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Research article

## Sociotropy and video game playing: Massively multiplayer online role-playing games versus other games

*Sociotropie et jeux vidéo : comparaison entre les MMORPG et les autres types de jeux vidéo en ligne*

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### ABSTRACT

**Introduction.** – Internet Gaming Disorder (IGD) is associated with several psychiatric disorders. Previous research on IGD has predominantly focused on Massively Multiplayer Online Role-playing Games (MMORPGs), considered to be pro-social games as they foster interpersonal relationships necessary for in-game progress. Sociotropy is a personality trait characterized by a cognitive approach to dealing with interpersonal relationships. Individuals with high sociotropy have a strong desire for approval from others. Beck's cognitive theory of depression posits that high sociotropy can lead to depressive symptoms when faced with interpersonal stress. We used the I-PACE model to account for the consequences of distal factors such as sociotropy on the development and maintenance of IGD. The aim of this study was therefore to compare MMORPG players with players of other game genres in terms of sociotropy, social anxiety and depression. We hypothesized that sociotropy could serve as a predictor of IGD, particularly among MMORPG players.

**Methods.** – A total of 233 French videogame players recruited from specialized internet gaming forums participated in the study via questionnaires. Different scales were used to assess depression and social anxiety symptoms, IGD intensity, and sociotropy and autonomy.

**Results & discussion.** – MMORPG players reported higher psychological distress than players of other game genres. For all players, sociotropy, rather than autonomy, was found to be a predictor of social anxiety symptoms and IGD intensity. Sociotropy and depression explained IGD intensity only for MMORPG players and not for players of other game genres. The social dimension appears to be more prominent among MMORPG players and could be one of the main personality traits predicting this specific internet gaming disorder. The treatment implications for internet gaming disorder are discussed.

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### R É S U M É

**Introduction.** – L'usage problématique des jeux vidéo en ligne (*Internet Gaming Disorder* [IGD]) est associé à plusieurs troubles psychiatriques. Les recherches antérieures sur l'IGD se sont principalement concentrées sur les jeux de rôle en ligne massivement multi-joueurs (MMORPG), considérés comme des jeux prosociaux car ils favorisent les relations interpersonnelles nécessaires à la progression dans le jeu. La sociotropie est un trait de personnalité caractérisé par une approche cognitive des relations interpersonnelles. Les personnes à forte sociotropie ont un fort désir d'approbation d'autrui. La théorie cognitive de la dépression de Beck postule que la sociotropie élevée peut entraîner des symptômes dépressifs lorsqu'elle est confrontée à des sources de stress interpersonnel. L'objectif de cette étude était donc de comparer les joueurs de MMORPG et les joueurs d'autres genres de jeux en termes de sociotropie, d'anxiété sociale et de dépression. Nous avons utilisé le modèle I-PACE pour rendre compte des conséquences de facteurs distaux telles que la sociotropie sur le développement et le maintien de l'IGD. Nous avons supposé que la sociotropie pourrait servir de prédicteur de l'IGD, en particulier chez les joueurs de MMORPG.

**Mots clés :**

Usage problématique des jeux vidéo en ligne  
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*Méthode.* – Au total, 233 joueurs français de jeux vidéo en ligne recrutés sur des forums Internet de jeux spécialisés ont participé à l'étude par le biais de questionnaires. Différentes échelles ont été utilisées pour évaluer les symptômes de dépression et d'anxiété sociale, l'intensité de l'IGD et la sociotropie et l'autonomie.

*Résultats & discussion.* – Les joueurs de MMORPG ont signalé une détresse psychologique plus élevée que les joueurs d'autres types de jeux. Pour tous les joueurs, la sociotropie, plutôt que l'autonomie, s'est avérée être un prédicteur des symptômes d'anxiété sociale et de l'intensité de l'IGD. La sociotropie et la dépression expliquent l'intensité de l'IGD uniquement pour les joueurs de MMORPG et non pour les joueurs d'autres genres de jeux. La dimension sociale semble être plus importante chez les joueurs de MMORPG et pourrait être l'un des principaux traits de personnalité prédisant ce trouble spécifique de jeu en ligne. Les implications pour le traitement du trouble de jeu en ligne sont discutées.

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## 1. Introduction

### 1.1. Internet Gaming Disorder: a multifactorial problem

In the past decade, researchers have increasingly viewed Internet Gaming Disorder (IGD) as a behavioral addiction, leading to its inclusion in Section 3 of the DSM-5 [1] and to a definition for the term "gaming disorder" in the 11<sup>th</sup> revision of the International Classification of Diseases [2].

