# Internet gaming disorder in male and female young adults: The role of alexithymia, depression, anxiety and gaming type

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## ARTICLE INFO

## ABSTRACT

The aim of this study is to investigate the relationship between alexithymia and Internet Gaming Disorder (IGD) (while controlling for depression and anxiety), explore the presence of gender differences, and the potential differences between MOBA and MMORPG gamers. A total of 429 young adults (mean age 20.7 years) recruited from different forums dedicated to video games took part in the study and filled a questionnaire including type of video game use, the Game Addiction Scale, the TAS-20 (evaluating alexithymia) and the HADS (evaluation anxiety and depression). In the whole sample, being alexithymic, depression scores, and anxiety scores were associated with IGD. Nevertheless, results differed depending on gender and type of games played. In male gamers, being alexithymic, being young, and having high anxiety and depression scores was associated with IGD. In female gamers, having less than a high school education and a high depression score was associated with IGD. In MOBA gamers, only the difficulty describing feelings factor was associated with IGD while in MMORPGs gamers, graduation from high school and anxiety scores were associated with IGD. Playing MOBA games could be a strategy to regulate emotions while playing MMORPG appears to be a maladaptive coping strategy to deal with negative affective disturbances. Gender and gaming type are important factors in the relationship between alexithymia, depression, anxiety and IGD. These results have some interesting clinical implications, which are discussed.

## 1. Introduction

According to the National Institute for Prevention and Health Education (2016), video games are the world's bestselling "cultural product" (before the music industry and films), with 3.8 million French people playing them daily. Among users, adolescents and young adults are the biggest consumers of video games (TNS SOFRES, 2014). For most of them, this activity remains recreational but for others, it has become excessive and has led to many negative consequences. Thus, in 2013, Internet Gaming Disorder (IGD) was included in Section III of the latest version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, APA, 2013) and gaming disorder (GD) has just been added to the Eleventh World Health Organization's classification (ICD-11, WHO, 2018). Indeed, several clinicians and empirical studies have reported that some adolescents or young adults present symptoms of problematic video game use, which are similar to other well-described addictive disorders (Gentile, 2009; Kuss and Griffiths, 2012). Furthermore, many similarities have been found between IGD and other addictive disorders. For example, recent studies have shown similar neural mechanisms in problematic video game playing and substance use disorder (SUD) (see Weinstein and Lejoyeux, 2015 for a review), and in IGD and pathological gambling (Fauth-Bühler and Mann, 2017). Moreover, similarly to other addictive behaviors, IGD has been associated with many dysfunctional personality traits like impulsivity (Gentile et al., 2011), sensation seeking (Mehroof and Griffiths, 2010), low self-esteem (Lemmens et al., 2011), and neuroticism (Müller et al., 2014; Braun et al., 2016). Like other studies that have demonstrated that failures in emotion regulation are associated with SUD (Fox et al., 2007) and pathological gambling (Williams et al., 2012), two recent studies have shown an association between gaming and dysfunctions in emotion regulation (Gaetan et al., 2016; Estévez et al., 2017). Gaetan et al. (2016) have shown that compared to irregular gamers, regular gamers express their emotions less, present higher levels of alexithymia and have more difficulty being emotionally reactive. In the study by Estévez et al. (2017), low levels of emotion regulation appeared as a risk factor for IGD, and lack of emotional clarity and control

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predicted IGD (Estévez et al., 2017). These interesting results raise the question of the emotional functioning of gamers presenting IGD as well as the predictive value of various emotional dimensions in this disorder. In fact, one hypothesis based on previous research could be that alexithymia (first used by Sifneos (1973) to describe a lack of emotional skills initially found in psychosomatic patients) is a factor that could explain engagement in and maintenance of video game use. Indeed, individuals with poorly regulated emotions often engage in maladaptive behaviors, such as in addictive disorders, to escape from or downregulate their emotions (Tice et al., 2001; Estévez et al., 2017). Thus, several studies have shown that the addictive behavior relieves the emotional dysregulation associated with alexithymia (Stasiewicz et al., 2012; Bonnaire et al., 2017) (perceived as a pre-existing trait that fosters addictive disorders). Given the conceptual overlaps between alexithymia, depression and anxiety (Parker et al., 1991; Luminet et al., 2001), and given gender differences in emotion regulation (males tend to regulate their emotions less, feel them with less intensity, and express them less often (Kring et al., 1994; Christophe et al., 2009; Nolen-Hoeksema, 2012), it seems necessary to control these dimensions when studying the relationship between alexithymia and IGD. Furthermore, several studies have found strong associations between IGD and anxiety and depression, and most of these studies have found a higher prevalence of IGD in males (Gonzàlez-Bueso et al., 2018). Thus, it seems interesting to investigate the relationship between IGD and alexithymia while controlling for anxiety, depression, and gender. Because of the age differences in the factor structure and psychometric properties of the most commonly used tool for testing alexithymia (i.e. the TAS-20) – quality of measurement progressively deteriorating with younger age (Parker et al., 2000) – young adults seem more appropriate for this study.

To date, most studies on IGD have focused on Massively Multiplayer Online Role Playing Games (MMORPGs), and have highlighted their addictive potential (Stetina et al., 2011; Hussain et al., 2012; Müller et al., 2015), because of their specific structural characteristics (Billieux et al., 2015a,b). Indeed, MMORPGs are computer role-playing games in which thousands of gamers interact with one another in a persistent virtual world (Billieux et al., 2013). Because the environment exist independently of the players, the world, events and interactions between gamers continue to occur while the user is absent from the virtual environment. One of the most popular MMORPGs is World of Warcraft, in which there are three other major structural characteristics: progression (i.e. the avatar created by the gamer will acquire new skills and powers as rewards for succeeding in missions or quests), social interactions with other players (through written chat or audio), and grouping in guilds (i.e. persistent hierarchical organizations of players with common goals and backgrounds) (Billieux et al., 2013). However, currently, Multiplayer Online Battle Arena (MOBA) video games have become the most popular type played worldwide, especially League of Legends (LoL), superseding the MMORPGs (Nuyens et al., 2016). While MMORPGs and MOBA feature similar characteristics of advancement and social interactions (Nuyens et al., 2016), MOBA games are not never-ending virtual worlds (e.g. short and intensive game sessions). They provide daily updates of international rankings and statistics and involve much more competition than MMORPGs. Thus, one hypothesis could be that gamers who choose MOBA present different profiles from those who choose MMORPGs. Until now, few studies have investigated excessive use and associated factors in MOBA gamers and, to our knowledge, no study has compared the gamers of these two types of video games.

