

## ONLINE GAMING AND PROLONGED SELF-ISOLATION: EVIDENCE FROM ITALIAN GAMERS DURING THE COVID-19 OUTBREAK

Alessandro Giardina, Maria Di Blasi, Adriano Schimmenti, Daniel L. King, Vladan Starcevic, Joël Billieux

### Abstract

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**Objective:** The self-isolation measures employed during the COVID-19 pandemic made it difficult for basic needs to be met, thus increasing emotional distress. It has been suggested that socially meaningful online gaming buffered emotional distress during the lockdown. This study aimed to test the protective effect of online gaming during the lockdown and to investigate the differences between highly involved gamers (those who play videogames intensely without adverse consequences) and problematic gamers in this regard.

**Method:** Capitalizing on a data collection that started before the pandemic, we adopted a cross-sectional between-groups study design in which gaming patterns, gaming-related variables and levels of emotional distress were compared between a pre-COVID group (N=298) and a COVID group (N=366).

**Results:** Compared to the pre-COVID group, high involvement in gaming was more prominent and emotional distress was decreased in the COVID group. Moderated regression analyses further revealed that the interaction between social compensation via gaming and highly involved gaming was associated with lower levels of emotional distress in the COVID-19 group. In contrast, the interaction between gaming-related relaxation and problematic gaming predicted higher emotional distress in the COVID-19 group.

**Conclusions:** This study suggests that gaming for social compensation might mitigate the experienced emotional distress during pandemic related self-isolation, whereas maladaptive gaming patterns could constitute a vulnerability factor deserving clinical attention.

**Key words:** COVID-19, online gaming, problematic gaming, emotional distress, anxiety, depression

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### Introduction

The COVID-19 pandemic has forced most countries to impose self-isolation<sup>1</sup> measures in an effort to slow and/or prevent the spread of the infection. These measures have drastically changed everyday life, with relevant implications for mental health. Recent articles

<sup>1</sup> The term “self-isolation” has been preferred due to its more common use, but the authors are aware that other equivalent terms exist (e.g., Abel & McQueen, 2020).

have documented a variety of psychopathological manifestations as a consequence of self-isolation and quarantine (Pfefferbaum & North, 2020; Brooks et al., 2020). Moreover, there is a growing evidence that symptoms of anxiety and depression have increased substantially during the COVID-19 pandemic (Shanahan et al., 2020; Qiu et al., 2020; Schimmenti et al., 2020; Huang & Zhao, 2020). Against this background, people have been trying to find novel ways of keeping in touch and feeling close with others, so as to minimize the

negative impact of self-isolation. In this sense, the vast virtual environment which characterizes online games, is potentially safe for meeting needs (e.g., social affiliation and feeling of competence) that cannot be met under the conditions of a pandemic-imposed self-isolation. Accordingly, it seems that during the COVID-19 pandemic, there has been a significant increase in online gaming and various online activities, such as e-sports watching and live streaming (Balhara et al., 2020; Global Games Market, 2020; King et al., 2020; Koivisto & Hamari, 2019; Lepido & Rolander, 2020; Pantling, 2020; Stephen, 2020). A multidisciplinary group of experts on problematic Internet use has produced a consensus guidance about potential risks and good practices regarding Internet use during a pandemic-imposed self-isolation (Király et al., 2020). Similarly, the World Health Organization has supported a campaign launched by the gaming industry #PlayApartTogether, which aimed to encourage salubrious online gaming activities, especially those that promote social interaction (<https://www.businesswire.com/news/home/20200328005018/en/Games-Industry-Unites-Promote-World-Health-Organization>). This support is largely based on the recognition of the protective and even therapeutic value of video games in the context of emotional distress (Bean, 2018; Colder Carras et al., 2018). For example, Bown and Gackenbach (2016) showed that soldiers who participated in multiplayer combat video games report a greater ability to cope with nightmares and corresponding negative affect compared to those who did not play (Gackenbach et al., 2018), suggesting that videogame involvement might promote an emotional processing value comparable to that of dreams. Relatedly, having gaming-related social capital (referring to the quality and quantity of a gaming-related social networks) and being intrinsically motivated to play for social reasons have been consistently reported as protective factors and a sign of healthy involvement in video games (Billieux et al., 2013; Korkeila & Hamari, 2020; Mandryk et al., 2020). The emotional protective value of gaming also seems to be related to a compensatory function, i.e. the potential for fulfilling through the game basic needs related to competence, autonomy and social affiliation that cannot be met otherwise (Kardefelt-Winther, 2014; Snodgrass et al., 2018; Allen & Anderson, 2018; Ryan et al., 2006). Such function could be particularly relevant for the self-isolation context. Nevertheless, it is important to recognize the qualitative distinction between “high-but-healthy” involvement in online gaming (highly involved gaming) and dysfunctional involvement in online gaming (problematic gaming). Indeed, the former denotes a personally enriching and socially meaningful activity, whereas the latter refers to gaming patterns that interfere with daily functioning and social relationships (Billieux et al., 2019; Charlton & Danforth, 2007). It can be assumed that during a pandemic-imposed self-isolation gaming may protect highly involved gamers against emotional distress. In contrast, gaming may have uncertain effects and be potentially detrimental in problematic gamers. The evidence currently available about the effects of gaming on anxiety and depressive symptoms in the context of a pandemic is scarce.

