Generalised and specific problematic internet use among Spanish university students: Prevalence, co-occurrence, and related variables

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ABSTRACT

Objective: To examine the prevalence and co-occurrence of generalized problematic internet use (GPIU), problematic social media use (PSMU), and problematic online gaming (POG), as well as to identify associated sociodemographic, lifestyle, and internet use factors. **Method:** A total of 763 university students participated in an online survey. **Results:** Prevalence rates were 16.3% (GPIU), 8.7% (PSMU), and 1.4% (POG). Co-occurrence rates were 6.6% (GPIU-PSMU), 0.7% (GPIU-POG), 0% (PSMU-POG), and 0.5% (GPIU-PSMU-POG). Female gender was associated with GPIU and PSMU, while male gender was linked to POG. Unemployment was related to POG, alcohol use and poor sleep quality to GPIU, and PSMU. Daily internet use was associated with GPIU; social-related use with GPIU and PSMU; and process-related use with all three behaviours. **Conclusions:** These findings support the need for differentiated preventive strategies tailored to the specific patterns and correlates of each type of problematic online behaviour.

Keywords: Internet addiction; social media problematic use; online gaming; prevalence; university students.

Uso problemático generalizado y específico de internet entre estudiantes universitarios españoles:
Prevalencia, coocurrencia y variables relacionadas

RESUMEN

Objetivo: Examinar la prevalencia y co-ocurrencia del uso problemático generalizado de internet (GPIU), el uso problemático de redes sociales (PSMU) y el juego online problemático (POG), así como identificar factores sociodemográficos, de estilo de vida y de uso de internet asociados. **Método:** Participaron 763 estudiantes universitarios mediante una encuesta online. **Resultados:** La prevalencia fue de 16.3% (GPIU), 8.7% (PSMU) y 1.4% (POG). Las tasas de co-ocurrencia fueron 6.6% (GPIU-PSMU), 0.7% (GPIU-POG), 0% (PSMU-POG) y 0.5% (los tres). El género femenino se asoció con GPIU y PSMU, mientras que el masculino con POG. El desempleo se vinculó con POG; el consumo de alcohol y la mala calidad del sueño, con GPIU y PSMU. El uso diario de internet se relacionó con GPIU; el uso con fines sociales, con GPIU y PSMU; y el uso orientado a procesos, con los tres. **Conclusiones:** Los hallazgos orientan hacia estrategias preventivas diferenciadas según el tipo de uso problemático online.

Palabras clave: Adicción a internet; uso problemático redes sociales; juego online; prevalencia; estudiantes universitarios.

Introduction

The internet has become an essential space for human development. In Spain, according to the Digital Report 2023, 94.9% of the population are internet users, a figure exceeding that of Eastern Europe (93.5%) and

considerably higher than the global average (64.4%) (We Are Social & Hootsuite, 2023).

Although access to the internet has brought many benefits, it has also led to a parallel increase in its inappropriate use and the functions it provides. University students are particularly susceptible to these behaviours (Anderson et al., 2017), which may be related to free access to the internet, the need to use the internet to complete academic tasks, increased independence from the family system, the need to create new social relationships, cope with stressful situations, or changes in lifestyle (Tong et al., 2019). This susceptibility may have been further amplified during the COVID-19 pandemic, a period that necessitated increased online engagement for academic, social and recreational purposes (Király et al., 2020). The shift towards online or hybrid learning modalities, coupled with periods of social isolation, could have significantly altered students' internet use patterns and potentially increased their risk of developing problematic online behaviours. Inappropriate internet use has been associated with significant negative implications for students' health, academic performance, depression and self-harm behaviours (Buzzai et al., 2021; Duarte-Tánory et al., 2023; Kożybska et al., 2022).

The term "problematic internet use" (PIU) is found in the literature, denoting inappropriate online behaviour marked by a lack of control, negative psychological, social, and professional consequences, and obsessive thoughts when not online (D'Hondt et al., 2015), and exhibited through various problematic online activities (Fineberg et al., 2018). However, some critics challenge this concept, asserting that the internet is merely a conduit for diverse online activities (Meerkerk et al., 2009). Recently, PIU has been conceptualised as a spectrum of internet-mediated behaviours that share some characteristics but also possess specific ones (Baggio et al., 2018). Despite the validity of this perspective, which underscores the importance of examining specific online behaviours, a comprehensive understanding of problematic internet engagement requires consideration of both a general underlying tendency and its specific manifestations. By examining generalised PIU alongside specific problematic online behaviours, this study aims to identify potential common underlying mechanisms while acknowledging the unique features and impacts of these specific problematic activities within the university student population. This dual approach allows for a more holistic view of the spectrum of problematic internet use and its implications. Specifically, this research focuses on generalised PIU (i.e. inappropriate online behaviour without a particular goal) and the two most studied specific PIUs (i.e. problematic behaviour associated with a specific internet activity) among university students (i.e. problematic social media use [PSMU] and problematic online gaming [POG]) (Sánchez-Fernández & Borda-Mas, 2023).

