

Internet Gaming Addiction in Adolescence: Risk Factors and Maladjustment Correlates

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Abstract Several studies have documented the existence of a behavioral addiction related to Video Games, which appears to be similar to other forms of addiction (gambling and substance-related) in terms of characteristics and consequences. Literature about this topic has suffered from the lack of a standard definition of this disorder before the publication of DSM-5. Thus, the prevalence of the disorder and its characteristics at the moment are unclear. The present research aimed to investigate the differences between sub-clinical problematic Video Game (VG) use and Internet use and clear Internet gaming disorder (IGD) and Internet addiction in terms of gender, amount of time spent gaming, preferential coping strategies, adjustment problems, interpersonal relations, and to identify risk factors that predict a problematic engagement in video gaming. We administered a survey containing measures about coping strategies, interpersonal relations, internalizing/externalizing problems, and Internet and Video Game addiction to 612 Italian students recruited in the four main regions of the country (age range 9–19; $M = 13.94$). Results show that 15.2% of participants showed a sub-clinical problematic use of Video Games, while those with a clear IGD were 2.1% ($n = 13$); 16.3% of them showed a sub-clinical problematic Internet use, while full-criteria Internet addiction was found in 5.9% of the sample. IGD appears to be linked to various dysfunctional outcomes including a wide range of psychological symptoms and behavioral and social problems. Also, problematic video gamers tend to preferentially adopt dysfunctional coping

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strategies as distraction and avoidance, so VGs seem to represent a mean to cope with problems and difficulties.

Keywords Internet gaming disorder · Video Games · Internet · Psychological adjustment

Video Games' origins date back to 1950s, but they gained an exponential commercial development in the 80s–90s, when PCs, home consoles, and portable game devices were embraced by the public. The diffusion of online Video Games is more recent and represents the Video Game industry's major outlet of expansion in the consumer market, mainly because of their accessibility through devices not exclusively associated to Video Game use (e.g., new-generation smartphones).

Several studies have documented the existence of a kind of behavioral addiction related to Video Games (Grüsser et al. 2006). Video gaming disorder appears to be similar to other forms of addiction, as pathological gambling and substance-related disorders, in terms of characteristics, consequences, and neurophysiological correlates (American Psychiatric Association 2013; Kuss and Griffiths 2012). The American Psychiatric Association recently included Internet gaming disorder (IGD) as a potential diagnosis in the Diagnostic and Statistical Manual 5 (American Psychiatric Association 2013), with the goal of encouraging additional research.

One aspect needing additional study is the ability to make a distinction between a “normal,” high level of game engagement and actual gaming addiction (Griffiths 2010). In fact, many studies have shown that the amount of time spent video gaming does not represent an adequate measure of pathological gaming and is not necessarily linked to negative outcomes (Brunborg et al. 2013, 2014; Charlton and Danforth 2010; Gentile 2009; Spekman et al. 2013). Some authors have pointed out the relevance of context and gaming motivations, as the degree of importance and of salience assigned by players to their video gaming activity may lead to very different consequences (Griffiths 2010; Kuss 2013). In particular, the following motivations were identified as relevant: video gaming as coping strategy to deal with daily stressors and negative feelings (Cole and Hooley 2013; King et al. 2011; Kuss et al. 2012; Li et al. 2011), the preference for online relationships (Caplan et al. 2009), compensation for lack of success in real life, and search for immersion and dissociation (Snodgrass et al. 2013). Thus, the development of a Video Game disorder appears to be linked not only to the excessive amount of time spent video gaming but also to the use of Video Games (VGs) as a mean to fulfill those needs that individuals do not (or cannot) satisfy in different ways.

In the third section of DSM-5 (American Psychiatric Association 2013), IGD is defined as “persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress as indicated by five (or more) of the following in a 12-month period” (p. 795). The proposed criteria include preoccupation with Internet games, withdrawal symptoms, tolerance, unsuccessful attempts to control the participation in Internet games, loss of interests in previous hobbies and entertainment, continued excessive use of games despite knowledge of psychosocial problems, having deceived someone regarding the amount of Internet gaming, use of games to escape or relieve a negative mood, and having jeopardized or lost a significant relationship, job, or educational or career opportunity.

Literature about this topic has suffered from (and been enriched by) the lack of a standard definition of this disorder before the publication of DSM-5 (American Psychiatric Association 2013). Published studies have referred to different definitions, adopted diverse assessment instruments (or alternative cutoff of the same instruments), and the results were hardly

generalizable due to differences in the sampling methods. Thus, the prevalence of the disorder at the moment is unclear. When considering studies with definitions similar to that provided by the DSM-5, the lowest prevalence rate (0.2%) was found in a German population ranging from teenagers to adults (Festl et al. 2013). However, when adolescents were considered separately, the prevalence rate was higher (1.7%), with a relevant discrepancy between males (3%) and females (0.3%) (Rehbein et al. 2010). A similar discrepancy was found among Dutch adolescents (males 7.1%, females 3.9%), young adults 21–30 (males 8.9%, females 5.1%), and middle adults 31–40 (males 5.5%, females 2.0%) (Lemmens et al. 2015). The highest prevalence was found in Asiatic population, with a rate of 12.6% among male adolescents and 4.7% among female adolescents (Choo et al. 2010). In summary, this disorder seems to be more prevalent among male adolescents and in some Asian countries (American Psychiatric Association 2013; Porter et al. 2010; Van Rooij et al. 2014).