### Present study

The first aim of the current study was to compare emotional distress (indicated by the severity of anxiety and depression symptoms) in two independent groups of online gamers, before and during the COVID-19 outbreak-related lockdown (RQ1). Our second aim

was to determine whether compensatory involvement in online games (i.e., gaming for satisfaction of unmet needs) and gaming for relaxation or for emotional coping might protect highly involved or problematic gamers against COVID-19-related emotional distress (RQ2). This study provides a unique opportunity to better understand the impact of online gaming on depression and anxiety symptoms in the context of the pandemic and compare its effects according to different gaming patterns.

## Method

### Procedure

Participants were recruited from an ongoing online survey aiming to study escapism and dissociation-like phenomena in gamers<sup>2</sup>. The survey was posted on Italian Facebook groups of different videogames genres (MOBA, BR, MMORPGs, FPS, RTS and sport games<sup>3</sup>). To incentivize participation, players had 1 out of 100 chances to win an Amazon's Coupon of 20 euros and one additional chance to win a final lottery for a one-year subscription to a service of their choice (e.g. Netflix, PlayStation Plus, Xbox Live), valued at around 100 euros. Data collection started on February 14, 2020 and ended on April 3, 2020. For the purpose of the current study, the sample of gamers was divided into two groups (pre-COVID group and COVID group) based on whether the data were collected before or during the COVID pandemic. The Italian lockdown started on March 10, 2020. The pre-COVID group consisted of participants who completed the survey from February 14, 2020 to March 10, 2020. In the absence of the relevant evidence from the scientific literature, the research team considered two weeks as a sufficiently long period for experiencing confinement-related effects, with the COVID group therefore consisting of participants who completed the survey from March 28, 2020 to April 3, 2020. Data collected between March 11, 2020 and March 27, 2020 were excluded from the analysis. The survey comprised socio-demographic information (age, sex, education level), gaming-related variables (time spent on gaming per week, online game genre preferences, use of fixed vs mobile gaming devices and social gaming habits), gaming-related questionnaires (distinguishing between highly involved and problematic gaming) and measures of emotional distress (depression and anxiety). The survey was administered in a way that did not allow skipping questions. Therefore, there were no missing data.

The present study followed all the guidelines for the experimental investigation with human subjects required by the University of Luxembourg. Participants gave online consent prior to starting the online survey. Participation was voluntary. Anonymity of the participants was guaranteed.

### Participants

The minimum age for participating in the survey was 18. Descriptive statistics for both samples are reported

<sup>2</sup> A list of all measures used in the study (including measures not considered here) is available from the Open Science Framework: DOI: <https://osf.io/vgrwk/>

<sup>3</sup> MOBA= Multiplayer Online Battle Arena; BR = Battle Royal; MMORPGs = Massive Multiplayer Online Role-Playing Games; FPS = First Person Shooter; RTS = Real Time Strategy

in **table 1**. The total sample consisted of 664 players, predominantly males (91.3%, N=606) ranging in age from 18 to 58 years (M=23.59, SD=6.27). In comparison with the pre-COVID group, the COVID group was characterized by a younger mean age (M=22.2, SD=5.1), slightly more hours per week spent gaming (M=22.5, SD=16.5), higher frequency of playing FPS games (98.1%, N=359) and a greater percentage of

