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Research paper

# Depression, anxiety, and stress in young adult gamers and their relationship with addictive behaviors: A latent profile analysis

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ABSTRACT

*Background:* There is limited research examining latent profiles of gamers based on emotional variables, which has implications for prevention efforts. The study sought to identify young adult gamer profiles based on depression, anxiety, and stress, and to examine differences between the latent profiles in other addictive behaviors (i.e., tobacco, alcohol, cannabis, illegal substance use, gaming, and gambling).
*Methods:* A total of 1209 young adults ($M_{age}$ = 19.37, *SD* = 1.62; 55.3%males) reported past-year gaming. A latent profile analysis (LPA) was performed to identify distinct profiles, and a set of ANOVA and chi-square analyses characterized the profiles in terms of sociodemographic, addictive behaviors, and emotional variables.
*Results:* LPA suggested a three-profile solution: profile 1 ($n$ = 660, 'low emotional distress'), profile 2 ($n$ = 377, 'moderate emotional distress'), and profile 3 ($n$ = 172, 'high emotional distress'). Participants with 'moderate' and 'high emotional distress' were mostly women, showed greater gaming severity, higher prevalence of past-month substance use (i.e., tobacco and illegal drugs), and greater consequences of alcohol use.
*Limitations:* The cross-sectional nature of the study and sample being university students.
*Conclusion:* Findings revealed three distinct profiles of gamers, which differed in emotional, gaming, and substance use severity. Transdiagnostic prevention programs have the potential to provide significant benefits to college students by addressing the core processes (e.g., emotion regulation) that underlie substance use and gaming.

## 1. Introduction

Gaming is a popular recreational activity that has significantly increased all over the world in recent years (Sixto-Costoya et al., 2021; Stevens et al., 2021). Gaming provides a positive sense of community and serves as an escape from negative emotions and thoughts (Hygen et al., 2020; Sirola et al., 2021). In some instances, gaming can lead to negative consequences, including poorer mental health (e.g., anxiety, depression, and poor academic performance) and more specifically, gaming disorder (Macur and Pontes, 2021; von der Heiden et al., 2019). Gaming disorder prevalence varies widely across studies (Darvesh et al., 2020). The pooled past-year prevalence ranges between 2.5 % - 3.3 % among the general population (Fam, 2018; Kim et al., 2022b; Pan et al., 2020; Stevens et al., 2021), and is more frequent in men gamers than women (8.5 %–15.4 % vs. 3.5 %–6.4 %) (Gao et al., 2022; Kim et al., 2022b), and in children, adolescents and young adults (3.3 % - 6.7 %) than in adults (1.9 %) (Fam, 2018; Kim et al., 2022b; Stevens et al., 2021). A recent systematic review and meta-analysis (Gao et al., 2022), concluded that the pooled prevalence of gaming disorder was 8.8 % for adolescents and 10,4 % for young adults. In line with gaming prevalence worldwide, in Spain, problematic gaming prevalence has been established as between 3.1 % and 8.3 % (Buiza-Aguado et al., 2018; Nogueira-López et al., 2023).

In many cases, excessive gaming tends to be associated with the loss of natural reinforcers (e.g., spending time with friends, participating in leisure activities, or engaging in physical activities), and poor mental health—particularly elevated levels of anxiety and depression (Brunborg et al., 2014; González-Bueso et al., 2018; Männikkö et al., 2020; Mikuška and Vazsonyi, 2018; Ostinelli et al., 2021; Wong et al., 2020), although psychological conditions have been studied as a strong risk factor for gaming disorder (Drummond et al., 2022; Gao et al., 2022; Limone et al., 2023). Gaming also entails higher risk of developing addictive behaviors, including substance use, prescription drug misuse and gambling (Burleigh et al., 2019; Qeadan et al., 2022; Sanders and Williams, 2019; Strizek et al., 2020). The interaction between gaming and these other addictive behaviors underlines the importance of

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understanding and addressing gaming-related issues as part of a broader spectrum of addictive behaviors and mental health.

According to the premises of the multidimensional developmental theory of addiction (European Monitoring Centre for Drugs and Drug Addiction, 2019; Matthews and Natrajan-Tyagi, 2019), starting at university represents a period of vulnerability for young adults (Arnett, 2015; Azmitia et al., 2013). Transition from school to university involves integrating into new social groups and poses particular risk for engaging in addictive behaviors and the emergence of mental health problems (Davidson et al., 2015; Mikami et al., 2010; Schulenberg and Maggs, 2002; Zucker et al., 2016). From a developmental perspective, addictive behaviors may arise as a means of developing a new sense of identity or as a coping response to the new adjustment demands (e.g., independence, integrity, competence). In this regard, studies have emphasized the importance of considering the interplay of biopsychosocial risk factors of gaming that are relevant at each period of development (Benarous et al., 2019). University students exhibit high prevalence rates of mental health disorders that frequently co-occur with gaming (Männikkö et al., 2020). Additionally, studies on the effectiveness of cognitive-behavioral therapy have shown efficacy in improving gaming behavior as well as depressive and anxious symptoms (Stevens et al., 2019), and gaming intervention also has an effect on depression and anxiety (Townsend et al., 2022). All of this underscores the significant interconnection between mental health and gaming.

Recently, there has been growing interest in characterizing young individuals who engage in addictive behaviors from a person-centered approach (e.g., latent profile analysis) (Charzyńska et al., 2021; Green et al., 2023; Halladay et al., 2022; Nelon et al., 2019; Nower et al., 2022). Specifically for gaming, profiling young adults based on individual variables offers a nuanced understanding of risk factors due to people being classified into subgroups based on membership probabilities that are empirically estimated and subsequently profiled on demographic and relevant covariates, which allows preventive and treatment strategies to be tailored to individuals' needs (Lee et al., 2017; Spurk et al., 2020).

Most of studies classifying gamers from a person-centered approach are based on gaming characteristics (e.g., severity, motives, type of game) (Charzyńska et al., 2021; Chen et al., 2021; Labrador et al., 2023; Macur and Pontes, 2021; Saritepeci et al., 2022; Stavropoulos et al., 2020; Tullett-Prado et al., 2021; Wang et al., 2022), personality factors (Burleigh et al., 2022b; González-Bueso et al., 2020; Marmet et al., 2018), or addictive behaviors (Burleigh et al., 2022b; Granero et al., 2022). Notably, psychopathological variables seem to be the most informative for clustering and differentiating subgroups of gamers (Colder Carras and Kardefelt-Winther, 2018; Granero et al., 2022, 2021; Musetti et al., 2019). For example, findings from Granero et al. (2021, 2022) indicated that psychopathology demonstrated the highest relative weight in the clustering process and that psychopathological distress (along with age) were the variables with the most valuable information in the model.

Additionally, the study by Musetti et al. (2019) showed that depression and anxiety were the variables that exhibited the most pronounced differences between gamers. Similarly, results from Colder Carras and Kardefelt-Winther (2018) suggested that mental health differentiates clusters of gamers based on gaming-related features.

To our knowledge, most studies conducted among gamblers have looked at adolescents (see e.g., Cerniglia et al., 2019; Colder Carras and Kardefelt-Winther, 2018; Labrador et al., 2023; Macur and Pontes, 2021; Skripkauskaite et al., 2022), whereas few studies conducted have examined young adults (Burleigh et al., 2022b; Kim et al., 2023; Marmet et al., 2018; Musetti et al., 2019). Prior studies have some limitations, either only including a sample of male subjects (Marmet et al., 2018), or including both adolescents and young adults without differentiating by subgroups (Musetti et al., 2019). Another limitation is the inclusion of a large number of variables to form the subgroups, making it challenging to extrapolate findings to real-world settings (Granero et al., 2022, 2021; Musetti et al., 2019).

Against this background, this study aimed to identify profiles of young adults who reported past-year gaming in terms of emotional variables, particularly anxiety, depression, and stress. It also examined differences between the latent profiles in gaming severity, gambling-related, and substance use-related variables. Given the multidimensional nature of gaming, the results are expected to indicate refinement methods to accurately identify people at risk of gaming disorder beyond those included in categorical (yes vs. no) diagnostic systems, to improve assessment practices, and to expedite early tailored screening and interventions.

Based on theory and prior research, we anticipated the following hypotheses: 1) different empirically driven profiles will be identified based on severity levels of depression, anxiety, and stress; and 2) there would be significant differences between latent profiles in terms of gaming severity and addictive behaviors, with those presenting higher severity in emotional variables showing greater gaming severity and engagement in other addictive behaviors.

