

Latent Profiles of Problematic Video Game Use in Adolescents and Their Longitudinal Association with Socioemotional Variables

Perfiles latentes de uso problemático de videojuegos en adolescentes y su asociación longitudinal con variables socioemocionales

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Abstract

Problematic video game use in adolescence has been conceptualized as a heterogeneous phenomenon, with potentially different socioemotional implications over time. The present study aimed to identify latent profiles of adolescent video game players based on the nine criteria of Internet Gaming Disorder (IGD) and to examine their longitudinal associations with socioemotional outcomes one year later. The sample comprised 1,610 Spanish adolescents (67.1% boys; $M = 13.2$ years). A Latent Profile Analysis (LPA) was conducted using the Internet Gaming Disorder Scale – Short Form (IGDS9-SF) at the Time 1 measure. Longitudinal associations with anxiety symptoms, emotion regulation difficulties, and social integration/competence at Time 2 were examined, adjusting for baseline levels, age, and gender. The most parsimonious model identified four profiles: high symptomatology (5.7%), moderate symptomatology with functional interference (10.5%), moderate symptomatology without interference (18.9%), and a normative profile (64.9%). A higher probability of belonging to the high-symptom profile was longitudinally associated with greater emotion regulation difficulties and lower social competence compared to the normative profile. No significant longitudinal differences were observed between profiles in anxiety after controlling for baseline levels. These findings highlight the heterogeneity of problematic video game use in adolescence and underscore the relevance of functional impairment and emotion regulation as key dimensions for understanding its socioemotional impact over time.

Keywords

Problematic video game use, Internet Gaming Disorder, Latent Profile Analysis, emotion regulation, adolescence.

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Resumen

El uso problemático de videojuegos en la adolescencia ha sido conceptualizado como un fenómeno heterogéneo con repercusiones en la salud mental. El presente estudio tuvo como objetivo identificar perfiles latentes de adolescentes jugadores a partir de los nueve indicadores del Trastorno de Juego por Internet y analizar su asociación longitudinal con variables socioemocionales un año después. La muestra estuvo compuesta por 1.610 adolescentes españoles (67,1% chicos; $M = 13,2$ años). Se realizó un Análisis de Perfiles Latentes a partir del Internet Gaming Disorder Scale – Short Form (IGDS9-SF) en la evaluación T1 y se examinaron las asociaciones con ansiedad, regulación emocional e integración/competencia social en T2, ajustando por niveles basales. El modelo más parsimonioso identificó cuatro perfiles: sintomatología alta (5,7%), sintomatología moderada con interferencia (10,5%), sintomatología moderada sin interferencia (18,9%) y perfil normativo (64,9%). Una mayor probabilidad de pertenencia al perfil de sintomatología alta se asoció longitudinalmente con mayores dificultades de regulación emocional y menor competencia social en comparación con el perfil normativo. No se observaron diferencias significativas en ansiedad tras el ajuste por niveles previos. Estos hallazgos subrayan la heterogeneidad del uso problemático de videojuegos y la relevancia de la interferencia funcional y de la regulación emocional como dimensiones clave en su impacto socioemocional.

Palabras clave

Uso problemático de videojuegos, Trastorno de Juego por Internet, análisis de perfiles latentes, regulación emocional, adolescencia.

INTRODUCTION

Video gaming is one of the most widespread forms of digital leisure during adolescence. Although for most young people gaming is integrated normatively into everyday life, a subgroup exhibits patterns of use characterized by loss of control, persistence of the behavior despite negative consequences, and interference with daily functioning. These patterns have been conceptualized within the framework of behavioral addictions, specifically through Internet Gaming Disorder (IGD), included as a condition requiring further study in the DSM-5-TR (American Psychiatric Association [APA], 2022), and Gaming Disorder (GD), recognized as a disorder in the ICD-11 (World Health Organization [WHO], 2022).