Longitudinal studies provide some initial insights about risk and protective factors, as well as about consequences related to the Video Game addiction. The profile of a video gamer at risk of addiction seem to be male, impulsive, with low social and emphatic competences, poor emotional regulation skills, and raised in a single-parent family (Gentile et al. 2011; Lemmens et al. 2011; Rehbein and Baier 2013). Conversely, personal strengths, warm family environment, parent-child connectedness, high degree of parental supervision, high level of social integration in the class, and school-related well-being appear to act as protective factors (Liau et al. 2015; Rehbein and Baier 2013).

Research seems to relate Video Game addiction to several adverse outcomes, which are depression, anxiety, social phobia, conduct problems and lower academic achievement, and ADHD (Brunborg et al. 2014; Gentile et al. 2011; Liau et al. 2015; Schmitt and Livingston 2015; Schou Andreassen et al. 2016). However, some researchers hypothesize that the correlation found between gaming addiction and the abovementioned outcomes could be in fact reciprocal (Gentile et al. 2012). For example, Lemmens et al. (2011) found a bidirectional relation between loneliness and gaming disorder; elevated level of loneliness represents a risk of pathological game, and this, in its turn, increases perceived loneliness level. Gentile et al. (2012) found similar results relating to attention problems and impulsiveness.

Moreover, Video Game addiction seems to have a long-lasting duration for some people; based on research by Gentile et al. (2011), 84% of pathological gamers in the first phase of the study were still pathological gamers 2 years later. Therefore, gaming disorder does not constitute simply a transitional phase; rather, it seems to be a form of maladjustment that needs treatment.

As regards Italian video gamers, a survey conducted by ISFE (2012) showed that the 41% of Italian population use Video Games regularly, while 25% reported a weekly gaming habit and 82% usually play online. To our knowledge, only one study tackled the issue of Video Game addiction in Italy (Donati et al. 2015). This study found a relation between the “versatility” (i.e., preference for different genres of Video Games) and the risk of addiction. However, data were collected only among male adolescents, and the authors did not provide prevalence for Video Game addiction.

The DSM-5 includes both the aspects of the Internet and video gaming in the term Internet gaming disorder, although they intended the focus to be primarily on gaming, especially Internet-connected gaming (Petry et al. 2014). Nonetheless, researchers have tended to use instruments that focus on either Internet use or on Video Game use, out of a desire for specificity and clarity in measurement. This means that there are strong literatures that appear different but may or may not be distinct in fact. This is one of

the questions that need additional research—how similar are the pathological uses of Video Games or the Internet, typically called Internet addiction in the literature. This study provides some information relevant to this question, as we used two standard measures from the literature—one focusing on games and one on the Internet. Similarly, as with any newer diagnosis, it may be useful to distinguish not only between clinically defined pathological and non-pathological levels but also a level in between that might be termed problematic.

Aims of the Research

The present study aims to investigate prevalence and co-occurrence of Internet and Video Game addiction, identifying their negative correlates in development. In more specific terms, factors investigated by means of cross-informant methodology were VG and Internet habits, coping strategies, and quality of relationships with parents, peers, and teachers (survey administered to students), as well as internalizing and externalizing problems (survey administered to students' parents).

Research questions are summarized as follows:

- Investigating the differences between sub-clinical problematic VG use and Internet use and clear IGD and Internet addiction in terms of gender, amount of time spent gaming, preferential coping strategies, adjustment problems, and interpersonal relations.
- Identifying risk factors that predict a problematic engagement in video gaming.

Method

Participants

Questionnaire packets were delivered to 728 students attending primary and secondary schools in Italy. The sample was recruited from northern, central, and southern Italy, including 24.5% from Brescia and Verona (north-east), 34.3% from Milano (north-west), 27.0% from Roma (central), and 14.2% from Catania (south).

All of the 728 questionnaire packets were filled in; however, we decided to exclude from analyses 116 of them because they were incomplete (missing one to several scales).¹ The final sample comprised 612 participants, aged between 9 and 19 years old ($M = 13.94$, $SD = 2.44$). Of the participants, 47.2% ($n = 289$) were male and 52.8% ($n = 323$) were female. Relating to nationality, 93.8% of participants were Italian, 3.8% were from a European country, and the remaining 2.4% were from an extra-European country. Participants were evenly distributed both in terms of gender (47.2% males, 52.8% females) and age (9–12 years old 31.2%; 13–15 years old 39.2%; 16–19 years old 29.6%). Participants were mostly from middle class.

¹ The final sample had some scattered missing values. Missing data was handled via multiple imputation method on SPSS 23.0, as suggested by Schafer and Graham (2002).

