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FULL-LENGTH REPORT

From healthy play to gaming disorder: Psychological profiles from emotional regulation and motivational factors

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ABSTRACT

Background and Aims: The widespread popularity of video games reflects their appeal to meet fundamental needs. This study aims to investigate the psychological factors of gaming use, identifying profiles ranging from healthy to gaming disorder. *Methods:* In this cross-sectional study, 5,222 participants were surveyed. This international sample included adolescents and adults (16–69 years, $M = 25.6$ years, $SD = 6.44$), 48.66% men ($n = 2{,}541$; $M = 26.4$, $SD = 7.03$), 42.32% women ($n = 2{,}210$; $M = 25.1$, $SD = 5.78$), and 9.02% non-binary individuals ($n = 471$; $M = 23.3$, $SD = 5.23$), spanning from casual gamers to esports professional players. Latent Profile Analysis (LPA) was employed to identify distinct psychological profiles. The profile indicators included emotional regulation and motivations for playing video games. The profile correlates analysed included gaming disorder symptoms, time spent gaming and sociodemographics. *Results:* The LPA revealed four profiles labelled as *avoidant* (20.16%), *engaged* (38.95%), *relational* (26.01%), and *dysregulated* (15.78%). Results suggested that the *dysregulated* profile had the most emotional regulation difficulties, a low level of general motivation, and less interest in recreational gaming, presenting the highest risk for gaming disorder. *Discussion and Conclusions:* This study's findings present the first profiles encompassing key detailed psychological factors affecting gamers' behaviour across all game genres, considering three genders. These profiles can aid researchers and clinicians in developing further research on targeted prevention and intervention programs tailored to each profile's characteristics to promote healthy gaming habits and mitigate the risks and harm associated with gaming disorder.

KEYWORDS

video games, profiles, gaming disorder, Latent profile analysis, motivation, emotional regulation

The global popularity of video games appeal suggests that they satisfy some fundamental needs. The understanding of why video games are appealing to so many different people can be explored by motivational theories (Ryan, Rigby, & Przybylski, 2006). The Self-Determination Theory (SDT) is a motivation framework that examines various phenomena across gender, culture, age, and socioeconomic status, focusing on individuals' inherent growth. Using human perceptions, cognitions, emotions, and needs as predictors of regulatory, behavioural, developmental, and experiential outcomes, it identifies three key innate psychological needs: autonomy (driven by personal interest or intrinsic value, volition), competence (the sense of mastery and effectiveness), and relatedness (social connection with others) (Deci & Ryan, 1985, 2000). This theory distinguishes between intrinsic motivation, driven by internal satisfaction and growth, and extrinsic motivation, focused on external rewards or avoidance of negatives (Deci & Ryan, 2015; Ryan & Deci, 2000). Motivation can be a dynamic cognitive and emotional process in a complex system of intrinsic and extrinsic goals as individuals grow and experience life, activated in response to situational demands, constantly reshaping an individual's goals and actions (Wasserman & Wasserman, 2020).

By exploring the psychological factors that influence player's behaviour, motivation appears as one of the key role in shaping them. Yee's (2006) model of gaming motivation

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identifies three general components: achievement, social engagement, and immersion (Yee, 2006). Other theories also use motivation to explain that games are often designed to foster both autonomy and competence, enhancing immersion and enjoyment (Przybylski, Rigby, & Ryan, 2010; Ryan & Deci, 2000). Therefore, the player's engagement may be associated with the game's design, which often incorporates rewarding features, structural characteristics, and strategies that maintain player involvement and broad consumer appeal (Griffiths & Nuyens, 2017).

Gaming, widely enjoyed as a leisure activity, involves complex motivational dynamics that may also be influenced by increasingly sophisticated gaming environments. As such, it is not without risks, and for some individuals, video games can have detrimental effects on mental and physical health, particularly gaming disorder (GD) (King et al., 2019; Ko C-H et al., 2020; World Health Organization, 2019). GD is defined by the ICD-11 as a persistent pattern of gaming behaviour where individuals lose control over gaming, prioritise it over other activities, and continue gaming despite negative consequences. This behaviour must cause significant impairment in personal, social, educational, or occupational functioning and typically persists for at least 12 months to meet the diagnostic threshold (World Health Organization, 2019).

Problematic gaming is a broader term that captures gaming behaviour that leads to negative consequences in various aspects of life functioning, including both the definition of "Internet Gaming Disorder" in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatric Association, 2013) and GD (World Health Organization, 2019), these concepts continue to be a subject of debate among both researchers and clinicians regarding etiology and progression on the condition (Wang, Ren, Long, Liu, & Liu, 2019). Another factor, the increased time spent gaming is associated with problematic use and GD (Männikkö, Billieux, & Kääriäinen, 2015), with comparable impact whether measured through objective game logs or subjective self-reports (Jin, Kittaneh, Sidhu, & Lechner, 2022). Intense gaming use time is assessed for addiction diagnosis, nevertheless, TSG alone does not suffice as an indicator of addiction (Király & Demetrovics, 2017). According to Király, Tóth, Urbán, Demetrovics, and Maraz (2017), the notion of restricting gaming time under the presumption that excessive gaming is the core issue is an oversimplification. While problematic gamers tend to play more compared to moderate players, only a few excessive gamers suffer negative consequences; consequently, labelling these gamers as problematic is misleading (Király et al., 2017).

For understanding both problematic and non-problematic gaming behaviours, research highlights motives as a key element in grasping the nuances of gaming activities (Billieux et al., 2015; Demetrovics et al., 2011; Király et al., 2022; Larrieu, Fombouchet, Billieux, & Decamps, 2023; Yee, 2006; Yee & Ducheneaut, 2017). Escapism, where individuals play video games to avoid real-life issues, is one of the motivations linked to GD (Billieux et al., 2013, 2015; M. D. Blasi et al., 2019; Király et al., 2022; Kwon, Chung, & Lee, 2011). It is seen as an important factor in behavioural addictions, involving two dimensions: self-expansion linked to positive outcomes and approach coping, and self-suppression associated with problematic gaming and negative psychological outcomes, such as avoidance coping (Stenseng, Falch-Madsen, & Hygen, 2021).