Adolescence represents a particularly sensitive developmental period for the emergence of problematic patterns of video game use, due

to the interaction of developmental, emotional, and contextual factors. In this regard, studies conducted among adolescents have shown that problematic video game use is associated with socioemotional and academic difficulties, including indicators of emotional distress and poorer academic performance (Observatorio Español de las Drogas y las Adicciones [OEDA], 2023). These associations suggest that problematic use may be linked to emotional and interpersonal processes that could increase psychological vulnerability in the medium and long term, although the available evidence is largely based on cross-sectional studies. From this perspective, video gaming may function as a coping strategy based on avoidance or the modulation of emotional distress, particularly among adolescents who have difficulties managing negative emotions or have a more limited repertoire of emotion regulation strategies and lower social competence (Lin et al., 2023). Systematic reviews support



this relationship, showing that strategies such as emotional suppression are consistently associated with problematic gaming patterns (Estupiñá et al., 2024), further reinforcing the notion that emotion regulation difficulties may constitute a relevant explanatory mechanism (Ayllón-Salas et al., 2024).

Nevertheless, in recent years, debate has intensified regarding the conceptualization of problematic video game use and, in particular, the differential weight of the various symptoms that comprise IGD. Recent research on other behavioral addictions, such as problematic social media use, has suggested that not all traditional criteria have the same clinical value or functional impact, particularly those related to salience or tolerance, which may reflect high levels of involvement without necessarily implying significant impairment (Ciudad-Fernández et al., 2025). Although this evidence comes from research on other behavioral addictions, it suggests the value of examining potential differences in the functional relevance of individual criteria in the context of video game use as well. This perspective challenges categorical and unidimensional approaches and highlights the importance of identifying distinct patterns of symptomatology.

In this context, person-centered approaches, such as cluster analysis, latent class analysis (LCA), and latent profile analysis (LPA), have gained increasing relevance in the study of problematic video game use. These methods allow for the identification of homogeneous subgroups of adolescents based on specific symptom configurations. In doing so, they overcome some of the limitations of variable-centered analyses and avoid dichotomization based on cutoff scores, thereby capturing the heterogeneity of the phenomenon within the population. Recent studies have identified pro-

files characterized by low, moderate, and high levels of problematic use, showing differences in variables such as academic performance and psychosocial adjustment (García-Gil et al., 2025). Consistently, studies using LCA among adolescents have identified distinct profiles based on the number and combination of IGD criteria, showing that profiles characterized by a greater accumulation of symptoms present higher levels of emotional and behavioral comorbidity (Zhang et al., 2023). Despite the growing number of studies employing person-centered approaches to examine problematic video game use, the available evidence is predominantly cross-sectional. This limits our understanding of the stability of the identified profiles and their relationship with psychological adjustment, as well as the ability to distinguish between concurrent factors and predictors of subsequent maladjustment.

The present study aims to address this gap in the literature by adopting a longitudinal design that allows for the examination not only of symptom configurations at a given point in time but also of how membership in different profiles is associated with socioemotional variables, such as anxiety, emotion regulation, and social competence, one year later. The objective is to identify different profiles of adolescent video game players based on indicators of problematic use.

METHOD

Procedure

This study forms part of the EMOChild Project, aimed at understanding risk and protective factors for socioemotional problems in Spanish children and adolescents,



which received approval from the Miguel Hernández University ethics committee (DPS.MOA.02.21). The results of the present study correspond to two assessment waves, separated by approximately 10 to 12 months (T1 = October–December 2024, T2 = September–October 2025). The project consisted of administering a survey to students in Compulsory Secondary Education and Baccalaureate at their schools. Participating schools were selected using a mixed procedure, with an initial phase of stratified cluster random sampling (taking into account region and public or private school ownership), followed by convenience sampling to ensure representation from all autonomous communities. Only public and/or publicly funded schools were recruited in those communities where this was authorized by the responsible body. Once participation had been agreed upon with the school, a minimum of two participating classes was established and informed consent was distributed among students' families. Only students with parental consent, who were able to read and understand the survey in Spanish or Catalan, and who consented to participate, took part in the study. In both waves, the survey was administered through the LimeSurvey platform using electronic devices and took approximately 30 to 40 minutes to complete. Participating schools received educational material related to mental health as an incentive for participation. In addition, 1.4% of the sample in the present study completed an adapted version of the survey at home; these participants had been recruited in previous project waves through snowball sampling or had been unable to complete the survey at school.