Thus, the aim of this study is to: i) compare alexithymia scores between problematic and non-problematic gamers and explore the presence of gender differences while controlling for depression and anxiety; ii) investigate the association between alexithymia and IGD and examine any male and female specificities; and iii) explore the potential differences between MOBA and MMORPGs gamers for the different variables investigated (in terms of profile and factors

associated with IGD).

## 2. Method

### 2.1. Procedure and participants

Participants were recruited from several Facebook groups dedicated to video games as well as on the forum jeuxvidéo.com (all French). After having asked the administrators for permission, a message explaining the aim, age requirement, duration and anonymity of the study was posted as well as a link to the questionnaire (with the full explanatory note containing the ethical requirements).

The full message was "Hello everyone, Lovers of video games, you are invited to participate in a study investigating the link between emotions and video games use in subjects aged 18–25 years old. To participate in this study, you only need to be between 18 and 25 years old and play video games. This study is anonymous and will help advance scientific research on the profiles of video gamers. This research is part of a master's thesis in psychology at Paris Descartes University. The study lasts about 15 min and the data collected will be anonymous. Do not hesitate to send me an email if you have any questions about the research. I thank you in advance for your participation."

When the participants agreed to participate in the study, they had to certify to being over 18 years old and to give their informed consent before accessing the questionnaires. A total of 429 young adults (mean age 20.7, SD = 2.6) completed all the questionnaires, including 123 females (28.7%) and 306 males (71.3%).

### 2.2. Materials

Several questions regarding socio-demographic status were included in the survey study: age, gender, level of education, marital status, and employment status.

Video game preference: the young adults were asked to state which type of game they played the most (role-playing, simulation/strategy, action or adventure games), and which specific video game they preferred and played the most. Based on the name of the video game they preferred and played the most, two groups of players were identified: MMORPG and MOBA gamers.

Game Addiction Scale (GAS), short version (Lemmens et al., 2009): This scale is frequently used for measuring gaming disorder in adolescents because it specifically addresses the developmental characteristics of adolescents. For example, some items refer to homework or parents. This tool showed high reliability, good internal consistency and good concurrent validity across studied samples, as indicated by the consistent correlations with usage, loneliness, life satisfaction, social competence, and aggression (Lemmens et al., 2009). As recommended by the authors, four items scoring higher than 2 ("sometimes" or more) indicates problematic use of video games. This cut-off point is in line with the polythetic format applied in the DSM-IV (APA, 1996), i.e. at least half of the criteria indicate that the subject's video game use is problematic. On this basis, two groups were formed: problematic gamers (PG) and non-problematic gamers (NPG).

The Toronto Alexithymia Scale (TAS-20) (Bagby et al., 1994), French version (Loas et al., 1996). The TAS-20 is the most widely used tool for measuring alexithymia. It has well-established psychometric properties. The TAS-20 has a 3-factor structure: difficulty identifying feelings (F1); difficulty describing feelings (F2); and externally-oriented thinking (F3). The cut-off scores of the French version are: non-alexithymic (TAS-20 ≤ 44), intermediate (45 ≤ TAS-20 ≤ 55), and alexithymic (TAS-20 ≥ 56).

The Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983), French version (Lepine et al., 1985). The HADS is a 14-item self-report scale assessing psychological distress: anxiety (7 items) and depression (7 items). Cut-off scores for the depression subscale are: 7 or 8 indicates "possible depression", 10 or 11 suggests a "probable

depression" and 14 or 15 refers to "severe depression". It has good psychometric properties (Friedman et al., 2001), is quick to administer, and thus suitable for field research.

### 2.3. Data analyses

First, univariate analyses were conducted: PG and NPG were compared (first in the whole sample and then in MOBA and MMORPGs gamers) and gender differences analyzed. A one-way analysis of variance was used to assess mean differences in continuous variables. Analyses of covariance (MANCOVAs) were also conducted in order to compare PG with NPG on the alexithymia scores, controlling for depression and anxiety. For categorical data, differences in percentages were compared with the chi-squared test. A $p$-value $<0.05$ was used as a test of significance with a Bonferroni adjustment for multiple comparisons.

Second, multivariate analyses were conducted (logistic regressions). Odds ratios (OR) and 95% confidence intervals (CI) were generated using logistic regressions. In order to test for the unique contributions of sociodemographic data, depression, anxiety and alexithymia scores, a three-step multiple regression analysis was performed. Furthermore, to test for the potentially moderating effects of gender, regressions were stratified by gender in the whole sample. For MOBA and MMORPGs gamers, gender was added into the model. All statistically significant variables in the univariate logistic regressions for one or both sexes (and those who met the condition of application ($n > 5$)) were integrated into the multivariate model (age, education, depression score, anxiety score, alexithymia scores). A first model was made with the alexithymia dichotomous score (being alexithymic or not) and a second model with the three subscales of alexithymia. Gaming behavior (PG vs. NPG) was the dependent variable. The pseudo-$R^2$ coefficient represents the extent to which the outcome is predicted by the independent variables included in each regression model. All statistical analyses were carried out using SPSS software (version 20).

## 3. Results

### 3.1. Univariate analysis and gender comparisons in the whole sample

Sociodemographic characteristics, gaming data, alexithymia, depression and anxiety scores are presented in Tables 1 and 2.

#### 3.1.1. Sociodemographic characteristics

In the whole sample ($n = 429$), 273 (63.6%) participants were identified as problematic gamers (PG). In the PG group, 78.4% were male and 21.6% were female.

Compared to the non-problematic gamers (NPG), in the PG group there were more males ($\chi^2 = 18.30$, $p < 0.001$), they were younger ($F$ (1427) = 7.54, $p = 0.006$), and less often in a relationship ($\chi^2 = 12.93$, $p = 0.002$). In the PG group, the females were a little bit older than the males ($F(1427) = 3.92$, $p = 0.049$), they were more often in a relationship than male PG (who were less often in a relationship compared to NPG males) ($\chi^2 = 7.38$, $p = 0.025$), more often unemployed than male PG who were more often students ($\chi^2 = 6.58$, $p = 0.037$). There were more female PG who have less than a high school education and more male PG who are high school graduates ($\chi^2 = 10.48$, $p = 0.005$).

#### 3.1.2. Gaming data

Compared to NPG, PG played more role-playing games ($\chi^2 = 55.75$, $p < 0.001$). In the PG group, females played more simulation/strategy games while males played more action games ($\chi^2 = 38.99$, $p < 0.001$).

