online-games forums, and (d) friends' messages or e-mail invitation. All data were collected anonymously and voluntarily between 10 May 2017 and 20 April 2018.

2.2. Participants

Participants were all potential gamers joining online-communities, without any restriction by sex and age. The sample included 5,979 participants, 98% of total responders (N=6,105). 93% of them (N=5,672) filled in the questionnaire during the first ten days following its launch. 126 (2%) inputs were excluded due to duplication (N=87; 1.4%) or missing items (N=39; 0.6%). Most participants (N=4,189; 69.6%) approached the survey from Facebook by groups dedicated to online-games, 22.5% by generic groups (N=1,352), 4.7% from official forums (N=284) and 3.2% via friends' messages or e-mail (N=193).

2.3. The Survey

2.3.1. Sociodemographic data. They included gender, age-range, educational achievement, and employment status.

2.3.2. Internet Gaming Disorder Scale – Short Form 9 (IGDS-SF9). This is a self-report tool to assess the severity and the detrimental effects of IGD over the last 12 months. The items, derived from the nine proposed diagnostic criteria for IGD (American Psychiatric Association, 2013), give a total score by the sum of single records on a 5-points Likert scale. A person embodies an IGD disorder with a score of ≥21. The use of an online survey to assess IGD has been validated in online gamers (Jeromin et al., 2016). For this study, we used the Italian version of the *IGDS-SF9* (Cronbach's Alpha [α]=0.96) (Monacis et al., 2016).

2.3.3. Twenty-item Toronto Alexithymia Scale (TAS-20). This is a widely used self-report measure of alexithymia rated on a 5-points Likert scale with five items reverse-coded and a total summative score. TAS-20 scale has three subscales: (a) difficulty in identifying feelings (DIF) (5 items – score ranges 5-25); (b) difficulty describing feelings (DDF) (7 items – score ranges 7-35); and (c) externally-oriented thinking (EOT) (8 items – score ranges 8-40). Alexithymia is present with a total score of 61 or above. The internet version has demonstrated adequate validity, reliability, and equivalence to the standard version (Bagby et al., 2014). We used the Italian translation of TAS-20 (α=0.75 in general population samples [α_NS] and α=0.82 in

clinical samples [α_CS]), having good internal consistency for DIF (α_NS = 0.77; α_CS = 0.79), and DDF (α_NS = 0.67; α_CS = 0.68). EOT subscale (α_NS = 0.52; α_CS = 0.54), is barely acceptable (Bressi et al., 1996).

2.3.4. Game-genres. Questions collecting which of those games listed were more frequently played (more than 20 hours) in the lifetime. Multiple choices were allowed. Some games on similar categories were listed separately because of the different characteristics of their online-community members.

2.3.5. Time-depending playing-habits. This section included questions about when participants did start playing; how many hours-per-day did they play during the last 12 months (TSP); how many free hours-per-day did they have in the last 12 months; if they had other hobbies apart from gaming.

2.3.6. Perceived stressors and dependencies. These were yes-or-no questions about any recent adverse event in the last 12 months, the feeling of loneliness and boredom; the diagnosis of chronic diseases; the presence of any dependencies.

2.4. Ethics

The local ethics committee approved the study, which was shared with respect to individual privacy and according to the Helsinki declaration. A consent form was fully available by a link. The first page informed participants about the study's goal and privacy and the estimated time to complete the survey (i.e., approximately six minutes). All participants actively agreed to complete the survey by clicking, "I accept the study's terms."

2.5. Statistics

The primary outcome of the study was the score obtained at the *IGDS-SF9*. Following previous studies (Gaetan et al., 2016; Maganuco et al., 2019), factor sub-scores (DIF, DDF, EOT) from TAS-20 were standardized and used instead of total score in all the analyses. Cronbach's Alpha (α acceptable if ≥ 0.65) (Cortina, 1993) checked the reliability and internal consistency of the IGD-SF-9 and TAS-20 applied to this population. The primary analysis was a linear regression (enter method) having *IGDS-SF9* scores as the outcome and different set of predictors for each model (block), selected on theoretical reasons based on the hypothesis and preliminary correlational analysis. The first block included sociodemographic variables as constant terms. The second accounted for linear terms: DIF, DDF, EOT. The third entered genre, and the number of videogames played. In the fourth block, other time-depending playing habits were tested. The final block included perceived stressors and dependencies. A sixth *post hoc* model removed DIF, DDF, EOT, to see which variables they influenced more. This first analysis was