**Table 1. Demographics, Psychosocial and Game-related variables: differences between pre- and COVID group**

	Overall M (±SD) or N (%)		Pre-COVID (N =298) M (±SD) or N (%)		COVID (N =366) M (±SD) or N (%)		Ranges	t(df)	p	r
<b>Education</b>										
Primary school	3	(0.5%)	2	(0.7%)	1	(0.3%)	//	//	//	//
Middle School	158	(23.8%)	61	(20.5%)	97	(26.5%)	//	//	//	//
High school	440	(66.3%)	195	(65.4%)	245	(66.9%)	//	//	//	//
Bachelor/Master's	60	(9.0%)	39	(3.1%)	21	(5.7%)	//	//	//	//
PhD	3	(0.5%)	1	(0.3%)	2	(0.5%)	//	//	//	//
<b>Videogame Genre (multiple choice)</b>										
FPS	514	(77.4%)	155	(52%)	356	(98.1%)	//	//	//	//
BR	344	(51.8%)	199	(66.8%)	145	(39.1%)	//	//	//	//
MMORPG	185	(27.9%)	117	(39.3%)	68	(18.6%)	//	//	//	//
MOBA	60	(9%)	39	(13.1%)	21	(5.7%)	//	//	//	//
RTS	56	(8.4%)	28	(9.4%)	28	(7.7%)	//	//	//	//
Sport Games	254	(38.3%)	100	(33.6%)	154	(42.1%)	//	//	//	//
<b>Stable Community vs Lone Player</b>										
Stable community	385	(58%)	145	(48.7%)	240	(65.6%)	//	//	//	//
Lone/casual companies	279	(42%)	153	(51.3%)	126	(34.4%)	//	//	//	//
<b>Age</b>	<b>23.59 (±6.27)</b>		<b>25.18 (±7.15)</b>		<b>22.27 (±5.10)</b>		<b>18-58</b>	<b>5.904</b> <sub>(521)</sub>	<b>.001</b>	<b>.25</b>
<b>Weekly hours of play</b>	<b>21.47 (±16.46)</b>		<b>20.20 (±16.3)</b>		<b>22.51 (±16.50)</b>		<b>1-135</b>	<b>-1.798</b> <sub>(662)</sub>	<b>.073</b>	<b>//</b>
<b>Highly Involved Gaming (VIS)</b>	<b>38.46 (±7.73)</b>		<b>37.32 (±8.20)</b>		<b>39.39 (±7.20)</b>		<b>16-59</b>	<b>-3.414</b> <sub>(597)</sub>	<b>.001</b>	<b>.14</b>
<b>Problematic Gaming (IGDT-10)</b>	<b>5.44 (±3.24)</b>		<b>5.57 (±3.45)</b>		<b>5.33 (±3.06)</b>		<b>0-17</b>	<b>.951</b> <sub>(600)</sub>	<b>.287</b>	<b>//</b>
<b>Emotional Distress (DASS-21)</b>	<b>7.82 (±7.41)</b>		<b>8.87 (±7.95)</b>		<b>6.98 (±6.84)</b>		<b>0-40</b>	<b>3.242</b> <sub>(589)</sub>	<b>.001</b>	<b>.13</b>
<b>Social Compensation</b>	<b>2.14 (±1.25)</b>		<b>2.19 (±1.26)</b>		<b>2.09 (±1.24)</b>		<b>1-5</b>	<b>1.095</b> <sub>(662)</sub>	<b>.274</b>	<b>//</b>
<b>Achievement Compensation</b>	<b>2.35 (±1.20)</b>		<b>2.33 (±1.23)</b>		<b>2.37 (±1.17)</b>		<b>1-5</b>	<b>-.462</b> <sub>(662)</sub>	<b>.664</b>	<b>//</b>
<b>Gaming-related Relaxation</b>	<b>3.53 (±.957)</b>		<b>3.48 (±1.02)</b>		<b>3.56 (±.901)</b>		<b>1-5</b>	<b>-1.052</b> <sub>(597)</sub>	<b>.293</b>	<b>//</b>
<b>Gaming Emotional Coping</b>	<b>2.76 (±1.27)</b>		<b>2.81 (±1.28)</b>		<b>2.73 (±1.27)</b>		<b>1-5</b>	<b>.762</b> <sub>(662)</sub>	<b>.447</b>	<b>//</b>

Note. M = Mean; SD = Standard Deviation; df = degree of freedom; MOBA= Multiplayer Online Battle Arena; BR = Battle Royal; MMORPGs = Massively Multiplayer Online Role-Playing Games; FPS = First Person Shooter; RTS = Real Time Strategy; Degrees of freedom for Age, High-but-healthy Involvement, Problematic Gaming, Emotional Distress and Gaming Relaxation were adjusted according to results of Levene's test.