Several studies have examined the prevalence of these behaviours in the general adult population. Poli (2017) found prevalence rates ranging from 1% in a Norwegian sample to 12.9% in Taiwan, concluding that approximately 2% of the population had GPIU. More recently, Pan et al. (2020) reported a mean prevalence of GPIU of 7.02%, ranging from 0.50% in a German sample to 40% in a Jordanian sample. Regarding specific behaviours, the meta-analysis by Cheng et al. (2021), which collected prevalence rates across 32 nations, found a mean of 24%, with estimates ranging from 0% to 82%. Regarding POG, the study by Feng et al. (2017) found a global prevalence of 4.7%, ranging from 0.7% to 15.6%, and Pan et al. (2020), a mean prevalence of 2.47% ranging from 0.3% in the USA to 14.90% in Italy. Furthermore, the latter study compared the prevalence rates of GPIU with those of POG, finding higher rates in the case of generalised behaviour. In the university population, two recent systematic reviews reported more variable prevalence rates for GPIU (4-51%) and PSMU (14.8-70%) and more stable ones for POG (4.7-5.2%) (Sánchez-Fernández & Borda-Mas, 2023; Sánchez-Fernández et al., 2023). This heterogeneity has been explained in the literature by various factors, such as the wide variety of assessment tools, the lack of consistent diagnostic criteria, sociocultural differences in samples, and methodological differences in studies (Baloğlu et al., 2020; Király & Demetrovics, 2021; Li et al., 2018). Regarding Spanish university students, Fernández-Villa et al. (2015) found that 6.04% of the sample presented GPIU, while Romero-Rodríguez et al. (2021) identified that 12.3% of the sample showed moderate levels of GPIU and 0.01% showed severe levels. However, to date, no studies have been found that have reported the prevalence rates of PSMU and POG in Spanish university students. In relation to the co-occurrence rates of the three different online problem behaviours, Tereshchenko et al. (2022) analysed the overlaps of GPIU, PSMU, and POG in a sample of adolescents. To date, no studies have reported overlaps between these three problem behaviours in the same sample of university students.

Since its appearance in the literature, various models have attempted to explain the aetiology and maintenance of the PIU. The Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al., 2019) constitutes a relevant theoretical framework, as it integrates the neurobiological mechanisms of addiction, such as the

activation of reward circuits in response to online stimuli, with the principles of behavioural reinforcement that explain the maintenance of problematic behaviours through the attainment of pleasure or the avoidance of discomfort. Indeed, this model suggests that increased psychological distress contributes to the development and maintenance of problematic online behaviour. Furthermore, the model considers other personal variables that act as predisposing factors for the development and maintenance of these behaviours. Focusing on these variables, research on problematic online behaviours is varied but follows a uniform pattern in terms of their relationship with certain socio-demographic and lifestyle variables and internet use patterns. Significant effects of gender (Ceyhan et al., 2019; Macur & Pontes, 2021; Mills & Allen, 2020; Zhao et al., 2022), age (Ceyhan et al., 2019; Forster et al., 2021; Lerma et al., 2021; Oka et al., 2021), academic year (Asrese & Muche, 2020; Bisen & Deshpande, 2020), field of knowledge and residence (Romero-Rodríguez et al., 2021), and employment status (Hussain et al., 2012) have been observed. In terms of lifestyle, associations have been found with alcohol use (Lanthier-Labonté et al., 2020) and sleep-related problems (Alimoradi et al., 2019; Kawabe et al., 2019; Kuss et al., 2021). Concerning variables related to internet use patterns, time spent online (Aznar-Díaz et al., 2020; Schimmenti et al., 2021; Zenebe et al., 2021) and motivations for using the internet (Kircaburun et al., 2020; Mills & Allen, 2020; Romero-Rodríguez et al., 2021; Süral et al., 2019; Tong et al., 2019) have been studied.

Despite the extensive current research on the topic, more research is needed on the different behaviours that comprise PIU, analysing the relationships between them, and how the same predictors affect each one. A new direction would be to simultaneously use assessment instruments for different problem behaviours (Reer et al. 2021). While the prevalence and correlates of GPIU have received some attention among Spanish university students (Fernández-Villa et al., 2015; Romero-Rodríguez et al., 2021), specific data on PSMU and POG prevalence within this national university context remain notably absent. Furthermore, the co-occurrence of these three distinct problematic online behaviours within the Spanish university student population, a group facing unique academic and social pressures, has yet to be explored. Understanding these specific prevalence rates, potential overlaps, and the influence of various sociodemographic, lifestyle, and internet use factors on each of these behaviours within this particular educational setting is crucial for developing targeted interventions and informing university policies aimed at promoting healthy digital habits. Following this

approach, the present research aims to simultaneously deepen the study of these three online problem behaviours in a sample of Spanish university students.

In light of previous literature, the present study seeks to: 1) analyse the prevalence of PIU among university students, differentiating between three behaviours: GPIU, PSMU, and POG, and evaluating their co-occurrence; and 2) identify the effect of a series of socio-demographic characteristics (i.e. gender, age, educational degree, field of knowledge, residence, and employment status), lifestyle factors (i.e. alcohol consumption and sleep quality), and internet use factors (i.e. internet daily use and internet motives) for each problematic online behaviour.

Based on previous research, we established the following hypotheses (H):

H1: Prevalence is highest for GPIU, followed by PSMU, and lowest for POG.
H2: Co-occurrence is highest for GPIU-PSMU, followed by GPIU-POG, and lowest for the co-occurrence of all three behaviours (GPIU, PSMU and POG).
H3: Female gender is associated with higher levels of PSMU, and male gender is associated with higher levels of POG.
H4: Younger age is associated with higher levels of GPIU, PSMU, and POG.
H5: Lower educational levels are associated with higher levels of GPIU, PSMU, and POG.
H6: The field of knowledge is associated with the levels of GPIU, PSMU, and POG.
H7: The type of residence is associated with levels of GPIU, PSMU, and POG.
H8: Unemployment status is associated with higher levels of GPIU, PSMU, and POG.
H9: Higher alcohol consumption is associated with higher levels of GPIU, PSMU, and POG.;
H10: Poor sleep quality is associated with higher levels of GPIU, PSMU, and POG.
H11: Higher daily internet use is associated with higher levels of GPIU, PSMU, and POG.
H12: Specific motivations such as escapism and social compensation are associated with higher levels of GPIU, PSMU, and POG.

Methods

Participants

The participants were 763 university students (434 women, 319 men, and 10 non-binary; M_{age} = 21.26 years,

SD_{age} = 3.68; range = 17 to 40 years). Table 1 presents the students' characteristics. There was a higher frequency of female, undergraduate students, students under 20 years of age, students from Engineering and Architecture; students with a medium economic level; unemployed students; and students living in their parents' home.