Procedure

Schools were contacted upon convenience and were situated in five major cities (population equal to or more than 200,000 residents) representative of north-east (Brescia and Verona), north-west (Milano), central (Rome), and south (Catania). Schools were contacted via the official directory of state schools provided by local school authorities. We made sure that schools were located within city borders or in the immediate surroundings to maximize comparability of students regarding socio-economic and living conditions. The schools that accepted to participate informed the parents about the aims and the procedure of the research.

An envelope, containing the description of the study and the consent form, was handed over each family. The following days, experimenters presented the research to the classrooms involved in the data collection, collected the signed consent forms, and collectively administered the questionnaires to the students. Questionnaires directed to parents were given to the students to be handed over to their parents, and then, they were collected by the experimenters in sealed envelopes the following days.

Participants were made aware that they could withdraw from the research at any moment.

Measures

Measures Administered to Children

Video Game Addiction In the Revised VGA Questionnaire (VGA; Gentile 2009), the instrument measures the problematic video gaming use and VG addiction, both online and offline, consistently with DSM-5 diagnostic criteria. It consists of 15 items on a 1 to 3 Likert-type scale measuring the presence of each of the 9 IGD symptoms, with a maximum possible score of 9. In the present study, we defined that the cutoff score for a sub-clinical problematic involvement in VG was set to 3 of the 9 symptoms and used the recommended cutoff of 5 to define IGD. Cronbach's alpha was 0.71.

Internet Addiction In the Internet Addiction Test (IAT; Young 1998), the instrument assesses the problematic Internet use and its influence on social life quality, academic/job career, and control of time. It consists of 20 items on a 1 to 5 Likert-type scale. We used the recommended cutoff scores of 50 for Internet addiction and 40 for sub-clinical IA. Cronbach's alpha was 0.89.

Coping Strategies In the Children's Coping Strategies Checklist-Revised 1 (CCSC-R1; Ayers and Sandler 2009; Italian version Camisasca et al. 2012), the instrument assesses the preferential cognitive strategies used by children and adolescents to cope with situations perceived as problematic. It consists of 54 items on a 1 to 4 Likert-type scale. It includes the following four scales for the following coping strategies: active, support-seeking, avoidance, and distraction. Cronbach's alpha was 0.90.

Interpersonal Relations In the Test of Interpersonal Relations (TIRs; Bracken 1993; Italian version Ianes 1996), the instrument measures the social skills of children and adolescents and the quality of relations with parents, peers (males and females separately), and teachers. It provides 5 scales (one for each relationship) composed by 35 items on a 1 to 4 Likert-type scale. Cronbach's alpha was 0.93 for the scale relationship with

mother, 0.93 for the scale relationship with father, 0.92 for the scale relationship with male peers, 0.92 for the scale relationship with female peers, and 0.91 for the scale relationship with teachers. Cronbach's alpha was 0.95 for the overall score.

Measures Administered to Parents

Children's Externalizing and Internalizing Problems In the Child Behavior Checklist (CBCL; Achenbach 1991; Italian version Frigerio 2001), the instrument assesses children's emotional and behavioral problems. It consists of 112 items on a 1 to 3 Likert-type scale. It includes eight syndromic scales (withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, aggressive behavior) and two general scales of internalization and externalization. Cronbach's alpha was 0.95.

Data Analysis Strategy

Firstly, a series of MANOVAs were performed in order to highlight differences in mean scores of the scales administered between participants identified as having IGD (VGA score ≥ 5), participants identified as being problematic in Video Game use (VGA score ≥ 3 and < 5), and participants without any of the above (VGA score < 3). Gender and age were inserted as covariates, being above or below VGA cutoffs (3 or 5) was inserted as fixed factor, and the following were inserted as dependent variables: CBCL externalization, internalization, and sub-scales; TRI total quality of relationships and sub-scales; CCSC-R1 coping strategy scores; and IAT score of problematic Internet use. The same procedure was used to assess differences between participants with Internet addiction (IAT score ≥ 50), participants with problematic Internet use (IAT ≥ 40 and < 50), and participants with none. We opted for a "conservative" analysis strategy by counting the sub-clinical population (i.e., participants with IAT scores between 40 and 50 and VGA scores between 3 and 5) as "non-clinical" when contrasting participants with full criteria of VG and/or Internet addiction.

Secondly, a three-step hierarchical regression was performed in order to identify predictive factors of problematic video gaming. In particular, gender, age (step 1), Internet addiction (step 2), coping strategies, quality of interpersonal relations, internalization, and externalization (step 3) were tested as predictors and VGA score as dependent variable. We opted to test this three-step model in order to single out the contribution of three clusters of potential predictors of problematic VG use. We inserted demographic variables first in order to assess the role of distal factors such as age and gender in the onset of VG problematic use. We opted to insert Internet addiction score as second step in order to test the role of the (speculatively) more significant predictor of VG problematic use, given the fact that both Internet and VG problematic use insist upon the loss of control on the use of new technologies. Finally, we chose to insert as third step a cluster of other potential predictors such as coping strategies (CCSC-R1), internalization/externalization (CBCL), and quality of relationships (TRI). A similar procedure was used in previous works in the field (Milani et al. 2015). Data were analyzed with SPSS 23.0 on a Windows-7 personal computer.