**Table 2. Questionnaires used in the online survey and their (sub)scales**

Questionnaire	Likert scale	Variables assessed by questionnaires	Description of dimensions and examples of items	Reliability coefficient (α)
Depression, Anxiety and Stress Scale-21	0-4	Emotional Distress	Aggregated score of anxiety and depression symptoms (stress items are not taken into account)	.90
Internet Gaming Disorder Test-10	0-3	Problematic Gaming	Problematic gaming symptoms according to DSM-5 Internet Gaming Disorder criteria (APA, 2013)	.72
Videogames Involvement Scale	1-5	High Involvement in Gaming (high-but-healthy involvement in online games)	Achievement and socially oriented adaptive gaming patterns (high involvement in gaming)	.82
Gaming Compensation Items	1-5	Gaming Social Compensation	"Enjoying the sense of belonging that comes with being a part of a community of gamers (e.g., guilds, teams or general communities) prevents me from feeling lonely"	//
		Gaming Achievement Compensation	"I get involved in gaming activities that give me a sense of personal effectiveness (e.g., follow clear rules; achieve objectives; receive timely feedback) in order to balance the feeling of a stressful lack of control over some events in my life"	//
		Gaming Relaxation	"Engaging in gaming provides me with a feeling of calm, relaxation and of being in control"	//
		Gaming Emotional Coping	"I engage in gaming that helps me cope with my negative emotions (e.g. anger, loneliness) in a more suitable environment"	//

Note. Cronbach's alpha is not reported for Gaming Compensation Items since each of the four constructs is assessed by means of only one item (see Methods).

players reporting a stable gaming community (65.6%, N=240).

## Measures

A summary of the scales and their internal reliability are reported in **table 2**<sup>4</sup>. Emotional distress was measured by summing the anxiety and depression subscale scores of the Italian version of the Depression, Anxiety and Stress Scale 21-Item Version (DASS-21; Bottesi et al., 2015; Osman et al., 2012). In this study, scores on the stress subscale were not included in data analyses to avoid internal imbalance in the emotional distress measure, given that 1) high stress levels are very common during the pandemic and that 2) “stress” has been suggested to be a complex syndrome deserving a stand-alone consideration in such a context (Horesh & Brown, 2020). Problematic gaming was measured through an Italian adaptation of the Internet Gaming Disorder Test, 10-Item Version (IGDT-10) and treated as a continuous variable in a way similar to that proposed in the validation study of the scale (Kiraly et al., 2017). However, in this study we decided to exclude from analyses item 8 of the IGDT-10 that assesses “mood relief” to avoid (1) the overlap with Gaming Compensation Items and (2) the risk of over-pathologizing normal behavior, as recommended in relation to this measure by King and colleagues (2020). High involvement in gaming (as defined by Billieux et al., 2019; Charlton & Danforth, 2007) has been assessed via the Italian adaptation of the ethnographically validated 15-item scale for involvement in gaming by Snodgrass et al. (2017). This instrument is referred to as Videogame Involvement Scale (VIS) for the purpose of the current study. The scale is partly based on Yee’s (2006) tripartite online gaming motivational framework. Higher scores on the VIS reflect higher motivation (in terms of achievement, socialization and immersion), commitment and passion about gaming. However, in our original study design, the 3 immersion-related items were omitted to avoid an overlap with other items used in the current study (see procedure section), in accordance with the recommendations by Snodgrass et al. (2018). Thus, the measure that was administered consisted of 12 items. The involvement in online games to compensate for the sense of loneliness or poor achievement offline, to relax and cope with adverse emotions was assessed via four items, each rated on a 5-point Likert scale (1=Not at all representative; 5=Fully representative). These were named “Gaming Compensation Items”<sup>5</sup> (**table 2**). The four items were selected from a broader pool of items generated to study compensatory involvement and dissociation in gaming<sup>6</sup>. The selection of the items was driven by the postulated domains (e.g. achievement, socialization) that the pandemic and lockdown could have affected negatively.

<sup>4</sup> The measures used in the study can be retrieved from: DOI <https://osf.io/vgrwk/>

<sup>5</sup> These items were grouped in the same category of “Gaming Compensation Items” to avoid using multiple terms (e.g., when describing the results), yet we acknowledge that various items measure different constructs potentially reflecting different psychological processes.