Internet Gaming Disorder is commonly associated with psychological issues such as depression [3,4], anxiety and social anxiety [5], attention and hyperactivity disorder [6,7], obsessive passion [8], deficient self-regulation of emotions [9], and hostility [10]. Personality traits, representing distinct thought patterns that result in specific behaviors, may additionally predispose individuals to particular IGD behaviors. Studies have identified predictors of high IGD intensity, including high impulsivity [11], low self-esteem [12], low agreeableness and high neuroticism [13]. As IGD research emphasizes the linkages between addiction, psychopathology, and certain personality traits, understanding the predisposing factors related to personality and their role in the emergence of clinical symptoms (e.g., depressive [14] and social anxiety symptoms [15]) is crucial.

This multiplicity of comorbidities makes the conceptualization of IGD multifactorial and challenging. One of the most recent models explaining the determinants and causes of IGD is a cognitive-behavioral model called the I-PACE (Interaction of Person-Affect-Cognition-Execution) model [16] (Fig. 1). This model presents the interactions between several predispositions explaining IGD, the cognitive and affective responses to internal and external stimuli, the role of executive and inhibitory control involving dysfunctional decision-making regarding problematic usage, as well as the consequences of rewards obtained in video gaming that maintain IGD. This model addresses the hypothesis of compensation for lower well-being advanced by Kardefelt-Winther [17]. According to this hypothesis, the socio-cognitive rewards offered by the game facilitate engagement and can, in some cases, initiate problematic use of online video gaming [18]. Therefore, it is important to conceptualize IGD and its effects on an individual according to several criteria: structural characteristics such as personality, the quality of their psychosocial environment, the control that the person has over their behaviors, as well as the gaming experience through the reinforcements offered by it. In this article, we propose an exploration of the personality elements through empirically grounded theories. These elements can be either distal (e.g., personality) or proximal (e.g., symptoms of IGD such as depression).

The most common psychopathologies associated with IGD are depression and social anxiety [14,15]. Internet usage provides a means of avoiding face-to-face interaction, and facilitates online relationships, which users can form in chat rooms or online videogames [19]. Research underscores the importance of

social interactions in an online environment when examining the causes of Internet Gaming Disorder. Consequently, it is plausible that depression symptoms may arise from social anxiety symptoms [20]. Beck's cognitive model of depression [21] posits that depression results from interactions between specific cognitions, physical symptoms, emotional symptoms and particular behaviors. Certain personality traits may influence this model by causing distortive cognitions, leading to negative thoughts about oneself, the world, and the future. In this idea, Beck developed the concepts of sociotropy and autonomy [22]. Personality traits such as sociotropy and autonomy may increase vulnerability to depression [23]. Sociotropy is defined as a form of interpersonal dependency in which individuals have a strong desire for approval by others. In contrast, autonomy refers to individuals with high achievement expectations, implying independent life goals not reliant on others' approval [24]. When faced with corresponding life stressors, individuals with high sociotropy or high autonomy may become more susceptible to depression symptoms [25]. Given the link between Internet Gaming Disorder and depression, distal causes such as high sociotropy or autonomy may contribute to the development and persistence of gaming disorders.

In the I-PACE (Interaction of Person-Affect-Cognition-Execution) model (Fig. 1), sociotropy and autonomy refer to a person's core characteristics. If they are exacerbated, they will modify a person's perception of the situation, leading to increased stress and a desire to compensate for this stress through problematic use [26]. This is what the authors of the I-PACE model describe as "Internet-related cognitive bias and coping style" (Fig. 1). This vicious circle maintains Internet Gaming Disorder (IGD) because gaming provides mood relief without addressing any underlying issues [17,27].

### 1.2. The case of MMORPGs, pro-social games

Online video games are played with and/or against others, making social interactions crucial for in-game progress. Many researchers have investigated Internet Gaming Disorder through the lens of a unique game genre: Massively Multiplayer Online Role-Playing Games (MMORPGs) [28–30]. These never-ending games immerse players in a fantasy world in which they embody virtual avatars. MMORPGs are structured such that it is impossible to win or finish the game without the help of other players. Communication, forming alliances and online friendships, and teamwork are integral components of MMORPGs. In addition, sociability is one of the most important explanatory factors for motivation to play role-playing games [31,32]. We can consider MMORPGs to be pro-social games that foster human interactions in a virtual context. While social interactions occur in other games, they are not essential for progress. For instance, first-person shooters (FPS) like