Results

Descriptive Statistics

Participants declared that they used Internet on average for 12.92 h (SD = 13.08) a week. Of the participants, 16.3% ($n = 100$) showed a sub-clinical problematic Internet use, while full-criteria Internet addiction was found in 5.9% of participants ($n = 36$). Of the participants, 15.2% ($n = 93$) showed a sub-clinical problematic use of Video Games (VGA cutoff of 3), while those with a clear IGD (VGA cutoff of 5) were 2.1% ($n = 13$). Finally, 4.5% ($n = 28$) of the participants presented signs of both.

As regards the use of the Internet and online Video Games, 69.2% of the participants regularly use social networks, 53.1% streaming videos (e.g., YouTube), 49.6% learning websites (e.g., Wikipedia), 30.4% news websites, 36.9% e-mails, and finally, 41.7% regularly use online games.

Results are shown in Table 1.

Gender Differences

The distribution of participants who showed sub-clinical problematic Video Game use indicated that males are likely to show this problematic engagement with VG ($\chi^2 = 27.10$;

Table 1 Participants' descriptive statistics

Variable	Mean	SD	Range	Percent
Age	13.86	2.32	9–19	
9–12				31.2
13–15				39.2
16–19				29.6
Gender				
Male				47.2
Female				52.8
Nationality				
Italian				93.8
EU country				3.8
Non-EU country				2.4
Regional distribution participants				
North-east				24.5
North-west				34.3
Central				27.0
South				14.2
Weekly time spent online	12.92	13.08	0–84	
Sub-clinical Internet addiction (IAT cutoff 40)				16.3
Internet addiction (IAT cutoff 50)				5.9
Sub-clinical Internet gaming disorder (VGA cutoff 3)				15.2
Internet gaming disorder (VGA cutoff 5)				2.1
Use of Internet for social networks				69.2
Use of Internet for videos				53.1
Use of Internet for learning websites				49.6
Use of Internet for news websites				30.4
Use of Internet for e-mails				36.9
Use of Internet for online gaming				41.7

$p < 0.001$). In particular, in our sample, the 23.2% of males and the 8.0% of females had a problematic use of VG.

In contrast, the distribution of participants who showed sub-clinical problematic Internet use did not differ on the basis of gender ($\chi^2 = 0.36$; ns) with a prevalence of 16.7% for males and 16.1% for females.

Comparisons Between Participants with IGD (VGA Score ≥ 5), Participants with Sub-Clinical Problematic Video Game Use (VGA Score ≥ 3 and < 5), and Participants Without Any Problematic VG Use by Multivariate ANOVA

In order to better highlight differences between developmental correlates of a full IGD and a sub-clinical problematic Video Games, we performed a series of three MANOVAs to detect significant differences between IGD, sub-clinical, and non-problematic VG users. Gender and age were inserted as covariates, being above or below VGA cutoffs (3 or 5) was inserted as fixed factor, and the following were inserted as dependent variables: CBCL externalization, internalization, and sub-scales; TRI total quality of relationships and sub-scales; CCSC-R1 coping strategy scores; IAT score of problematic Internet use; and weekly time spent online.

The first MANOVA compared the 519 participants without any problematic VG use with the 93 participants with a sub-clinical problematic VG use (VGA score ≥ 3). A main effect was detected for being above the VGA cutoff of 3 (Wilks' $\Lambda = 0.381$, $F = 41.44$, $p < 0.001$, multivariate $\eta^2 = 0.619$). Follow-up ANOVAs (see Table 2) indicate that participants with sub-clinical problematic VG use show worse scores in Internet addiction, coping strategies (higher distraction and avoidance and lower support seeking), in interpersonal relations (mostly with

Table 2 Differences between participants without problematic VG use and participants with a sub-clinical problematic Internet use (VGA score ≥ 3)

Mean scores		Dependent variable	df	F	η	p
Non-problematic VG users	Sub-clinical VG users					
12.62	14.58	Weekly time spent online	1	18.28	0.083	0.001
24.45	33.35	IAT	1	20.44	0.092	0.001
2.38	2.43	CSCC active	1	9.01	0.043	0.001
2.11	2.34	CSCC distraction	1	5.17	0.025	0.01
2.10	2.39	CSCC avoidance	1	9.21	0.043	0.001
2.19	2.18	CSCC support-seeking	1	8.50	0.040	0.001
88.55	86.06	TRI quality of relationship with male peers	1	14.99	0.069	0.001
91.09	83.50	TRI quality of relationship with female peers	1	14.55	0.067	0.001
83.97	77.59	TRI quality of relationship with teachers	1	6.99	0.033	0.001
1.98	2.43	CBCL withdraw	1	3.77	0.018	0.01
1.30	1.12	CBCL somatic complaints	1	6.31	0.030	0.001
1.42	1.98	CBCL social problems	1	7.36	0.035	0.001
0.49	0.88	CBCL thought problems	1	3.82	0.019	0.01
3.01	4.34	CBCL attention problems	1	7.77	0.037	0.001
4.57	6.05	CBCL aggressive behavior	1	5.06	0.024	0.01
6.48	7.24	CBCL internalization	1	4.10	0.020	0.01
5.77	7.67	CBCL externalization	1	3.75	0.018	0.01

female peers and teachers), and in many CBCL syndromic scales, which are withdraw, social problems, thought problems, attention problems, aggressive behavior, internalization, and externalization. They also spend more time online than non-problematic VG users.