Procedure

Between October 2022 and March 2023, a cross-sectional study was conducted at a public university in Andalusia, Spain (University of Seville). A total of 763 university students were recruited using convenience sampling. Questionnaires were administered via an online survey distributed to students by the teaching staff through various channels (e.g. email lists and virtual learning environments). The inclusion criteria were as follows: being over 17 years of age, enrolled in a degree program at this university, having any device with internet access, and giving informed consent to participate. Participation in the study was voluntary. The study was approved by the Ethics Committee of the University and adhered to the tenets of the Declaration of Helsinki. Owing to the distribution method via teaching staff, it was not possible to track the exact number of students who received the survey invitation; therefore, a precise participation rate could not be calculated.

Measures

In addition to basic sociodemographic data (i.e. age, gender, educational degree, field of knowledge, income level, employment status, and residence), and information regarding alcohol consumption, sleep quality, and internet daily use, the following measures were collected:

Compulsive Internet Use Scale (CIUS-14; Meerkerk et al., 2009; Spanish version: Sarmiento et al., 2021). GPIU was measured using this test that comprises 14 items that focus on lack of control, intra- and interpersonal conflicts, cognitive and behavioural preoccupation, impaired mood, and withdrawal symptoms. All 14 items can be responded to using a 5-point Likert scale ranging from 0 (never) to 4 (very frequently). Scores range from 0 to 56, with higher scores indicating greater severity of GPIU. A cutoff score of 28 was recommended to distinguish between problematic and non-problematic internet users (Meerkerk, 2007). CIUS-14 has been translated into several languages and used in cross-cultural research, showing adequate psychometric qualities (Lopez-Fernandez et al., 2019). The Spanish version confirmed

Table 1. Characteristics of the study participants (N = 763)

Variables	n	%
Sociodemographic factors		
Gender		
Male	319	41.81
Female	434	56.88
Non-binary	10	1.31
Age (years)		
<20	290	38.01
20-22	288	37.75
>22	185	24.25
Educational degree		
Undergraduate	677	88.73
Postgraduate	86	11.27
Field of knowledge		
Sciences	130	17.04
Health sciences	118	15.46
Social sciences	162	21.23
Arts and humanities	85	11.14
Engineering and architecture	268	35.12
Income level		
Low	164	21.49
Medium	366	47.97
High	233	30.54
Employment status		
Unemployed	608	79.68
Employed	155	20.31
Living in the parents' home		
Yes	408	53.50
No	355	46.50
Lifestyles		
Alcohol consumption		
Never	117	15.33
< 1times/month	228	29.88
>=1 times/ month	302	39.58
>= 1 times/week	116	15.20
Sleep quality		
Poor	108	14.15
Fair	289	37.88
Good	366	47.97
Internet use factors		
Internet daily use (in hours)		
<3	86	11.27
3 – 6	293	38.40
6 – 9	261	34.20
>9	119	15.60
Internet motives		
Process use	34.61	7.79
Social use	25.25	7.07
Outcome variables	M	SD
Problematic internet use	17.69	9.79
Problematic social media use	11.66	4.65
Problematic gaming use	11.65	4.45

the consistency, high quality of the construct, excellent model fit, and measurement invariance (Sarmiento et al., 2021). In the present study, the Spanish CIUS-14 exhibited good internal consistency (α = .88, ω = .88).

Bergen Social Media Addiction Scale (BSMAS; Andreassen et al., 2016; Spanish version: Vallejos-Flores et al., 2018). This instrument contains six items that reflect central addiction elements (i.e. salience, mood modification, tolerance, withdrawal, conflict, and relapse) to measure social media addiction over the past year. All items are rated on a 5-point Likert scale ranging from 1 (very rarely) to 5 (very often). Scores range from 5 to 30, with higher scores indicating greater PSMU severity. A cutoff score of 18 was recommended to distinguish between problematic and non-problematic social media users. The Spanish version confirmed its validity and reliability (Vallejos-Flores et al., 2018). In the present study, the Spanish BSMAS exhibited good internal consistency (α = .81, ω = .81).

Internet Gaming Disorder Scale–Short Form (IGDS9-SF; Pontes & Griffiths, 2015; Spanish version: Beranuy et al., 2020). This test assesses the severity of POG and its detrimental effects by examining gaming activities that occurred in the last year. All items are rated on a 5-point Likert scale ranging from 1 (never) to 5 (very often). Scores range from 9 to 45, with higher scores indicating greater severity of POG. Participants who responded with scores of 4 or 5 to four or more items of the instrument were considered to have POG (Beranuy et al., 2020). Spanish IGDS9-SF has been shown to have robust psychometric properties (Beranuy et al., 2020). In the present study, the IGDS9-SF exhibited good internal consistency (α = .87, ω = .87).

Internet motives were measured using an adapted version of the items proposed by van Deursen et al. (2015). A total of 12 items about using the internet for process motives (seven items, e.g. entertainment, news consumption) and social motives (five items, e.g. relationship maintenance, SNS use) were queried. All items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The scores range from 7 to 49 and 5 to 35, with higher scores referring to higher levels of process and social internet motives, respectively. In the present study, internal consistency was good (social use: α = .88, ω = .88; process use: α = .82, ω = .82).

Statistical analysis

The collected data were examined using JASP (JASP Team, 2023). Basic descriptive analyses included means, standard deviations, reliabilities (Cronbach's alpha and McDonald's omega), frequencies, and percentages. Cronbach's alpha and McDonald's omega values above .70 were considered acceptable, and values above .80 were considered indicative of good reliability (Oviedo & Campo-Arias, 2005; Ventura-León & Caycho-Rodríguez, 2017).