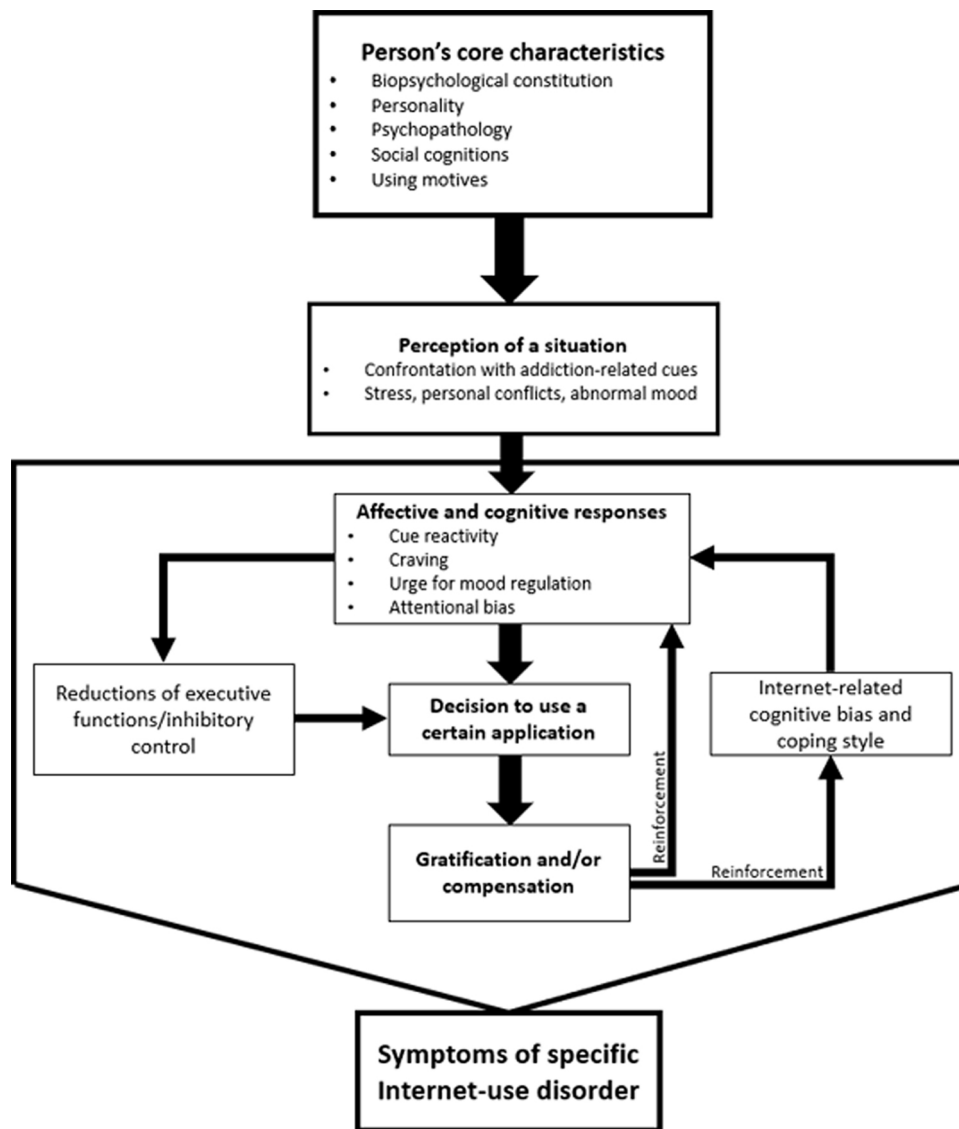


Fig. 1. I-PACE model [16].

Call of Duty© allow solo play or competition against other human players without verbal communication.

This sociability offered by MMORPGs means that it is easier to compensate for negative moods through the reinforcements provided by the game REF. The rewards in MMORPGs have a social component and are valued in relation to the opinions of other players. Sociotropic individuals fear abandonment and need to ensure that they please those around them [22]. With mastery of the game, individuals with IGD are more likely to choose MMORPGs over other types of games.