The second MANOVA compared the 599 participants without any problematic VG use with the 13 participants with IGD (VGA score ≥ 5). A main effect was detected for being above the VGA cutoff of 5 (Wilks' $\Lambda = 0.750$, $F = 8.50$, $p < 0.001$, multivariate $\eta^2 = 0.250$). As Table 3 shows, follow-up ANOVAs indicate that users with a clinical IGD level show worse scores in Internet addiction, coping strategies (lower active and support seeking, higher distraction), in interpersonal relations (mostly with female peers and teachers), and in several CBCL syndromic scales, which are social problems, attention problems, aggressive behavior, and internalization. Also in this case, they spend more time online than non-problematic VG users.

Finally, the third MANOVA compared the 80 participants with sub-clinical VG problematic use (VGA score ≥ 3 and < 5) with the 13 participants with IGD (VGA score ≥ 5). A main effect was detected for being above the VGA cutoff of 5 (Wilks' $\Lambda = 0.310$, $F = 6.87$, $p < 0.001$, multivariate $\eta^2 = 0.690$). Table 4 shows the follow-up ANOVA results. IGD users' scores are worse in the following scales: Internet addiction, coping strategies (lower active), and in interpersonal relations with female peers. Clinical IGD users more than double the weekly time spent online if compared to sub-clinical users. Also, effect sizes have shown to be more relevant than in the two previous MANOVAs.

Comparisons Between Participants with Internet Addiction (IAT Score ≥ 50), Participants with Sub-Clinical Internet Problematic Use (IAT Score ≥ 40 and < 50), and Participants Without Any Problematic Internet Use by Multivariate ANOVA

Similar to the IGD analyses above, we compared the scores in the scales administered between participants with a clear Internet addiction, participants with a sub-clinical addiction, and those without via three MANOVAs. Again, gender and age were inserted as covariates, and being

Table 3 Differences between participants without problematic VG use and participants with clear IGD (VGA score ≥ 5)

Mean scores		Dependent variable	df	F	η	p
Non-problematic VG users	Clinical IGD users					
12.62	26.80	Weekly time spent online	1	23.97	0.106	0.001
25.42	43.58	IAT	1	14.30	0.066	0.001
2.39	2.20	CSCC active	1	7.94	0.038	0.001
2.14	2.53	CSCC distraction	1	3.79	0.018	0.01
2.19	2.02	CSCC support-seeking	1	8.17	0.039	0.001
88.20	86.76	TRI quality of relationship with male peers	1	14.63	0.067	0.001
90.30	73.46	TRI quality of relationship with female peers	1	14.93	0.069	0.001
83.29	69.30	TRI quality of relationship with teachers	1	6.15	0.029	0.001
1.28	0.92	CBCL somatic complaints	1	6.33	0.030	0.001
1.50	1.53	CBCL social problems	1	6.19	0.030	0.001
3.19	4.30	CBCL attention problems	1	3.92	0.019	0.01
4.79	5.07	CBCL aggressive behavior	1	2.72	0.013	0.05
6.59	6.61	CBCL internalization	1	3.24	0.016	0.05

Table 4 Differences between participants with sub-clinical problematic VG use (VGA score ≥ 3 and < 5) and participants with clear IGD (VGA score ≥ 5)

Mean scores		Dependent variable	df	F	η	p
Sub-clinical VG users	Clinical IGD users					
12.59	26.80	Weekly time spent online	1	5.63	0.160	0.001
31.68	43.58	IAT	1	2.46	0.077	0.06
85.95	86.76	TRI quality of relationship with male peers	1	7.46	0.201	0.001
85.13	73.46	TRI quality of relationship with female peers	1	5.69	0.161	0.001

above or below IAT cutoffs (40 or 50) was inserted as fixed factor. Dependent variables were CBCL externalization, internalization, and sub-scales; TRI total quality of relationships and sub-scales; CCSC-R1 coping strategy score; VGA score of gaming addiction; and weekly time spent online.

The 512 participants without Internet addiction were compared to the 100 with an IAT score higher than 40. A main effect for the 40 cutoff of IAT was found (Wilks' $\Lambda = 0.478$, $F = 27.80$, $p < 0.001$, multivariate $\eta^2 = 0.522$). Table 5 reports the follow-up ANOVAs. Results show that participants with a sub-clinical Internet addiction have worse VGA score of game addiction, worse interpersonal relations (with mothers, fathers, male and female peers, and teachers), tend to have worse coping strategies, show more developmental adaptation difficulties (withdrawal, somatic complaints, anxiety/depression, social and attention problems, aggression, internalization, and externalization), and spend more time online.