## 2. Methods

### 2.1. Participants and procedure

The study sample included 1186 gamers who participated in a multicenter study in three regions in Spain (The Balearic Islands, the Principality of Asturias, and Aragon) during September–November 2021. Recruitment was carried out through universities and vocational schools. Specifically, professors were contacted and asked spread awareness of the project and ask their students to participate. Participation in the study was also invited through posters, flyers, and media advertisements. All the students completed an e-battery assessment that lasted approximately 45 min.

Inclusion criteria for this study were: 1) being aged between 18 and 25 years old; 2) being a student at university or at a vocational center; 3) willingness to participate in subsequent assessments; and 4) having reported past-year gaming. Of the 2980 individuals that completed the evaluation battery, 1794 were excluded because they were aged over 25 ($n$ = 121), they lacked attentional control ($n$ = 22) (see the Measures section for further details), they were duplicate cases ($n$ = 75), or they had not gamed in the previous year ($n$ = 1576). This resulted in a final sample of 1186 gamers ($M_{age}$ = 19.38, $SD$ = 1.63). Just over half the participants were men (55.7 %, $n$ = 661), 43.3 % ($n$ = 513) of the participants were in their 1st year and 40.5 % ($n$ = 480) were in their 2nd year of university. Their weekly allowance was on average €60.11 ($SD$ = 135.79). Past-month tobacco use was reported by 17.3 % ($n$ = 205) of the sample, 47.8 % ($n$ = 567) reported past-month alcohol use, 9.6 % ($n$ = 114) past-month cannabis use, and 4.2 % ($n$ = 50) past-month illegal drug use. Additionally, 11.55 % ($n$ = 137) reported having gambled in the previous month (4.63 % online, and 9.95 % offline).

All participants provided written informed consent before the study participation, and the local Research Ethics Committee of the University of the Balearic Islands approved the study protocol (no. 191CER21).

### 2.2. Measures

All participants completed an e-battery in which sociodemographic data, gaming and gambling-related characteristics, substance use, and mental health variables were collected. To verify sufficient effort and attention to the task, four attentional control items (e.g., for this question choose “true”) were included within the assessment battery. Participants with more than two incorrect answers were excluded.

#### 2.2.1. Sociodemographic characteristics

All participants provided sociodemographic information relative to age, sex (i.e., male or female), academic year (i.e., 1st or 2nd year of vocational studies, or 1st to 4th year of university), and weekly

allowance.

#### 2.2.2. Gaming variables

The Spanish validation (Beranuy et al., 2020) of the Internet Gaming Disorder Scale (IGDS-9; Lemmens et al., 2015) was used to assess Internet gaming disorder. This scale contains 9 items using a 5-point Likert-type scale (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = very often). The total score ranges from 9 to 45. Participants with a score of 4 or 5 in no more than three items are considered non-disordered gamers, those with a score of 4 or 5 in four items, are deemed at-risk disordered gamers, and those with a score of 4 or 5 in more than five items are considered disordered gamers. In the current sample, Cronbach's alpha was 0.87.

Participants also provided information on the type of videogames they had played most in the previous year: adventure games, role-playing games (RPG), massively multiplayer online role-playing games (MMORPG), multiplayer online battle arena (MOBA), graphic adventure games, shooters, strategy videogames, simulation and sports, platform, and racing games. In addition, students reported the amount of total money spent in the past year on videogames to improve their game situations, their characters, accessories, image, etc. The variable was categorized as follows: €0, between €1 and €50, between €51 and €100 and more than €100.

#### 2.2.3. Substance use and gambling variables

Substance use-related variables included past-month tobacco, alcohol, and cannabis use, as well as past-month illegal substance use (i.e., cocaine, ecstasy, amphetamines, LSD, and heroin). Past-year frequency was divided into three categories: between 1 and 11 times per year, between 1 and 3 times per month, and between 1 and 3 times per week.

Substance use severity was assessed using the Heaviness of Smoking Index (HSI; Borland et al., 2010), the Cannabis Use Disorder Identification Test (CUDIT-R; Adamson et al., 2010; Mezquita et al., 2022), and the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler et al., 2008; Pilatti et al., 2014). The HSI comprises two items from the Fagerström Test for Cigarette Dependence, specifically "on the days that you smoke, how soon after you wake up do you have your first cigarette?", and "how many cigarettes do you typically smoke per day?". An HSI cut-off point of 4 suggests high nicotine dependence (Sujal et al., 2021). CUDIT-R has 8 items using a 5-point Likert scale (from 0 to 4), with questions relating to the previous six months. The total score is the sum of items; a higher score indicates more severe cannabis use and the optimal cut-off point that screens for a cannabis use disorder is 13 (Adamson et al., 2010). In this study, Cronbach's alpha was 0.81. Finally, the BYAACQ contains 24 items using a dichotomized scale (i.e., yes/no), that describe the consequences of alcohol use in the past year. A higher number of items indicate more serious consequences of alcohol consumption. The questionnaire shows adequate psychometric properties ($\alpha = 0.84$).

Gambling assessment included past-month gambling (i.e., yes/no), both online and offline. Gambling severity was assessed by the Problem Gambling Severity Index (PGSI; Lopez-Gonzalez et al., 2018), which has 9 items using a 4-point Likert scale (0 = never, 3 = almost always). Total scores range from 0 to 27; where 1–2 indicates low-risk, 3–7 moderate-risk, and ≥ 8 problem gambling (Ferris and Wynne, 2001; Lopez-Gonzalez et al., 2018). Internal consistency in our sample was 0.78.

#### 2.2.4. Emotional distress variables

The Spanish validation (Daza et al., 2002) of the Depression, Anxiety, and Stress Scale (DASS-21; Henry and Crawford, 2005) was used to examine emotional distress. This scale has 21 items using a 4-point Likert-type scale (0 = did not apply to me at all; 1 = applied to me to some degree, or some of the time; 2 = applied to me to a considerable degree or a good part of time; 3 = applied to me very much or most of the time). Each dimension contains 7 items, and the total score is computed by multiplying the sum of the items by two, so the total score ranges between 0 and 126 points (0–42 in each subscale). Cutoffs for depression, anxiety and stress are at 10, 8 and 16, respectively (Lovibond and Lovibond, 1995). In the current sample, Cronbach's alpha ranged from 0.81 in the stress dimension to 0.89 in the depression dimension.

### 2.3. Data analysis

Descriptive statistics were calculated to characterize the sample size in relation to demographics, substance use, gaming, gambling, and emotional variables. Latent profile analysis (LPA) was performed to identify empirically driven profiles of past-year gamers based on depressive, anxiety, and stress symptoms, according to the DASS-21. Following prior recommendations (Steinley and Brusco, 2011; Tein et al., 2013; Williams and Kibowski, 2016), four criteria were considered to determine the number of latent profiles: a) the Bayesian information criterion (BIC); b) the sample-size adjusted Bayesian information criterion (SSABIC); c) the Lo–Mendel–Rubin likelihood ratio test (LMR-LRT); and d) the Bootstrapped likelihood ratio test (BLRT). A lower value of BIC and SSABIC indicates a better model fit. A significant *p*-value in the LMR-LRT and BLRT tests indicates that a particular k-profile model is significantly better than the k-profile-1. Entropy ranges between 0 and 1 with values close to 1 indicating high classification accuracy.

Lastly, a set of one-way analysis of variance (ANOVA) and a set of chi-square analyses were carried out to examine differences between latent profiles in continuous (e.g., DASS-21, IGDS, PGSI), and categorical variables (e.g., prevalence of substance use), respectively. Effect size was evaluated with Cohen's *d* and Cramer's *V*, as appropriate. All analyses were performed with Mplus V.8 (Muthén and Muthén, 2007) and SPSS V.24 software.

## 3. Results

### 3.1. Latent profiles of gamers in terms of anxiety, stress, and depression

The results of the LPA are displayed in Table 1. The SSABIC criteria indicated the four-profile solution was the most adequate. However, according to the LMR-LRT criteria, the four-profile model did not fit better than the prior model ($p > .05$). Thus, we selected the three-profile model. Profile 1 comprised 660 participants ($M_{age} = 19.26$; 67.1 % men), Profile 2 comprised 372 ($M_{age} = 19.55$, 46.8 % men) and Profile 3 comprised 154 ($M_{age} = 19.48$, 28.6 % men). There was a significant relationship between latent profile and sex [$\chi^2_{(2)} = 92.848$, $p < .001$, $\Phi = 0.280$], with higher female representation in profiles 2 and 3. There were statistically significant differences between profiles in the emotional distress variables (see Table 2). According to the levels of depression, anxiety, and stress, we called profile 1 'low emotional distress', profile 2 'moderate emotional distress' and profile 3 'high emotional distress'.