The role of game-based social interactions is vital in understanding IGD and testing I-PACE model [16] across multiple game genres may offer insights into this behavioral addiction. This study aimed to compare MMORPG players to players of other game genres through the lens of a specific internet disorder, highlighting the role of personality in IGD. Sociotropy may offer a valuable avenue for examining comorbidities among disordered players. The hypotheses were as follows:

- sociotropy, and not autonomy, is a defining person's core characteristic for psychosocial vulnerability to IGD development and maintenance;

- as MMORPGs are pro-social games, participants will differ in personality, sociotropy levels and clinical symptoms such as depression, social anxiety and IGD intensity. MMORPG players will report higher levels of these factors than players of other game genres, as MMORPGs are the most problematic games played by online gamers [29];
- according to the I-PACE model [16], problematic behavior stems from distal contributors such as sociotropy, and it is reinforced by the relief of affective and cognitive responses caused by depression and social anxiety.

## 2. Method

### 2.1. Participants

A total of 233 French people (60.7% men, 39.3% women, average age 22; 144 students, 57 full-time workers, 8 part-time workers and 24 were unemployed) completed an online survey posted on popular French video game forums such as jeuxvideo.com and Reddit. On such forums, people discuss video games in general or specific video games such as World of Warcraft©, League of Legends©, and Pokémon Go©. Forums are often used by players to communicate

with peers who share their gaming interests, fostering discussions about their favorite games. As such, the visitors of these forums are a representative population of online video game players.

## 2.2. Procedure

A one-time web link provided participants access to voluntary questionnaires, accompanied by a welcome message, an informed consent, and an explanation of the study. After completion, a public service message was displayed along with the addresses of French IGD prevention websites. Participants were not informed of the results. General and demographic information (age, sex, work sector, favorite game genre, number of hours played weekly, occupation) was also collected with informed consent. The survey was validated only if all the questions were answered. The participants were asked: “Which game genre do you prefer to play?”. This question was worded to obtain the best authenticity of responses, keeping in mind that online respondents often provide more genuine answers than their in-real-life counterparts [32,33]. Participants could choose from the following popular online game types: MMORPGs, first-person shooters, real-time strategy games and mobile games. The protocol has been approved by the Behavioral Sciences Ethics Committee of the University of Lille (version 2019-394-S78 dated 17/03/2020).

## 2.3. Measures

### 2.3.1. Internet gaming disorder

The French questionnaire “Addictive Intensity Evaluation Questionnaire” (AIE-Q) [34] was used to evaluate IGD intensity, with or without substance involvement. The AIE-Q is one of the only IGD tests validated in French, devised based on Goodman’s criteria for addiction [35], which are listed in the DSM-5. This questionnaire has been chosen for its good psychometric properties and its validation with a French-speaking sample. Moreover, it is one of the few that measures cutoff scores for addiction intensity [36]. The video game section of the questionnaire consists of 14 items, rated from 1 (do not agree at all) to 7 (totally agree), which assess emotions experienced while playing, desired playtimes, and gaming’s impact on everyday life. Total scores range from 14 to 98, with the following cut-off scores for IGD intensity: weak (14–27), moderate (28–43), high (44–51), and intense (52–98) ( $\alpha_c = 0.87$ ).

### 2.3.2. Sociotropy and autonomy

Sociotropy and autonomy were assessed using the Sociotropy-Autonomy Scale (or SAS) [24], validated in French [37]. The SAS features 60 items with participant agreement levels ranging from 1 (do not agree at all) to 5 (totally agree). Half of the 60 items address sociotropy, while the other half cover autonomy. The item order is counterbalanced. Total scores for each dimension range from 0 to 120. The “Sociotropy” section evaluates the importance assigned to others’ perceptions, separation anxiety, and support-seeking. These 30 items examine a form of social dependency driven by the significance placed on others’ support. Husky et al. [37] liken sociotropy to an extreme form of sociability. These items could also assess the preferential use of MMORPGs in relation to other game genres ( $\alpha_c = 0.88$ ). The “Autonomy” section pertains to individuality, independence, goal achievement, and low expectations from others. Thus, the autonomy section is divided into three parts: goal achievement and independence, attraction to solitude, and valuing freedom of movement and action, characteristics not found in pro-social games such as MMORPGs ( $\alpha_c = 0.71$ ).

### 2.3.3. Depression

Depressive symptoms were assessed using the Beck Depression Inventory (BDI-II) [38], a widely used scale for evaluating

pathological internet use correlations [4,39]. The BDI-II consists of 21 statements that assess the frequency of depressive symptoms listed in the DSM-5. These emotions, thoughts and behaviors are often associated with IGD in the literature [4,40]. Each statement is assessed using by four items, ranging from 0 (“I never feel this way”) to 3 (“I always feel this way”), with total score ranging from 0 to 63 and the following cut-offs: 0–13 (minimal depression), 14–19 (mild depression), 19–29 (moderate depression), and 30–63 (severe depression) ( $\alpha_c = 0.88$ ).