useful to see (a) the weight of different risk factors in determining an increased IGD score and (b) to select variables for the sensitivity analysis. A binary logistic regression (sensitivity analysis) indicated which of the predictors could push a subject over the threshold for IGD (pathological/not pathological). The order of predictors and interactions were chosen based on their relevance in the previous model. SPSS 25.0 for Mac (IBM, 2018) was employed for statistical analyses.

3. Results

3.1. Descriptive characteristics

Responders were mostly males (N=5,305; 88.7%), aged between 14-18 years (N=2,629; 44%) and 19-25 years (N=2,406; 40.2%); 48.5% (N=2,901) achieved a high school degree 37.3% (N=2,229); 72.4% (N=4,326) were students at the time of the survey (Table 1).

Table 1. Sociodemographic Characteristics

	Code	N	%	BCa 95% C.I.	
Gender					
Male	0	5,305	88.7	87.9	89.6
Female	1	674	11.3	10.4	12.1
Age range					
Less than 10 years	5	7	0.1	0	0.2
10-13 years	4	136	2.3	1.9	2.7
14-18 years	3	2,629	44	42.7	45.3
19-25 years	2	2,406	40.2	39	41.5
26-45 years	1	777	13	12.1	13.8
More than 45 years	0	24	0.4	0.2	0.6
Educational achievement					
Primary school	4	52	0.9	0.6	1.1
Secondary school	3	2,229	37.3	36	38.6
Vocational college	2	340	5.7	5.1	6.3
High school	1	2,901	48.5	47.3	49.7
Degree or post-degree	0	457	7.6	7	8.3
Employment status					
Unemployed	2	486	8.1	7.4	8.8
Student	1	4,326	72.4	71.3	73.5
Employed	0	1,167	19.5	17.4	21.7
● Farming		28	0.5	0.3	0.7
● Worker		366	6.1	5.5	6.8
● Service industry		569	9.5	8.8	10.2
● Armed forces		27	0.5	0.3	0.6
● Business owner		177	3.0	2.5	3.4

Legend: Bootstrap C.I.s were bias-corrected and accelerated (BCa 95% C.I.), to account for the uncertainty arising from the survey sampling and the population itself.

50% of the sample played *League of Legends* (LoL) (N=3,101, 51.9%), and *CounterStrike*, and similar *First-Person Shooter* (FPS) (N=2,880, 48.2%). Almost 30% played *Overwatch* (N=1,742, 29.1%), and *World of Warcraft* and similar *Massive Multiplayer Online Role-Playing Games* (Wow and

similar MMORPG) (N=1,629, 27.2%). More than 22% played *Minecraft* (N=1,346, 22.5%), and Hearthstone (N=1,339, 22.4%). 16.8% declared to play *Diablo3* and similar *Role-Playing Games* (RPG) (N=1,003) and 8.7% *The Elder Scrolls* (TES) *Online* (N=522), another MMORPG. They preferentially played two different games for more than 20 hours during their lifetime (mean=2.27 [sd=1.2]). Most of them started playing before age 10 (N= 3,775; 63.1%), having 4-6 free hours/per day (N=2,385; 39.9%) (without excluding time spent playing from this estimate), and they medially played 1-3 hours/per day (N= 2,730; 45.7%). However, 46.6% of participants played 3-6 hours/per day (N= 2,058; 34.4%) or more (N=726; 12.1%). 87.3% of them reported another hobby apart from gaming (N=5,217). Finally, 32% of participants experienced at least one negative event in the last month (N=1,885), more than half of the sample felt lonely and bored (N=3,165; 52.9%), and 5.9% suffered from a chronic disease (N=350). 25% of participants declared to have at least one dependence (N=1,479) (Table 2).

Table 2. Playing Habits, Perceived Stressors and Dependencies.