#### 3.1.3. Alexithymia, depression and anxiety

Compared to NPG, PG had higher alexithymia scores (total and subscales) ($F(1427) = 34.01$, $p < 0.001$ for total score, $F$

(1427) = 25.18, $p < 0.001$ for F1, $F(1427) = 21.71$, $p < 0.001$ for F2, and $F(1427) = 13.08$, $p < 0.001$ for F3 respectively). These results were true for both males and females. Comparisons were re-evaluated after adding depression and anxiety as the covariates. The analysis of covariance showed that these differences remained stable after controlling for depression and anxiety for the total score and for the externally-oriented thinking factor ($F(3, 428) = 6.18$, $p = 0.013$ and $F(3, 428) = 4.91$, $p = 0.027$ respectively). The difference almost reached significance for the difficulty describing feelings factor ($F(3, 428) = 3.17$, $p = 0.071$).

There were no gender differences in the PG and NPG groups. Furthermore, more PG were alexithymic than NPG (males and females) ($\chi^2 = 27.95$, $p < 0.001$).

Compared to NPG, PG had higher depression and anxiety scores ($F(1427) = 45.72$, $p < 0.001$ for depression and $F(1427) = 17.86$, $p < 0.001$ for anxiety). These results were true for both males and females. In the PG group, females had a higher anxiety score than males ($F(1427) = 8.26$, $p = 0.004$).

### 3.2. Univariate analysis in MOBA and MMORPGs gamers

Sociodemographic characteristics, gaming data, alexithymia, depression, and anxiety scores of the MOBA and MMORPGs gamers are presented in Table 3.

Compared to NPG, PG of MOBA had higher depression total scores ($F(1,81) = 5.40$, $p = 0.023$), alexithymia total scores ($F(1,81) = 4.59$, $p = 0.035$), and difficulty describing feelings factor scores ($F(1,81) = 6.17$, $p = 0.015$). After controlling for anxiety and depression, the difficulty describing feelings factor did not reach significance ($F(3,82) = 1.70$, $p = 0.072$).

Compared to NPG, PG of MMORPGs were single more often (and less often in a relationship) ($\chi^2 = 6.29$, $p = 0.043$), more often high school graduates ($\chi^2 = 8.03$, $p = 0.018$), and had higher depression, anxiety, and alexithymia total scores ($F(1166) = 16.12$, $p < 0.001$, $F(1166) = 15.36$, $p < 0.001$, and $F(1166) = 10.63$, $p = 0.001$ respectively). They also had higher scores on the difficulty identifying feelings factor and the externally-oriented thinking factor ($F(1166) = 10.01$, $p = 0.002$, and $F(1166) = 6.30$, $p = 0.013$ respectively). After controlling for anxiety and depression, differences on alexithymia scores were no longer significant. Finally, more PG of MMORPGs were alexithymic than NPG ($\chi^2 = 14.07$, $p < 0.001$).

Few differences appeared between MOBA PG and MMORPGs PG. PG of MMORPGs were older than PG of MOBA ($F(1166) = 14.61$, $p < 0.001$). More MOBA PG were students while more MMORPGs PG were employed or inactive ($\chi^2 = 12.58$, $p = 0.002$).

### 3.3. Multivariate analysis (three-step multiple logistic regressions)

#### 3.3.1. Factors associated with IGD

In the whole sample and in the first model, being male (OR = 2.55, $p < 0.001$), depression (OR = 1.18, $p < 0.001$), anxiety (OR = 1.08, $p = 0.031$) and being alexithymic (OR = 1.88, $p = 0.030$) were positively associated with IGD. The same results appeared in the second model but none of the alexithymia subscales were associated with IGD.

Table 4 presents the unique contributions of sociodemographic data, depression, anxiety and alexithymia scores in males and females.

In males and in the first model, the contribution of sociodemographic variables to IGD was significant with $R^2 = 0.04$ (Wald$\chi^2 = 9.21$, $p = 0.027$). In fact, age (OR = 0.89, $p = 0.039$) was negatively associated with IGD. After the variability in sociodemographic variables was taken into account, depression and anxiety explained the additional significant variance in the second block with $R^2 = 0.19$ (Wald$\chi^2 = 35.67$, $p < 0.001$). Thus, depression and anxiety (OR = 1.19, $p = 0.003$ and OR = 1.11, $p = 0.026$, respectively) were positively associated with IGD. After the variability in sociodemographic variables, depression, and anxiety were taken into

**Table 1**

Sociodemographic characteristics and gaming data of the whole sample, PG and NPG.