The differential analysis of the DASS-21 items showed that

**Table 1**
Fit indices from latent profile analysis.

| Models | BIC | SSABIC | *p*-Value of LMR-LRT | *p*-Value of BLRT | Entropy |
|---|---|---|---|---|---|
| One profile | 25,908.302 | 25,889.244 | – | – | – |
| Two profiles | 24,427.952 | 24,396.188 | <.001 | <.001 | 0.890 |
| Three profiles | 24,109.599 | 24,065.130 | <.001 | <.001 | 0.811 |
| Four profiles | 24,009.255 | 23,952.080 | .244 | <.001 | 0.777 |

Note. BIC = Bayesian information criterion; SSABIC = sample-size adjusted Bayesian information criterion; LMR-LRT = Lo–Mendell–Rubin likelihood ratio test; BLRT = Bootstrapped likelihood ratio test.

**Table 2**
Participants' characteristics based on latent profile.

| | Total sample $N = 1186$ | Profile 1 "Low emotional distress" ($n = 660$) | Profile 2 "Moderate emotional distress" ($n = 372$) | Profile 3 "High emotional distress" ($n = 154$) | *p*-Value | Cohen's *d* |
|---|---|---|---|---|---|---|
| Depression* | 12.95 (10.27) | 6.59 (5.17)[a] | 17.58 (7.79)[b] | 28.99 (8.44)[c] | <.001 | 2.42 |
| Anxiety* | 10.03 (8.71) | 4.45 (3.65)[a] | 13.27 (5.47)[b] | 26.10 (6.11)[c] | <.001 | 3.17 |
| Stress* | 14.20 (8.63) | 8.43 (4.84)[a] | 18.65 (4.87)[b] | 28.19 (5.43)[c] | <.001 | 2.87 |

Note. Each superscript letter denotes a statistically significant difference between groups at a *p*-value ≤ .05.
* Mean (standard deviation).

participants in profile 1 (low emotional distress) stood out for their score in depressive symptoms (especially in items 5 and 13, related to lack of initiative and feeling downhearted or blue, respectively). Participants in profile 2 (moderate emotional distress) stood out for their score in anxiety/stress symptoms, especially in items 1 (i.e., winding down), 9 (i.e., worry), and 12 (i.e., difficulties in relaxing). Finally, participants in profile 3 (high emotional distress) scored the highest in the three subscales, especially in items 1, 9–13, related to winding down, worry, anhedonia, agitation, difficulties in relaxing, and feeling downhearted or blue (see Supplementary material).

### 3.2. Relationship between emotional symptom profiles, gaming, and gambling characteristics

As Table 3 shows, participants with the 'high emotional distress' profile exhibited greater gaming severity [$F_{(2)} = 14.671$, $p < .001$, $d = 0.314$] and higher risk of gaming disorder [$\chi^2_{(4)} = 35.059$, $p < .001$, $V = 0.122$]. Additionally, participants with the 'moderate emotional distress' profile reported higher engagement in adventure and graphic adventure games, as well as lower engagement in shooter-type games, compared to those with the 'low emotional distress' profile [$\chi^2_{(18)} = 34.580$, $p = .011$, $V = 0.121$].

There were no statistically significant differences between profiles in terms of gambling-related variables (i.e., gambling prevalence and severity).

### 3.3. Relationship between emotional symptom profiles and substance use

Table 4 shows the characterization of latent profiles based on substance use. Compared to gamblers with 'low emotional distress', those with 'moderate' and 'high emotional distress' (i.e., profiles 2 and 3) reported a higher percentage of past-month tobacco use [$\chi^2_{(2)} = 20.432$, $p < .001$, $\Phi = 0.131$], past-month cannabis use [$\chi^2_{(2)} = 9.916$, $p = .007$, $\Phi = 0.091$], and past-month illegal substance use [$\chi^2_{(2)} = 6.782$, $p = .034$, $\Phi = 0.076$], and greater negative consequences of alcohol use (i.e., BYAACQ) [$F_{(2)} = 15.248$, $p < .001$, $d = 0.464$]. Participants with moderate emotional distress reported smoking more cigarettes per day than those with low emotional distress [$F_{(2)} = 4.949$, $p = .008$, $d = 0.444$].

## 4. Discussion

This study sought to identify young adult gamer profiles based on emotional variables (i.e., depression, anxiety, and stress), as well as to examine whether these profiles differed in terms of addictive behaviors (i.e., gaming, gambling, and substance use). Results from the LPA demonstrated three profiles: profile 1 'low emotional distress', profile 2 'moderate emotional distress', and profile 3 'high emotional distress' characterized respectively by low, moderate, and high levels of depression, anxiety, and stress. Participants with 'moderate' and 'high emotional distress' were mostly women, showed greater gaming severity, higher prevalence of past-month substance use (i.e., tobacco and illegal drugs), and greater negative alcohol use consequences. Lastly, latent profiles were not associated with gambling behavior.

The association between gaming disorder and poor mental health has been found in previous studies (Gao et al., 2022; González-Bueso et al., 2018; Ostinelli et al., 2021; Purwaningsih and Nurmala, 2021), and may be an indicator of shared vulnerability or common predisposing factors. Previous research has documented that gaming may cause high emotional distress (Brunborg et al., 2014; González-Bueso et al., 2018; Männikkö et al., 2020; Mikuška and Vazsonyi, 2018; Wong et al., 2020), due to both biological (e.g., increased arousal due to screen exposure) and psychological factors (e.g., loneliness, low extraversion, high neuroticism, loss of natural reinforcers) (Hygen et al., 2020). Conversely, there is also evidence suggesting that mental health disorders (e.g., depression, anxiety, stress) constitute a risk factor for developing gaming disorder (Andreetta et al., 2020; Richard et al., 2020). From this point of view, gaming can be considered a way to deal with negative emotional symptomatology (Wang et al., 2022).

The differential analysis of the DASS-21 items showed that Profile 1 exhibited a tendency towards depressive symptoms, Profile 2 tended towards anxiety/stress symptoms, and Profile 3 showed a mix of depressive, anxiety, and stress symptoms. This result has important clinical implications, such as guiding interventions targeted at the needs of these specific profiles (e.g., behavioral activation, mindfulness) (Ostinelli et al., 2021; Sharma et al., 2021).

Additionally, there were significant differences between the gaming profiles based on the type of gaming. Specifically, gamers assigned to profile 1 exhibited lower engagement in adventure, and RPG games, and higher engagement in shooter games. The relationship between gaming severity and gaming type has hardly been investigated. One previous study found that risk factors for gambling severity may be different depending on the type of game. More specifically, alexithymia was related to higher gaming severity in MOBA games, while anxiety was related to higher severity with MMRPG games (Bonnaire and Baptista, 2019). Previous studies (see e.g., Kim et al., 2022a, 2022b; Lemmens and Hendriks, 2016) have indicated that the shooter genre was related to a higher gaming addiction. Further research is required in this regard to elucidate the role of gaming genres in gaming disorder.

Notably, the gamers in our study who exhibited higher levels of depression, anxiety, and stress symptomatology (i.e., profile 3) were predominantly women and displayed higher gaming severity. This finding differs from previous research, which suggests that gaming severity is overrepresented in men (Bonnaire and Baptista, 2019; Nogueira-López et al., 2023; Yu et al., 2021) but can be explained by the higher emotional distress levels we saw in the women in in our study. This interpretation is supported to some extent by research suggesting a higher prevalence of emotional disorders in women and a more negative progression of mental disorders (e.g., larger and a higher number of depressive episodes) (Essau et al., 2010).