Table 5 Differences between participants without Internet addiction and participants with a sub-clinical IA (IAT score ≥ 40)

Mean scores		Dependent variable	df	F	η	p
Non-Internet addicts	Sub-clinical Internet addicts					
11.21	21.64	Weekly time spent online	1	37.24	0.155	0.001
1.22	2.04	VGA	1	35.95	0.151	0.001
2.36	2.52	CSCC active	1	10.25	0.048	0.001
2.11	2.34	CSCC distraction	1	6.57	0.031	0.001
2.10	2.34	CSCC avoidance	1	6.32	0.030	0.001
2.18	2.24	CSCC support-seeking	1	8.19	0.039	0.001
87.74	90.15	TRI quality of relationship with male peers	1	14.66	0.068	0.001
90.37	87.77	TRI quality of relationship with female peers	1	14.45	0.067	0.001
83.63	79.84	TRI quality of relationship with teachers	1	4.89	0.024	0.001
2.03	2.16	CBCL withdraw	1	2.59	0.013	0.05
1.24	1.44	CBCL somatic complaints	1	6.52	0.031	0.001
3.25	4.12	CBCL anxiety/depression	1	3.15	0.015	0.05
1.45	1.76	CBCL social problems	1	7.01	0.034	0.001
3.04	4.07	CBCL attention problems	1	7.34	0.035	0.001
4.64	5.63	CBCL aggressive behavior	1	4.41	0.021	0.01
6.42	7.57	CBCL internalization	1	4.07	0.020	0.01
5.85	7.20	CBCL externalization	1	3.11	0.015	0.05

We then compared the 576 participants without Internet addiction to the 36 with an IAT score higher than 50. The 50 cutoff of IAT provided a significant effect (Wilks' $\Lambda = 0.657$, $F = 13.25$, $p < 0.001$, multivariate $\eta^2 = 0.343$). ANOVAs show that participants with IA have worse relations in two sub-scales of TRI (female peers and teachers) but better relations with male peers. They recur more to distraction and avoidance coping and have higher scores in many sub-scales of CBCL (withdrawal, somatic complaints, anxiety/depression, social problems, attention problems, delinquent behavior, aggressive behavior, internalization, and externalization). They have also higher score of addiction to VGs and spend more time online (cf. Table 6).

Finally, we compared the 64 participants with sub-clinical Internet addiction to the 36 with a clear Internet addiction. Again, the 50 cutoff of IAT provided a significant effect (Wilks' $\Lambda = 0.264$, $F = 8.83$, $p < 0.001$, multivariate $\eta^2 = 0.736$). Table 7 shows the results of the follow-up ANOVAs; participants with clear IA spend more time online, have worse VGA scores, worse coping strategies, worse interpersonal relations with female peers, and more problems of anxiety/depression, delinquent behavior, and internalization.

Predictors of Video Game Addiction

As can be seen in Table 8, gender is a significant and relevant predictor of Video Game addiction score in all three steps (β assumes a negative value because gender has been categorized as 1 = male and 2 = female; therefore, male gender appears to be a risk factor of problematic VG use).

Also, age is a significant predictor in all three steps, but its predictive weight is moderate. Internet Addiction Test score is the single most relevant predictor in the second and in the third step of the analyses. In the third step, moreover, avoidant and distraction coping qualify as a significant predictor of Video Game addiction as measured by VGA score. A potential protective factor is the quality of relations with teachers.

Table 6 Differences between participants without Internet addiction and participants with a clear IA (IAT score ≥ 50)

Mean scores		Dependent variable	df	F	η	p
Non-Internet addicts	Internet addicts					
12.07	25.92	Weekly time spent online	1	31.93	0.136	0.001
1.28	2.46	VGA	1	33.21	0.141	0.001
2.37	2.61	CSCC active	1	10.04	0.047	0.001
2.13	2.44	CSCC distraction	1	5.48	0.026	0.001
2.13	2.40	CSCC avoidance	1	3.37	0.016	0.01
2.18	2.28	CSCC support-seeking	1	8.50	0.040	0.001
87.86	93.19	TRI quality of relationship with male peers	1	15.17	0.070	0.001
90.28	84.86	TRI quality of relationship with female peers	1	14.67	0.067	0.001
83.39	76.44	TRI quality of relationship with teachers	1	5.29	0.026	0.001
2.01	2.69	CBCL withdrawn	1	3.48	0.017	0.01
1.27	1.41	CBCL somatic complaints	1	6.30	0.030	0.001
3.28	5.00	CBCL anxiety/depression	1	4.31	0.021	0.01
1.48	1.91	CBCL social problems	1	6.82	0.033	0.001
3.13	4.44	CBCL attention problems	1	6.02	0.029	0.001
1.21	2.44	CBCL delinquent behavior	1	4.06	0.020	0.01
4.69	6.52	CBCL aggressive behavior	1	4.95	0.024	0.01
6.45	8.88	CBCL internalization	1	4.98	0.024	0.01
5.88	9.08	CBCL externalization	1	5.15	0.025	0.01