| | Tot (n = 429) n | % | NPG Tot (n = 156) n | % | NPG ♂ (n = 92) n | % | NPG ♀ (n = 64) n | % | NPG p value ♂ vs. ♀ | PG Tot (n = 273) n | % | PG ♂ (n = 214) n | % | PG ♀ (n = 59) n | % | PG p value ♂ vs. ♀ | p value NPG vs. PG | ♂ NPG vs. PG | ♀ NPG vs. PG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gender** | | | | | | | | | | | | | | | | | | | |
| Male | 306 | 71.3 | 92 | 59.0 | | | | | | 214*** | 78.4 | | | | | | < 0.001 | | |
| Female | 123 | 28.7 | 64 | 41.0 | | | | | | 59 | 21.6 | | | | | | | | |
| **Marital status** | | | | | | | | | | | | | | | | | | | |
| Single | 323 | 75.3 | 102 | 65.4 | 64 | 69.6 | 38 | 59.4 | 0.26 | 221 | 81.0 | 179 | 83.6 | 42 | 71.2 | 0.025 | 0.002 | NPG > PG* | 0.18 |
| Married/in a couple | 104 | 24.2 | 53** | 34.0 | 27 | 29.3 | 26 | 40.6 | | 51 | 18.7 | 35 | 16.4 | 16* | 27.1 | | | | |
| Divorced | 2 | 0.5 | 1 | 0.6 | 1 | 1.1 | 0 | 0 | | 1 | 0.4 | 0 | | 1 | 1.7 | | | | |
| **Employment status** | | | | | | | | | | | | | | | | | | | |
| Student | 248 | 57.8 | 85 | 54.5 | 52 | 56.5 | 33 | 51.6 | 0.41 | 163 | 59.7 | 134* | 62.6 | 29 | 49.2 | 0.037 | 0.53 | 0.60 | 0.96 |
| Employed | 138 | 32.2 | 53 | 34.0 | 32 | 34.8 | 21 | 32.8 | | 85 | 31.1 | 65 | 30.4 | 20 | 33.9 | | | | |
| Unemployed | 43 | 10.0 | 18 | 11.5 | 8 | 8.7 | 10 | 15.6 | | 25 | 9.2 | 15 | 7.0 | 10* | 16.9 | | | | |
| **Education** | | | | | | | | | | | | | | | | | | | |
| Less than high school | 99 | 23.1 | 33 | 21.2 | 21 | 22.8 | 12 | 18.8 | 0.78 | 66 | 24.2 | 44 | 20.6 | 22** | 37.3 | 0.005 | 0.08 | 0.13 | 0.07 |
| High school graduate | 132 | 30.8 | 40 | 25.6 | 24 | 26.1 | 16 | 25.0 | | 92 | 33.7 | 81** | 37.9 | 11 | 16.5 | | | | |
| Some college or more | 198 | 46.2 | 83 | 53.2 | 47 | 51.1 | 36 | 56.2 | | 115 | 42.1 | 89 | 41.6 | 26 | 44.1 | | | | |
| **Gaming type** | | | | | | | | | | | | | | | | | | | |
| Role-playing | 227 | 52.9 | 72 | 46.2 | 45 | 48.9 | 27 | 42.2 | 0.13 | 155* | 56.8 | 119 | 55.5 | 36 | 61.0 | < 0.001 | 0.015 | 0.11 | 0.12 |
| Simulation/strategy | 55 | 12.8 | 30 | 19.2 | 12 | 13.0 | 18 | 28.1 | | 25 | 9.2 | 12 | 5.6 | 13*** | 22.0 | | | | |
| Action | 124 | 28.9 | 44 | 28.2 | 29 | 31.5 | 15 | 23.4 | | 80 | 29.3 | 74*** | 34.6 | 6 | 10.2 | | | | |
| Adventure | 23 | 5.4 | 10 | 6.4 | 6 | 6.5 | 4 | 6.2 | | 13 | 4.8 | 9 | 4.2 | 4 | 6.8 | | | | |
| | m | SD | m | SD | m | SD | m | SD | | m | SD | m | SD | m | SD | | | | |
| Age | 20.7 | 2.6 | 21.2* | 2.8 | 21.1 | 2.9 | 21.3 | 2.5 | 0.68 | 20.5 | 2.5 | 20.3 | 2.4 | 21.0* | 2.8 | 0.049 | 0.006 | NPG > PG* | 0.63 |
| GAS total | 12.2 | 5.4 | 6.8 | 2.8 | 7.1 | 2.9 | 6.3 | 2.7 | 0.07 | 15.4*** | 3.7 | 15.2 | 3.6 | 15.9 | 4.3 | 0.29 | < 0.001 | NPG < PG*** | NPG < PG*** |

NPG = non-problematic gamers, PG = problematic gamers (4 items "sometimes" on the Game Addiction Scale); GAS total = total score on the Game Addiction Scale.

\*\*\* $p < 0.001$;

\*\* $p < 0.01$;

\* $p < 0.05$.

**Table 2**
Alexithymia, depression and anxiety scores of the whole sample, PG and NPG.

| | Tot (n = 429) | | NPG | | | | | PG | | | | | | |
| | | | Tot (n = 156) | | ♂ (n = 92) | | ♀ (n = 64) | p value ♂vs.♀ | Tot (n = 273) | | ♂ (n = 214) | | ♀ (n = 59) | p value ♂vs.♀ | p value NPG vs. PG | ♂ NPG vs. PG | ♀ NPG vs. PG |
| | n | % | n | % | n | % | n | % | | n | % | n | % | n | % | | | | |
| **Alexithymia** | | | | | | | | | | | | | | | | | | | |
| Yes | 133 | 31.0 | 24 | 15.4 | 12 | 13.0 | 12 | 18.8 | 0.23 | 109*** | 39.9 | 86 | 40.2 | 23 | 39.0 | 0.50 | < 0.001 | NPG < PG*** | NPG < PG* |
| No | 296 | 69.0 | 132 | 84.6 | 80 | 87.0 | 52 | 81.2 | | 164 | 60.1 | 128 | 59.8 | 36 | 61.0 | | | | |
| | m | SD | m | SD | m | SD | m | SD | | m | SD | m | SD | m | SD | | | | |
| Depression score | 4.8 | 3.0 | 3.6 | 2.6 | 3.7 | 2.5 | 3.4 | 2.8 | 0.55 | 5.5*** | 3.0 | 5.6 | 3.1 | 5.2 | 2.7 | 0.33 | < 0.001 | NPG < PG*** | NPG < PG** |
| Anxiety score | 7.2 | 3.5 | 6.3 | 3.3 | 5.7 | 3.1 | 7.1* | 3.6 | 0.014 | 7.7*** | 3.4 | 7.4 | 3.2 | 8.8* | 3.9 | 0.004 | < 0.001 | NPG < PG*** | NPG < PG* |
| **Alexithymia** | | | | | | | | | | | | | | | | | | | |
| Total | 48.6 | 11.7 | 44.4 | 10.9 | 43.9 | 10.2 | 45.0 | 11.8 | 0.54 | 51.0*** | 11.5 | 51.0 | 11.5 | 51.0 | 11.6 | 0.99 | < 0.001 | NPG < PG*** | NPG < PG** |
| F1 | 16.3 | 6.0 | 14.5 | 5.6 | 14.0 | 5.3 | 15.0 | 5.9 | 0.28 | 17.4*** | 6.0 | 17.3 | 5.9 | 17.7 | 6.3 | 0.71 | < 0.001 | NPG < PG*** | NPG < PG* |
| F2 | 13.5 | 4.7 | 12.1 | 4.8 | 12.1 | 4.7 | 12.1 | 5.0 | 0.97 | 14.3*** | 4.5 | 14.4 | 4.5 | 14.0 | 4.7 | 0.58 | < 0.001 | NPG < PG*** | NPG < PG* |
| F3 | 18.7 | 4.2 | 17.8 | 4.3 | 17.7 | 4.4 | 17.8 | 4.2 | 0.86 | 19.3*** | 4.0 | 19.2 | 4.0 | 19.3 | 4.2 | 0.92 | < 0.001 | NPG < PG* | NPG < PG* |

NPG = non-problematic gamers, PG = problematic gamers (4 items "sometimes" on the Game Addiction Scale), F1: difficulty identifying feelings factor, F2: difficulty describing feelings factor, F3: externally-oriented thinking factor.