However, motivation alone does not fully account for why some individuals develop GD. The Interaction of Person-Affect-Cognition-Execution or I-PACE model offer further insights into the development of problematic gaming, identifying biopsychosocial factors that emphasizes traits such as impulsivity, stress vulnerability, and poor executive control as key predisposing factors (Brand, Young, Laier, Wölfling, & Potenza, 2016). This model recognises the role of cognitive biases, where positive perceptions of gaming can drive engagement, while emotional regulation (ER) difficulties may lead to reliance on gaming as a coping mechanism for negative emotions (Brand et al., 2016).

Given its significant role in addictive behaviours, particularly concerning problematic gaming (Billieux et al., 2015; King et al., 2019), ER emerges as another essential factor for study. Although a unified definition of ER is lacking, it can be understood by interacting with biological, contextual and environmental factors (Tull & Aldao, 2015), in a dynamic interaction for regulatory emotional aspects between cognition and emotion, including both (Mennin & Farach, 2007) set of what individuals use to manage and influence their emotional states (e.g. emotional awareness and acceptance) (Gross, 1998, 2015) and a set of strategies (e.g. rumination or avoidance) (Thompson, 1994). The effectiveness of these strategies varies by context and individual adaptability, with flexible and context-appropriate regulation being associated with better long-term mental and physical health outcomes (Gross, 2015).

ER can be challenging, and its difficulties can be considered in key components such as the awareness and understanding of emotions, acceptance of emotions, the capacity to control impulsive behaviours in line with personal goals, and the flexibility to apply context-appropriate strategies to modulate emotional responses (Gratz & Roemer, 2004). A deficiency in any of these areas may indicate emotional dysregulation, which is often linked to impulsive or maladaptive behaviours (Gratz & Roemer, 2004). Specifically, individuals with GD tend to exhibit difficulties in emotional clarity and acceptance and negative emotional responses, limiting their ability to effective ER strategies (Blasi et al., 2019; Estévez, Jáuregui, Sánchez-Marcos, López-González, & Griffiths, 2017). Confirming the importance of ER in problematic gaming, the study by Yen et al. (2017) revealed that individuals with GD exhibited significantly higher scores in expressive suppression and lower scores in cognitive reappraisal compared to control subjects (Yen et al., 2017).

Aiming to explore the several psychological factors in different gaming behaviours, previous research on profiling gamers has produced a variety of valuable player types. However, these studies often focus on isolated aspects of gaming behaviour such as motivations, addiction,

psychological symptoms, online or offline gaming, or specific gaming genres, are sometimes limited to students populations, and with only two genders represented (Billieux et al., 2015; Carras & Kardefelt-Winther, 2018; Chang & Lin, 2019; Faulkner et al., 2015; Infanti, Valls-Serrano, Perales, Vögele, & Billieux, 2023; Lee, Lee, & Choo, 2016; Lemmens, Valkenburg, & Gentile, 2015; Pontes, Király, Demetrovics, & Griffiths, 2014; Tullett-Prado, Stavropoulos, Mueller, Sharples, & Footitt, 2021; Ünübol et al., 2020; Yee, 2006; Yee & Ducheneaut, 2017). Additionally, the multicultural context of video games is increasingly genre-blending and universally available with consistent content globally (Martucci, Gursesli, Duradoni, & Guazzini, 2023). Martucci's (2023) systematic review mentions the limitations of studies due to sampling methods and the recruitment of participants from schools or specific countries, which may restrict their global applicability (Martucci et al., 2023). Furthermore, research should seek to understand and distinguish between healthy gaming habits and problematic usage (Brand et al., 2020), particularly within the framework of the recognised disorder such as GD (Ko C-H et al., 2020; Kuss, Griffiths, & Pontes, 2017; Montag et al., 2019; World Health Organization, 2019).

THE PRESENT STUDY

The present study addresses these gaps by exploring detailed motivation and ER components to understand why individuals engage with games and how they manage the emotional consequences of gaming, capturing a diverse sample of gamers across age, three genders, occupational groups and countries, including all game genres.

Based on key psychological risk factors established in the literature, motivation and ER, the current study seeks to determine subgroups ranging from problematic to non-problematic gaming. To assess the potential consequences of game use, addiction symptoms were included through GD assessment. Non-problematic behaviour is a subject of interest in this study, which also aims to avoid unnecessary pathologising gamers (Király & Demetrovics, 2017). As gaming time alone is not a definitive marker of problematic use, the current study will consider the covariate TSG within this limitation.

The present study aims to: (1) identify the heterogeneous latent profiles of psychological and interpersonal factors represented by the profile indicators of ER and gaming motivation (GM) in a person-centered framework; (2) examine the profiles correlates, covariates of GD, time spent gaming (TSG), and sociodemographic variables; (3) analyse and integrate the profiles considering problematic and non-problematic use, from healthy engagement to GD.

Furthermore, while many previous studies have relied on cluster analysis to classify gamer profiles, the present study opted for a person-centered approach using Latent Profile Analysis (LPA, B. Muthén & Muthen, 2000). This statistical method allows for identifying distinct, naturally occurring profiles of players that capture their individual variations (B. Muthén & Muthen, 2000), in this study, based on their motivational and emotional regulation patterns.

METHODS

Participants

From the initial total sample of 8,896 participants, 5,222 were selected for inclusion in the analysis. Participants were excluded based on the criteria of being under the age of 16. The study sample comprised 5,222 English-speaking gamers. The participants ages ranged from 16 to 69 years old (M = 25.6 years old, SD = 6.44), the majority were 2,541 men (48.66%, M = 26.4 years old, SD = 7.03), followed by 2,210 women (42.32%, M = 25.1 years old, SD = 5.78) and 471 non-binary (9.02%, M = 23.3, SD = 5.23). The study comprised participants from 112 countries, with the majority residing in the USA (n = 1,194), Portugal (n = 1,126), UK (n = 594), India (n = 330), Canada (n = 419), Australia (238), Ireland (n = 255), New Zealand (n = 81).