Table 7 Differences between participants with Internet addiction (IAT score ≥ 50) and participants with a pre-clinical (IAT score ≥ 40 and < 50)

Mean scores		Dependent variable	<i>df</i>	<i>F</i>	η	<i>p</i>
Sub-clinical Internet addicts	Internet addicts					
19.04	25.92	Weekly time spent online	1	5.15	0.140	0.001
1.83	2.53	VGA	1	5.55	0.149	0.001
2.27	2.44	CSCC distraction	1	2.85	0.083	0.05
2.20	2.28	CSCC support-seeking	1	5.68	0.152	0.001
88.42	93.19	TRI quality of relationship with male peers	1	3.93	0.110	0.05
89.58	84.86	TRI quality of relationship with female peers	1	2.91	0.084	0.05
3.61	5.00	CBCL anxiety/depression	1	3.28	0.094	0.05
1.12	2.44	CBCL delinquent behavior	1	3.07	0.089	0.05
6.84	8.88	CBCL internalization	1	3.11	0.090	0.05

Discussion

Results of our research, on the whole, seem to indicate that children and adolescents affected by IGD and Internet addiction (both at pre-clinical and clinical levels) are characterized by worse quality of interpersonal relations, worse coping strategies, and some developmental adaptation issues, which are anxiety/depression, withdrawal, social problems, thought problems, attention problems, aggressive behavior, internalization, and externalization. Data show a pattern of partial overlap between IGD and Internet addiction; both are related with more adaptation problems and poorer coping strategies. However, results also suggest that while Internet addiction prevalence is evenly distributed between male and female participants, IGD seems to be particularly prevalent among males.

Results showed that sub-clinical problematic VG use seems to be slightly more widespread among Italian adolescents (16.3%) than problematic Internet use (15.2%). However, adopting a full five-criteria cutoff for determining clear IGD as recommended in DSM-5, the prevalence

Table 8 Predictors of the VGA score for Video Game addiction

Predictors	R^2	β	<i>t</i>
Step 1	0.094***		
Age		-0.152	-3.929**
Gender		-0.255	-6.584***
Step 2	0.210***		
Age		-0.208	-5.699***
Gender		-0.262	-7.252***
Internet Addiction Test		0.350	9.611***
Step 3	0.265***		
Age		-0.194	-4.896***
Gender		-0.246	-6.488**
Internet Addiction Test		0.280	7.545***
CSCC distraction		0.092	2.305*
CSCC avoidance		0.180	3.926***
TRI quality of relations with teachers		-0.265	-4.002***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

drops to 2.1%. Consistent with many previous correlational studies, IGD appears to be linked to various dysfunctional outcomes including a wide range of psychological symptoms and behavioral and social problems (Batthyány et al. 2009; Brunborg et al. 2014; Caplan et al. 2009; Chan and Rabinowitz 2006; Collins et al. 2012; Dreier et al. 2017; Kim et al. 2008; Müller et al. 2015; Rehbein et al. 2010, 2015). Our results are of particular interest given the fact that maladaptive outcomes in participants were assessed via cross-informant method. CBCL scale was administered to parents, and results clearly show that VG and Internet addicts tend to show worse adaptation in key areas of development, which are anxiety/depression, withdrawal, social problems, thought problems, attention problems, aggressive behavior, internalization, and externalization. Moreover, as the MANOVAs highlighted, comparing users with sub-clinical addiction with users with full-criteria addiction, effect sizes tend to increase. We are inclined to interpret this result as evidence of the higher impact of symptoms in addicted participants compared to sub-clinical addict.

The issue about the relation between coping strategies and IGD has been less investigated in the literature. Prior research shows that media addicts tend to use media as a coping strategy when facing difficulties (Wölfling & Müller 2009). Also, Reinecke (2009) found evidence about the importance of games as a coping strategy, albeit not in connection with addiction or risk of addiction. The recent work of Dreier et al. (2017) showed that gaming addicts tend to recur to both to media-related coping (i.e., trying to forget a problem by using media) and to cognitive/behavioral strategies (i.e., denial, distraction, behavioral disengagement) to deal with stressors. Although our survey did not include variables about media-specific coping strategies, our results are completely coherent with those of Dreier et al. In our sample, the results of the present study suggest that problematic video gamers tend to preferentially adopt dysfunctional coping strategies as distraction and avoidance, so VGs may represent a means to cope with problems and difficulties. This result is likely to be a key point; literature shows that escapism as gaming motivation significantly predicts excessive gaming (Kuss et al. 2012) and that gamers with maladaptive coping style may be more vulnerable to developing Video Game addiction (Loton et al. 2015). Future studies should focus on the correlation between coping strategies (both media-specific and non-media specific) and the risk of addiction.