### 2.3.4. Social anxiety

Social anxiety was evaluated using the Liebowitz Social Anxiety Scale (LSAS) [41], adapted into French [42]. In this scale, participants rated their fear in 24 situations on a scale from 0 (no fear) to 3 (intense fear), and their avoidance frequency of these situations from 0 (no avoidance) to 3 (avoid more than two-thirds of the time). The total score comprises two subscores – fear and avoidance frequency – and ranges from 0 to 144. The LSAS’s psychometric properties make it a valuable tool. Indeed, Heimberg et al. [43] found good convergent validity with the BDI-II, demonstrating comorbid effects between social phobia and depression. The final score can be assessed using the following cut-offs, which indicate the presence of social anxiety symptoms: unlikely (0–30), probable (31–60), very probable (61–90) and highly probable (greater than 90) ( $\alpha_c = 0.93$ ).

## 2.4. Data analysis

First, we performed comparisons and correlations based on preferred game genre, measuring variables such as age, gender, number of hours played weekly, sociotropy, autonomy (SAS), depression (BDI-II) and social anxiety (LSAS). These analyses allowed us to highlight specific elements characterizing the pro-social gaming aspect of MMORPGs.

Next, we performed a structural equation modeling (SEM) path analysis for all players. To assess the goodness-of-fit of these two models, we chose three indices. The parsimony index is the chi-square estimate with degrees of freedom ( $X^2/df$ ), which should be less than 2 to indicate a good fit [44]. For the incremental index, we employed the comparative fit index (CFI), derived from a comparison of the hypothesized model with the independence model; a good CFI is over 0.95 [45]. For the absolute index, we chose the root mean square error approximation (RMSEA) with its confidence intervals and closeness-of-fit tests (PCLOSE). The RMSEA is the most recommended goodness-of-fit index [46] and should be less than 0.05 for a good fit, with a small confidence interval. The PCLOSE  $P$ -value should be greater than 0.50 for a good fit.

Finally, we carried out a multigroup analysis on this model, comparing MMORPG players with players of other game genres. For this, we used the critical ratio method. A  $Z$ -test evaluated the significance level of exogenous variables such as sociotropy and autonomy on endogenous variables, which include depression, social anxiety and addiction intensity.

All analyses were conducted with SPSS v22.0 and AMOS v22.0.

## 3. Results

### 3.1. Demographic characteristics

All participants ( $n = 233$ ) were divided based on their preferred online game genre: MMORPG ( $n = 128$ ) or other game genres ( $n = 105$ ). The sample included 142 men (60.7%) and 91 women (39.3%) with an average age of 22 years ( $SD = 5.36$ ). A total of 109 players (46.6%) exhibited high or intense gaming disorder related

**Table 1**  
 Scores for MMORPG players and players of other game genres.

	MMORPG M (SD)	Other genres M (SD)	t
Age	21.86 (4.42)	22.28 (6.33)	0.59
Game duration	19.81 (20.03)	12.70 (12.74)	-3.29**
Sociotropy	66.41 (18.02)	64.26 (18.46)	-0.90
Autonomy	76.46 (11.17)	75.89 (11.32)	-0.39
BDI-II	7.56 (8.84)	4.73 (5.50)	-2.99**
LSAS	54.98 (27.22)	46.49 (24.31)	-2.49*
AIE-Q	47.52 (16.72)	42.30 (15.07)	-2.51*

n = 128 (MMORPG) and n = 105 (other game genre). M: mean; SD: standard deviation; BDI-II: Beck Depression Inventory; LSAS: Liebowitz Social Anxiety Scale; AIE-Q: Addictive Intensity Evaluation Questionnaire; Sociotropy and Autonomy: Sociotropy and Autonomy Scale.

\* P < 0.05.  
 \*\* P < 0.01.

**Table 2**  
 Correlations between age, weekly playing time, sociotropy, autonomy, BDI-II, LSAS and AIE-Q scores.

	AIE-Q	Sociotropy	Autonomy	BDI-II	LSAS	Age	Hours
AIE-Q							
Sociotropy	0.211***						
Autonomy	-0.003	-0.243***					
BDI-II	0.468***	0.050	0.000				
LSAS	0.305***	0.304***	0.059	0.454***			
Age	-0.100	-0.068	-0.113	-0.191**	-0.230***		
Hours	0.273***	-0.275***	0.072	0.439***	0.011	-0.076	

n = 233. BDI-II: Beck Depression Inventory; LSAS: Liebowitz Social Anxiety Scale; AIE-Q: Addictive Intensity Evaluation Questionnaire, Sociotropy and Autonomy: Sociotropy and Autonomy Scale.