Participants

The present study included 1,610 adolescents who played video games at least once a week at T1 and responded to both survey waves. Of these, 67.1% were boys, with ages ranging from 11 to 17 years ($M = 13.2$, $SD = 1.1$). Of the participants, 91.1% had been born in Spain, followed by Colombia (1.7%) and Venezuela (1.1%). These 1,610 participants represented the retained sample (54.6%) from an initial cohort of 2,949 video game players assessed at T1. No significant differences were observed between retained and non-retained participants in terms of problematic video game use ($t = 1.77$, $p = 0.077$) or gender distribution ($\chi^2(1) = 0.59$, $p = 0.442$). However, participants who did not continue in the study were significantly older than those who did ($t = 12.82$, $p < 0.001$), suggesting that attrition may have been related to completion of studies and leaving school.

Measures

In addition to participants' gender, age, and country of birth, the following information was collected.

Frequency of video game use. This was assessed at T1 with an item asking how frequently adolescents played video games. It was used as a discriminative item at T1 for administration of the IGDS-9-SF and therefore as an inclusion criterion for the present study. The item had seven response options (from "Never or almost never" to "Every day or almost every day: More than 5 hours per day"), with the third option ("Once a week") being the minimum frequency for participants to be considered video game players.



Problematic video game use. The Internet Gaming Disorder Scale–Short Form (IGDS9-SF; Pontes & Griffiths, 2015), in its Spanish version (Beranuy et al., 2020), was used. The scale consists of 9 items corresponding to the clinical criteria for Internet Gaming Disorder proposed in the DSM-5-TR (APA, 2022). Each item is answered on a 5-point Likert scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very often). Because the highest response category had very low frequencies, in line with guidelines for Latent Profile Analysis (Sinha et al., 2021), response options 4 and 5 were collapsed into a single category. Internal consistency in this study was good ($\omega = 0.85$).

Anxiety, emotion regulation difficulties, and social integration and competence. Information on these variables was collected using the Child and Adolescent Assessment System (SENA; Fernández-Pinto et al., 2015; Sánchez-Sánchez et al., 2016). This is a dimensional instrument assessing different dimensions related to emotional well-being. Its items use a 5-point Likert scale, which are combined for each subscale into a score ranging from 1.0 to 5.0, to one decimal place. The self-report version for Secondary Education was used.

Data analysis

First, descriptive and attrition analyses were conducted using IBM SPSS version 25 for Mac, using χ^2 and Student's *t* tests to compare participants retained and not retained from T1 to T2. Subsequently, the remaining analyses were conducted in RStudio (version 2024.04.2 + 764 for Mac), using R version 4.4.1. First, the lavaan and semTools packages were used to calculate composite reli-

ability for the IGDS9-SF, specifically omega for ordinal items (Green & Yang, 2009). Subsequently, a Latent Profile Analysis (LPA) was conducted using the tidyLPA package, with the 9 IGDS9-SF items as variables. Unlike other methods, in LPA each participant receives a posterior probability of belonging to a profile, allowing uncertainty to be incorporated for participants who do not fit a profile completely. For example, in a two-profile model, one participant might have a 99.9% probability of belonging to Profile 1 and a 0.1% probability of belonging to Profile 2, whereas another participant might have probabilities of 70% and 30%. This approach avoids overly simplistic classification into a single group (Mathew & Doorenbos, 2022; Sinha et al., 2021). First, models ranging from 2 to 6 profiles were estimated to compare their fit. To select the best-fitting model, the Bayesian Information Criterion (BIC) was considered because of its suitability for large samples, together with its sample-size-adjusted version (SABIC), using the elbow rule. This rule proposes selecting the smallest possible number of profiles provided that the improvement in fit when adding one profile is not substantial (Sinha et al., 2021). The Akaike Information Criterion (AIC) and entropy were also reported. Entropy is an indicator of the accuracy of profile separation, with values above 0.90 indicating good model quality in classifying participants into profiles (Mathew & Doorenbos, 2022).