	Code	N	%
What are your favourite games (yes)?*	**Yes/No**		
FPS	1/0	3,741	62.6
- Overwatch and similar (FPS)	1/0	1,742	29.1
- Counter Strike and similar (FPS)	1/0	2,880	48.2
MMORPG	1/0	1,906	31.9
- World of Warcraft and similar	1/0	1,629	27.2
- The Elder Scrolls (TES) Online	1/0	522	8.7
League of Legends (MOBA)	1/0	3,101	51.9
Minecraft (Sandbox)	1/0	1,346	22.5
Hearthstone (digital collectable card game)	1/0	1,339	22.4
Diablo 3 and similar (RPG)	1/0	1,003	16.8
Numbers of videogames**			
One	1	2,038	34.1
Two	2	1,779	29.8
Three	3	1,236	20.7
Four	4	563	9.4
Five	5	236	3.9
Six	6	79	1.3
Seven	7	32	0.5
Eight	8	16	0.3
When did you start playing?			
Before 10 years	2	3,775	63.1
11-18 years	1	1,983	33.2
After 18 years	0	221	3.7
How many hours/per day did you play during the last 12 months?			
Less than 1 Hour	0	453	7.6
1-3 Hours	1	2,730	45.8
3-6 Hours	2	2,058	34.5
More than 6 Hours	3	726	12.1

How many free hours/per day did you have in the last 12 months?			
Less than 1 Hour	0	130	2.2
1-3 Hours	1	1,370	22.9
4-6 Hours	2	2,385	39.9
More than 6 Hours	3	1,646	27.5
All day	4	448	7.5
Have you got any other hobbies, apart from gaming?			
Yes	1	5,217	87.3
No	0	762	12.7
Have you recently suffered a negative event?			
Yes	1	1,885	31.5
No	0	4,094	68.5
Do you often feel lonely and bored?			
Yes	1	3,165	52.9
No	0	2,814	47.1
Do you have any chronic disease?			
Yes	1	350	5.9
No	0	5,628	94.1
Do you currently have any dependencies*?			
No	0	4,500	75.3
Yes	-	1,479	24.7
● Cigarette, cigars	1	1,030	17.2
● Cannabis, alcohol	2	364	6.1
● Behavioural (e.g. gambling)	3	73	1.2
● Cocaine, heroin, other	4	12	0.2

*multiple choices were allowed, so the total percentage is more than 100%.
** mean=2.27 [sd=1.2]; median=2; mode=1.

3.2. TAS-20 and IGDS-SF9 scores

IGD had an average value of 20.2 (sd=6.6), but 42.7% of the participants resulted in a pathological score of a least 21 (N=2,555).

Average alexithymia values were in the borderline range (mean=47.5, sd=12.3). Participants were pathological for the 16% (N=957), not-pathological for the 61.4% (N=3,669), and borderline for the 22.6% (N=1,353). The reliability of the IGDS-SF9 (α=0.79; α Based on Standardized Items [α^{z_items}]=0.80) and TAS-20 (α=0.82; α^{z_items}=0.82) resulted high. DIF (α=0.81; α^{z_items}=0.82), and DDF (α=0.76; α^{z_items}=0.77) were acceptable, while EOT reliability was lower (α=0.51; α^{z_items}=0.51) (Bressi et al., 1996). EOT could embody two sub-factors, i.e., "pragmatic thinking" and "no appreciation of the importance of emotions," based on some evaluation of a "reduced fantasy activity" (Bagby et al., 2014). These characteristics could be highly variable in this sample where players choose different game-genres.

3.3. What does predict IGD increasing scores?

First Block: sociodemographic variables explained the 1.5% of the total variance (Adjusted *R*-Square [$_{Adj}R^2$]=0.015), (F (4, 5,961)= 23.8, p<0.001). A lower age (B=0.94, p<0.001), and a lower educational achievement (B=0.20, p=0.033), predicted higher IGD scores, while gender (B=0.15, p=0.575) and employment status (B=-0.09, p=0.564) did not.