In line with previous research (see e.g., Burdzovic Andreas et al., 2015; Burkauskas et al., 2022; Burleigh et al., 2019, 2018; Urbanoski et al., 2007), there was a significant relationship between gamers' levels of emotional distress and increased prevalence of legal and illegal substance use. It is worth noting that people with psychological disorders often employ coping mechanisms and emotion regulation strategies that can be considered maladaptive, such as engagement in addictive behaviors, particularly substance use (Burleigh et al., 2022a; Estévez et al., 2017, 2014). Additionally, substance use may also have the function of enhancing gaming experiences, contributing to elevated excitement and

**Table 3**
Characterization of profiles based on gaming- and gambling-related variables.

| | Profile 1 "Low emotional distress" ($n$ = 660) | Profile 2 "Moderate emotional distress" ($n$ = 372) | Profile 3 "High emotional distress" ($n$ = 154) | $p$-Value | Effect size |
|---|---|---|---|---|---|
| IGDS* | 21.92 (4.47)[a] | 23.05 (5.66)[b] | 24.22 (6.48)[b] | .000 | 0.314 |
| GD classification [n (%)] | | | | <.001 | 0.122 |
| Non-disordered gamers | 612 (92.73 %)[a] | 326 (87.63 %)[b] | 121 (78.57 %)[c] | | |
| At-risk disordered gamers | 20 (3.03 %)[a] | 8 (2.15 %)[a] | 7 (4.55 %)[a] | | |
| Disordered gamers | 28 (4.24 %)[a] | 38 (10.22 %)[b] | 26 (16.88 %)[c] | | |
| Money spent on videogames [n (%)] | | | | .564 | 0.045 |
| €0 | 499 (75.61 %)[a] | 280 (75.27 %)[a] | 120 (77.92 %)[a] | | |
| €1–50 | 121 (18.33 %)[a] | 60 (16.13 %)[a] | 23 (14.94 %)[a] | | |
| €51–100 | 28 (4.24 %)[a] | 19 (5.11 %)[a] | 6 (3.90 %)[a] | | |
| Over €100 | 12 (1.82 %)[a] | 13 (3.49 %)[a] | 5 (3.25 %)[a] | | |
| Videogame type [n (%)] | | | | .011 | 0.121 |
| Adventure game | 84 (2.73 %)[a] | 72 (19.35 %)[b] | 25 (16.23 %)[a,b] | | |
| RPG | 36 (5.45 %)[a] | 30 (8.06 %)[a,b] | 16 (10.39 %)[b] | | |
| MMORPG | 12 (1.82 %)[a] | 3 (0.81 %)[a] | 4 (2.60 %)[a] | | |
| MOBA | 100 (15.15 %)[a] | 45 (12.10 %)[a] | 21 (13.64 %)[a] | | |
| Graphic adventure games | 13 (1.97 %)[a] | 18 (4.84 %)[b] | 7 (4.55 %)[a,b] | | |
| Shooters | 128 (19.39 %)[a] | 50 (13.44 %)[b] | 23 (14.94 %)[a,b] | | |
| Strategy videogame | 43 (6.52 %)[a] | 25 (6.72 %)[a] | 7 (4.55 %)[a] | | |
| Sports simulation | 123 (18.64 %)[a] | 64 (17.20 %)[a] | 22 (14.29 %)[a] | | |
| Platform | 53 (8.03 %)[a] | 35 (9.41 %)[a] | 17 (11.04 %)[a] | | |
| Racing games | 68 (10.30 %)[a] | 30 (8.06 %)[a] | 12 (7.79 %)[a] | | |
| Gambling-related variables [n (%)] | | | | | |
| Past-month gambling (online and/or offline) | 88 (13.33 %)[a] | 38 (10.22 %)[a] | 11 (7.14 %)[a] | .381 | 0.136 |
| Past-month gambling online | 38 (5.76 %)[a] | 15 (4.03 %)[a] | 2 (1.30 %)[a] | .280 | 0.213 |
| Past-month gambling offline | 73 (11.06 %)[a] | 36 (9.68 %)[a] | 9 (5.84 %)[a] | .327 | 0.137 |
| PGSI* | 1.21 (2.32)[a] | 1.00 (1.84)[a] | 1.43 (2.52)[a] | .684 | 0.109 |

Note. Different superscript letters denote a statistically significant difference at a p-value ≤ .05. IGDS = Internet gaming disorder scale; PGSI = problem gambling severity index. RPG = role-playing game; MMORPG = massively multiplayer online role-playing game; MOBA = multiplayer online battle arena.
* Mean (standard deviation).

**Table 4**
Characterization of profiles based on weekly allowance and substance use.

| | Profile 1 "Low emotional distress" ($n$ = 660) | Profile 2 "Moderate emotional distress" ($n$ = 372) | Profile 3 "High emotional distress" ($n$ = 154) | $p$-Value | Effect size |
|---|---|---|---|---|---|
| Weekly allowance* | 56.28 (126.48)[a] | 71.07 (164.88)[a] | 50.09 (87.07)[a] | .151 | 0.109 |
| Substance use related variables | | | | | |
| Past-month tobacco use | 85 (12.88 %)[a] | 83 (22.31 %)[b] | 37 (24.03 %)[b] | <.001 | 0.131 |
| Frequency of tobacco use | | | | <.001 | 0.238 |
| 1–11 times per year | 70 (60.34 %)[a] | 33 (32.35 %)[b] | 20 (41.67 %)[b] | | |
| 1–3 times per month | 19 (16.38 %)[a] | 9 (8.82 %)[a] | 4 (8.33 %)[a] | | |
| 1–3 or more times per week | 27 (23.28 %)[a] | 60 (58.82 %)[b] | 24 (50.00 %)[b] | | |
| HSI | | | | .774 | 0.050 |
| Low addiction (0–2) | 75 (88.24 %)[a] | 73 (87.95 %)[a] | 31 (83.78 %)[a] | | |
| Moderate addiction (3–4) | 10 (11.76 %)[a] | 10 (12.05 %)[a] | 6 (16.22 %)[a] | | |
| CPD* | 1.61 (3.15)[a] | 4.33 (7.84)[b] | 3.49 (4.14)[a,b] | .008 | 0.444 |
| Past-month alcohol use | 310 (46.97 %)[a] | 179 (48.12 %)[a] | 78 (50.65 %)[a] | .705 | 0.024 |
| BYAACQ* | 4.93 (3.98)[a] | 6.64 (4.22)[b] | 7.32 (5.02)[b] | <.001 | 0.464 |
| Frequency of alcohol use | | | | .322 | 0.049 |
| 1–11 times per year | 213 (40.11 %)[a] | 120 (39.60 %)[a] | 55 (40.44 %)[a] | | |
| 1–3 times per month | 156 (29.38 %)[a] | 74 (24.42 %)[a] | 32 (23.53 %)[a] | | |
| 1–3 or more times per week | 162 (30.51 %)[a] | 109 (35.97 %)[a] | 49 (36.03 %)[a] | | |
| Past-month cannabis use | 49 (7.42 %)[a] | 50 (13.44 %)[a] | 15 (9.74 %)[a,b] | .007 | 0.091 |
| Frequency of past-year cannabis use | | | | .772 | 0.064 |
| 1–11 times per year | 69 (75.00 %)[a] | 64 (68.82 %)[a] | 26 (74.29 %)[a] | | |
| 1–3 times per month | 9 (9.78 %)[a] | 15 (16.13 %)[a] | 4 (11.43 %)[a] | | |
| 1–3 or more times per week | 14 (15.22 %)[a] | 14 (15.05 %)[a] | 5 (14.29 %)[a] | | |
| CUDIT* | 5.92 (5.30)[a] | 6.12 (4.91)[a] | 7.00 (7.10)[a] | .794 | 0.089 |
| Number of joints/day* | 0.25 (0.601)[a] | 0.52 (1.36)[a] | 0.53 (1.36)[a] | .430 | 0.247 |
| Number of joints/month | | | | .251 | 0.184 |
| 1–2 | 30 (61.22 %)[a] | 22 (44.00 %)[a] | 7 (43.75 %)[a] | | |
| 3–9 | 10 (20.41 %)[a] | 19 (38.00 %)[a] | 4 (25.00 %)[a] | | |
| 10–19 | 5 (10.20 %)[a] | 3 (6.00 %)[a] | 1 (6.25 %)[a] | | |
| More than 20 | 4 (8.16 %)[a] | 6 (12.00 %)[a] | 4 (25.00 %)[a] | | |
| Past-month illegal substance use | 19 (2.88 %)[a] | 21 (5.65 %)[b] | 10 (6.49 %)[b] | .034 | 0.076 |

Note. Different superscript letters denote a statistically significant difference at the 0.05 level. HSI = heaviness of smoking index; CPD = cigarettes per day; CUDIT = cannabis use disorder identification test; BYAACQ = brief young adult alcohol consequences questionnaire.