Differences in the prevalence of GPIU, PSMU, and POG based on sociodemographic, lifestyle, and internet use variables were analysed using chi-square tests. Cramer's V was reported as an effect-size measure. According to Cohen (1988), for chi-square tests with degrees of freedom equal to 1, effect sizes can be small (V < .30), medium (V ≥ .30), or large (V ≥ 0.50); for chi-square tests with degrees of freedom equal to 2, effect sizes can be small (V < .21), medium (V ≥ .21), or large (V ≥ .35); for chi-square tests with degrees of freedom equal to 3, effect sizes can be small (V < .17), medium (V ≥ .17), or large (V ≥ 0.29); and for chi-square tests with degrees of freedom equal to 4, effect sizes can be small (V < .15), medium (V ≥ .15), or large (V ≥ .25). To test the interrelation between GPIU, PSMU, and POG, three contingency tables were created: GPIU-PSMU, GPIU-POG, and PSMU-POG.

To test the relationship between problematic online behaviours and internet motives, Spearman correlations between GPIU, PSMU, POG, process use, and social use were calculated. Subsequently, three multiple linear regression models were conducted using the enter method, with three different problematic behaviours (i.e. GPIU, PSMU, and POG) the outcome variables. The following predictor variables were included in each regression model: age, gender, educational degree, field of knowledge, income level, employment status, residence, alcohol consumption, sleep quality, daily internet use, process use and social use. Unstandardised (B) regression coefficients with the corresponding standard errors (SE), standardised regression coefficients (β), F value, and R^2 coefficient were reported. The statistical assumptions of linear regression analysis (normality of residuals, linearity, independence of residuals [GPIU: DWT = 2.00; PSMU: DWT = 2.09; POG: DWT = 1.99], homoscedasticity [i.e. random scatterplot between residuals and predicted outcome values], and non-multicollinearity [Tolerance = 0.63 – 0.95; VIF = 1.04 – 1.60]) were fulfilled. As the normality of the residuals assumption was violated, B and SE coefficients were estimated using the bootstrapping method (at a bias-corrected confidence interval of 95% and using 5000 samples from different bootstraps). To interpret the strength of the associations, the following cut-off points were used for the correlation coefficients: small (< .2), medium (.2 – .3), and large (> .3) (Hemphill, 2003). On

the other hand, the following cut-off points were used for the beta coefficients: very small (< .1), small (.1 – .3), medium (.3 – .5), and large (≥ .5) (Ferguson, 2016).

The G*Power calculator (Faul et al., 2007) was used to determine the minimum sample size. For chi-square tests, with an anticipated effect size of .15, an alpha level of .05, a power of .80, and a maximum of four degrees of freedom, the program indicated a minimum sample size of 531 participants. Similarly, in the context of regression analysis, considering an expected effect size of .10, an alpha level of .05, a power of .80, and 12 predictors, the program showed a minimum sample size of 127. In both instances, the required minimum was exceeded.

Results

Descriptive statistics

Regarding the variables of interest, the mean scores were low for the GPIU (M = 17.69, SD = 9.79), PSMU (M = 11.66, SD = 4.65), and POG (M = 11.65, SD = 4.45). In contrast, the mean scores were high for process-related internet use (M = 34.61, SD = 7.79) and social-related internet use (M = 25.25, SD = 7.07). The most representative group reported consuming alcohol more than once a month (39.6%), having good sleep quality (48.0%), and engaging in medium- or low-level daily internet use (38.4%) (Table 1).

Prevalence of problematic online behaviours

The most frequently problematic online behaviour was GPIU (n = 124, 16.3%), followed by PSMU (n = 66, 8.7%), and lastly, POG (n = 11, 1.4%). The prevalence of problematic online behaviour based on sociodemographic, lifestyle, and internet use variables is shown in Table 2. The highest prevalence rates of GPIU were found in non-binary (20.0%) and male (17.5%) participants, those younger than 20 years (16.9%), undergraduates (16.4), those studying sciences (18.9%), those with a high income level (18.0%), those who were unemployed (16.8%), those living with their parents (16.9%), those with the highest frequency of alcohol consumption (18.1%), those with poor sleep quality (24.1%), and those who used the internet for more than 9 hours per day (25.2%). However, significant differences were only found in sleep quality and daily internet use, with the highest prevalence rates of GPIU observed in students with poor sleep quality and those who spent more than 9 hours per day online. The highest prevalence rates of PSMU were found in females (10.1%), age 20-22 years (9.4%), postgraduates (10.5%), social sciences

majors (11.7%), those with a medium income level (9.1%), those who were employed (8.7%), those living with parents (8.2%), those with the highest frequency of alcohol consumption (13.8%), those with poor sleep quality (15.7%), and those who used the internet for more than 9 hours per day (13.5%). However, significant differences were only found in sleep quality, with the highest prevalence of PSMU observed in students with poor sleep quality. The highest prevalence rates of POG were found in males (2.8%), age 20-22 years (1.7%), undergraduates (1.5%), those studying sciences (2.3%), those with low income (2.4%), those unemployed (1.6%), those living with parents (1.7%), those with the lowest frequency of alcohol consumption (3.4%), those with poor sleep quality (1.9%), and those using the internet for more than 9 hours per day (4.2%). However, significant differences were only found in gender and daily internet use, with the highest prevalence rates of POG observed in male students and those who spent more than 9 hours per day online. The effect sizes in all cases were small.

Generalized problematic internet users, problematic social media users and problematic online gamers

To determine the overlap between the GPIU, PSMU, and POG, a contingency table comprising eight groups was created (Table 3). Most participants did not report any of the three problematic online behaviours (81.9%). 6.6% had GPIU and PSMU but no POG, 0.7% had GPIU and POG but no PSMU, and 0% had PSMU and POG but no GPIU. 0.5% reported the co-occurrence of GPIU, PSMU, and POG.