Second Block: alexithymia scores added a 20.5% ($_{Adj}R^2$=0.220; R^2_{change}=0.205, p<0.001) of variance prediction (F (7, 5,958)=241.5, p<0.001) that is, IGD scores differentially increased when DIF (B=2.63, p>0.001), DDF (B=0.41, p>0.001), and EOT (B=0.60, p>0.001) increased of one standardized score. In this model, age (B=0.16, p=0.175) and educational achievement (B=0.05, p=0.550) lost significance.

Third Block: game-genres increased the predictive power of 1% ($_{Adj}R^2$=0.229; R^2_{change}=0.010, p<0.001) in the regression (F(15, 5,950)=119.3, p<0.001). WoW and similar MMORPGs (B=0.50, p=0.005), and LoL (B=0.99, p<0.001) increased IGD while Diablo3 and similar RPG did not (B=-0.99, p<0.001) while being male became predictive of higher IGD, once these variables were taken into account (B=-0.56, p=0.024). The number of videogames played was excluded from the model because of its multicollinearity (Tolerance=0.00).

Fourth Block: perceived stressors significantly predicted the outcome (F(19, 5,946)=104.6, p<0.001) by explaining 2% of variance ($_{Adj}R^2$=0.248; R^2_{change}=0.019, p<0.001). Feelings of loneliness and boredom (B=1.9, p<0.001), and suffering from a recent negative event (B=0.39, p=0.019) increased IGD. Chronic diseases did not contribute to the model (B=0.467, p=0.149). Having a dependence showed a borderline significance in the same direction (B=0.22, p=0.058).

Fifth Block: time-depending playing-habits raised the explanatory power of the regression (F(23, 5,942)=126.7, p<0.001) of another 8% ($_{Adj}R^2$=0.329; R^2_{change}=0.079, p<0.001). IGD scores increased by more than two points every three more hours/per day spent playing during the last 12 months (B=2.23, p<0.001). Conversely, increasing free hours/per day (B=-0.37, p<0.001) and having another hobby apart from gaming (B=-2.13, p<0.001) decreased IGD. The age at which participants started playing did not influence the model (B=-0.04, p=0.761). Playing WoW (B=0.01, p=0.951) and a recent negative event lost their predictive power (B=0.239, p=0.137), while playing Minecraft acquired significance (B=0.359, p=0.041). This last model explained 33% of the total variance.

Sixth Block: by removing alexithymia scores, the regression was still explanatory (F(20, 5,945)=82.1, p<0.001) of the 21.4% of the variance, i.e. removed factors explained the 11.3% ($_{Adj}R^2$=0.214; R^2_{change}=-0.113, p<0.001). In this *post hoc* model, other risk-factors emerged, whose

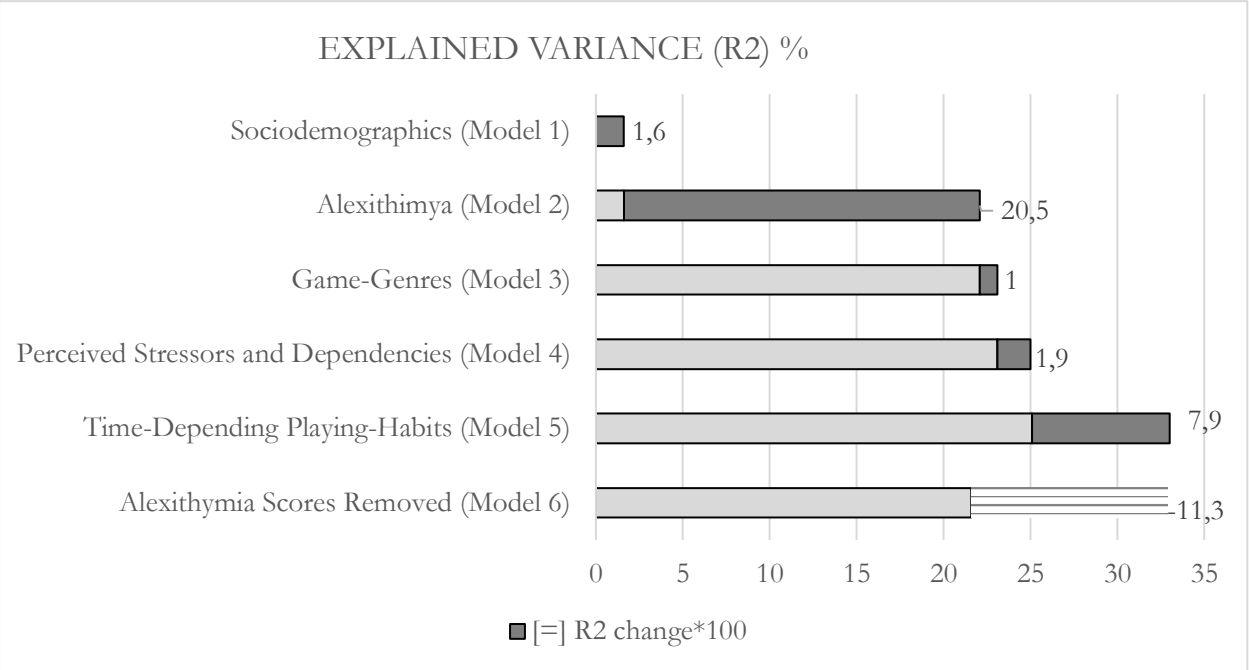
power was masked by alexithymia scores, i.e., a lower age (B=0.46, p=0.001), reporting a recent adverse event (B=0.83, p<0.001), any dependency (B=0.52, p<0.001), and chronic disease (B=0.93, p=0.005). The male gender risk-factor disappeared (B=-0.45, p=0.075) (Table 3; Figure 1). Predictors were not multicollinear in any model (all r <0.7; all VIF <2).