Measures

Sociodemographics. The questionnaire encompassed sociodemographic variables about participants' age, gender, nationality, educational background, and employment status. The questionnaire included a subjective self-report measure of TSG question for participants to answer retrospectively the total time spent (hours) actively engaged in gaming during the week, "*How many hours per day do you spend gaming?*".

This study incorporated a question within the survey to assess self-reported gaming experience. Participants were asked to classify themselves: "*What type of gamer do you consider yourself to be?* with options ranging from "Casual" and "Novice" to "Expert" and "Professional (esports)."

The Difficulties in Emotion Regulation Scale – Short Form (DERS-SF). ER was assessed using the 18-item DERS – SF (Kaufman et al., 2016). The DERS-SF items reflect difficulties within the following dimensions of ER: (a) *awareness* and understanding of emotions; (b) *acceptance* of emotions; (c) the ability to engage in *goal-directed* behavior, and (d) refrain from *impulsive* behavior, when experiencing negative emotions; and (e) access to ER *strategies* perceived as effective. In the present study, the DERS-SF has good psychometric properties regarding construct validity and internal consistency with a McDonald's ω of 0.89. The DERS-SF was selected for its ability to assess emotional regulation across various dimensions, while the short-form version was used to minimize participant fatigue from lengthy questionnaires.

The Gaming Motivation Inventory (GMI). The GMI (Király et al., 2022) is a scale designed to assess the motives for playing video games. It has a total of 88 items and assesses 26 gaming motives, grouped into six higher-order dimensions: Mastery (e.g. skill development advancement and achievement in games), Immersion/Escapism (e.g. playing to escape from reality or immerse oneself in a different world),

Competition (e.g. compete and achieve recognition with the gaming community), Stimulation (e.g. enjoyment and excitement and sensory stimulation in games), Social (e.g. social interactions, cooperation, and forming connections through gaming), and Habit/Boredom (e.g. playing due to habit or to alleviate boredom). Our study used the 66-item version to evaluate the motives for playing video games exclusively. In our study, the 19 gaming motives assessed included: Advancement, Boredom, Completion, Exploration + Mechanics, Game Skills, Amotivation, Competence, Coping, Fantasy, Identity, Autonomy, Competition, Escape, Financial, Introjected Regulation, Recreation, Status, Skill Development, and Social (Király et al., 2022). The McDonald's ω internal consistency coefficient of the GMI in the present study was 0.95, demonstrating good psychometric properties. In this study, the GMI (Király et al., 2022) was chosen to measure players' motivations due to its comprehensive scope and applicability across various gaming genres and utilised 19 gaming motives to reduce the participant's fatigue and dropout associated with lengthy questionnaires.

The Gaming Disorder Test (GDT). The Gaming Disorder Test (GDT) (Pontes et al., 2019) assesses GD severity and detrimental effects according to the diagnostic criteria of the ICD11 (World Health Organization, 2019). The instrument is brief and concise, with four items scored on a 5-point Likert scale from 1 ("never") to 5/"very often"). It evaluates two dimensions of gamers: those classified as "disordered" and "non-disordered" (Pontes et al., 2019). Higher scores indicate a greater likelihood of disordered gaming. This instrument evaluates the severity and negative impact on the gamer's life. For research purposes, responses of 4 ("often") or 5 ("very often") on any item are considered as meeting a GD criterion, allowing researchers to differentiate between disordered and non-disordered gamers. The GDT has demonstrated concurrent validity with the Internet GD Scale-Short Form (IGDS9-SF). Since the IGDS9-SF addresses "Internet Gaming Disorder," a provisional mental health condition classified in the DSM-5 (American Psychiatric Association, 2013), these two scales are theoretically related, share concurrent validity, and are highly suitable for cross-cultural measure of GD (Montag et al., 2019; Pontes et al., 2019; Pontes & Griffiths, 2020). In our study, the internal consistency reliability coefficient, McDonald's ω, for the GDT was found to be 0.81.

Procedure

This study employed a cross-sectional design of a convenience sample and gathered data through an anonymous online survey on Qualtrics (Qualtrics, 2022). This platform enabled monitoring response patterns and ensuring data quality in terms of data cleaning procedures. The inclusion criteria for participants were having at least 16 years of age, being native English speakers or possessing a level of English language proficiency enough to comprehend and respond to the questionnaire, who engage in video games across all genres, in a wide range of player types and gaming experiences. Participants were recruited through social media, online gaming communities and streamers. Advertisements on Facebook and Instagram targeted adolescents and adults interested in video games and were extended to Discord, Reddit, and Twitter. For participation, various rewards were offered through a raffle, including two Fnac shopping vouchers worth €20 each, two Amazon vouchers worth €30 each, four Steam vouchers valued at €15 each, and twenty tote bags. Participants were asked to provide their email addresses for the purpose of contacting winners. No personal data was directly linked to survey responses to ensure participants' anonymity.