Table 3. Contingency table showing overlaps between GPIU, PSMU, and POG (N= 763)

GPIU n (%)	PSMU n (%)	POG n (%)		
		No	Yes	Total
No	No	625 (81.9)	2 (0.3)	627 (82.2)
	Yes	12 (1.6)	0 (0)	12 (1.6)
	Total	637 (83.5)	2 (0.3)	639 (83.7)
Yes	No	66 (8.6)	5 (0.7)	71 (9.3)
	Yes	50 (6.6)	4 (0.5)	54 (7.1)
	Total	116 (15.2)	9 (1.2)	125 (16.4)
Total	No	690 (90.5)	7 (0.9)	697 (91.4)
	Yes	62 (8.1)	4 (0.5)	66 (8.6)
	Total	752 (98.6)	11 (1.4)	763 (100)

GPIU: generalised problematic internet use; PSMU: problematic social media use; POG: problematic online gaming.

Table 2. PIU prevalence based on sociodemographic, lifestyle, and internet use factors (N = 763)

	GPIU n (%)			PSMU n (%)			POG n (%)		
	No	Yes	χ^2 (ES)	No	Yes	χ^2 (ES)	No	Yes	χ^2 (ES)
Sociodemographic factors									
Gender[a]									
Male	263 (82.4)	56 (17.5)	0.75	296 (93.1)	22 (6.9)	3.37 (.00 S)	310 (97.2)	9 (2.8)	**7.12****
Female	368 (84.1)	66 (15.2)	(.00 S)	390 (89.9)	44 (10.1)		432 (99.5)	2 (0.5)	**(.10 S)**
Non-binary	10 (100)	2 (20)		10 (100)	0 (0)		10 (100)	0 (0)	
Age (years)									
<20	242 (83.5)	49 (16.9)	0.19 (.00 S)	266 (92.0)	23 (8.0)	0.37 (.00 S)	288 (99.3)	3 (1.0)	0.56 (.00 S)
20-22	242 (84.0)	47 (16.3)		261 (90.6)	27 (9.4)		284 (98.6)	5 (1.7)	
>22	155 (83.8)	28 (15.1)		169 (91.4)	16 (8.6)		180 (97.3)	3 (1.6)	
Educational degree									
Undergraduate	566 (83.6)	111 (16.4)	0.92 (.00 S)	619 (91.6)	57 (8.4)	0.40 (.00 S)	667 (98.5)	10 (1.5)	0.05 (.00 S)
Postgraduate	73 (84.9)	13 (15.1)		77 (89.5)	9 (10.5)		85 (98.8)	1 (1.2)	
Field of knowledge									
Sciences	108 (83.1)	22 (18.9)	0.75 (.00 S)	116 (89.2)	14 (10.8)	6.37 (.05 S)	127 (97.7)	3 (2.3)	4.90 (.05 S)
Sciences Health sciences	102 (86.4)	16 (13.6)		108 (92.3)	9 (7.7)		118 (100)	0 (0)	
Social sciences	135 (83.3)	27 (16.7)		143 (88.3)	19 (11.7)		160 (98.8)	2 (1.2)	
Arts and humanities	71 (83.5)	14 (16.5)		76 (89.4)	9 (10.6)		85 (100)	0 (0)	
Engineering and Architecture	223 (83.2)	45 (16.8)		253 (94.4)	15 (5.6)		268 (100)	6 (2.2)	
Income level									
Low	135 (82.3)	29 (17.7)	1.63 (.03 S)	151 (92.1)	13 (7.8)	0.18	160 (97.6)	4 (2.4)	2.27 (.03 S)
Medium	313 (85.5)	53 (14.5)		332 (90.9)	33 (9.1)	(.00 S)	363 (99.2)	3 (0.8)	
High	191 (82.0)	42 (18.0)		213 (91.4)	20 (8.6)		229 (98.3)	4 (1.7)	
Employment status									
Unemployed	506 (83.2)	102 (16.8)	0.60 (.03 S)	556 (91.6)	51 (8.4)	0.25	598 (98.4)	10 (1.6)	0.87
Employed	133 (85.8)	22 (14.2)		140 (90.3)	15 (8.7)	(.03 S)	154 (99.4)	1 (0.6)	(.03 S)
Living in the parents' home									
Yes	339 (83.1)	69 (16.9)	0.24	315 (91.8)	28 (8.2)	0.04	403 (98.8)	5 (1.2)	0.20
No	307 (86.5)	48 (13.5)	(.02 S)	275 (92.3)	23 (7.7)	(.00 S)	349 (98.3)	6 (1.7)	(.02 S)
Lifestyle									
Alcohol consumption									
Never	103 (88.0)	14 (12.0)	1.99	110 (94.8)	6 (5.2)	6.57	113 (96.6)	4 (3.4)	4.22 (.04 S)
< 1times/month	190 (83.3)	38 (16.7)	(.03 S)	212 (93.0)	16 (7.0)	(.06 S)	226 (99.1)	2 (0.9)	
>1 times/ month	251 (83.1)	51 (16.9)		274 (90.7)	28 (9.3)		299 (99.0)	3 (1.0)	
>= 1 times/week	95 (81.9)	21 (18.1)		100 (86.2)	16 (13.8)		114 (98.3)	2 (1.7)	
Sleep quality									
Poor	82 (75.9)	26 (24.1)	**9.99****	91 (84.3)	17 (15.7)	**13.43*****	106 (98.1)	2 (1.9)	0.56 (.00 S)
Fair	236 (81.7)	53 (18.3)	**(.08 S)**	259 (86.8)	30 (10.4)	**(.13 S)**	286 (99.0)	3 (1.0)	
Good	321 (87.7)	45 (12.3)		346 (94.8)	19 (5.2)		360 (98.4)	6 (1.6)	
Internet use factors									
Internet daily use (in hours)									
<3	79 (91.9)	7 (8.1)	**12.58****	82 (95.3)	4 (4.7)	5.88 (.05 S)	86 (100)	0 (0)	**8.11* (.06
3 – 6	252 (86.0)	41 (14.0)	(.07 S)	266 (90.8)	27 (9.2)		290 (99.0)	3 (1.0)	S)**
6 – 9	215 (82.4)	46 (17.6)		241 (92.9)	19 (7.1)		258 (98.8)	3 (1.1)	
>9	89 (74.8)	30 (25.2)		103 (86.5)	16 (13.5)		114 (95.8)	5 (4.2)	

PIU: problematic internet use, GPIU: generalised problematic internet use, PSMU: problematic social media use, POG: Problematic online gaming, χ^2: Chi-square, ES: Effect size (given by the Cramer's V coefficient), S: small effect size. *$p \le .05$ ** $p < .01$ ***$p < .001$.
[a] Non-binaries were not considered in the χ^2 analysis due to under-representation.