* Mean (standard deviation).

enjoyment (Skařupova et al., 2018).

Our findings indicate that emotional distress in gamers was not associated with gambling behavior (i.e., prevalence and severity). Similar results have been reported in adults (Forrest et al., 2016; King et al., 2012; Sanders and Williams, 2019) and adolescents (Delfabbro et al., 2009). Some distinct features of gaming, such as the presence of loot boxes, have been identified as factors that can increase gamers' vulnerability to developing gambling-related behaviors (Drummond et al., 2022; Gibson et al., 2022). However, the unexpectedly low prevalence of monetary expenditure on gaming—including spending on loot boxes—in our study (i.e., 75.8 % of participants reported €0 expenditure on videogames) may explain this outcome.

The results of the current study should be interpreted considering some limitations. First, it is worth mentioning that the LPA suggested a solution with three parallel profiles, which is consistent with previous studies into emotional distress variables among gamblers (Kovacs et al., 2022). Although this might indicate unreliable results from profile analysis (Sinha et al., 2021), it is worth stressing that it is possible for these classes to be distinct (Sinha et al., 2021) in terms of degree (i.e., symptom severity) rather than by type (Bauer, 2022). However, the occurrence of such parallel lines should be considered a strong indicator of the salsa phenomenon (Sinha et al., 2021), and the results should be interpreted with caution.

Additionally, the cross-sectional nature of the study prevents us from making causal conclusions about emotional distress and gaming. Secondly, the current sample comprised young adults from the general community, and most participants did not present gaming disorder, so caution should be exerted when extrapolating current results to clinical samples. Finally, including only a limited number of emotional variables may have overlooked important nuances about gaming, potentially limiting the depth of understanding derived from our findings. Nonetheless, the current approach was driven by the objective of constructing a parsimonious model that could be easily applied in practice (e.g., early detection of gaming-related problems in university settings). Currently, there is interest in the study of transdiagnostic variables (e.g., emotional regulation, impulsivity) that may account for the high co-occurrence of mental health disorders in gamers (Müller et al., 2023; Schettler et al., 2024). Studies on this area are limited and more research is needed looking at the intersection of gaming and transdiagnostic variables.

In conclusion, this study identified distinct profiles of young adult gamers according to the severity of emotional distress. It is worth noting that even participants with moderate levels of depression, anxiety, and stress exhibited high levels of gaming severity. The high co-occurrence between gaming and emotional distress in young adults suggests the need to screen for emotional variables, as it could allow improved identification of gamers who are at-risk of internet gaming disorder. The interplay between gaming and mental health also has implications for mental health services in Spain, as they have been traditionally separated from addictive behaviors treatment units. In consequence, there is a need to provide integrated treatments addressing common underlying risk factors of gaming and substance use, which might include emotion dysregulation (Gross, 2015a, 2015b) and deficits in self-control (Kim and Hodgins, 2018).

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## CRediT authorship contribution statement

**Gema Aonso-Diego:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Alba González-Roz:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Funding acquisition, Data curation, Conceptualization. **Sara Weidberg:** Writing – review & editing, Supervision, Data curation. **Roberto Secades-Villa:** Writing – review & editing, Supervision, Conceptualization.

## Declaration of competing interest

All authors declare no conflicts of interest or financial interest.

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## References

Adamson, S.J., Kay-Lambkin, F.J., Baker, A.L., Lewin, T.J., Thornton, L., Kelly, B.J., Sellman, J.D., 2010. An improved brief measure of cannabis misuse: the Cannabis Use Disorders Identification Test-Revised (CUDIT-R). Drug Alcohol Depend. 110, 137–143. https://doi.org/10.1016/j.drugalcdep.2010.02.017.

Andreetta, J., Teh, J., Burleigh, T.L., Gomez, R., Stavropoulos, V., 2020. Associations between comorbid stress and Internet Gaming Disorder symptoms: are there cultural and gender variations? Asia Pac. Psychiatry 12. https://doi.org/10.1111/APPY.12387.

Arnett, J.J., 2015. College students as emerging adults. Emerg. Adults 4, 219–222. https://doi.org/10.1177/2167696815587422.

Azmitia, M., Syed, M., Radmacher, K., 2013. Finding your niche: identity and emotional support in emerging adults' adjustment to the transition to college. J. Res. Adolesc. 23, 744–761. https://doi.org/10.1111/JORA.12037.

Bauer, D.J., 2022. A primer to latent profile and latent class analysis. In: Goller, M., Kyndt, E., Paloniemi, S., Damşa, E. (Eds.), Methods for Researching Professional Learning and Development. Professional and Practice-Based Learning. Springer, pp. 243–268. https://doi.org/10.1007/978-3-031-08518-5_11.

Benarous, X., Morales, P., Mayer, H., Iancu, C., Edel, Y., Cohen, D., 2019. Internet gaming disorder in adolescents with psychiatric disorder: two case reports using a developmental framework. Front. Psychol. 10 https://doi.org/10.3389/FPSYT.2019.00336/FULL.

Beranuy, M., Machimbarrena, J.M., Vega-osés, M.A., Carbonell, X., Griffiths, M.D., Pontes, H.M., González-cabrera, J., 2020. Spanish validation of the Internet Gaming Disorder Scale-Short Form (IGDS9-SF): prevalence and relationship with online gambling and quality of life. Int. J. Environ. Res. Public Health 17. https://doi.org/10.3390/IJERPH17051562.

Bonnaire, C., Baptista, D., 2019. Internet gaming disorder in male and female young adults: the role of alexithymia, depression, anxiety and gaming type. Psychiatry Res. 272, 521–530. https://doi.org/10.1016/j.psychres.2018.12.158.

Borland, R., Yong, H.H., O'Connor, R.J., Hyland, A., Thompson, M.E., 2010. The reliability and predictive validity of the heaviness of smoking index and its two components: findings from the International Tobacco Control Four Country Study. Nicotine Tob. Res. 12, 45–50. https://doi.org/10.1093/ntr/ntq038.

Brunborg, G.S., Mentzoni, R.A., Frøyland, L.R., 2014. Is video gaming, or video game addiction, associated with depression, academic achievement, heavy episodic drinking, or conduct problems? J. Behav. Addict. 3, 27. https://doi.org/10.1556/JBA.3.2014.002.

Buiza-Aguado, C., Alonso-Canovas, A., Conde-Mateos, C., Buiza-Navarrete, J.J., Gentile, D., 2018. Problematic video gaming in a young Spanish population: association with psychosocial health. Cyberpsychol. Behav. Soc. Netw. 21, 388–394. https://doi.org/10.1089/CYBER.2017.0599.

Burdzovic Andreas, J., Lauritzen, G., Nordfjærn, T., 2015. Co-occurrence between mental distress and poly-drug use: a ten year prospective study of patients from substance abuse treatment. Addict. Behav. 48, 71–78. https://doi.org/10.1016/J.ADDBEH.2015.05.001.

Burkauskas, J., Griskova-Bulanova, I., Đorić, A., Balhara, Y.P.S., Sidharth, A., Ransing, R., Thi, T.-V.V., Huong, T.N., Kafali, H.Y., Erzin, G., Vally, Z., Chowdhury, M.R.R., Sharma, P., Shakya, R., Moreira, P., Faria, S., Noor, I.M., Campos, L.A.M., Szczegielniak, A.R., Stevanovic, D., 2022. Association of Internet gaming disorder symptoms with anxiety and depressive symptoms and substance use: an international cross-sectional study. Middle East Curr. Psychiatry, Ain Shams Univ. 29 https://doi.org/10.1186/S43045-022-00180-6.

Burleigh, T., Stavropoulos, V., Liew, L.W.L., Adams, B.L.M., Griffiths, M.D., 2018. Depression, internet gaming disorder, and the moderating effect of the gamer-avatar relationship: an exploratory longitudinal study. Int. J. Ment. Heal. Addict. 16, 102–124. https://doi.org/10.1007/S11469-017-9806-3.

Burleigh, T., Griffiths, M.D., Sumich, A., Stavropoulos, V., Kuss, D.J., 2019. A systematic review of the co-occurrence of gaming disorder and other potentially addictive behaviors. Curr. Addict. Reports 6, 383–401. https://doi.org/10.1007/S40429-019-00279-7.