Table 3. Predictors' Role at each Block of the Linear Model and Sensitivity Analysis

Linear regression: IGD scores are the outcome						
Block		**Significant predictors**		**Not significant predictors**	**Final result of the model**	
		Risk factors	**Protective factors**		**Risk factors**	**Protective factors**
1	**Socio-demographics** Age, gender, education, employment	<age <education		Male gender Unemployment	<age <education	
2	**Alexithymia** DIF, DDF, EOT	>DIF >DDF >EOT		Age Education	>DIF >DDF >EOT	
3	**Genre of videogames** Overwatch, Counter Strike, TES, Minecraft, Heartstone, WoW, LoL Diablo3, N° videogames	WoW LoL Male gender	Diablo3	N° videogames Overwatch Counter Strike TES Minecraft Heartstone	Males >DIF >DDF >EOT WoW LoL	Diablo3
4	**Perceived stressors and other addictions** Negative event, Lonely/bored, Chronic disease, Dependencies	Negative event Lonely/bored		Chronic disease Dependencies	Males >DIF >DDF >EOT WoW LoL Negative event Lonely/bored	Diablo3
5	**Time-depending playing habits** TSP, Free Time, Hobby, Age start playing	TSP Minecraft	>Free Time Hobby	Age start playing	Males >DIF >DDF >EOT Minecraft LoL Lonely/bored >TSP	Diablo3 >Free time Hobby
6	**Alexithymia scores removed** Remove DIF Remove DDF Remove EOT	<age Negative event Dependency Chronic disease		Male gender	<age Negative event Dependency Chronic disease Minecraft LoL Lonely/ bored >TSP	Diablo3 >Free time Hobby
Binary logistic regression: IGD≥21 (yes/no) is the outcome						
Gender, DIF, DDF, EOT, Diablo 3, Minecraft, LoL, Lonely/bored, Free time, TSP, Hobby, age, employment, education, N° videogames, WoW, Overwatch, Counter Strike, TES, Heartstone, negative events, chronic disese, dependencies, age start playing, TSP*DIF, TSP*DDF, TSP*EOT.					Males >DIF Negative Event Lonely/bored Dependency >TSP	Diablo3 >Free time Hobby

Legend: IGD=Internet Gaming Disorder; DIF=Difficult in Identifying Feelings; DDF=Difficult in Describing Feelings; EOT=Externally Oriented Thinking; TES=The Elder Scroll; WoW=World of Warcraft; LoL=League of Legends; TSP=time spent playing.