Statistical analysis

LPA offers a method for understanding gaming behaviours by identifying distinct player profiles within a population. This technique acknowledges that individuals may have multiple gaming motives and ER. LPA involves selecting relevant variables, preparing data, and modelling to reveal latent categories that explain variable heterogeneity (Collins & Lanza, 2009; Oberski, 2016). The statistical analysis comprised the following stages: (i) the participant's descriptive statistics using Jamovi (The jamovi project, 2023); (ii) the identification of the optimum number of latent profiles and the nature of their differences by LPA and Monte Carlo analysis in Mplus version 8.10 (L. K. Muthén & Muthén, 1998), using as continuous variables the six factors of the DERS-SF and 19 motivation factors of the GMI. The total percentage of missing data in this study was approximately 1.06% across all variables and participants. This percentage was calculated based on the number of missing data points relative to the total data points expected. Regarding the treatment of any remaining missing data in the LPA, we employed Mplus's multiple imputation procedure. This method is based on Bayesian analysis (Rubin, 1987; Schafer, 1997). The estimation method used in our analysis is Maximum Likelihood (MLR), a robust method that accommodates data under the assumption of missing at random (MAR) (Little & Rubin, 2002). The robust maximum likelihood estimation method was used for its efficacy in non-normally distributed data, generating robust standard errors. The present study explored models ranging from two to four classes and additionally ran a five-class model because no prior study has integrated DERS-SF and GMI items simultaneously. Several recommended fit statistics were used to determine the optimal number of profiles, considering three categories of techniques (Tein, Coxe, & Cham, 2013). Analysing the information-theoretic approaches like the Akaike Information Criterion (*AIC*), Bayesian Information Criterion (*BIC*), and Sample Size Adjusted BIC (*SSA-BIC*). Indicators of a better model fit are lower values in *AIC, BIC* and *SSA-BIC* (Morin, Arens, & Marsh, 2016). Furthermore, entropy values exceeding 0.80 signify minimal uncertainty in classifying individuals within the model (Tein et al., 2013). The likelihood ratio tests, including log-likelihood, adjusted Lu-Mendell-Rubin likelihood ratio test (*aLMR*), and bootstrap likelihood ratio (*BLRT*) test, were also analysed; (iii) the

predictive influence of the covariables GD, gender, age, and other sociodemographic variables on profile membership through multinomial logistic regression was analysed using the R3STEP procedure in Mplus.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. Ethical approval for the study was obtained by the ethics committee of ISPA Instituto Universitário (Approval D-055-11-22). Participants were informed about the study's objectives, confidentiality, and their right to withdraw at any time, providing electronic consent before beginning the questionnaire.

RESULTS

Descriptive statistics

Descriptive statistics for all research variables (see Table 1), including sociodemographics, were calculated, confirming univariate normality. Average scores of the scales DERS-ST and GMI ($p < 0.001$) were computed by averaging item responses, demonstrating adequate levels of internal consistency (Table 1).

Latent profile analysis of the psychological factors profiles

The LPA identified a four-profile model as the most fitting solution (Table 2). This model demonstrated the best-fitting solution with lower values for fit indicators such as *AIC, BIC*, and *SSA-BIC*, surpassing the performance of the three-profile model (DiStefano & Kamphaus, 2006). The four-class solution was superior with $aLMR = 7831.535$, $p < 0.001$. No subsequent class comparisons yielded significant results (Nylund, Asparouhov, & Muthén, 2007). The entropy value for this four-profile model was 0.908. This high entropy value indicates the classification accuracy of individuals into the profiles, as values ≥0.80 are desirable, reflecting a more precise and reliable model than the three-profile alternative (Asparouhov & Muthen, 2014). Furthermore, the average

Table 1. Descriptive statistics of the research variables

Variable	Mean	SD	Min	Max	Skewness	Skewness (Std. error of skewness)	Kurtosis
AGE	25.576	6.4435	16.0	69.0	0.998	0.0339	1.378
EDU	2.630	0.8444	1.0	5.0	0.476	0.0339	−0.057
EMP	2.254	1.5037	1.0	6.0	1.668	0.0339	1.746
TIG	4.703	11.8637	0.0	500.0	26.859	0.0339	929.398
XST	8.276	3.3198	4.0	20.0	0.820	0.0339	0.449
DST	7.588	3.2653	3.0	15.0	0.403	0.0339	−0.742
DNA	8.326	3.552	0.210	0.036	−0.977	0.145	DNA
DIM	5.962	3.130	1.005	0.036	0.214	0.145	DIM
DGO	9.703	3.418	−0.133	0.036	−0.940	0.145	DGO
DCL	7.454	3.111	0.517	0.036	−0.522	0.145	DCL
DAW	4.410	2.682	0.331	0.036	−0.477	0.145	DAW
GAD	14.949	4.254	−0.660	0.037	−0.045	0.147	GAD
GBO	12.728	4.323	−0.129	0.037	−0.544	0.147	GBO
GCM	10.559	5.222	0.195	0.037	−0.972	0.148	GCM
GEM	18.667	5.812	−0.278	0.037	−0.621	0.147	GEM
GSK	16.045	6.590	−0.076	0.037	−0.841	0.148	GSK
GAM	6.346	4.367	1.259	0.037	0.592	0.147	GAM
GCT	13.446	4.710	−0.345	0.037	−0.637	0.148	GCT
GOP	12.869	4.049	−0.212	0.037	−0.259	0.147	GOP
GFT	19.056	6.534	−0.509	0.037	−0.594	0.148	GFT
GID	21.857	7.481	−0.203	0.037	−0.675	0.148	GID
GAT	19.456	5.459	−0.549	0.037	−0.163	0.147	GAT
GCE	10.905	5.066	0.176	0.037	−0.897	0.147	GCE
GES	18.739	6.671	−0.432	0.037	−0.736	0.147	GES
GFI	6.029	4.575	1.501	0.037	1.272	0.147	GFI
GIR	7.474	4.498	0.848	0.037	−0.234	0.147	GIR
GRE	17.669	3.410	−1.146	0.037	0.981	0.147	GRE
GST	8.447	5.146	0.638	0.037	−0.702	0.147	GST
GKD	15.612	6.157	0.018	0.037	−0.735	0.148	GKD
GSO	14.575	6.902	0.166	0.037	−0.983	0.148	GSO

Abbreviations: GEN (gender), EDU (education), TIG (time spent gaming), XST (gaming disorder), DST (DERS-SF Strategies), DNA (DERS-SF Non-Acceptance), DIM (DERS-SF Impulse), DGO (DERS-SF Goals), DCL (DERS-SF Clarity), DAW (DERS-SF Awareness), GAD (GMI-Advancement), GBO (GMI-Boredom), GCM (GMI-Completion), GEM (GMI Exploration + Mechanics), GSK (GMI-Game Skills), GAM (GMI-Amotivation), GCT (GMI-Competence), GOP (GMI-Coping), GFT (GMI-Fantasy), GID (GMI-Identity), GAT (GMI-Autonomy), GCE (GMI-Competition), GES (GMI-Escape), GFI (GMI-Financial), GIR (GMI-Introjected Regulation), GRE (GMI-Recreation), GST (GMI-Status), GKD (GMI-Skill Development), GSO (GMI-Social).