Once the best-fitting model had been selected, associations between the probability of profile membership and gender and age were examined. For this purpose, robust linear regression models with HC3 errors were fitted using the estimatr package because heteroscedasticity had been detected



with the Breusch–Pagan test (1979). Finally, to address the second objective, linear regression models with robust errors were fitted separately for each of the three socio-emotional variables studied (anxiety, emotion regulation difficulties, and social integration and competence). The socioemotional variable at T2 was the dependent variable, and the probabilities of profile membership were selected as predictors, yielding pairwise comparisons between profiles. To avoid Type I errors due to multiple comparisons, *p*-values for comparisons between profiles were adjusted using the false discovery rate (FDR). The model was adjusted for baseline levels (T1) of the socioemotional variable, gender, and age. A 95% confidence level was used throughout.

RESULTS

Overall, 48.1% of participants played video games once a week, whereas the remaining played every day or almost every day, for varying durations: less than 1 hour per day (17.2%), between 1 and 3 hours (23.4%), between 3 and 5 hours (7.5%), and more than 5 hours per day (3.9%).

First, the model with the best fit indices was selected. Table I presents the comparison of fit across models according to the number of

latent profiles. Although the 5-profile model had the lowest BIC and SABIC, the difference compared with the 4-profile model was small. Therefore, following the elbow rule and considering that the 4-profile model had entropy above 0.90, the 4-profile model was ultimately selected. Figure 1 illustrates the mean level of each Internet Gaming Disorder diagnostic criterion in each profile (on a 1–4 scale). Profile 1 (*n* = 91, 5.7%), for which membership probability was highest, was labeled high symptomatology, with users characterized by a high prevalence of all IGD symptoms. Academic interference was particularly prominent in this profile. Profiles 2 (mostly represented by *n* = 169, 10.5%) and 3 (*n* = 305, 18.9%) reflected moderate symptom levels, with no general differences. Profile 2 showed moderate academic interference, whereas Profile 3 showed slightly greater tolerance but no academic interference. Therefore, these profiles were labeled moderate symptomatology with interference and moderate symptomatology without interference, respectively. Finally, Profile 4 represented the majority of participants (*n* = 1,045, 64.9%) and was labeled normative without symptomatology, as it reflected low levels of all symptoms, with slightly higher levels of gaming-related preoccupation and use as an escape from unpleasant emotions.

Table I. Model fit indices by number of profiles

	Entropy	BIC	SABIC	AIC
2 profiles	0.90	32172.03	32083.08	32021.28
3 profiles	0.90	31055.76	30935.04	30851.17
4 profiles	0.93	28583.09	28430.60	28324.66
5 profiles	0.89	28496.66	28312.40	28184.39
6 profiles	0.67	31002.99	30786.97	30636.88



The probability of belonging to Profiles 1, 2, and 3 was higher among boys, whereas girls had a higher probability of belonging to Profile 4 ($p < 0.03$). In addition, the probability of belonging to Profile 1 was higher among older adolescents ($p = 0.02$), with no significant relationship with age for the remaining profiles.

Table 2 shows comparisons between profiles on the three socioemotional variables one year later. After estimating robust standard errors and adjusting p-values, only 3 statistically significant differences were found. Specifically, a higher probability of belonging to Profile 1 (high symptomatology) was associated with greater emotion regulation difficulties and lower social integration and competence in the long term, compared with the probability of belonging to Profile 4 (normative). Likewise, a higher probability of belonging to Profile 2 (moderate

symptomatology with interference) was more strongly associated with emotion regulation difficulties than the probability of belonging to Profile 4 (normative). No other significant differences were found between profiles, nor were there significant differences in anxiety.

DISCUSSION

The present study aimed to identify profiles of adolescent gamers based on indicators of problematic video game use and to examine their longitudinal association with socioemotional variables. The findings support a heterogeneous conceptualization of problematic video game use during adolescence, indicating that not all symptom patterns are similarly associated with emotional and social adjustment over the medium term.