*** $p < 0.001$;
** $p < 0.01$;
* $p < 0.05$.

account, being alexithymic explained the additional significant variance with $R^2 = 0.21$ (Wald$\chi^2 = 5.48$, $p = 0.019$) and was positively associated with IGD (OR = 2.32, $p = .024$). In the second model, the contribution of sociodemographic variables to IGD was significant with $R^2 = 0.04$ (Wald$\chi^2 = 9.21$, $p = 0.027$). In fact, age (OR = 0.9, $p = .048$) was negatively associated with IGD. After the variability in sociodemographic variables was taken into account, anxiety and depression explained the additional significant variance in the second block with $R^2 = 0.19$ (Wald$\chi^2 = 35.67$, $p < 0.001$). Thus, depression and anxiety (OR = 1.20, $p = 0.002$ and OR = 1.11, $p = 0.033$, respectively) were positively associated with IGD. After the variability in sociodemographic variables, depression, and anxiety were taken into account, alexithymia subscales did not explain additional significant variance (Wald$\chi^2 = 3.74$, $p = 0.29$).

In females and in the first model, the contribution of sociodemographic variables to IGD was not significant (Wald$\chi^2 = (5.33$, $p = 0.149$). Nevertheless, having less than a high school education was positively associated with IGD (OR = 2.9, $p = 0.033$). After the variability in sociodemographic variables was taken into account, depression and anxiety explained the additional significant variance in the second block with $R^2 = 0.20$ (Wald$\chi^2 = 14.84$, $p = 0.001$). Thus, depression (OR = 1.30, $p = 0.011$) was positively associated with IGD. After the variability in sociodemographic variables, depression, and anxiety were taken into account, being alexithymic did not explain additional significant variance (Wald$\chi^2 = 0.03$, $p = 0.85$). In the second model, the contribution of sociodemographic variables to IGD was not significant (Wald$\chi^2 = 5.33$, $p = 0.149$). Nevertheless, having less than a high school education was positively associated with IGD (OR = 2.74, $p = 0.040$). After the variability in sociodemographic variables was taken into account, depression and anxiety explained the additional significant variance in the second block with $R^2 = 0.20$ (Wald$\chi^2 = 14.84$, $p = 0.001$). Thus, depression (OR = 1.26, $p = 0.014$) was positively associated with IGD. After the variability in sociodemographic variables, depression, and anxiety were taken into account, alexithymia subscales did not explain additional significant variance (Wald$\chi^2 = 1.24$, $p = 0.74$).

### 3.3.2. Factors associated with IGD in MOBA and MMORPG gamers

Table 5 presents the unique contributions of sociodemographic data, depression, anxiety and alexithymia scores in MOBA and MMORPGs gamers (three-step multiple logistic regressions).

In MOBA gamers and in the first model, none of the variables were associated with IGD. In the second model, the only factor associated with IGD was the difficulty describing feelings factor of the TAS-20 (OR = 1.19, $p = 0.042$).

In MMORPGs gamers and in the first model, the contribution of sociodemographic variables to IGD was significant with $R^2 = 0.08$ (Wald$\chi^2 = 10.52$, $p = 0.032$). In fact, high school graduation (OR = 2.49, $p = 0.045$) was positively associated with IGD. After the variability in sociodemographic variables was taken into account, depression and anxiety explained the additional significant variance in the second block with $R^2 = 0.24$ (Wald$\chi^2 = 22.13$, $p < 0.001$). Thus, anxiety (OR = 1.19, $p = 0.009$) was positively associated with IGD. After the variability in sociodemographic variables, depression, and anxiety were taken into account, being alexithymic did not explain additional significant variance (Wald$\chi^2 = 2.10$, $p = 0.147$). Same results appeared in the second model. None of the alexithymia subscales were associated with IGD.

## 4. Discussion

The first aim of this study was to investigate the relationship between alexithymia and IGD (while controlling for anxiety and depression) and to see if there were gender differences. In this study, compared to NPG, PG could be described as young males, playing role-playing games, who were less often in a relationship, and had higher

**Table 3**

Sociodemographic characteristics, alexithymia and depression scores of the MOBA and MMORPG gamers.

| | MOBA gamers (n = 83) | | | | | MMORPGs gamers (n = 168) | | | | | MOBA PG vs. MMORPGs PG p value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | NPG (n = 26) | | PG (n = 57) | | p value NPG vs. PG | NPG (n = 57) | | PG (n = 111) | | p value NPG vs. PG | |
| | n | % | n | % | | n | % | n | % | | |
| Gender | | | | | | | | | | | |
| Male | 17 | 65.4 | 48 | 84.2 | 0.05 | 36 | 63.2 | 84 | 75.7 | 0.09 | 0.24 |
| Female | 9 | 34.6 | 9 | 15.8 | | 21 | 36.8 | 27 | 24.3 | | |
| Marital status | | | | | | | | | | | |
| Single | 21 | 80.8 | 48 | 84.2 | | 33 | 57.9 | 85* | 76.6 | | 0.07 |
| Married/in a couple | 5 | 19.2 | 9 | 15.8 | 0.70 | 23* | 40.4 | 25 | 22.5 | 0.043 | |
| Divorced | 0 | | 0 | | | 1 | 1.8 | 1 | 0.9 | | |
| Employment status | | | | | | | | | | | |
| Student | 20 | 76.9 | 45 | 78.9 | | 32 | 56.1 | 57 | 51.4 | | MOBA > MMORPG** |
| Employed | 6 | 23.1 | 10 | 17.5 | 0.55 | 21 | 36.8 | 38 | 34.2 | 0.37 | MOBA < MMORPG** |
| Unemployed | 0 | | 2 | 3.5 | | 4 | 7.0 | 16 | 14.4 | | MOBA < MMORPG** |
| Education | | | | | | | | | | | |
| Less than high school | 3 | 11.5 | 11 | 19.3 | | 12 | 21.1 | 15 | 13.5 | | 0.71 |
| High school graduate | 7 | 26.9 | 15 | 26.3 | 0.67 | 10 | 17.5 | 43* | 38.7 | 0.018 | |
| Some college or more | 16 | 61.5 | 31 | 54.4 | | 35 | 61.4 | 53 | 47.7 | | |
| Alexithymia | | | | | | | | | | | |
| Yes | 6 | 23.1 | 22 | 36.6 | 0.16 | 7 | 12.3 | 45*** | 40.5 | < 0.001 | 0.66 |
| No | 20 | 76.9 | 35 | 61.4 | | 50 | 87.7 | 66 | 59.5 | | |
| | m | SD | m | SD | | m | SD | m | SD | | |
| Age | 20.0 | 2.1 | 19.7 | 2.1 | 0.29 | 21.7 | 2.8 | 21.3 | 2.6 | 0.30 | MOBA < MMORPG*** |
| Depression score | 4.3 | 2.5 | 5.8* | 2.8 | 0.023 | 3.7 | 2.6 | 5.8*** | 3.3 | < 0.001 | 0.57 |
| Anxiety score | 7.1 | 3.6 | 7.2 | 3.3 | 0.89 | 5.7 | 3.0 | 7.8*** | 3.5 | < 0.001 | 0.87 |
| Alexithymia | | | | | | | | | | | |
| Total score | 45.6 | 14.0 | 51.5* | 10.3 | 0.035 | 44.0 | 11.0 | 50.4** | 12.4 | 0.001 | 0.37 |
| F1 | 16.0 | 5.8 | 17.3 | 5.6 | 0.32 | 14.1 | 5.4 | 17.2** | 6.4 | 0.002 | 0.35 |
| F2 | 11.9 | 5.5 | 14.5* | 3.9 | 0.015 | 12.8 | 4.7 | 14.3 | 4.9 | 0.06 | 0.83 |
| F3 | 17.8 | 5.2 | 19.7 | 3.9 | 0.07 | 17.1 | 4.5 | 18.9* | 4.1 | 0.013 | 0.15 |
| GAS total | 7.7 | 2.4 | 16.2 | 3.9 | < 0.001 | 7.0 | 2.8 | 15.4*** | 4.2 | < 0.001 | 0.15 |