Figure 1. Prediction Model for IGD Scores from the Linear Regression

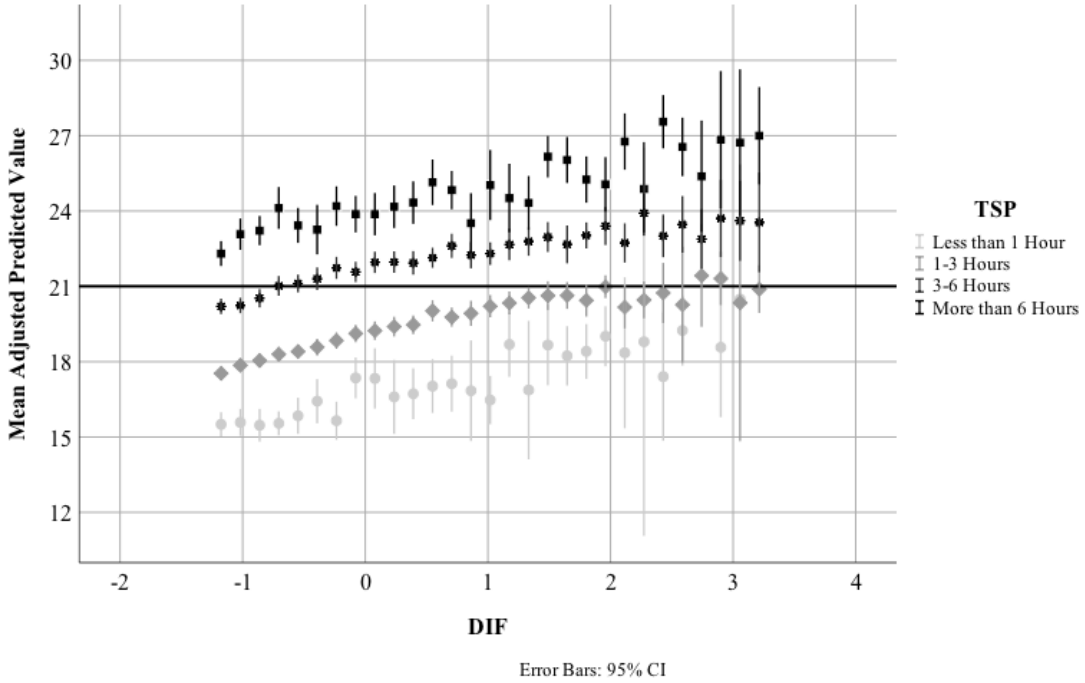


3.4. Sensitivity analysis on risk-factors for IGD

The model correctly predicted 79.6% of cases with no dependence and 57.1% of cases with dependence, with an overall percentage-correct prediction-rate of 70% ($\chi^2(55)=1392.9$, $p<0.001$). It explained 28% of the variability in participants' classification.

Risk-factors for IGD were male gender (OR=1.2, 95% C.I.=1, 1.5, p=0.019), higher DIF (OR=1.5, 95% C.I.=1.1, 2.1, p=0.003), having suffered of a recent negative event (OR=1.1, 95% C.I.=1, 1.3, p=0.026), and having feelings of loneliness and boredom (OR=1.8, 95% C.I.=1.5, 2, p<0.001). TSP up to three hours/per day almost doubled the risk of dependence (OR=1.8, 95% C.I.=1.4, 2.4, p<0.001), which increased by almost four and eight times when TSP was up to six hours/per day (OR=3.9, 95% C.I.=2.9, 5.2, p<0.001) or more (OR=7.6, 95% C.I.=5.5, 10.6, p<0.001). Having a behavioural addiction (e.g., gambling), doubled the risk of IGD (OR=2.1, 95% C.I.=1.2, 3.9, p=0.009), compared to "no dependencies," while other substance-dependence did not. Once considered TSP, having all-day free (OR=-0.5, 95% C.I.=0.3, 0.9, p=0.018), another hobby apart from gaming (OR=-0.56, 95% C.I.=-0.47, -0.67, p<0.001), and playing at Diablo3/RPGs (OR=-0.69, 95% C.I.=-0.52, -0.93, p<0.001), lowered the risk of IGD (Table 3). Alexithymia and TSP did not interact with each other. Specifically, when DIF increased by one standard point, the probability of being a pathological gamer increased by one and a half. Independently, time spent playing increased this risk exponentially, up to eight times (Figure 2).