\*\* P < 0.01.  
 \*\*\* P < 0.001.

to video games, defined as an AIE-Q score strictly greater than 44 [34]. No effect of gender on IGD intensity was observed.

### 3.2. Differences between MMORPG players and players of other game genres

The mean AIE-Q score was 45.18 (SD = 16.17). BDI-II scores ranged from 0 to 54 with a mean score of 6.29 (SD = 7.64), indicating minimal depression on average, but with a high standard deviation. The LSAS mean score was 51.17 (SD = 1.72), close to a score indicative of probable social anxiety disorder. Participants played an average of 16.62 (SD = 1.14) hours per week. MMORPG players spent more time playing than players of other game genres (t231 = -3.29; P < .01). MMORPG players also reported higher depression intensity (t231 = -2.99; P < .01), social anxiety (t231 = -2.49; P < .05) and IGD intensity (t231 = -2.51; P < .05). In conclusion, MMORPG players play longer, exhibit more depressive symptoms, more social anxiety symptoms and have higher IGD intensity. See Table 1 for more information.

### 3.3. Correlations between variables

Using Pearson's correlation analysis, we discovered that IGD intensity (AIE-Q) positively correlated with clinical scores for depression (BDI-II), social anxiety (LSAS), and sociotropy, but not with autonomy. See Table 2 for details.

Significant and positive correlations were observed between the intensity of problematic use and sociotropy (r = 0.211; P < 0.001), depressive symptomatology (r = 0.468; P < 0.001), intensity of social anxiety (r = 0.305; P < 0.001), and number of hours played (r = 0.273; P < 0.001).

### 3.4. Structural equation modeling (SEM)

The path analysis, along with its factor loadings, is detailed in Fig. 2.

For all players, sociotropy scores statistically explained social anxiety scores. Social anxiety and depression scores significantly explained IGD intensity. Similarly, depression scores were significantly explained by social anxiety scores. However, depression scores were not statistically explained by sociotropy and autonomy scores. In other words, players with a high sociotropy personality trait tend to exhibit more social anxiety symptoms, which in turn could lead to high IGD intensity.

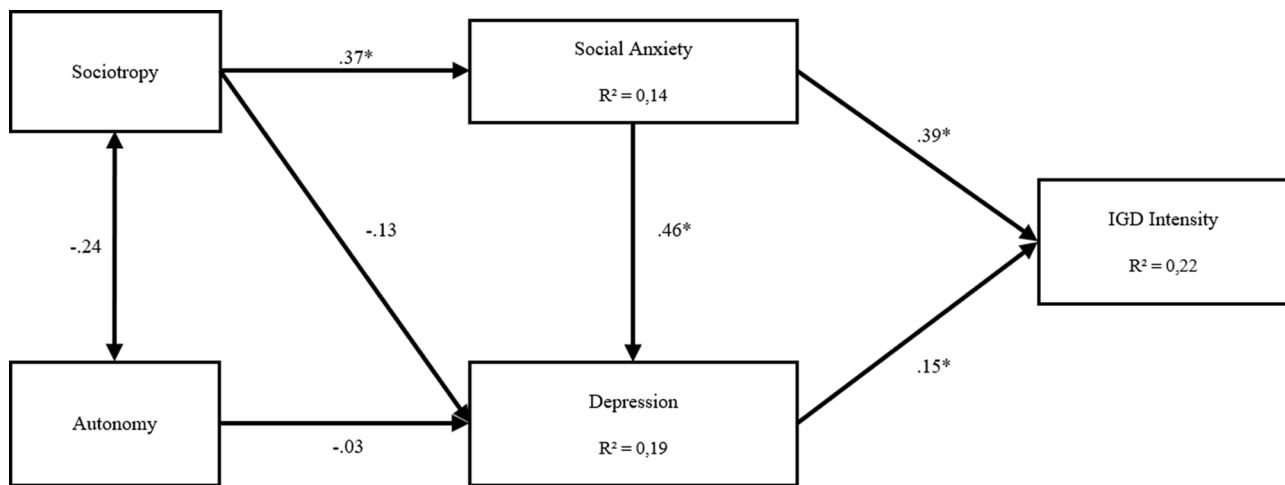
### 3.5. Multigroup analysis: critical ratio

The path analysis takes into account the distinction between MMORPG players and players of other game genres. Table 3 summarizes differences in the path coefficients.