MOBA = Multiplayer Online Battle Arena, MMORPGs = Massively Multiplayer Online Role Playing Games, NPG = non-problematic gamers, PG = problematic gamers (4 items "sometimes" on the Game Addiction Scale), F1: difficulty identifying feelings factor, F2: difficulty describing feelings factor, F3: externally-oriented thinking factor, GAS total = total score on the Game Addiction Scale.

\*\*\* $p < 0.001$;

\*\* $p < 0.01$;

\* $p < 0.05$.

**Table 4**

Factors associated with IGD in males and females (three-step multiple logistic regressions).

| Variables | Model 1 Step 1 | | | | Step 2 | | | | Step 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men (n = 306) | | Women (n = 123) | | Men (n = 306) | | Women (n = 123) | | Men (n = 306) | | Women (n = 123) | |
| | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p |
| Age | **0.9 (0.8–1.0)** | 0.039 | 1.1 (0.9–1.3) | | | | | | | | | |
| Education | | | | | | | | | | | | |
| Less than high school | 1.4 (0.8–2.7) | | 0.8 (0.3–2.3) | | | | | | | | | |
| High school graduate | 0.8 (0.4–1.6) | | **2.9 (1.1–7.6)** | 0.033 | | | | | | | | |
| Some college or more | Reference | | Reference | | | | | | | | | |
| Depression | | | | | **1.2 (1.1–1.3)** | 0.003 | **1.2 (1.0–1.5)** | 0.011 | | | | |
| Anxiety | | | | | **1.1 (1.0–1.2)** | 0.026 | 1.0 (0.9–1.2) | | | | | |
| Alexithymia | | | | | | | | | | | | |
| Yes | | | | | | | | | **2.3 (1.1–4.8)** | 0.024 | 1.1 (0.4–3.1) | |
| No | | | | | | | | | Reference | | Reference | |
| $R^2$ | 0.04 | | 0.06 | | 0.19 | | 0.20 | | 0.21 | | 0.20 | |
| | Model 2 | | | | | | | | | | | |
| Age | **0.9 (0.8–1.0)** | 0.048 | 1.1 (0.9–1.3) | | | | | | | | | |
| Education | | | | | | | | | | | | |
| Less than high school | 1.4 (0.7–2.6) | | 0.8 (0.3–2.2) | 0.040 | | | | | | | | |
| High school graduate | 0.8 (0.4–1.6) | | **2.7 (1.0–7.2)** | | | | | | | | | |
| Some college or more | Reference | | Reference | | | | | | | | | |
| Depression | | | | | **1.2 (1.1–1.3)** | .002 | **1.3 (1.0–1.5)** | 0.014 | | | | |
| Anxiety | | | | | **1.1 (1.0–1.2)** | .033 | 1.0 (0.9–1.2) | | | | | |
| Alexithymia | | | | | | | | | | | | |
| F1 | | | | | | | | | 1.1 (0.9–1.1) | | 0.9 (0.9–1.1) | |
| F2 | | | | | | | | | 1.0 (0.9–1.1) | | 1.0 (0.9–1.1) | |
| F3 | | | | | | | | | 1.0 (0.9–1.1) | | 1.0 (0.9–1.2) | |
| $R^2$ | 0.04 | | 0.09 | | 0.19 | | 0.15 | | 0.21 | | 0.16 | |

OR = odds ratios, CI = confidence interval, bold font indicates statistical significance, F1: difficulty identifying feelings factor, F2: difficulty describing feelings factor, F3: externally-oriented thinking factor.

**Table 5**

Factors associated with IGD in MOBA and MMORPGs gamers (three-step multiple logistic regressions).