<sup>6</sup> The entire databank of items for this measure is available at: <https://osf.io/vgrwk/>

## Statistical Analyses

T-tests for independent samples were performed to evaluate the differences between pre-COVID and COVID groups, followed by Pearson’s correlation analyses to check for relations and potential multicollinearity-related issues among the variables. Finally, the PROCESS version 22 macro was used to run eight moderated multiple regression models per group (pre-COVID versus COVID group, for a total of 16 models) in order to test the protective effect of gaming during self-confinement in highly involved and problematic gamers. For each group, four models included highly involved gaming (VIS) as a focal predictor (i.e., the variable interacting with the moderator) and four models included problematic gaming (IGDT-10) as a focal predictor. Thus, the specific interactions between each gaming compensation item (4 items) and each gaming pattern (highly involved versus problematic gaming) were tested in both groups of gamers (pre-COVID and COVID). Problematic gaming and high involvement in gaming were included as covariates when they were not considered as the focal variable, together with sex, age, education level, game genres (all game genres coded as binary variables), weekly hours spent gaming and gaming compensation items not used as moderators in each model. Preacher and colleagues (2006) approach was followed to probe significant interactions.

## Results

Descriptive statistics, including *t*-tests for differences between pre-COVID and COVID groups with degrees of freedom adjusted according to Levene’s test, are presented in **table 1**. Correlations between the variables for the entire sample are reported in **table 3**. On the whole, results show increased levels of highly involved gaming ( $t_{(597)} = -3.414, p < .005, r = 0.14$ ) and decreased emotional distress scores ( $t_{(589)} = 3.242, p < .005, r = 0.13$ ) in the COVID group. All variables of interests showed significant, positive and weak to moderate associations with emotional distress.

### Moderated multiple regressions

Results of the moderated multiple regressions are summarized in **table 4**. When highly involved gaming was the focal predictor, results showed a small-sized yet significant interaction of gaming social compensation ( $\beta = -.076, t_{(348)} = -2.16, p < .05$ ) and gaming-related relaxation ( $\beta = .098, t_{(348)} = 2.22, p < .05$ ) in the COVID group, which was not present in the pre-COVID group ( $\beta = .041, t_{(280)} = 1.05, p = .293; \beta = -.001, t_{(280)} = -.028, p = .977$ ).

High levels of gaming social compensation (+1SD = 3.33,  $\beta = -.19, t_{(348)} = -2.78, p < .01$ ) and low levels of gaming-related relaxation (-1SD = 2.66,  $\beta = -.19, t_{(348)} = -2.86, p < .01$ ) strengthened the negative relationship between highly involved gaming and emotional distress (**figures 1 and 2**, respectively). As shown in **figure 3**, when problematic gaming was the focal predictor, a significant effect was only found for gaming-related relaxation ( $\beta = .24, t_{(348)} = 2.40, p < .05$ ), such that in the COVID group a greater gaming-related relaxation strengthened the positive relationship between problematic gaming and emotional distress (-1SD=2.66,  $\beta = .82, t_{(348)} = 5.60, p < .0001; \pm 0SD=3.56, \beta = 1.05, t_{(348)} = 8.93, p < .0001; +1SD=4.46, \beta = 1.27, t_{(348)} = 8.50, p < .0001$ ). This effect was not present in the pre-COVID group.

**Table 3.** Pearson correlations between Problematic Gaming, Gaming Involvement, Distress and Compensation through gaming

Measures	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Sex	1																
2. Age	.140**	1															
3. Education	.085*	.234**	1														
4. FPS genre	-.212**	-.282**	-.124**	1													
5. BR genre	.019	-.083*	-.063	-.24	1												
6. MMORPG genre	.026	.262**	.134**	-.186**	-.107**	1											
7. MOBA genre	-.025	.015	.053	-.081*	.031	.179**	1										
8. RTS genre	-.019	-.068	-.016	-.005	.097*	.017	-.020	1									
9. Sport Games	-.208**	-.122**	-.050	.121**	.096*	-.137**	-.108**	.018	1								
10. Hours/week	.024	-.041	-.033	.056	-.005	.091*	.071	-.028	-.080*	1							
11. IGDT-10	-.046	-.133**	-.005	.003	.030	.080*	.074	-.011	-.050	.191**	1						
12. VIS	-.050	-.141**	-.071	.133**	-.045	.134**	.113**	-.004	-.134**	.331**	.502**	1					
13. DASS-21	.124**	-.097*	-.031	-.044	.058	.085*	.058	-.056	-.089*	.140**	.509**	.235**	1				
14. Social Comp.	.048	-.110**	.015	-.005	-.021	.115**	.075	-.007	-.090*	.135**	.333**	.334**	.262**	1			
15. Gaming Relax.	-.009	-.082*	.002	.098*	-.064	.054	.030	-.003	-.064	.158**	.137**	.288**	.106**	.102**	1		
16. Autonomy Comp.	-.025	-.103**	-.047	.019	.030	.060	.009	-.030	-.115**	.155**	.410**	.378**	.356**	.346**	.182**	1	
17. Emotional Cop.	.005	-.140**	-.057	.052	-.013	.028	.025	-.024	-.095*	.059	.303**	.289**	.278**	.242**	.197**	.412**	1