MMORPG players exhibit a statistically higher degree to which sociotropy scores explain social anxiety scores compared to players of other game genres (0.365 vs. 0.196; z = -1.799; P < .05). The two groups also diverge in the path explaining depression scores by social anxiety scores (0.354 vs. 0.037; z = -3.575; P < .01). However, the path explaining depression scores from sociotropy scores is statistically lower for MMORPG players (-0.147 vs. 0.037; z = 3.575; P < .01). No differences between the groups are observed for the following paths: depression explained by autonomy (z = 0.285), IGD intensity explained by social anxiety (z = 1.238) and addiction intensity explained by depression (z = -1.384). Consequently, the sociotropy trait associated with MMORPG players elucidates social anxiety and depression symptoms as well as IGD intensity. This relationship is not apparent in players of other game genre.

## 4. Discussion

This study explored the differences between MMORPG players and those of other game genres by considering gaming disorder intensity, depression, social anxiety, sociotropy and autonomy, within the I-PACE model framework [16]. As depression and social anxiety are typically linked to Internet Gaming Disorder intensity,



**Fig. 2.** Standardized estimates for the SEM model including sociotropy (SAS), social anxiety (LSAS), depression (BDI-II), and IGD intensity (AIE-Q). RMSEA = .028 (90% confidence interval: [0; .118],  $P = .542$ ),  $\chi^2/df = 1.186$ , CFI = .996, GFI = .994. (\* $P < 0.05$ ).

**Table 3**  
 Factor loading differences between players of MMORPGs and other game genres.

	MMORPG		Other games		z-score
	Factor loadings	<i>p</i>	Factor loadings	<i>p</i>	
Sociotropy → Social anxiety	0.365	0.000	0.196	0.004	-1.799*
Sociotropy → Depression	-0.147	0.000	0.037	0.234	3.575**
Social anxiety → Depression	0.354	0.000	0.102	0.011	-3.941**
Social anxiety → IGD intensity	0.357	0.000	0.534	0.000	1.238
Depression → IGD intensity	0.405	0.016	-0.008	0.975	-1.384

$n = 128$  (MMORPG) and  $n = 105$  (other game genre).

\*  $P < .05$ .

\*\*  $P < .01$ .

the originality of this study was to explore the role of personality traits (e.g., sociotropy and autonomy) as person's core characteristics for psychosocial vulnerability to IGD development and maintenance, according to game genre. We hypothesized that sociotropy, but not autonomy, would be a predictor of clinical symptoms among MMORPG players compared to players of other game genres.

First, the results (correlations) showed that sociotropy is a personality trait that can constitute a psychosocial vulnerability to IGD. Then, these results were put into perspective with the type of games played, focusing on MMORPGs, games considered as pro-social. The results showed higher scores in IGD intensity, depression, and social anxiety for MMORPG players compared to players of other types of games, highlighting the problematic aspect of MMORPGs. Finally, we explored the I-PACE model [16] to account for the vicious circle in which distal characteristics such as sociotropy contribute to the maintenance of IGD.

#### 4.1. Psychological distress associated with IGD

Scientific literature demonstrates that IGD intensity is comorbid to depression and social anxiety [47]. As such, it is unsurprising that MMORPG players exhibit higher depression intensity, social anxiety and IGD intensity [14,15]. MMORPGs are indeed often deemed the most addictive online games [48,49]. However, it is important to note that depression scores remain relatively low, indicating minimal depression [38]. Numerous IGD researchers have used the BDI-II to assess depression intensity and found that depression scores indicate minimal to mild depression [50-52].

Players with high IGD intensity are more prone to experience higher levels of psychological distress (defined in this

study by high scores of depression and social anxiety) than non-problematic online players [52]. Depressive people (and people experiencing psychological distress in general) tend to feel less socially competent than non-depressive people [21,53]. Additionally, psychologically distressed people prefer to engage in virtual social interactions, rather than face-to-face interactions [54]. However, the psychological distress recorded in this study is mainly explained by a lack of social support rather than depression [54]; we should therefore consider other causes of Internet Gaming Disorder.