Table 2. Latent profile analysis model fit indices information for a two-class, three-class, and four-class solution for the DERS-SF and GMI item scores

No. of profiles	Free parameters	LL	AIC	BIC	SSA-BIC	R^2	aLMR	BLRT
2	76	−369397.759	738947.517	739446.125	739204.622	0.893	23205.816	23310.076
3	102	−365546.989	731297.978	731967.162	731643.040	0.886	7667.093	7701.540
4	**128**	**−365546.989**	**723483.257**	**724323.018**	**723916.276**	**0.908**	**7831.535**	**7866.721**

Note: Bold indicates best fitted model. *LL* = log likelihood; *AIC* = Akaike information criterion; *BIC* = Bayesian information criterion; *SSA-BIC* = sample adjusted *BIC*; R^2 = entropy; *aLMR* = adjusted Lu-Mendell-Rubin likelihood ratio test; *BLRT* = bootstrapped likelihood ratio test.

latent profile probabilities for the most likely profile in the four-profile model (Table 3) were 0.958, 0.938, 0.941, and 0.953, meeting the recommended criterion cut-off of >0.90 (B. Muthén & Muthen, 2000). Thus, the four-class model seems optimal in terms of fit, theory, and parsimony.

The four-model profile of video game players' psychological factors

The four-profile model of the video game players' psychological factors best fitting model is represented in Fig. 1. It is based on within-profile item means labelled according to their mean values. These indicators include 25 variables of the DERS-SF and GMI scales.

The first profile, labelled as *avoidant* (n = 1,053, 20.16% of the participants), is distinguished by the substantially low mean scores of nearly all measured variables, except for the variables ER-Awareness, GM-Recreation, and GM-Amotivation. This profile exhibits the most proficient level of ER among all profiles, as evidenced by the lowest scores recorded for most ER-related mean variables except ER-Awareness. Within the profile ER, the lowest means is ER-Impulse. On GM within the profile, the highest mean is GM-Recreation, GM-Escape, GM-Autonomy, GM-Identity, GM-Fantasy, and GM-Exploration + Mechanics, the lowest are GM-Financial, GM-Introjected regulation, GM-Status, GM-Amotivation.

The second profile, identified as *dysregulated* (n = 824, 15.78%), consists of the smallest group of participants in the study. This profile is marked by the highest scores across all profiles in four specific ER variables ER-Strategies, ER-Impulse, ER-Clarity, and ER-Awareness, with the remaining two ER variables ER-Goals and ER-Non-Acceptance also scoring relatively high compared to the other profiles. In terms of GM, the most prominent variables comparing all profiles are GM-Introjected Regulation, GM-Financial, and GM-Amotivation. Additionally, within the profile, the GM variables that exhibit high levels include GM-Identity, GM-Autonomy, GM-Escape, GM-Fantasy, GM-Social, GM-Game Skills, and GM-Exploration + Mechanics.

Table 3. Average Latent Profile Probabilities for Most Likely Profile Membership (Row) by Latent Profile (Column)

Class	Profile 1	Profile 2	Profile 3	Profile 4
Profile 1	0.958	0.008	0.033	0.001
Profile 2	0.015	0.938	0.024	0.023
Profile 3	0.022	0.014	0.941	0.022
Profile 4	0.000	0.014	0.033	0.953

The third engaged profile (n = 1,987, 38.05%) includes the most significant fraction of participants. This profile is marked by the lowest level of ER-Awareness and highest level of GM-Recreation compared to all profile means. Following moderate levels of all variables within the profile means the highest levels are GM-Identity, GM-Autonomy, GM-Fantasy, GM-Escape.

Finally, the fourth profile, identified as *relational* (n = 1,358, 26.01%), compared to all profiles presents the highest levels of ER-Goals, ER-Non-acceptance, GM-Identity, GM-Autonomy, GM-Fantasy, GM-Escape, GM-Skill development, GM-Game-Skills, GM-Exploration + Mechanics, GM-Social, GM-Competence, GM-Advancement, GM-Coping, GM-Competition, GM-Boredom, GM-Completion, and GM-Status.

The sociodemographic profile distribution

Regarding age, avoidant profile had the highest mean age of 26.6 years (SD = 6.98), while relational profile had the youngest mean age at 24.0 years (SD = 5.61) (Table 4).

In terms of gender distribution (Table 4), the dysregulated profile contained a higher proportion of men (10.2%), closely followed by the relational profile (13.8%), with the largest representation found in the engaged profile (15.8%). For women, the highest representation was found in the avoidant profile (9.6%), alongside a significant proportion in the engaged profile (18.1%). Non-binary individuals were represented in smaller numbers, predominantly in the engaged profile (4.2%) and the relational profile (2.8%).

The participants' distribution of educational levels (Table 4) showed the highest educational level (PhD) was most represented in engaged profile (0.7%) and avoidant profile (0.5%). The dysregulated profile had the highest proportion of participants with less than a high school diploma (1.6%) and relational profile (1.4%).

In terms of employment status (Table 4), the engaged profile had the highest percentage of students (11.5%) and employed individuals (18.7%). The dysregulated and engaged profiles had the highest proportion of unemployed individuals at 0.1%.