Figure 1. Average scores on each item of the IGDS-9-SF by profile

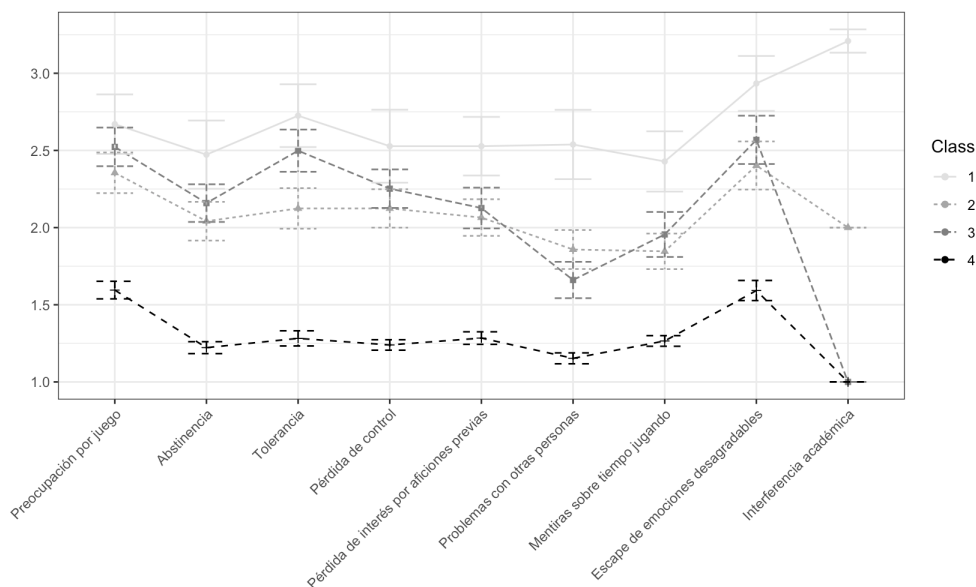


Table 2. Comparisons of profiles across socio-emotional variables one year later

	1 vs. 2	1 vs. 3	1 vs. 4	2 vs. 3	2 vs. 4	3 vs. 4
Anxiety	0,01 (0,981)	0,01 (0,981)	0,09 (0,338)	-0,001 (0,981)	0,08 (0,160)	0,09 (0,144)
Emotional Regulation Problems	0,13 (0,260)	0,19 (0,131)	0,28 (0,012)	0,06 (0,431)	0,15 (0,027)	0,09 (0,144)
Social integration and competence	-0,14 (0,144)	-0,12 (0,178)	-0,22 (0,011)	0,03 (0,710)	-0,08 (0,168)	-0,10 (0,088)

Note: Differences were estimated using regression models adjusted for the variable's baseline level, age, and gender. Robust standard errors were used, and p-values were corrected using the false discovery rate (FDR). Each cell shows the difference in the corresponding socioemotional variable between the probabilities of belonging to each profile indicated in the column. A positive or negative value indicates, respectively, higher or lower levels of the socioemotional variable in the first profile.

First, the latent profile analysis identified four distinct profiles organized around two key dimensions: symptom severity and the presence of functional impairment, specifically in the academic domain. This structure is consistent with previous research indicating that problematic video game use is not a unitary phenomenon and should be distinguished from high behavioral involvement in the absence of functional impairment (e.g., Király et al., 2017). The profiles identified in the present study make it possible to differentiate between high behavioral involvement without marked functional impairment and patterns characterized by an accumulation of symptoms accompanied by significant interference. Similarly, the findings are comparable to those reported in a recent study that used LCA in adolescents to examine IGD criteria, identifying distinct profiles primarily based on the number and combination of criteria present. In that study, the profile characterized by the greatest accumulation of symptoms showed higher levels of emotional and behavioral problems, whereas intermediate profiles exhibited a more nuanced pattern of adjustment. The conver-

gence between these findings and those of the present study reinforces the consistency of the identified structure and the relevance of distinguishing between high involvement and symptomatology accompanied by functional impairment (Zhang et al., 2023).