There seems to be a close relationship between IGD and Internet addiction. In fact, Video Game addicts spend more time online and showed higher scores on the IAT than other adolescents. This result needs more investigation, considering that it is difficult to distinguish these phenomena because of their partial overlap, based on online games' large diffusion. However, this evidence is consistent with studies that pointed out that the use of online games constitutes a risk of the addiction's development because of their incentives to maintain a high level of VG engagement (e.g., developing the character through levels, high degree of identification with the avatar, social recognition and appreciation) (Kuss 2013; Yee 2006). Rehbein and Mößle (2013) investigated these forms of addiction separately, showing that Video Game addiction and Internet addiction mainly occur independently from one other and are linked with two different patterns of socio-demographic correlates in their sample. Nonetheless, a certain level of comorbidity emerged; in particular, 26% of the Video Game addicted participants also fulfilled the criteria for IA and the 6.5% of the Internet addicted students also fulfilled the criteria for VG addiction. Consistent with the study performed by Rehbein and Mößle (2013), the present research found that Internet and VG addiction mainly occurred independently among Italian adolescents, although 4.5% of the participants fulfilled the criteria for both of them. Moreover, our study revealed some differences between problematic VG users and problematic Internet users. In fact, participants with problematic Internet

use seem to be evenly divided by gender, while those with problematic VG use seem to be mostly male adolescents.

A second aim of the present research was to better discriminate the characteristics of adolescents with a sub-clinical problematic VG use and those with full IGD, as well as to discriminate characteristics of participants with sub-clinical Internet addiction and those of participants with full IA. Results of the MANOVAs show that users that have a sub-clinical condition tend to have slightly better coping strategies, worse relations with male peers but better relations with female peers. On the whole, these results suggest that moving from sub-clinical problematic VG or Internet use to clear IGD or IA, relations with male and female peers tend to diverge; it seems that as the degree of addiction increases, users are more at ease with male peers than with female peers. Users with IA seem to have a similar pattern of maladaptive characteristics. Given the differences in gender distribution of problematic VG use found in our sample, it seems that addicted gamers tend to refrain from interacting with girls and limit their relations to a male-dominated and computer-mediated milieu. This may be a result of game-addicted youth to change their peer groups to include primarily other gamers. Similar results, indicating clear gender differences in VG addiction, have been recently published (Schou Andreassen et al. 2016).

Finally, the third aim of the study was the identification of predictive risk factors for IGD. As emerged from the hierarchical regression, significant predictors appear to be age, gender, the IAT score, and the avoidance coping strategy. Therefore, consistent with the literature (King et al. 2011), the profile of an Italian video gamer at risk of addiction appears to be male, prone to develop a problematic Internet use, and resorting preferentially to avoidant coping strategies when in stressful situations. Of particular interest is the influence of age; it seems that as children grow older, they are less prone to VG addiction in our sample. Contrarily to some studies (cf. Li and Wang 2013; Gentile 2009; Kim et al. 2008), which excluded age as a predictor for VG addiction, our data show that age can be correlated with the risk of potential IGD. In this, our data are coherent with some of the literature on IGD (cf. Mentzoni et al. 2011; Van Rooij et al. 2011). This result, albeit somewhat in contrast with literature on the topic, draws attention to the potential risk of addiction also in younger children and invites more attention in future research.

Quality of teacher relations emerged as a potential protective factor for IGD. This result is coherent with the study of Stavropoulos et al. (2016); a good classroom functioning and climate is a longitudinal protective factor against the onset of IGD, probably because high-functioning classrooms provide better socializing contexts than low-functioning classrooms. Indeed, it seems that—besides the quality of social relations in the informal environment, namely, parents and friends—also developing positive and engaging relations in “formal” setting such as school may represent a buffering factor that counterbalance the risk of developing an addiction to media. Future research should address this issue, ideally focusing more specifically on the dynamics of building and strengthening relations both with schoolmates and teachers in the school setting.

Limitations and Future Directions

One limitation of the study is its cross-sectional methodology. Unfortunately, we were not in the position to collect longitudinal data at this first installment of the research. Future research should include a longitudinal method in order to better represent the developmental course of this proposed disorder.

One strength of this study is that data were gathered from several regions of the country. Nonetheless, participants were mainly from the two primary metropolitan areas of Italy (Milan and Rome); thus, the conclusions we propose apply mainly to youth from dense urban areas. Another strength is the multiinformant method; questionnaires were administered both to children/adolescents and their parents, increasing the reliability and generalizability of the results regarding maladaptive outcomes in addicts and sub-clinical addicts to VGs and Internet.

Notwithstanding these limitations, our research is the first—to our knowledge—to directly address IGD in Italy and is one of the few that try to deepen the knowledge about the intertwine of this potentially unhealthy behavior to Internet addiction. Our research is also one of the few to use a cross-informant methodology in the field of Internet/VG problematic use.

Data allow us to draw some preliminary conclusions; VG and Internet addictions seem to stem from a similar configuration of developmental problems in terms of interpersonal relations and coping strategies. Moreover, they seem to be a mutual risk factor of each other.

More research is needed in this topic in order to better understand this phenomenon.

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Compliance with Ethical Standards

Statement 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 (5). Informed consent was obtained from all participants for being included in the study.

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