Regarding the distribution of the gamer levels from casual gamer to professional (esports) (Table 4), we highlight the regular gamers, the engaged profile (21.4%) has the highest

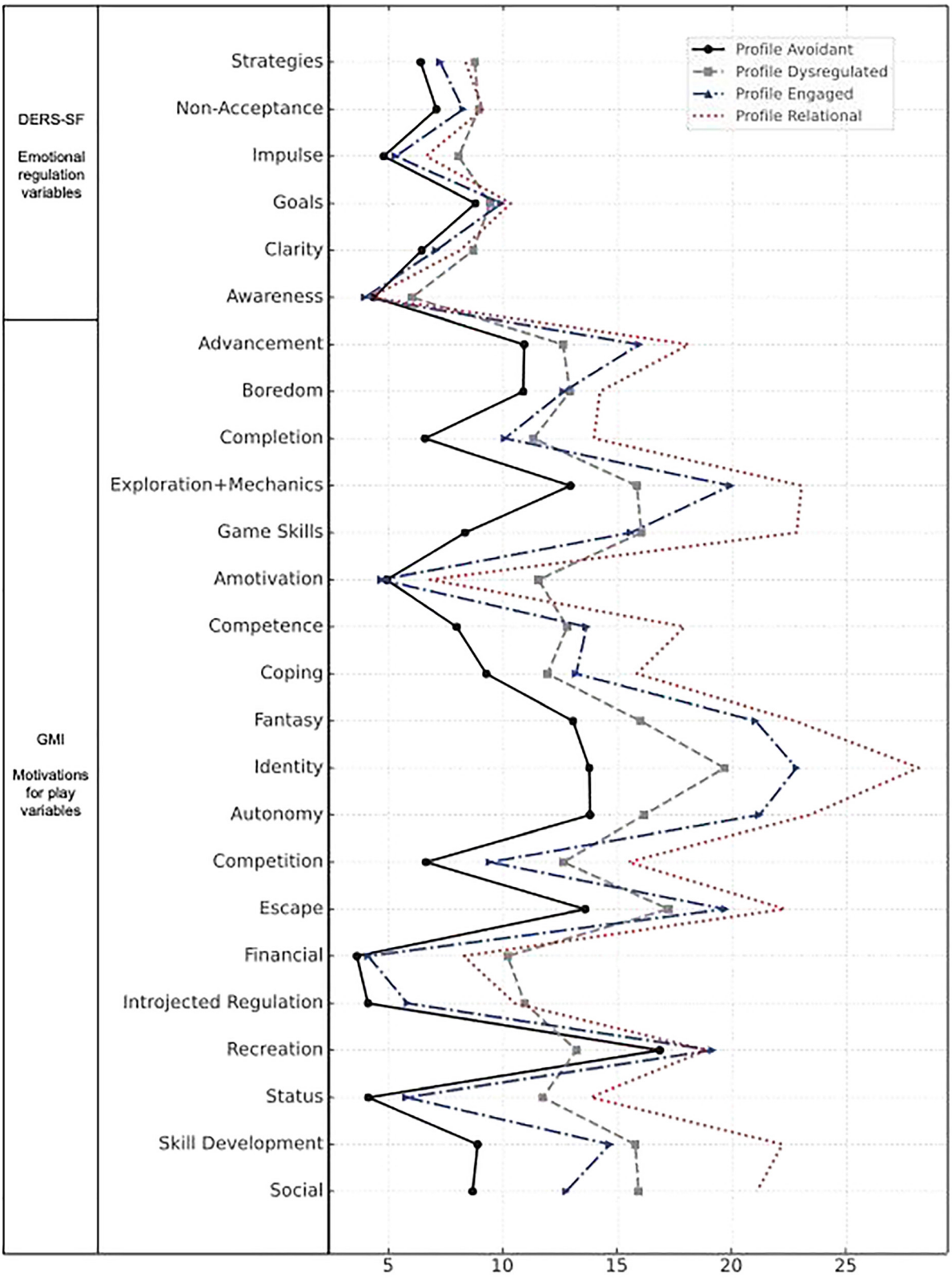

Fig. 1. Mean scores of each dimension in the four profiles
Abbreviations: DERS – SF The Difficulties in Emotion Regulation Scale – Short Version (Kaufman et al., 2016); GMI The Gaming Motivation Inventory (Király et al., 2022).

Table 4. Percentages of distribution of age, gender, education, employment and gamer level across the four profiles

		Profiles			
		Avoidant	Dysregulated	Engaged	Relational
Age		M = 26.6 SD = 6.98	M = 25.1 SD = 6.34	M = 26.2 SD = 6.51	M = 24 SD = 5.61
Gender	Male	8.8%	10.2%	15.8%	13.8%
	Female	9.6%	5.1%	18.1%	9.5%
	Non-binary	1.7%	0.5%	4.2%	2.6%
Education	Less than a high school diploma	0.7%	1.6%	1.3%	1.4%
	High school degree or equivalent	7.7%	7.2%	15.5%	13.7%
	Bachelor's degree	7.4%	5.7%	14.4%	8.2%
	Master's degree	3.9%	1.0%	6.1%	2.4%
	PhD	0.5%	0.3%	0.7%	0.4%
Employment	Student	6.1%	5.5%	11.5%	8.8%
	Employed	10.0%	7.4%	18.7%	10.6%
	Working student	1.8%	0.9%	3.8%	2.8%
	Unemployed	0.0%	0.1%	0.1%	0.0%
	Retired	2.1%	1.9%	4.1%	3.8%
Gamer level	Casual	4.0%	3.8%	7.7%	6.0%
	Novice	1.3%	1.5%	2.3%	1.8%
	Regular	11.1%	8.4%	21.4%	13.7%
	Expert	3.7%	2.0%	6.4%	4.3%
	Professional (esport)	0.1%	0.2%	0.3%	0.2%

percentage, followed by the relational profile (13.7%), the avoidant profile (11.1%), and the dysregulated profile (8.4%).