Notes. \*p<.05, \*\*p<.01; IGDT-10 = 10-item Internet Gaming Disorder Test; VIS-12 = 12-item Videogames Involvement Scale; DASS-21 = 21-item Depression, Anxiety Stress Scale; Comp. = Compensation; Cop. = Coping; Relax. = Relaxation

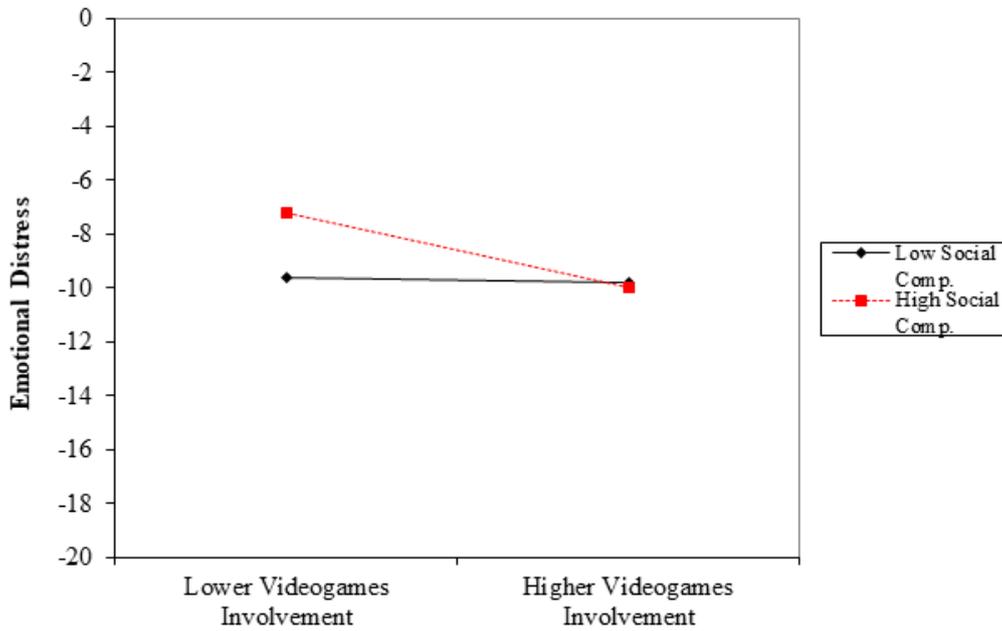
**Table 4.** Moderated Regressions tested in pre-COVID and COVID groups\*

Focal predictor: Videogame Involvement	Beta	t	Sig.	R <sup>2</sup>	Covariates included in all models
VI*GSC → ED	<b>-.076</b>	<b>-2.165</b>	<b>.031</b>	<b>.59</b>	Education, Age, Sex, Game Genres (MOBA, MMORPGs, FPS, RTS, BR, Sports games), Weekly Hours of play, PG and GSC, GAC, Grel, GEC when not moderators
VI*GAC → ED	-.016	-.444	.656	.34	
VI*GRel → ED	<b>.103</b>	<b>2.323</b>	<b>.020</b>	<b>.35</b>	
VI*GEC → ED	.001	.040	.968	.34	
Focal Predictor: Problematic Gaming					
PG*GSC → ED	-.114	-1.504	.133	.35	Education, Age, Sex, Game Genres (MOBA, MMORPGs, FPS, RTS, BR, Sports games), Weekly Hours of play, VI and GSC, GAC, Grel, GEC when not moderators
PG*GAC → ED	.102	1.246	.213	.34	
PG*GRel → ED	<b>.243</b>	<b>2.406</b>	<b>.016</b>	<b>.35</b>	
PG*GEC → ED	.070	.923	.356	.34	