Burleigh, T., Griffiths, M.D., Sumich, A., Wang, G.Y., Kuss, D.J., 2022a. Coping and co-occurrence of gaming disorder and substance use in recovering substance users. J. Clin. Med. 11 https://doi.org/10.3390/JCM11247370.
Burleigh, T., Griffiths, M.D., Sumich, A., Wang, G.Y., Stavropoulos, V., Kannis-Dymand, L., Kuss, D.J., 2022b. Co-occurrence of gaming disorder and other potentially addictive behaviours between Australia, New Zealand, and the United Kingdom. Public Health 19, 16078. https://doi.org/10.3390/ijerph192316078.
Cerniglia, L., Griffiths, M.D., Cimino, S., De Palo, V., Monacis, L., Sinatra, M., Tambelli, R., 2019. A latent profile approach for the study of internet gaming disorder, social media addiction, and psychopathology in a normative sample of adolescents. Psychol. Res. Behav. Manag. 12, 651–659. https://doi.org/10.2147/PRBM.S211873.
Charzyńska, E., Sussman, S., Atroszko, P.A., 2021. Profiles of potential behavioral addictions' severity and their associations with gender, personality, and well-being: a person-centered approach. Addict. Behav. 119 https://doi.org/10.1016/J.ADDBEH.2021.106941.
Chen, J., Liu, J., Zhao, G., Kong, F., 2021. Internet behavior preferences predict pathological internet use: a latent profile analysis. Front. Psychol. 12, 644623 https://doi.org/10.3389/FPSYG.2021.644623.
Colder Carras, M., Kardefelt-Winther, D., 2018. When addiction symptoms and life problems diverge: a latent class analysis of problematic gaming in a representative multinational sample of European adolescents. Eur. Child Adolesc. Psychiatry 27, 513–525. https://doi.org/10.1007/S00787-018-1108-1.
Darvesh, N., Radhakrishnan, A., Lachance, C.C., Nincic, V., Sharpe, J.P., Ghassemi, M., Straus, S.E., Tricco, A.C., 2020. Exploring the prevalence of gaming disorder and Internet gaming disorder: a rapid scoping review. Syst. Rev. 9 https://doi.org/10.1186/S13643-020-01329-2.
Davidson, L.L., Grigorenko, E.L., Boivin, M.J., Rapa, E., Stein, A., 2015. A focus on adolescence to reduce neurological, mental health and substance-use disability. Nature 527, 161–166. https://doi.org/10.1038/nature16030.
Daza, P., Novy, D.M., Stanley, M.A., Averill, P., 2002. The depression anxiety stress scale-21: Spanish translation and validation with a Hispanic sample. J. Psychopathol. Behav. Assess. 24, 195–205. https://doi.org/10.1023/A:1016014818163/METRICS.
Delfabbro, P., King, D., Lambos, C., Puglies, S., 2009. Is video-game playing a risk factor for pathological gambling in Australian adolescents? J. Gambl. Stud. 25, 391–405. https://doi.org/10.1007/S10899-009-9138-8.
Drummond, A., Hall, L.C., Sauer, J.D., 2022. Surprisingly high prevalence rates of severe psychological distress among consumers who purchase loot boxes in video games. Sci. Rep. 12 https://doi.org/10.1038/S41598-022-20549-1.
Essau, C.A., Lewinsohn, P.M., Seeley, J.R., Sasagawa, S., 2010. Gender differences in the developmental course of depression. J. Affect. Disord. 127, 185–190. https://doi.org/10.1016/J.JAD.2010.05.016.
Estévez, A., Herrero-Fernández, D., Sarabia-Gonzalvo, I., Jáuregui, P., 2014. El papel mediador de la regulación emocional entre el juego patológico, uso abusivo de Internet y videojuegos y la sintomatología disfuncional en jóvenes y adolescentes. Adicciones 26, 282–290. https://doi.org/10.20882/ADICCIONES.26.
Estévez, A., Jáuregui, P., Sánchez-Marcos, I., López-González, H., Griffiths, M.D., 2017. Attachment and emotion regulation in substance addictions and behavioral addictions. J. Behav. Addict. 6, 534–544. https://doi.org/10.1556/2006.6.2017.086.
European Monitoring Centre for Drugs and Drug Addiction, 2019. European Prevention Curriculum: A Handbook for Decision-makers, Opinion-makers and Policy-makers in Science-based Prevention of Substance Use.
Fam, J.Y., 2018. Prevalence of internet gaming disorder in adolescents: a meta-analysis across three decades. Scand. J. Psychol. 59, 524–531. https://doi.org/10.1111/SJOP.12459.
Ferris, J., Wynne, H., 2001. The Canadian Problem Gambling Index: Final Report.
Forrest, C.J., King, D.L., Delfabbro, P.H., 2016. The gambling preferences and behaviors of a community sample of Australian regular video game players. J. Gambl. Stud. 32, 409–420. https://doi.org/10.1007/S10899-015-9535-0.
Gao, Y.-X., Wang, J.-Y., Dong, G.-H., 2022. The prevalence and possible risk factors of internet gaming disorder among adolescents and young adults: systematic reviews and meta-analyses. J. Psychiatr. Res. 154, 35–43. https://doi.org/10.1016/j.jpsychires.2022.06.049.
Gibson, E., Griffiths, M.D., Calado, F., Harris, A., 2022. The relationship between videogame micro-transactions and problem gaming and gambling: a systematic review. Comput. Hum. Behav. 131, 107219 https://doi.org/10.1016/J.CHB.2022.107219.
González-Bueso, V., Santamaría, J.J., Fernández, D., Merino, L., Montero, E., Ribas, J., 2018. Association between Internet gaming disorder or pathological video-game use and comorbid psychopathology: a comprehensive review. Int. J. Environ. Res. Public Health 15. https://doi.org/10.3390/IJERPH15040668.
González-Bueso, V., José Santamaría, J., Oliveras, I., Fernández, D., Montero, E., Baño, M., Jiménez-Murcia, S., del Pino-Gutiérrez, A., Ribas, J., Fisiopatología Obesidad Nutrición, C, 2020. Internet gaming disorder clustering based on personality traits in adolescents, and its relation with comorbid psychological symptoms. Int. J. Environ. Res. Public Health 17, 1516. https://doi.org/10.3390/ijerph17051516.
Granero, R., Fernández-Aranda, F., Castro-Calvo, J., Billieux, J., Valero-Solís, S., Mora-Maltas, B., Rivas-Pérez, S., Valenciano-Mendoza, E., del Pino-Gutiérrez, A., Gómez-Peña, M., Moragas, L., Baenas, I., Mena-Moreno, T., Casalé-Salayet, G., Codina, E., González-Bueso, V., Santamaría, J.J., Baño, M., Menchón, J.M., Jiménez-Murcia, S., 2021. Subtyping treatment-seeking gaming disorder patients. Addict. Behav. 123 https://doi.org/10.1016/J.ADDBEH.2021.107086.