| Variables | Model 1 | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Step 1 | | | | Step 2 | | | | Step 3 | | | |
| | MOBA gamers (n = 83) | | MMORPGs gamers (n = 168) | | Men (n = 306) | | Women (n = 123) | | Men (n = 306) | | Women (n = 123) | |
| | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p |
| Age | 0.9 (0.7–1.2) | | 1.0 (0.9–1.2) | | | | | | | | | |
| Gender | | | | | | | | | | | | |
| Male | 2.9 (0.8–10.2) | | 1.7 (0.8–3.9) | | | | | | | | | |
| Female | Reference | | Reference | | | | | | | | | |
| Education | | | | | | | | | | | | |
| Less than high school | 0.7 (0.2–2.8) | | **2.4 (1.0–6.1)** | 0.045 | | | | | | | | |
| High school graduate | 1.7 (0.3–8.9) | | 0.8 (0.3–2.3) | | | | | | | | | |
| Some college or more | Reference | | Reference | | | | | | | | | |
| Depression | | | | | 1.2 (0.9–1.5) | | 1.1 (0.9–1.3) | | | | | |
| Anxiety | | | | | 0.9 (0.8–1.2) | | **1.2 (1.0–1.3)** | 0.009 | | | | |
| Alexithymia | | | | | | | | | | | | |
| Yes | | | | | | | | | 1.5 (0.4–5.0) | | 2.1 (0.7–5.8) | |
| No | | | | | | | | | Reference | | Reference | |
| $R^2$ | 0.09 | | 0.08 | | 0.15 | | 0.24 | | 0.16 | | 0.26 | |
| | Model 2 | | | | | | | | | | | |
| Age | 0.8 (0.6–1.2) | | 1.0 (0.9–1.1) | | | | | | | | | |
| Gender | | | | | | | | | | | | |
| Male | 3.0 (0.9–11.4) | | 1.9 (0.9–4.5) | | | | | | | | | |
| Female | Reference | | Reference | | | | | | | | | |
| Education | | | | | | | | | | | | |
| Less than high school | 0.8 (0.2–3.4) | | **2.7 (1.1–6.8)** | 0.031 | | | | | | | | |
| High school graduate | 2.3 (0.4–12.0) | | 0.9 (0.3–2.6) | | | | | | | | | |
| Some college or more | Reference | | Reference | | | | | | | | | |
| Depression | | | | | 1.2 (0.9–1.5) | | 1.1 (0.9–1.3) | | | | | |
| Anxiety | | | | | 1.0 (0.8–1.2) | | 1.2 (1.1–1.4) | 0.004 | | | | |
| Alexithymia | | | | | | | | | | | | |
| F1 | | | | | | | | | 0.9 (0.8–1.0) | | 1.0 (0.9–1.1) | |
| F2 | | | | | | | | | **1.2 (1.0–1.4)** | 0.40 | 0.9 (0.8–1.0) | |
| F3 | | | | | | | | | 1.1 (0.9–1.2) | | 1.0 (0.9–1.1) | |
| $R^2$ | 0.09 | | 0.08 | | 0.15 | | 0.24 | | 0.24 | | 0.27 | |

MOBA = Multiplayer Online Battle Arena, MMORPGs = Massively Multiplayer Online Role Playing Games, OR = odds ratios, CI = confidence interval, bold font indicates statistical significance, F1: difficulty identifying feelings factor, F2: difficulty describing feelings factor, F3: externally-oriented thinking factor.

depression, anxiety, and alexithymia scores. Furthermore, in the whole studied sample, being male, being alexithymic and having high depression and anxiety scores were factors associated with IGD. The association between negative affect (e.g. anxiety and depression) and IGD is in line with previous studies showing that some individuals may play to cope with distress more than to succeed in the game (Billieux et al., 2013). Furthermore, our results are also in line with a previous study on regular gamers, showing that their alexithymia level was higher than that of irregular gamers (Gaetan et al., 2016). Like previous studies on addictive behaviors (e.g. SUD (Morie et al., 2016) or pathological gambling (Bonnaire et al., 2013)), our results showed the high prevalence of alexithymia in problematic gamers. After controlling for anxiety and depression, almost all alexithymia subscale scores were significantly higher in PG compared to NPG meaning that PG had an emotion dysregulation characterized by difficulties describing feelings and by externally-oriented thinking. Furthermore, while none of the alexithymia subscales were associated with IGD, being alexithymic almost doubled the risk of being a problematic gamer. Thus, as previously hypothesized for regular gamers (Gaetan et al., 2016), results suggest that alexithymia is a factor that could explain engagement in and maintenance of IGD. Young adults who have difficulty recognizing their emotions may use video games as an opportunity to experience emotions and then regulate them. Thus, we could hypothesize that gaming enables them to relieve the emotional dysregulation associated with alexithymia. Indeed, during adolescence, as the attachment system takes a less noticeable role in the daily life of the adolescent, challenges to emotion regulation across numerous contexts remain high (Allen and Miga, 2010). Even if they still rely on their parents for help in regulating emotion, they need to develop alternative methods, ranging from relying on peers to using internal cognitive strategies (Allen and Miga, 2010). One main characteristic of this developmental period is

the strive for emotional self-sufficiency and autonomy (Hill and Holmbeck, 1986). It is possible that these young adults with IGD have found in gaming, during the course of their development, a way of relieving the emotional dysregulation associated with alexithymia and this strategy could be seen an adaptive at that time (Sroufe, 1997). However, they did not develop later alternative methods of emotion regulation.

Nevertheless, this result has to be nuanced with regards to gender differences. In male gamers, being alexithymic, along with being young and having high anxiety and depression scores, more than doubled the risk of having IGD. While in female gamers, having less than a high school education and the depression score were associated with IGD. Thus, while male and female PG did not differ in terms of alexithymia scores (total and subscales), alexithymia did not seem to be a risk factor for IGD in females. Our results are in line with previously identified gender differences in the experience and expression of emotions (Nolen-Hoeksema, 2012). One interpretation of our results is that in male PG, alexithymia could be considered as a constant personality trait (De Timary et al., 2008) that represents a risk factor for IGD, while in female PG, alexithymia could be a defense mechanism that is a consequence of psychological distress such as depression or anxiety (Honkalampi et al., 2000), depression being a risk factor for IGD. Further research is needed to confirm this hypothesis.

Before discussing the second aim of this research, it is interesting to note that 28.7% of the whole sample, 21.7% of the MOBA gamers and 28.6% of the MMORPGs gamers, was female, which represents relatively high prevalence rates. Gender differences appeared only in the PG group, in which more females played simulation games while more males played action games. Recent research suggests that players of shooting and role-playing games are predominantly males (Trepte et al., 2009) and that, compared to males, females are less

attracted to games with competitive elements, violent content, or a lack of social interaction opportunities (Hartmann and Klimmt, 2006). In their study, Shen et al. (2016) concluded that the stereotype of female gamers as inferior (in gaming-related motivation, expertise, level of participation, etc.) is not only false but could also be a cause of unequal participation in digital gaming. The high prevalence of female gamers in our study could suggest that female stereotypes are starting to diminish.