Figure 2. Grouped Scatter Mean of Adjusted Predicted Value DIF by TSP



4. Discussion

4.1. Representativeness of the sample

Our responders were frequent gamers (Rehbein et al., 2016), having representative characteristics in terms of education and employment status, as compared to the general population of gamers (AESVI, 2018a; ESA, 2019). In line with other Italian studies, there were mostly males and young participants (Di Blasi et al., 2019; Maganuco et al., 2019).

Male gender probably contributed to lower the age of first access to videogames (Roberts et al., 1999), as well as the recruitment of online-community users and free-to-play gamers, who are younger (Ipsos Connect, 2017).

As expected, online-community players tend to present with higher alexithymia than the general population and higher level of IGD than the general population of gamers (Bressi et al., 1996; Monacis et al., 2016).

4.2. Main findings

To date, this study collected the most extensive and inclusive Italian population of online gamers at different genres, recruited through gaming communities. It was also able to consider in the same analysis all the main risk factors differentially studied in the literature.

Problematic gaming emerged in the 43% of the sample, and it was revealed the independence between difficult in identifying feelings (DIF) and the typical addictive feature of time spent playing (TSP), in determining a pathological approach to videogames.

4.3. Sociodemographic variables

As expected, lower age (Cerniglia et al., 2019) and lower educational achievement (Rehbein et al., 2016) originally predicted higher IGD scores. However, alexithymia explained their relevance (Kokkonen et al., 2001). Notably, the male gender risk-factor (Emory Woodard & Natalia Gridina, 2000; Rho et al., 2017) stayed significant in determining the risk of overcoming the threshold for a pathological approach to videogames. It emerged once taking into account the genre of games played and lost its importance when removing alexithymia scores. This result could suggest that males are more involved in games with addictive features, like competitive games (Gao & Shih, 2018), which are designed for a males' target (Newman, 2017; Spekman et al., 2013). At the same time, the portion of females present in this sample played immersively, probably as a regulation-strategy of unpleasant emotions (Bonnaire & Baptista, 2019).

4.4. Game genres

The distribution of favourite games reflected their trends at the time of the interview (Statista & Gough, 2019), with several LoL and Counter-Strike players (Messner & PCgamer.com, 2019; Steam, 2019), and a decline in popularity for MMORPGs (Statista research department, 2019).

The game-genre explained 1% of variation only. Each game engaged people with specific characteristics that, in turn, differentially predisposed to IGD (Şalvarlı & Griffiths, 2019).

WoW and similar MMORPGs confirmed their potentiality in promoting IGD (Stavropoulos et al., 2017), regardless of alexithymia features (Iacolino et al., 2019). This game exerted its effect through a greater extent of TSP (Billieux et al., 2013), as time-related variables completely absorbed its effect, probably thanks to its escaping characteristics (Billieux et al., 2015; Leménager et al., 2014). On the contrary, LoL resulted in addictive, regardless of both TSP and alexithymia. It is an auto-conclusive free-to-play and highly competitive game, which includes loot-boxes and daily reward mechanisms (Li et al., 2019).

Minecraft emerged when time-variables were inserted into the model and stayed significant when removing alexithymia traits. That means, if all participants had played the same amount of time, those playing at Minecraft would have been one of the most addicted. Minecraft is popular with younger audiences, highly predisposed to be trapped in its parallel-world (Kardaras, 2016). Unlike previous research (Lemmens & Hendriks, 2016), playing at RPG similar to Diablo3 did not relate to IGD, the only game to survive in its relevance in the final analysis. It is not daily-rewarding, nor competitive, nor free-to-play. This sub-group of players embedded older people adhering to a little online-community, and equally distributed in terms of gender (exploratory analysis).

We can speculate that the inclusion of several game-genres disentangled the relationship between TSP and alexithymia found in previous studies, which considered MMORPG players only (Di Blasi et al., 2019; Maganuco et al., 2019).