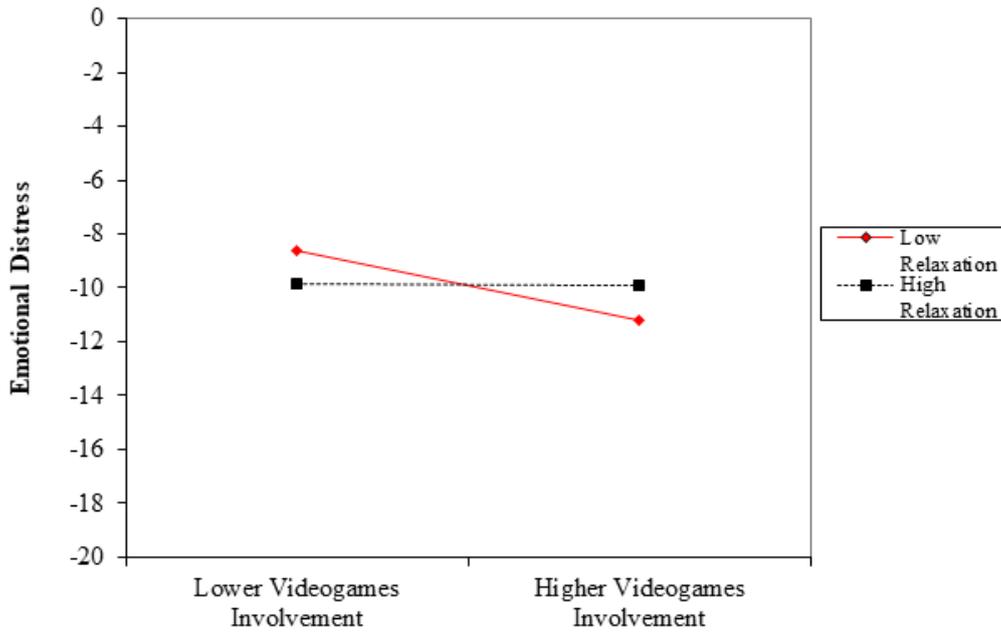
Notes. VI=Videogame Involvement; PG=Problematic Gaming; GSC= Gaming Social Compensation; GAC=Gaming Achievement Compensation; GRel=Gaming Relaxation; GEC=Gaming Emotional Coping; ED=Emotional Distress

\*Results reported in the table only refer to the COVID group; all Pre-COVID group models tested were non-significant.

**Figure 1.** Emotional Distress as a function of Gaming Social Compensation and Highly Involved Gaming. Dotted line = 1SD above the mean of Gaming Social Compensation. Solid line = 1SD below the mean of Gaming Social Compensation. Red lines denote significant interactions



**Figure 2.** Emotional Distress as a function of Gaming-related relaxation and Highly Involved Gaming. Dotted line = above 1SD the mean of Gaming Relaxation. Solid line = 1SD below the mean of Gaming Relaxation. Red lines denote significant interactions



**Figure 3.** Emotional Distress as a function of Gaming Relaxation and Problematic Gaming. Dotted line = 1SD above the mean of Gaming Relaxation. Solid line = 1SD below the mean of Gaming Relaxation. Red lines denote significant interactions



## Discussion

The aims of this study were to compare the levels of emotional distress in two groups of gamers before and during the COVID-19 self-isolation (pre-COVID versus COVID groups) and investigate the potential protective effect of online gaming vis-à-vis such emotional distress. Levels of emotional distress were lower and high involvement in gaming (as conceptualized by Billieux et al., 2019; Charlton & Danforth, 2007) was more prominent in the COVID group. Results of the moderated multiple regression suggested a relationship between a lower level of emotional distress during self-isolation and the interaction between highly involved gaming and engagement in social gaming as the means of preventing the feeling of loneliness. This finding aligns with results of previous research showing the positive effects of social gaming, especially in people with general difficulties in participating in interpersonal interactions (Halbrook et al., 2019; Kowert & Oldmeadow, 2015; Elhai et al., 2020). Moreover, results relate to Solms' (2018, p. 6) proposal for which "emotional disorders entail failed attempts to satisfy needs", in that they show that satisfaction of unmet social needs (remarkably signaled by the feeling of loneliness) through the game corresponds to a decrease in depression and anxiety levels. However, it is of importance to note that such effect was not found in the pre-COVID group. A possible explanation for this finding is that many highly involved gamers do not engage in gaming for social compensation under normal circumstances (i.e., when they do not have to self-isolate) because their offline social interactions are sufficient and satisfactory. The moderated multiple regression analysis also showed that the interaction between a low level of relaxation experienced during gaming and highly involved gaming predicted lower emotional distress among the COVID-19 group. This may suggest that the benefit of gaming during the pandemic is not related to relaxation *per se*, but that it