Furthermore, in the PSMU group ($n = 66$), most had GPIU ($n = 54$, 81.8%) compared to those without GPIU ($n = 12$, 18.2%). Similarly, in the POG group ($n = 11$), most had GPIU ($n = 9$, 81.8%), compared to the small proportion who did not have GPIU ($n = 2$, 18.2%).

Multivariate multiple regression

table 4 presents the correlation matrix of the study's continuous variables. All three problematic online behaviours correlated with each other, but the association between GPIU and PSMU was strong, between GPIU and POG was medium, and between PSMU and POG was small. All three online problem behaviours were positively related to process use, with a medium-sized effect in the case of GPIU and PSMU and a small effect in POG. GPIU and PSMU were positively associated with social use, and POG was negatively associated with medium-sized effects in the case of GPIU and small-sized effects in the case of POG.

The results of the multiple linear regression models for GPIU, PSMU, and POG are shown in Table 5. The regression analysis for GPIU showed that male gender, high alcohol consumption, low sleep quality, high social use, and high process use were significant predictors of higher rates of GPIU. The regression analysis for PSMU found that female gender, high alcohol consumption, low sleep quality, high social use, and high process use were significant predictors of higher rates of PSMU. The regression analysis for POG found that male gender, unemployment status, and high process use were significant predictors of high levels of POG. Process use was a common predictor of higher rates of GPIU, PSMU, and POG. High alcohol consumption, low sleep quality, and high social use were common predictors of high GPIU and PSMU. Finally, male gender was a common predictor of higher rates of GPIU and POG.

Table 4. Correlations between GPIU, PSMU, POG, and internet motives (N = 763)

Measures	1	2	3	4	5
1. GPIU	—				
2. PSMU	.70***	—			
3. POG	.29***	.17***	—		
4. Social use	.20***	.25***	-.12**	—	
5. Process use	.28***	.21***	.11***	.41***	—

GPIU: generalised problematic internet use; PSMU: problematic social media use; POG: Problematic online gaming. **$p < .01$, ***$p < .001$ (2-tailed).

Effect sizes were small in all cases except for the association between male gender and POG, which was medium. The coefficient of determination (R^2) of the model was .138 for GPIU, .128 for PSMU, and .169 for POG, so an explained variance of 13.8%, 12.8%, and 16.9%, respectively, was estimated

Discussion

The current study examined the prevalence and overlap of GPIU, PSMU, and POG in a sample of Spanish university students, as well as the effect of the same set of sociodemographic, lifestyle, and internet use factors on each of these online problem behaviours.

In line with H1, which hypothesised that GPIU would exhibit the highest prevalence, followed by PSMU and then POG, the observed prevalence rates in this study were 16.3% for GPIU, 8.7% for PSMU, and 1.4% for POG among Spanish university students, respectively. The percentage of GPIU was similar to that in other international studies conducted on samples of university students using different assessment methods (Bener et al., 2019; Forster et al., 2021; Mamun et al., 2020). The prevalence of GPIU observed in our study is comparable to that reported in a Spanish study conducted in a post-pandemic COVID university context (Romero-Rodríguez et al., 2021). However, this study found higher rates than other studies using the same instrument and cut-off points (CIUS ≥ 28) in the general adult population (Gmel et al., 2019). This discrepancy may be attributed to the socio-cultural variations between countries (Baloğlu et al., 2020). A plausible contributing factor is the increased use of the internet in Spain, surpassing the percentages observed in other European countries such as Italy, France, and Portugal (World Bank, 21 December 2023). Furthermore, the data collection period for this study (2022-2023) occurred relatively shortly after the return to normalcy following the extensive COVID-19 lockdowns. This period of transition may have been characterised by sustained high levels of online engagement carried over from confinement, potentially contributing to the observed higher prevalence rates of GPIU (Király et al., 2020).

Concerning PSMU, the sample studied presented a prevalence rate lower than the 14.8 - 70% reported in the review focusing on the undergraduate student population (Sánchez-Fernández & Borda-Mas, 2023). This may be due to the use of less restrictive assessment methods, which provide higher prevalence rates. Indeed, when using more conservative cut-off points, a previous study that analysed the prevalence of PSMU in university

Table 5. Multiple regressions to predict GPIU, PSMU, and POG (N = 753 [a])

Independent Variables	GPIU			PSMU			POG		
	B	SE B	β	B	SE B	β	B	SE B	β
Sociodemographic factors									
Age	-.24	.12	-.09	-.07	.05	-.06	.03	.08	.03
Gender (Male vs. female)	2.10	.79	.11**	-.77	.38	-.08*	3.40	.38	.37***
Educational degree	.95	1.39	.03	.60	.65	.04	.44	.56	.03
Field of knowledge	.09	.23	.01	.02	.12	.01	.11	.12	.04
Income level	-.20	.58	-.02	-.30	.27	-.05	-.25	.29	-.04
Employment status (Unemployed vs. employed)	-.32	1.08	-.01	-.18	.50	-.02	-1.17	.46	-.11**
Residence	-.95	.74	-.05	.13	.35	.01	-.62	.36	-.07
Lifestyle									
Alcohol consumption	1.06	.41	.10**	.84	.19	.17***	-,22	.21	-.04
Sleep quality	-2.34	.54	-.17***	-.91	.26	-.14***	-,02	.25	-.00
Internet use factors									
Internet daily use	.97	.42	.09*	.04	.19	.01	.30	.27	.06
Social use	.14	.06	.10*	.09	.03	.15***	-.04	.03	-.06
Process use	.23	.05	.19***	.06	.03	.11*	.07	.03	.13**
R^2	0.14			0.13			0.17		
F	8.22***			7.53***			10.41***		