Granero, R., Fernández-Aranda, F., Demetrovics, Z., Ayala-Rojas, R.E., Gómez-Peña, M., Moragas, L., Jiménez-Murcia, S., 2022. Profile of treatment-seeking gaming disorder patients: a network perspective. J. Gambl. Stud. 38, 941–965. https://doi.org/10.1007/s10899-021-10079-2.
Green, J., Lindqvist Bagge, A.S., Laporte, N., Andiné, P., Wallinius, M., Hildebrand Karlén, M., 2023. A latent class analysis of mental disorders, substance use, and aggressive antisocial behavior among Swedish forensic psychiatric patients. Compr. Psychiatry 127. https://doi.org/10.1016/J.COMPPSYCH.2023.152428.
Gross, J.J., 2015a. Handbook of Emotion Regulation, 2nd edition. Guilford Press.
Gross, J.J., 2015b. Emotion regulation: current status and future prospects. Psychol. Inq. 26, 1–26. https://doi.org/10.1080/1047840X.2014.940781.
Halladay, J., MacKillop, J., Munn, C., Amlung, M., Georgiades, K., 2022. Individual- and school-level patterns of substance use and mental health symptoms in a population-based sample of secondary students: a multilevel latent profile analysis. Drug Alcohol Depend. 240 https://doi.org/10.1016/J.DRUGALCDEP.2022.109647.
von der Heiden, J.M., Braun, B., Müller, K.W., Egloff, B., 2019. The association between video gaming and psychological functioning. Front. Psychol. 10, 1731. https://doi.org/10.3389/FPSYG.2019.01731/BIBTEX.
Henry, J.D., Crawford, J.R., 2005. The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. Br. J. Clin. Psychol. 44, 227–239. https://doi.org/10.1348/014466505X29657.
Hygen, B.W., Skalická, V., Stenseng, F., Belsky, J., Steinsbekk, S., Wichstrøm, L., 2020. The co-occurrence between symptoms of internet gaming disorder and psychiatric disorders in childhood and adolescence: prospective relations or common causes? J. Child Psychol. Psychiatry 61, 890–898. https://doi.org/10.1111/JCPP.13289.
Kahler, C.W., Hustad, J., Barnett, N.P., Strong, D.R., Borsari, B., 2008. Validation of the 30-day version of the brief young adult alcohol consequences questionnaire for use in longitudinal studies. J. Stud. Alcohol Drugs 69, 611–615. https://doi.org/10.15288/jsad.2008.69.611.
Kim, H.S., Hodgins, D.C., 2018. Component model of addiction treatment: a pragmatic transdiagnostic treatment model of behavioral and substance addictions. Front. Psychol. 9, 406. https://doi.org/10.3389/FPSYT.2018.00406.
Kim, D., Nam, J.K., Keum, C., 2022a. Adolescent Internet gaming addiction and personality characteristics by game genre. PLoS One 17, e0263645. https://doi.org/10.1371/journal.pone.0263645.
Kim, H.S., Son, G., Roh, E. Bin, Ahn, W.Y., Kim, J., Shin, S.H., Chey, J., Choi, K.H., 2022b. Prevalence of gaming disorder: a meta-analysis. Addict. Behav. 126, 107183 https://doi.org/10.1016/J.ADDBEH.2021.107183.
Kim, B.N., Kang, H.S., Park, J., 2023. A latent profile approach for classifying internet gamers based on motives for online gaming. J. Behav. Addict. 12 https://doi.org/10.1556/2006.2022.00092.
King, D.L., Ejova, A., Delfabbro, P.H., 2012. Illusory control, gambling, and video gaming: an investigation of regular gamblers and video game players. J. Gambl. Stud. 28, 421–435. https://doi.org/10.1007/S10899-011-9271-Z.
Kovacs, J., Zarate, D., de Sena Collier, G., Tran, T.T.D., Stavropoulos, V., 2022. Disordered gaming: the role of a gamer's distress profile. Can. J. Behav. Sci. https://doi.org/10.1037/CBS0000335 (Advance online publication).
Labrador, M., Fernandez-Arias, F.J., Vallejo-Achón, I., Labrador, Marta, Sánchez-Iglesias, I., Bernaldo-De-Quirós, M., Estupiñá, F.J., Fernandez-Arias, I., Vallejo-Achón, M., Labrador, F.J., 2023. Citation: Video Game Playing and Internet Gaming Disorder: A Profile of Young Adolescents. https://doi.org/10.3390/ijerph20247155.
Lee, S., Lee, H.K., Choo, H., 2017. Typology of Internet gaming disorder and its clinical implications. Psychiatry Clin. Neurosci. 71, 479–491. https://doi.org/10.1111/pcn.12457.
Lemmens, J.S., Hendriks, S.J.F., 2016. Addictive online games: examining the relationship between game genres and internet gaming disorder. Cyberpsychology. Behav. Soc. Netw. 19, 270–276. https://doi.org/10.1089/cyber.2015.0415.
Lemmens, J.S., Valkenburg, P.M., Gentile, D.A., 2015. The internet gaming disorder scale. Psychol. Assess. 27, 567–582. https://doi.org/10.1037/pas0000062.
Limone, P., Ragni, B., Toto, G.A., 2023. The epidemiology and effects of video game addiction: a systematic review and meta-analysis. Acta Psychol. Amst). 241 https://doi.org/10.1016/J.ACTPSY.2023.104047.
Lopez-Gonzalez, H., Estévez, A., Griffiths, M.D., 2018. Spanish validation of the Problem Gambling Severity Index: a confirmatory factor analysis with sports bettors. J. Behav. Addict. 7, 814. https://doi.org/10.1556/2006.7.2018.84.
Lovibond, S.H., Lovibond, P.F., 1995. Manual for the Depression Anxiety Stress Scales, 2nd ed. Psychology Foundation.
Macur, M., Pontes, H.M., 2021. Internet Gaming Disorder in adolescence: investigating profiles and associated risk factors. BMC Public Health 21. https://doi.org/10.1186/S12889-021-11394-4.
Männikkö, N., Ruotsalainen, H., Miettunen, J., Pontes, H.M., Kääriäinen, M., 2020. Problematic gaming behaviour and health-related outcomes: a systematic review and meta-analysis. J. Health Psychol. 25, 67–81. https://doi.org/10.1177/1359105317740414.
Marmet, S., Studer, J., Rougemont-Bücking, A., Gmel, G., 2018. Latent profiles of family background, personality and mental health factors and their association with behavioural addictions and substance use disorders in young Swiss men. Eur. Psychiatry 52, 76–84. https://doi.org/10.1016/j.eurpsy.2018.04.003.
Matthews, J., Natrajan-Tyagi, R., 2019. The multidimensional developmental theory of substance addiction: toward full recovery through precision-guided treatment. J. Addict. Res. Ther. 10, 384. https://doi.org/10.4172/2155-6105.1000384.
Mezquita, L., Bravo, A.J., Pilatti, A., Ortet, G., Ibáñez, M.I., 2022. Quantifying cannabis problems among college students from English and Spanish speaking countries: cross-cultural validation of the Cannabis Use Disorders Identification Test-Revised (CUDIT-R). Addict. Behav. 127, 107209 https://doi.org/10.1016/J.ADDBEH.2021.107209.