The multifactor analysis of GD and TSG

In the subsequent analysis, whether the gamer's covariables of TSG, GD and sociodemographic characteristics (i.e. age, gender, education) predicted their profile membership was investigated (Table 5).

Our findings indicate that women were more likely to belong to avoidant profile (Odds Ratio [*OR*] = 2.362), and non-binary players were more likely to belong to relational profile (*OR* = 2.575). In contrast, men players are predominantly associated with dysregulated profile (*OR* = 0.388).

Table 5. Effects of latent covariates in latent profiles membership having "avoidant" profile as the reference group

Predictor	Odds ratio (*OR*)	*LL* 2.5%	*UU* 2.5%
Profile "dysregulated"			
Gender	0.423	0.353	0.508
Age	0.991	0.971	1.011
Education	0.802	0.692	0.930
Time spent gaming	1.335	1.249	1.427
GD	1.426	1.367	1.488
Profile "relational"			
Gender	0.952	0.935	0.969
Age	0.705	0.608	0.817
Education	0.946	0.836	1.071
Time spent gaming	1.331	1.246	1.423
GD	1.309	1.259	1.361

Note: *LL* – Lower limit of the confidence interval, *UL* – upper limit. 95% confidence interval for the covariate effects on profile membership. All variables have $p < 0.01$.

In terms of age, it appears that older gamers are more likely to be assigned to engaged profile (*OR* = 1.054) followed by avoidant profile (*OR* = 1.051), while younger gamers are more likely to belong to relational profile (*OR* = 0.949). Regarding education level, it showed that players with higher educational qualifications were also significant in predicting engaged profile membership (*OR* = 1.260). In contrast, those with lower educational levels are more commonly found in dysregulated profile (*OR* = 0.794).

Finally, when comparing with the avoidant profile, which presents the lowest level of all profiles as a reference group (see Table 4), the profile that exhibits the highest level of tendency of GD (*OR* = 1.426) and TSG (*OR* = 1.335) is the dysregulated profile.

Followed by the second high level of predicting membership of GD (*OR* = 1.309) and TSG (*OR* = 1.309) is the relational profile (OR = 1.175).

DISCUSSION

This study identified psychological profiles from an affective perspective, with 19 different variables of GM and six variables of ER in gaming and analysing their association with GD, TSG, and socio-demographics. It approaches game use in a genre-neutral and a "person-centered" approach, allowing its use for everyone who plays video games above the age of 16. Furthermore, including a diverse global sample of age, occupational groups and countries allow the profiles to reflect various cultural contexts, capturing the universal aspects of gaming behaviour.

According to LPA model fitting evaluation indexes, the four-profile solution was selected. The first profile, *avoidant*

(20.16%), corresponds to individuals with recreational gaming motivation but a low level of social engagement. The second and largest, the engaged profile (38.05%), includes individuals with average levels of overall motivation for most gaming components, engaged in playing in a generally recreational and balanced use. The third profile, relational (26.01%), is characterised by individuals with a pronounced social component seeking connection with other players. Lastly, the fourth profile, dysregulated (15.78%), is characterised by individuals with general difficulties in ER, which is indicative of the profile's name.

The variance analysis in this model indicates distinct statistical variable variances between profiles. All profiles recorded low ER-Awareness, meaning individuals are attentive to their emotions, and high ER-Goals, indicating difficulty in task completion amid negative emotions. Common motives include "identity" games as meaningful, "autonomy" in-game choices, "escapism" using video games as a distraction from real life, potentially harmful if excessive (Chang & Lin, 2019; Lin et al., 2021); and "fantasy" as creative engagement in virtual worlds. "Recreation" was also a primary motive, linked to gaming for entertainment and enjoyment.

The dysregulated profile is characterised by men gamers with lower academic qualifications, including both employed individuals and students. This group exhibits high scores in ER difficulties in impulsivity, awareness, clarity and strategies, which aligns with previous research on cognitive control impairment (Dong & Potenza, 2014) and impulsivity as key contributors to GD (Gentile, Swing, Lim, & Khoo, 2012). This may contribute to their difficulties in managing their gaming behaviors effectively. As previous research refers, the lack of deliberation, coupled with an increased propensity for risk-taking, mirrors the tendencies found in individuals with cognitive control deficits, who struggle to disengage from gaming despite competing life demands (Dong & Potenza, 2014; Ko et al., 2017).

This profile has the highest results of GD and TSG and aligns with theories suggesting that difficulties in managing emotions are associated with an increased risk of GD and TSG (Billieux et al., 2015; M. D. I. Blasi et al., 2019; Estévez et al., 2017; Gratz & Roemer, 2004; Gross, 1998; Kaufman et al., 2016; King et al., 2019). The high scores in amotivation, boredom and escape motivations may present a general lack of motivation and life dissatisfaction; suggesting playing games to escape negative emotions and alleviate boredom (Király et al., 2022). According to Yee (2017), there is an alignment between community involvement and competitive spirit, particularly evident in team-based gaming (Yee, 2017), which aligns with this profile's high motivation scores for competition and social involvement. The high scores on financial motivation in individuals in this profile may be monetising their gaming (e.g., esports, streaming), and they may view the collaborative and competitive interactions as key components of their social gaming experience.

The relational profile comprises young gamers with social engagement and mastery of game skills and mechanics. Members of this profile may enjoy getting to know, relating to, and playing with others, perceiving these social interactions as meaningful. The assertion that gamers drawn to social engagement typically also appreciate other forms of social interaction (Yee, 2017), such as competing with other players, is consistent with this profile results as both "competition" and "social" motives prominently rank as the highest across all identified profiles. Additionally, this profile significantly emphasises status, which may reflect a quest to connect and interact with others, aiming for social recognition through their gaming achievements. Also, they tend to play to alleviate boredom; consequently, together with social motivation, they spend a significant amount of time gaming, making it the second profile with both the highest TSG and risk of GD scores.