4.5. Playing-time habits

Male gender and the inclusion of online community users and free-to-play gamers contributed to lower the age of first access to videogames (Roberts et al., 1999). We did not find a direct relationship between early age of first game and IGD, probably because the other time-related variables considered were more relevant. Gaming could have been the favourite way to fill-in participants' idle time at the period of the interview. Notably, when considered in the same model with TSP, "free hours" was the only variable changing its sign in a negative correlation with IGD scores, as compared with simple correlation analysis. That means the extra time that was not spent playing resulted in a protective-factor, alongside having another hobby. However, we do not know if the other hobbies they reported were game-related (Shi et al., 2019), or connected to other activities (ESA, 2019).

4.6. Perceived-stressors

The 6% of responders declared to suffer from chronic diseases, a lower percentage than those expected in the general Italian population of 18 years-olds (i.e. 18.6%) %) (The European House, 2018). A general better health of people included in this sample could be related to their higher education, as compared to the general population (Williams et al., 2008).

A recent adverse event in the last year was found in more than 30% of our sample, similar to the 25% found in Bowditch, Naweed, & Chapman study (Bowditch et al., 2019). Boredom and loneliness feelings increased the risk of IGD, in line with previous studies (Lemmens et al., 2011; Myrseth et al., 2017; Seay & Kraut, 2007) regardless of all other variables. A dysfunctional (Brand et al., 2016) or externally oriented coping (Snodgrass et al., 2014), and lower resilience (Canale et al., 2019) for life stressors might lead to downregulate negative emotions by gaming (Wichstrøm et al., 2019).

Indeed, alexithymia scores and the whole block of time variables moderated the effect of chronic diseases and recent negative events in increasing IGD scores.

4.7. Other addictions

25% of subjects had at least one addiction, with only 6.1% related to alcohol or cannabis. These results were lower than that obtained in other studies (Coëffec et al., 2015). We have no cues against or supporting a possible sampling or reporting bias, as compared to other studies, which could be a possible explanation. Nevertheless, we could speculate that young online-community

users could be less socially involved and less likely to use these clubbing substances. IGD had no relationships with other substance-dependencies (Paulus et al., 2018).

Having a behavioural addiction was associated with a doubled risk of endorsing IGD characteristics. However, alexithymia moderated the co-occurrence of another behavioural dependency in increasing IGD scores, as proposed from previous studies, common rewarding characteristics and (Fauth-Bühler & Mann, 2017), sometimes, throughout the sharing of similar communities (Sirola et al., 2020). Finally, a recent negative event, boredom and loneliness feelings and having a behavioural dependency still represented a trigger to push a subject in the part of the sample having pathological IGD scores, even in the contest of several other predictors. Thus, we can hypothesize a crucial role of these characteristics in determining the transition to an addictive relationship with videogames, even as a transient condition, and not only through the trait of emotional dysregulation.

5. Limitation and Strengths

The online survey methodology can reach broad and heterogeneous gamers' groups, which has a cost-efficiency advantage (Griffiths, 2012; Pontes & Griffiths, 2015). It was demonstrated by its sharing-logarithm and ability to collect most of the surveys in the first days. However, the self-selection strategy could have involved the most problematic gamers, who are more interested in the questionnaire proposed and are more likely to spend their time in game-related activities. Additionally, we could expect the under-reporting of some experiences and the difficulty in understanding some questions without a face-to-face interview. On the other hand, the internet increases the privacy-perception and could have facilitated the disclosure of some information. Finally, the study photographed a moment in the subjects' lives and which characteristics can trigger a pathological approach to videogames. Only a longitudinal study can answer the question about how many subjects among the 43% pathological, will stay in this condition and develop life-lasting addiction-related functional impairment.

6. Conclusions

Italian players who participate in online communities resulted in particularly at-risk of IGD. Difficulties in identifying feelings and time spent playing were independent and crucial predictors of a pathological approach to videogames. Alexithymia traits weakened the predictive power of male gender and perceived stressors and another behavioural-addiction comorbidity. However, these characteristics stayed crucial in determining the transition to pathological gaming. Distinctive game-genres exerted their addictive power toward specific moderating factors. They restituted a variegate landscape of players, but none of them could push the subject over the threshold of IGD *per se*.

Consent form

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all subjects for being included in the study.

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