GPIU: generalized problematic internet use, PSMU: problematic social media use, POG: problematic online gaming, *B*: Unstandardized regression coefficients, *SE*: standard errors, *β*: standardized regression coefficients. *$p \leq 0.05$ ** $p < 0.01$ ***$p < 0.001$
Note. Bootstrapping was based on 5000 replicates. *B, SE,* and *p* coefficient estimates are based on the median of the bootstrap distribution.
[a] Non-binary gender was not considered in the analyses due to a lack of representativeness.

students found similar rates (Kircaburun & Griffiths, 2018). However, using the same criteria (BSMAS ≥ 19), the meta-analysis by Cheng et al. (2021) reported a prevalence of 25%. Nonetheless, no previous studies have been found that analysed the prevalence of PSMU among university students using these assessment criteria. In contrast, the percentage of participants with POG was lower than that found in other international studies with samples of university students (Sánchez-Fernández & Borda-Mas, 2023). Likewise, this may be due to differences in the assessment instruments used, as well as the socio-cultural differences between samples from different countries. The percentage found in the present study coincides with the 1.9% reported by Beranuy et al. (2020) in the general Spanish population.

The results suggest that gender established significant differences between those with and without POG, with higher rates for males, as found in the previous literature (Mihara & Higuchi, 2017). Furthermore, no significant gender differences were found between those with and

without GPIU and PSMU, in line with previous studies (e.g. Romero-Rodríguez et al., 2021; Sayili et al., 2022).

The results in terms of prevalence rates are in line with previous studies, suggesting that in GPIU, prevalence rates are higher than those of specific behaviours in the general population (Moreno et al., 2022), and in specific behaviours, the prevalence of PSMU is higher than that of POG (Burén et al., 2021). This finding could be explained by the fact that social media is the most widespread online activity in the general population (We Are Social & Hootsuite, 2023).

Consistent with H2, which hypothesised that co-occurrence would be highest between GPIU and PSMU, followed by GPIU and POG, and lowest between PSMU and POG, the results showed high overlaps and correlations have been observed between the three problem behaviours, with the highest being between GPIU and PSMU, followed by GPIU and POG, and the lowest being PSMU and POG. These results are similar to those of previous studies examining co-occurrence

(Tereshchenko et al., 2022) and the relationship between GPIU, PSMU, and POG (Wong et al., 2020).

Concerning the factors associated with each of the problem behaviours, the results found similarities and differences between the three online behaviours. Regarding sociodemographic variables, in line with H3, the female gender was associated with PSMU and the male gender with POG. This finding is supported by other studies (Kircaburun et al., 2020; Mills & Allen, 2020). The association of males with POG and females with PSMU may reflect a male orientation toward aggressive, competitive gaming activities and a female orientation toward the strong social component of social media (Kuss & Griffiths, 2015). Males and females may have specific needs, values, and motivations that act as predictors of each addictive behaviour (Brand et al., 2019). Furthermore, the findings support the hypothesis that gender constitutes a distinct non-shared risk factor for problematic online behaviours (Andreassen et al., 2016). The results also found a significant association between male gender and higher levels of GPIU, a finding that was not explicitly predicted but is consistent with some previous research (Bisen & Deshpande, 2020; Ceyhan et al., 2019). The association of males with GPIU may be due to the fact that this construct includes a number of specific behaviours (Baggio et al., 2018) and these, although some are more associated with females, such as PSMU, others are associated with males, such as POG, as evidenced by the results, problematic online gambling (Montiel et al., 2021) or problematic pornography use (Borgogna et al., 2022).

H8 was partially confirmed, whereas H5, H6, and H7 were not confirmed. Specifically, there was a significant association between unemployment status and POG. This outcome could be attributed to the increased availability of free time among unemployed college students, which could facilitate the development and perpetuation of addictive online gaming behaviour. However, this trend was not observed in the context of GPIU and PSMU, possibly due to the nature of these activities. Various genres of video games impose high cognitive demands (Dale et al., 2020) that are unlikely to be met in a professional setting. In contrast, social media and, in general, internet use tend to extend into working hours (Huang & Fan, 2022).

Regarding lifestyle variables, H9 and H10 were partially supported. Regarding alcohol consumption (H9), significant associations were observed between GPIU and PSMU. The prevalence of these two behaviours was higher in groups with a higher frequency of consumption. This result was also found in a systematic review by Lanthier-Labonté et al. (2020),

who concluded that there is a relationship between alcohol consumption and generalised and specific PIU behaviours. However, no effect of alcohol consumption on POG was observed. This may be related to video game use being linked to social isolation (Chen et al., 2018), whereas alcohol consumption is associated with social interaction (Seid, 2016).

Similarly, significant associations between sleep quality and GPIU and PSMU were found, partially supporting H10. The prevalence of GPIU and PSMU was higher in the poor sleep quality group. This is consistent with previous literature suggesting that sleep problems are positively associated with GPIU and PSMU in university students (Bener et al., 2019; Mamun et al., 2020; Wong et al., 2020). However, no significant effect of sleep quality on the POG was observed. This may be due to the characteristics of the game, which constitutes a time-defined online activity with a beginning and end. In contrast, in the case of social networking, as it is a continuous activity without defined time limits, students' sleep may be disturbed by their inability to disconnect from interactions with others. These results are supported by Wong et al. 's (2020) study, which found a stronger association between sleep quality and PSMU than between sleep quality and POG.