Regarding ER, as far as the high goal score is concerned, these individuals may often struggle with focusing and completing tasks when experiencing negative emotions. Coping motivation high score could indicate maladaptive coping strategies. The high scores in ER non-acceptance can indicate that these individuals may be in denial about their distress, having difficulty in recognising and addressing emotional issues. However, some video games are designed with small, task-oriented objectives that are relatively easy to achieve, allowing players to complete them without excessive effort or complexity, which may provide a sense of achievement. Excessive focus on social aspects in gaming can lead to reliance on games for social needs, leading to excessive comfort-seeking behaviour and increasing the risk of GD (Deci & Ryan, 2000).

The engagement profile consists of older gamers with higher levels of education, indicating individuals likely established in their careers. They may engage in gaming as leisure (recreation motivation), with preferences for escapism and fantasy; with high scores in these motivations, they may seek experiences beyond daily life. The medium scores in social motivation may also value gaming's social aspects, possibly due to a need for fulfilling social connections. Their focus on skill development and game mechanics suggests a dedication to continuous self-improvement. The high level of exploration and mechanics, game-skill development and autonomy further underscore the importance of seeking in-game competence and autonomy, concepts of the SDT (Deci & Ryan, 1985, 2000). Previous studies link exploration to a positive affective state, which is crucial for enjoyment and plays a significant role in elevating gamers' overall well-being (Ryan et al., 2006). Their moderate scores across almost all variables suggest that gaming fulfils their psychological needs for autonomy, competence, and socialisation in a balanced and conscious manner. This is also supported by the lowest scores in ER-Awareness, indicating a mindful approach to gaming.

The individuals of the avoidant profile seem to engage in gaming more for leisure, suggesting that these individuals may view gaming more as a form of entertainment rather than for achievement or social interaction, as indicated by the highest scores on recreation motivation within the profile's variables. Their limited interest in gaming's social aspects may indicate a preference for solitary and independent

activities or a lower need to fulfil social needs through gaming. Their motivation for escapism, autonomy, and fantasy within games indicates the use of gaming as a means of escapism (Király et al., 2015, 2022). This approach to gaming can be beneficial if balanced with other life aspects and not used to avoid real-life responsibilities, confirmed by the lowest GD and TSG scores, minimal scores off all profiles and the lowest scores in ER impulse variable. These findings imply that individuals in this profile exhibit greater control over their behaviour, indicating a lower risk of GD. This suggests that members of this profile engage in gaming in a controlled and moderate manner.

While profiles like the avoidant and engaged were characterised by a lower risk of GD, the dysregulated and relational profiles exhibited patterns more closely aligned with problematic gaming behaviours. This distinction allows the understanding of each profile's specific factors related to ER and gaming motivations that contribute to the risk of GD but also healthy behaviour (those without GD).

Regarding the present study's limitations, the current research employed self-reported surveys to evaluate a cross-sectional study. Future studies should track the stability of these profiles over time through longitudinal studies, particularly in relation to GD. In this study, we chose not to include specific countries or preferred gaming genres as covariates in the LPA due to the need to focus our resources on the psychological variables central to our research question. While we recognise the potential influence of countries' differences and game genres on gaming behaviour, their exclusion was a deliberate decision to optimise the scope of the current study. However, it is essential to note that we did collect data on participants' nationalities and preferred gaming genres during the sampling process. We acknowledge that their exclusion may limit our ability to capture potential cultural or genre-specific nuances in gaming behaviour. While these variables were not included in the current analysis, they remain available for future exploration.

Another limitation, refers to the TSG variable in this study is its lack of specificity. The measure does not differentiate between gaming hours during weekdays and weekends, which could offer a more comprehensive understanding of gaming habits. While TSG provides a basic indication of gaming engagement, its simplistic measurement may not fully capture the complexities of time investment in gaming, limiting its ability to distinguish between different types of gaming use and associated outcomes.

Unlike other profiles (Billieux et al., 2015; Carras & Kardefelt-Winther, 2018; Chang & Lin, 2019; Faulkner et al., 2015; Infanti et al., 2023; Lee et al., 2016; Lemmens et al., 2015; Pontes et al., 2014; Tullett-Prado et al., 2021; Ünübol et al., 2020; Yee, 2006; Yee & Ducheneaut, 2017), this study gathered a broad range of data on the sociodemographic diversity of gender, including men, women, and non-binary, in the gamer population, reflecting its inclusivity. The data reveals that women gamers are nearly as prevalent as men gamers, and non-binary gamers, while a minority, hold a significant presence in gaming. The inclusion of several game genres, unlike earlier profiles that often distinguished between online, offline, and specific game genres, this study embraces a broad gender type and all game genres, reflecting the evolving and diverse nature of contemporary gaming.

Investigating further these profiles in relation to their mental health covariates will enhance our understanding of how they interact with individuals from each group. Given the strong relational and social elements inherent in these profiles, exploring the attachment styles and social contexts of individuals within these profiles would be beneficial.

CONCLUSION

The present study provides the first set of profiles integrating 25 descriptive variables from two key psychological factors, motivation and the ER, that influence gamer behaviour, based on an international sample of adolescent and adult gamers, including all game genres and three gender categories. Additionally, by analysing the influence of the covariate GD, these profiles can distinguish between healthy gaming behaviours and the risk of GD.

Our findings offer preliminary insights into psychological and behavioural patterns identified by four psychological profiles of video game players, each linked to specific variables. These results lay the foundation for further study of these profiles as potential mechanisms for personalised prevention and intervention strategies, adaptable to any video game player aged 16 or older.

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Conflict of interest: The authors declare that they have no known competing financial interest or personal relationships that could constitute a real, potential, or apparent conflict of interest with respect to their involvement in the publication. The authors do not have conflicts of interest.

Data availability: Data will be made available on reasonable request to the first author.

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SUPPLEMENTARY MATERIAL

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