The second aim of this study was to compare MOBA and MMORPGs gamers and see if any differences existed. While few differences appeared between PG of MOBA and PG of MMORPGs (MOBA PG were younger, more MOBA PG were students while more MMORPGs PG were employed or inactive), the comparison of NPG and PG revealed some specificities. For example, compared to NPG, PG playing MOBA had higher depression and difficulty describing feelings factor scores. Furthermore, only the difficulty describing feelings factor was associated with IGD in these gamers. One hypothesis is that gamers of MOBA choose a type of game in which the competitive elements are central in order to enhance emotions and thus express them. Playing MOBA games could be seen as a strategy to regulate one's emotions (for example, modifying the intensity of the emotion). Because anxiety and depression were not associated with IGD, it may be that they are not playing in order to escape from real-life problems but are motivated by achievement in the game. Thus, MOBA gamers could fit with the second problematic cluster identified by Billieux et al. (2015b). This idea needs to be confirmed in further study and the investigation of the motivation of these gamers seems very relevant here.

Compared to NPG, PG playing MMORPGs were more often single, the prevalence rate of alexithymia was higher, and they had higher depression and anxiety scores. Moreover, high school graduation and anxiety scores were associated with IGD. Thus, in MMORPGs gamers, playing this type of game could be seen as a maladaptive coping strategy to deal with negative affective disturbances or a maladaptive emotion regulation strategy (e.g. to avoid or suppress emotion). Gaming could be self-medication for emotional states which individuals find no other way of dealing with. Video game use could be seen as an escape strategy, or as proposed by Haves et al. (1996), an experiential avoidance. MMORPGs gamers could fit with the first problematic cluster identified by Billieux et al. (2015b). Indeed, for these games, excessive use can be conceptualized as a maladaptive coping strategy serving to overcome negative affect (Kardefelt-Winther, 2014) and/or negative life events (Schimmenti et al., 2014). This means that they play more to "dissociate" from real life than to succeed in the game (Schimmenti and Caretti, 2010). Once again, further investigation is needed to confirm this hypothesis.

This study has several limitations that need to be addressed in future research. The main one is its cross-sectional nature; it is impossible to determine the direction of the associations between the data. Furthermore, gamers were recruited in gaming forums, thus limiting the generalizability of the study (e.g. convenient sample). There is also a need to replicate these results in larger groups of gamers, especially MOBA gamers. Thus, some of the results could be due to the sample size. It is possible that some differences (or lack of differences) are due to something artificial -sample size – rather than real. This research should be viewed as a preliminary study and our results need to be confirmed by studying larger samples. Gender differences need to be further explored in MOBA and MMORPGs gamers with regards to emotional functioning. Our findings are also limited by the use of a single measure for alexithymia whereas the use of multiple methods (self-report and structured interview measures) eliminates the potential biases associated with a single one. Thus, the quality of future research on alexithymia would be enhanced by the use of the TAS-20 and the Toronto Structured Interview for Alexithymia (TSIA), which seems to be a promising structured interview for assessing alexithymia (Bagby et al., 2006). Our sample of gamers was composed of young adults . It would be interesting to investigate the emotional functioning

of older gamers and compare it with younger gamers to see if there are some specificities in the emotional functioning of adolescent, young adult and adult gamers. Finally, even if participants were recruited selectively from gaming websites and the tool used in our study identified problematic use (and not gaming disorder), we found a high percentage of problematic gamers. This raises two concerns. The first concern is how appropriate the instrument used (the GAS) is for classifying gaming disorder, and whether it overestimates the prevalence? The second concern is the definition of behavioral addiction in general and IGD in particular. Indeed, several authors point out the fact that substance addiction symptoms cannot be applied uncritically to behaviors, as they cannot be distinguished adequately from high engagement or passion (Kardefelt-Winther et al., 2017). The risk is to pathologize common behaviors or leisure activities due to the lack of a clear theoretical framework. Developing assessment instruments, and implicitly a definition, for behavioral addiction by substituting one behavior for another is unsuitable (Kardefelt-Winther et al., 2017). Thus, there is a need to investigate etiological processes and unique features of IGD. The criteria used to diagnose a behavioral addiction such as IGD should be based on an understanding of the underlying mechanisms (Tunney and James, 2017) and of the unique psychological processes of potentially problematic and repeated behaviors (Billieux et al., 2017).

Despite these limitations, this study provides some interesting results that have theoretical implications. Indeed, as emphasized earlier by Billieux et al. (2015a,b), problematic online gaming concerns a heterogeneous group of individuals and depends on several psychological factors. Furthermore, the results of our study show that issues in problematic gaming also depend on the type of game played. This idea was previously highlighted in studies on pathological gamblers showing different subtypes (Blaszczynski and Nower, 2002; Bonnaire et al., 2009). Our results also have clinical implications. For example, if playing MOBA games is an emotion regulation strategy, which through the competitive aspect of the game allows the player to experience intense emotions, it seems useful to use specific psychotherapeutic techniques like body-centered psychotherapy (Cornell, 2002) with these PG. For example, certain types of relaxation help individuals to more easily "let go" of their concerns, which favors skills like listening to oneself. This allows emotions, psychological material, and mental imagery to arise (Ferragut, 2008). Awareness of the inner world through a bodily feeling creates introspection which, when shared with the clinician, allows for quality work on the relationship. Through the reduction of the psyche / soma cleavage, the therapy improves emotion identification and differentiation, and helps the subject to find ways to experience himself in his body without resorting to an external activity that is more harmful. In contrast, in MMORPG gamers, the role of depression and anxiety in the development and maintenance of IGD may indicate that specific therapies targeting negative emotions could be appropriate for these patients. For example, emotion-focused therapy (Greenberg, 2011) could be more beneficial for these PG. Furthermore, family is perceived as a crucial factor in determining individuals' abilities to develop skills for coping with life's difficulties (Mikulincer and Shaver, 2007), especially with difficult emotions. Indeed, children learn, through their experiences with attachment figures, how to cope with negative emotions when facing situations of distress and danger (Estévez et al., 2017). Emotion regulation is affected by specific parenting practices and behaviors related to the socialization of emotion (Morris et al., 2007). Thus, children learn about emotion regulation in order to reach goals mostly within the parent-child relationship (Thompson, 1994). Moreover, relationship disturbances could be seen as the precursors of individual psychopathology, "through their role in establishing fundamental patterns of emotion regulation" (Sroufe et al., 2000, p.8). As a result, family therapy seems particularly relevant for these PG. More specifically, family therapy that takes into account the intrapersonal and the interpersonal dimensions, in other words, family therapy with a multidimensional conception (interactional contexts in the family but also interactional contexts of

people vis-à-vis their outside environments, and interactional contexts in an intrapersonal sense) as can be found in Multidimensional Family Therapy (Liddle, 1995), could be very promising.

## Conflict of interest

The author has no conflicts of interest to disclose.

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