Beyond the identified structure, one of the most relevant findings was that a higher probability of belonging to the high-symptomatology profile was longitudinally associated with greater difficulties in emotion regulation and lower social integration and competence, compared with the probability of belonging to the normative profile. This finding is consistent with previous evidence linking problematic video game use to difficulties in emotion regulation and psychosocial adjustment among adolescents (Estupiñá et al., 2024; Schettler et al., 2023). Along these lines, recent research in Spanish children and adolescents has shown that emotion regulation difficulties are also associated with other problematic behaviors in digital environments, such as involvement in cyberbullying roles, suggesting that emotional dysregulation may represent a cross-cutting vulnerability mechanism across different



online contexts (Sánchez-Moreno et al., 2025). This pattern adds an important nuance by showing that these associations persist one year later, even after controlling for baseline levels of socioemotional variables. Furthermore, this pattern is consistent with recent studies highlighting the role of the family context as a risk and/or protective factor in the relationship between problematic use and socioemotional adjustment in adolescents (Petrescu et al., 2025). From a theoretical perspective, these findings are also consistent with models conceptualizing problematic video game use as a maladaptive emotion regulation strategy linked to emotional avoidance and escapism, particularly among adolescents with fewer socioemotional resources (Giardina et al., 2024). The longitudinal association observed suggests that greater correspondence with high-symptomatology profiles may be linked to patterns of social withdrawal that, over the medium term, could interfere with the development of adaptive social skills.

Likewise, a higher probability of belonging to a moderate-symptomatology profile with interference was also associated with greater emotion regulation difficulties compared with the normative profile, although no significant differences were found in social integration. This pattern is consistent with research indicating that emotion regulation difficulties may emerge even at intermediate levels of problematic use, whereas more pronounced social impairment tends to be concentrated in profiles characterized by greater functional interference (Uçur & Dönmez, 2021). In contrast to the findings for emotion regulation and social integration, no significant longitudinal differences between profiles were found in anxiety

symptoms. Although this finding may appear counterintuitive, it is consistent with recent syntheses of longitudinal studies indicating that the relationship between gaming disorder symptoms and subsequent mental health is not uniform and that, specifically, prospective effects on anxiety are not consistently observed (Amendola et al., 2025). Likewise, the literature suggests that the link between problematic gaming and anxiety may depend on contextual and individual factors, such as coping styles, gaming characteristics, and comorbid variables, which may moderate the observed association (Teng et al., 2021). Along these lines, reviews focusing on social anxiety have also highlighted heterogeneity in the relationships between problematic gaming and anxiety, as well as the role of variables involved in this association (Gioia et al., 2022). Taken together, these findings support the possibility that anxiety may function as a concurrent or bidirectional factor, particularly when prior anxiety levels are controlled for.

Regarding sociodemographic variables, the greater probability of belonging to problematic profiles among boys is consistent with recent evidence showing a higher prevalence of gaming disorder among males internationally (Stevens et al., 2021), as well as epidemiological data from Spanish adolescent populations (OEDA, 2023). Likewise, the association between older age and a greater probability of belonging to the high-symptomatology profile may be related to greater autonomy in video game use, as well as the possible consolidation of more intensive gaming habits during later stages of adolescence, in line with recent epidemiological data from Spanish adolescents (OEDA, 2023).



Overall, the findings of the present study underscore the usefulness of person-centered approaches for advancing the understanding of problematic video game use during adolescence. From a practical perspective, these findings suggest that prevention efforts should not focus solely on the intensity of gaming behavior, but should also monitor functional interference and emotion regulation difficulties as early warning signs. School-based interventions could incorporate programs aimed at strengthening social competence and providing adaptive alternatives to the use of video games as a means of emotional escape.

Nevertheless, this study is not without limitations. First, substantial attrition of 45.4% was observed between the two waves, particularly among older participants, which may bias the representativeness of the findings in late adolescence. In addition, the data were based on self-reports, which may introduce social desirability bias. Furthermore, specific variables such as video game genre and gaming motivations were not assessed, although these factors may influence the association between profiles and socioemotional adjustment. Moreover, the use of probabilities of profile membership, although methodologically more precise than categorical classification, implies that the profiles do not represent discrete, closed groups, but rather configurations with some degree of overlap among participants. Future research should integrate multi-informant measures and objective records to further investigate the nature of anxiety and problematic gaming over the long term.

Overall, the present study provides longitudinal evidence of the heterogeneity of problematic video game use during adolescence and highlights the relevance of functional interference

and emotion regulation as key dimensions for understanding its socioemotional impact. These findings contribute to a more nuanced conceptualization of the phenomenon and reinforce the need for differential approaches to prevention and intervention.

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