Regarding internet use factors, H1 was partially supported. The results show that daily internet use was associated with GPIU. The prevalence of GPIU in groups that spent more time online. This result has already been found in the previous literature (Sánchez-Fernández et al., 2023) and could be explained by the fact that people would spend more time online as an ineffective coping mechanism, ultimately contributing to the maintenance of PIU (Tokunaga & Rains, 2010). Certainly, within cognitive behavioural therapy aimed at addressing PIU, a technique used involves monitoring usage. The objective is to reduce online time to a level that no longer hinders a person's overall well-being (Király & Demetrovics, 2021). However, the effects of daily internet use on PSMU and POG were not significant. This may be related to the way in which the variable of daily internet use was evaluated in the present study without differentiating the activities carried out on the network. Therefore, it is recommended that these psychometric limitations be solved by studying the effect of time spent on problematic online behaviours, distinguishing between time spent on different functions and activities in future research.

In support of H12, internet use motives were significantly associated with different problematic online behaviours. Specifically, social use -establishing and maintaining ties- positively impacted GPIU and

PSMU. These results are supported by previous studies showing that social motivations are risk factors for GPIU and PSMU (Mamun et al., 2020; Sánchez-Fernández & Borda-Mas, 2023). These results support previous studies that found significant effects of psychosocial needs on these problematic behaviours (Foroughi et al., 2021; Kozan et al., 2019). In the case of PSMU, the effect size was larger, which makes sense because, on the internet, people will make greater use of activities that facilitate social contact. Furthermore, these results support the idea that the integration of social media into identity construction may be related to its excessive use (Psiachos et al., 2025). Process use -reading news, having fun, or unwinding- was a common risk factor for the behaviours studied. This result is consistent with those of previous studies (Foroughi et al., 2021; Kircaburun et al., 2020; Süral et al., 2019). Students engage with the internet driven by various motivations, encompassing both process-oriented and social aspects. Through various online activities, they seek specific rewards, such as entertainment and the ability to disconnect from reality in social media and video games or the facilitation of social interaction in social media. According to Bandura (1991), these rewards contribute to an improved emotional state and increase the likelihood of repeated behaviours. Consequently, this repetition can lead to the development of habitual and addictive behaviours that are progressively challenging to regulate (Van Deursen et al., 2015). Furthermore, in alignment with the I-PACE model, specific motivations serve as predisposing factors for specific addictive behaviours (Brand et al., 2019).

The similarities and differences found between GPIU, PSMU, and POG, both in prevalence, overlaps, and associated factors, support current conceptions of PIU, according to which there are three related but distinct psychological categories with common and unique characteristics (Baggio et al., 2018). Moreover, the more significant similarities found between the first two (GPIU and PSMU) compared to the third (POG) supports the view of Tereshchenko et al. (2022) that there are two patterns in PIU: one that includes GPIU and PSMU, and another, notably different, that includes POG. The link between the GPIU and POG has been the subject of intense discussion in recent studies. Some experts advocate that these psychological constructs are conceptually distinct (Griffiths, 2018). Therefore, it is necessary to develop prevention and intervention strategies for these behaviours that consider their specificities.

This study had some limitations. First, it was conducted in a large Spanish university; therefore, the generalisability is limited. To verify these findings, future research should reproduce the current study using diverse samples of university students from other regions and cultures. Second, the use of a convenience sampling method and the distribution of the online survey via teaching staff made it impossible to calculate a precise participation rate, potentially affecting sample representativeness. Future studies should strive for more controlled recruitment strategies to allow for the calculation of participation rates and to improve sample representativeness. Third, the voluntary nature of participation might have introduced a self-selection bias, potentially leading to an overestimation of prevalence rates. Employing probabilistic sampling methods in future studies could help mitigate this bias. Fourth, the cross-sectional design of this study precludes the establishment of causal relationships between the variables examined. Longitudinal studies are required to determine the directionality and causality of the observed effects. Fifth, the use of discrete categorical variables in multiple linear regression models, although common, might have affected the statistical and interpretive precision of the model. Future studies should explore alternative statistical approaches to address this limitation. Finally, self-report questionnaires were used in this study, which have flaws, including social desirability and memory recall bias. Additionally, owing to the rapid advancement of technology, updating the criteria for PIU may be necessary. Therefore, verification using qualitative tools in addition to self-report measures could increase the thoroughness of the assessment of these behaviours. Furthermore, future research should consider a more differentiated evaluation of internet use to better understand the nuances of problematic internet use, especially in the post-COVID-19 era, and refine preventive recommendations.

Despite these limitations, the present study makes an important contribution to the scientific literature. Although the relationship between socio-demographic, lifestyle, and internet use variables and different PIUs has been extensively analysed in previous research, this is the first study to examine how these variables influence three problematic online behaviours in the same sample of Spanish university students, allowing for the analysis of similarities and differences between them.

From a practical perspective, based on the prevalence rates found, we can conclude that PIU is a real problem among Spanish university students, making it necessary to develop and implement prevention and intervention strategies. Considering these results, we propose strategies to promote healthy lifestyles, especially focusing on reducing alcohol consumption

and improving sleep hygiene. To address time use, we propose encouraging recreational and academic pursuits devoid of internet use so that college students spend less time online and also use logging tools that allow students to track their actual internet use. This aligns with current cognitive-behavioural intervention measures for cyber-addictions, which involve monitoring time spent online, social networking, and gaming to reduce internet use until it no longer interferes with a person's normal functioning (Király & Demetrovics, 2021). Finally, addressing the motivations for internet use as a risk factor requires promoting alternatives to online social interaction, offering university students spaces and activities that encourage face-to-face social contact, and leisure and entertainment alternatives that go beyond the use of new technologies.

Conflicts of interest

The authors have no conflicts of interest to disclose.

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