Mikami, A.Y., Szwedo, D.E., Allen, J.P., Evans, M.A., Hare, A.L., 2010. Adolescent peer relationships and behavior problems predict young adults' communication on social networking websites. Dev. Psychol. 46, 46. https://doi.org/10.1037/A0017420.
Mikuška, J., Vazsonyi, A.T., 2018. Developmental links between gaming and depressive symptoms. J. Res. Adolesc. 28, 680–697. https://doi.org/10.1111/jora.12359.
Müller, S.M., Antons, S., Brand, M., 2023. Facets of impulsivity in gaming disorder: a narrative review. Curr. Addict. Reports 10, 737–748. https://doi.org/10.1007/S40429-023-00522-2/FIGURES/1.
Musetti, A., Mancini, T., Corsano, P., Santoro, G., Cavallini, M.C., Schimmenti, A., 2019. Maladaptive personality functioning and psychopathological symptoms in problematic video game players: a person-centered approach. Front. Psychol. 10 https://doi.org/10.3389/FPSYG.2019.02559.
Muthén, L., Muthén, B., 2007. Mplus User's Guide, Sixth edition. Muthén & Muthén, Los Angeles, CA.
Nelon, J.L., De Pedro, K.T., Gilreath, T.D., Patterson, M.S., Holden, C.B., Esquivel, C.H., 2019. A latent class analysis of the co-occurrence of sexual violence, substance use, and mental health in youth. Subst. Use Misuse 54, 1938–1944. https://doi.org/10.1080/10826084.2019.1618337.
Nogueira-López, A., Rial-Boubeta, A., Guadix-García, I., Villanueva-Blasco, V.J., Billieux, J., 2023. Prevalence of problematic Internet use and problematic gaming in Spanish adolescents. Psychiatry Res. 326, 115317 https://doi.org/10.1016/j.psychres.2023.115317.
Nower, L., Blaszczynski, A., Anthony, W.L., 2022. Clarifying gambling subtypes: the revised pathways model of problem gambling. Addiction 117, 2000–2008. https://doi.org/10.1111/ADD.15745.
Ostinelli, E.G., Zangani, C., Giordano, B., Maestri, D., Gambini, O., D'Agostino, A., Furukawa, T.A., Purgato, M., 2021. Depressive symptoms and depression in individuals with internet gaming disorder: a systematic review and meta-analysis. J. Affect. Disord. 284, 136–142. https://doi.org/10.1016/J.JAD.2021.02.014.
Pan, Y.C., Chiu, Y.C., Lin, Y.H., 2020. Systematic review and meta-analysis of epidemiology of internet addiction. Neurosci. Biobehav. Rev. 118, 612–622. https://doi.org/10.1016/J.NEUBIOREV.2020.08.013.
Pilatti, A., Read, J.P., Vera, B. del V., Caneto, F., Garimaldi, J.A., Kahler, C.W., 2014. The Spanish version of the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ): a Rasch model analysis. Addict. Behav. 39, 842–847. https://doi.org/10.1016/J.ADDBEH.2014.01.026.
Purwaningsih, E., Nurmala, I., 2021. The impact of online game addiction on adolescent mental health: a systematic review and meta-analysis. Open Access Maced. J. Med. Sci. 9, 260–274. https://doi.org/10.3889/OAMJMS.2021.6234.
Qeadan, F., Egbert, J., English, K., 2022. Associations between problematic internet use and substance misuse among US college students. Comput. Hum. Behav. 134, 107327 https://doi.org/10.1016/J.CHB.2022.107327.
Richard, J., Fletcher, E., Boutin, S., Derevensky, J., Temcheff, C., 2020. Conduct problems and depressive symptoms in association with problem gambling and gaming: a systematic review. J. Behav. Addict. 9, 497–533. https://doi.org/10.1556/2006.2020.00045.
Sanders, J., Williams, R., 2019. The relationship between video gaming, gambling, and problematic levels of video gaming and gambling. J. Gambl. Stud. 35, 559–569. https://doi.org/10.1007/S10899-018-9798-3.
Saritepeci, M., Yildiz Durak, H., Atman Uslu, N., 2022. A latent profile analysis for the study of multiple screen addiction, mobile social gaming addiction, general mattering, and family sense of belonging in university students. Int. J. Ment. Heal. Addict. https://doi.org/10.1007/S11469-022-00816-Y (Advance online publication).
Schettler, L.M., Thomasius, R., Paschke, K., 2024. Emotional dysregulation predicts problematic gaming in children and youths: a cross-sectional and longitudinal approach. Eur. Child Adolesc. Psychiatry 33, 605–616. https://doi.org/10.1007/S00787-023-02184-X/TABLES/9.
Schulenberg, J.E., Maggs, J.L., 2002. A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. J. Stud. Alcohol Suppl. 63, 54–70. https://doi.org/10.15288/JSAS.2002.S14.54.
Sharma, M.K., Bhargav, H., Kumar, A., Digambhar, V., Mani, T.A., 2021. Mindfulness-based interventions: potentials for management of internet gaming disorder. Int. J. Yoga 14, 244. https://doi.org/10.4103/IJOY.IJOY_46_21.
Sinha, P., Calfee, C.S., Delucchi, K.L., 2021. Practitioner's guide to latent class analysis: methodological considerations and common pitfalls. Crit. Care Med. 49, e63 https://doi.org/10.1097/CCM.0000000000004710.
Sirola, A., Savela, N., Savolainen, I., Kaakinen, M., Oksanen, A., 2021. The role of virtual communities in gambling and gaming behaviors: a systematic review. J. Gambl. Stud. 37, 165–187. https://doi.org/10.1007/S10899-020-09946-1.
Sixto-Costoya, A., Castelló-Cogollos, L., Aleixandre-Benavent, R., Valderrama-Zurián, J. C., 2021. Global scientific production regarding behavioral addictions: an analysis of the literature from 1995 to 2019. Addict. Behav. Rep. 14 https://doi.org/10.1016/J.ABREP.2021.100371.
Skařupova, K., Blinka, L., Tápal, A., 2018. Gaming under the influence: an exploratory study. J. Behav. Addict. 7, 493–498. https://doi.org/10.1556/2006.7.2018.27.
Skripkauskaite, S., Fazel, M., Bear, H., Borschmann, R., Fernandes, B., Geulayov, G., Illingworth, G., Manchanda, T., Mansfield, K.L., Nawaz, R.F., Newby, D., Puntis, S., Soneson, E., White, S.R., 2022. Time spent gaming, device type, addiction scores, and well-being of adolescent English gamers in the 2021 OxWell Survey: latent profile analysis. JMIR Pediatr. Parent. 5 https://doi.org/10.2196/41480.
Spurk, D., Hirschi, A., Wang, M., Valero, D., Kauffeld, S., 2020. Latent profile analysis: a review and "how to" guide of its application within vocational behavior research. J. Vocat. Behav. 120, 103445 https://doi.org/10.1016/J.JVB.2020.103445.
Stavropoulos, V., Pontes, H.M., Gomez, R., Schivinski, B., Griffiths, M., 2020. Proteus effect profiles: how do they relate with disordered gaming behaviours? Psychiatry Q. 91, 615–628. https://doi.org/10.1007/S11126-020-09727-4.
Steinley, D., Brusco, M.J., 2011. Evaluating mixture modeling for clustering: recommendations and cautions. Psychol. Methods 16, 63–79. https://doi.org/10.1037/a0022673.
Stevens, M.W.R., King, D.L., Dorstyn, D., Delfabbro, P.H., 2019. Cognitive-behavioral therapy for Internet gaming disorder: a systematic review and meta-analysis. Clin. Psychol. Psychother. 26, 191–203. https://doi.org/10.1002/CPP.2341.
Stevens, M.W.R., Dorstyn, D., Delfabbro, P.H., King, D.L., 2021. Global prevalence of gaming disorder: a systematic review and meta-analysis. Aust. N. Z. J. Psychiatry 55, 553–568. https://doi.org/10.1177/0004867420962851.
Strizek, J., Atzendorf, J., Kraus, L., Monshouwer, K., Puhm, A., Uhl, A., 2020. Perceived problems with adolescent online gaming: national differences and correlations with substance use. J. Behav. Addict. 9, 629–641. https://doi.org/10.1556/2006.2020.00061.
Sujal, P., Anand, P., Abhishek, S., 2021. Heaviness of smoking index versus Fagerstrom test for nicotine dependence among current smokers of Ahmedabad City. India. Addict. Heal. 13, 29. https://doi.org/10.22122/AHJ.V13I1.291.
Tein, J., Coxe, S., Cham, H., 2013. Statistical power to detect the correct number of classes in latent profile analysis. Struct. Equ. Model. 20, 640–657. https://doi.org/10.1080/10705511.2013.824781.
Townsend, C., Humpston, C., Rogers, J., Goodyear, V., Lavis, A., Michail, M., 2022. The effectiveness of gaming interventions for depression and anxiety in young people: systematic review and meta-analysis. BJPsych open 8. https://doi.org/10.1192/BJO.2021.1078.
Tullett-Prado, D., Stavropoulos, V., Mueller, K., Sharples, J., Footitt, T.A., 2021. Internet Gaming Disorder profiles and their associations with social engagement behaviours. J. Psychiatr. Res. 138, 393–403. https://doi.org/10.1016/J.JPSYCHIRES.2021.04.037.
Urbanoski, K.A., Rush, B.R., Wild, T.C., Bassani, D.G., Castel, S., 2007. Use of mental health care services by Canadians with co-occurring substance dependence and mental disorders. Psychiatr. Serv. 58, 962–969. https://doi.org/10.1176/PS.2007.58.7.962.
Wang, Y., Liu, B., Zhang, L., Zhang, P., 2022. Anxiety, depression, and stress are associated with internet gaming disorder during COVID-19: fear of missing out as a mediator. Front. Psychol. 13, 827519 https://doi.org/10.3389/fpsyt.2022.827519.
Williams, G., Kibowski, F., 2016. Latent class analysis and latent profile analysis. In: Jason, L.A., Glenwick, D.S. (Eds.), Handbook of Methodological Approaches to Community-based Research: Qualitative, Quantitative, and Mixed Methods, pp. 143–151 (Oxford).
Wong, H.Y., Mo, H.Y., Potenza, M.N., Chan, M.N.M., Lau, W.M., Chui, T.K., Pakpour, A. H., Lin, C.Y., 2020. Relationships between severity of internet gaming disorder, severity of problematic social media use, sleep quality and psychological distress. Int. J. Environ. Res. Public Health 17. https://doi.org/10.3390/IJERPH17061879.
Yu, Y.Y., Mo, P.K.H., Zhang, J., Li, J., Lau, J.T.F., 2021. Why is Internet gaming disorder more prevalent among Chinese male than female adolescents? The role of cognitive mediators. Addict. Behav. 106637 https://doi.org/10.1016/j.addbeh.2020.106637.
Zucker, R.A., Hicks, B.M., Heitzeg, M.M., 2016. Alcohol use and the alcohol use disorders over the life course: a cross-level developmental review. In: Cicchetti, D. (Ed.), Developmental Psychopathology: Volume Three: Maladaptation and Psychopathology, pp. 793–832 (Hoboken).