#### 4.2. Sociotropy as a predictor of MMORPG IGD

Of particular interest is the finding that sociotropy, as a personality trait, predicted depression and social anxiety scores solely for MMORPG players. MMORPGs are pro-social games, and socially anxious players might perceive the virtual environment as safer for social interactions than real-life environments, given, for example, the ease of avoiding eye-to-eye contact [19,53]. Beck's theory of depression [21] suggests that sociotropy may predict the emergence of social anxiety and depressive symptoms when faced with interpersonal stress. People with sociotropic tendencies tend to fear abandonment and need the approval of others to behave [24]. If a person has high levels of sociotropy, it creates fertile ground for psychosocial distress in case of interpersonal stress [54]. However, online video games such as MMORPGs offer a context that helps alleviate the fear of abandonment through collaboration with others. They also facilitate the approval of others through the demonstration to other players of high achievements and accomplishments obtained in the game. Since highly sociotropic individuals are vulnerable to interpersonal stress, they

to employ problem-solving skills less frequently than non-sociotropic counterparts and prefer to evade this stressor [52,55], resulting in increased negative intrusive thoughts. Davis posited in his cognitive-behavioral model of internet addiction [56,57] that problematic behavior may derive from maladaptive cognitions. Its modern evolution, the I-PACE model [16], shows that its maladaptive cognitions can be the cause of a desire to compensate for the resulting negative mood.

#### 4.3. IGD as a maladaptive coping mechanism for negative emotions

Researchers have extensively investigated the etiologic elements and risk factors of Internet Gaming Disorder [58], specifically examining whether they represent features of a generalized internet behavioral disorder or are common to all behavioral addictions [56]. Coping with negative emotions is a widely reported issue among problematic online gamers and other dependent individuals [59]. According to the I-PACE model [16] and Kardefelt-Winther's compensation hypothesis [17], online video games could be used to alleviate the psychological distress caused by depression and social anxiety. It would be interesting to evaluate the coping strategies implemented to verify this claim. Nevertheless, the current findings suggest that negative emotions experienced during excessive MMORPG gaming may stem from coping with interpersonal stress induced by high sociotropy [59,60]. Consequently, this study demonstrates that sociotropy should be considered an Online Gaming Disorder risk factor, and particularly a specific risk factor for MMORPG gaming disorder.

While Internet Gaming Disorder is commonly associated with social anxiety [15], the present study shows that the preference for MMORPGs and/or MMORPG gaming disorder may result both from social anxiety and sociotropy. These findings provide insights into the therapeutic approaches mental health practitioners should employ. Cognitive-behavioral therapy (CBT) combined with pharmacotherapy is the most widely used treatment for addiction and internet disorder [26,61–63]. This approach focuses on challenging maladaptive cognitions, examining emotional motives, and using techniques such as motivational interviewing to enhance patience motivation. Our study underscores the importance of understanding different types of online games. While extant research appears to focus on identifying the specific causes of online gaming addiction, it is crucial to distinguish the unique causes and risk factors associated with each game type to properly direct and target therapy. The present findings suggest that sociotropy should be considered when using CBT to treat MMORPG gaming disorder. It is therefore critical to not force a problematic MMORPG player out of their social environment, even if the social interactions engaged in are predominantly virtual. Lastly, therapists should enhance their knowledge about all types of online games to better assist their patients, especially those who prefer MMORPGs.

#### 4.4. Limitations and recommendations

Firstly, the effects of sociotropy would have been more consistent if the data had been collected longitudinally. The sample size is relatively small, and additional participants could significantly improve the proposed models. While we consider here that psychological distress is a distal cause of internet addiction, this distress is unlikely to be explained solely by depression, social anxiety and the two aforementioned personality traits. Further factors should be considered in order to provide a more comprehensive explanation of Internet Gaming Disorder, even though sociotropy appears to be a promising target.

Second, as the questionnaire used to assess addiction intensity, AIE-Q [34], was developed to evaluate many addictions simultane-

ously, it lacks specificity for Online Gaming Disorder. More recent questionnaires should be employed.

Finally, it is essential to acknowledge that MMORPGs were played less in 2022 than in previous years. Other game genres, such as “battle royale” games (e.g., Fortnite©, Apex Legends©) which are played by a broad majority of online players, should be explored.

## 5. Conclusion

This study's findings indicate that MMORPG players may develop an Internet Gaming Disorder due to exhibiting high sociotropy compared to players of other game genres. Social interactions primarily occur on the internet, with online games serving as a preferred outlet for most players. This study highlights the need to consider the specific characteristics of games played by problematic online gamers, along with risk factor personality traits such as sociotropy. Furthermore, this study reveals that motivations to play may depend on a game genre's characteristics. Amid intense debates among researchers about the etiology of Internet Gaming Disorder, expanding our knowledge about different game genres and the various ways to play online is of paramount importance.

## Disclosure of interest

The authors declare that they have no competing interest.

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