is rather a result of in-game activities that provided a sense of purpose and/or a sense of excitement from a gaming-related social experience (Billieux et al., 2019; Shi et al., 2019). Relatedly, results suggested that the more relaxation is experienced during gaming, the greater the association between problematic gaming and emotional distress. Such result aligns with those of Higuchi and colleagues (2020), showing that the majority of gamers in their treatment seeking sample reported a deterioration of their condition during the COVID-19 restrictions, especially with respect to the social withdrawal criteria. It can be speculated that problematic gamers were more vulnerable to some restrictive measures, such as the continuous sharing of the house space with the other inhabitants (e.g. children, parents, flat mates, partner), due to specific psychological traits that have been shown to be associated with maladaptive gaming symptoms in past literature (e.g. physical social avoidance or social anxiety; Di Blasi et al., 2020; Marino et al., 2020). In that case, gaming-related relaxation could contribute to downregulation and to reaching an effective yet circumscribed feeling of relief (Di Blasi et al., 2019; Caro & Popovac, 2020). However, this result also further reinforces the notion that relaxation is not the process through which intensive gaming may reduce emotional distress during a pandemic, or more broadly in a context where offline social interactions are curtailed. Contextually, Király and colleagues (2020) suggested that gaming as a non-problematic or even healthy coping strategy to alleviate daily life stress might turn into a maladaptive or problematic one when facing an overwhelming uncertainty and worries related to the COVID-19 pandemic. Under such circumstances, gaming-related relaxation might even be counterproductive and lead to more distress.

## Limitations

This study comes with some noteworthy limitations.

First, the research had not been originally designed for the COVID-19 pandemic and therefore, several context-relevant variables (e.g., those pertaining to health, employment and housing) were not included. Moreover, the between-group, cross-sectional study design does not make it possible to infer causality and has the limitations inherent to comparisons of two different samples. A *within* group, prospective study design would have been ideal, with highly involved and problematic gamers being followed up from the period before the COVID-19 pandemic through the pandemic. Relatedly, this study evaluated gamers only after a few weeks since the beginning of the lockdown and cannot inform about long-term effects of self-isolation. However, given the unpredictable nature of the pandemic, such a design was not possible, and this limitation is shared with most studies conducted in the context of the pandemic. Finally, future studies may benefit from an administration of questionnaires at the hands of clinicians, to overcome potential biases and prevent the risk of under- or over-diagnoses connected to self-reported measures of problematic gaming and emotional distress.

## Conclusion

Despite its limitations, the current study is to the best of our knowledge the first one providing evidences regarding the effect of high and problematic involvement in gaming on emotional distress during the COVID-19 pandemic. Our findings contribute to the literature on gaming and on mental health during COVID-19 pandemic in significant ways. First, they suggest that basic needs may be met by gaming during both “normal” and stressful situations (such as pandemic-imposed self-isolation), although this has different implications, depending on the gaming pattern. Indeed, gamers who experienced gaming as a means of socializing (typically highly involved gamers) may continue to do so during self-isolation, experiencing less emotional distress. In contrast, gamers who experienced playing mainly as a way of escaping from depressive or anxious states (typically problematic gamers) may perpetuate this pattern during self-isolation, with short-term relaxing effects of gaming and long-term emotional symptoms worsening. Such perspective is also in line with a recent longitudinal cohort evaluation (Shanahan et al., 2020) showing that pre-pandemic emotional distress remains the strongest predictor of increased emotional distress during the pandemic. Secondly, our study provides scientific support for policies promoting socially meaningful forms of online gaming to prevent emotional distress related to pandemic-related lockdown, while suggesting to pay clinical attentions to individuals problematically involved in gaming, who could be particularly vulnerable in such circumstance. Finally, our results highlight the impact of gaming on emotional distress when meeting needs in everyday life is thwarted due to external circumstances (e.g., during the pandemic-imposed self-isolation). Relatedly, research studies are emerging about other psychological conditions characterized by self-isolation and social withdrawal that share the involvement in online games as a mean to maintain some sort of connection with the others (e.g. Hikikomori conditions; Stavropoulos et al., 2019; Stip et al., 2016; Tateno et al., 2019). Thus, the present study calls for further investigations of various gaming patterns in relation to certain unmet needs and associated overwhelming emotions that can drive people to compensate through gaming, as well

as of the role online gaming can play for individuals in self-isolation conditions or, more broadly, unable to participate in face-to-face interactions.

## Contributors

AG and JB designed the study and interpreted the results. AG created and disseminated the online survey and ran the statistical analyses. AG wrote the initial draft of the article, under the supervision of JB. MDB, AS, DK, and VS reviewed the initial draft and participated in the writing of the final draft. All authors approved the final version of the manuscript

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