

The Problematic Internet Entertainment Use Scale for Adolescents: Prevalence of Problem Internet Use in Spanish High School Students

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Abstract

Many researchers and professionals have reported nonsubstance addiction to online entertainments in adolescents. However, very few scales have been designed to assess problem Internet use in this population, in spite of their high exposure and obvious vulnerability. The aim of this study was to review the currently available scales for assessing problematic Internet use and to validate a new scale of this kind for use, specifically in this age group, the Problematic Internet Entertainment Use Scale for Adolescents. The research was carried out in Spain in a gender-balanced sample of 1131 high school students aged between 12 and 18 years. Psychometric analyses showed the scale to be unidimensional, with excellent internal consistency (Cronbach's alpha of 0.92), good construct validity, and positive associations with alternative measures of maladaptive Internet use. This self-administered scale can rapidly measure the presence of symptoms of behavioral addiction to online videogames and social networking sites, as well as their degree of severity. The results estimate the prevalence of this problematic behavior in Spanish adolescents to be around 5 percent.

Introduction

INTERNET ADDICTION¹ (IA) has been frequently studied since its entry into the clinical lexicon in 1995, although it has yet to be officially recognized as a mental disorder by international organisms. Among the other terms used to refer to this condition are pathological^{1,2} or problematic Internet use (PIU),^{3,4} Internet dependency,⁵ excessive Internet use,⁶ and compulsive Internet use.⁷ IA nevertheless remained the most popular term in publications^{8,9,10} until the inclusion of Internet Use Disorder (IUD) in the appendix^{10,11} to the fifth edition of the Diagnostic and Statistical Manual (DSM-5) of Psychiatric Disorders. The American Psychiatric Association¹¹ has proposed it as a possible nonsubstance addiction within the new DSM-5 category Substance Use and Addictive Disorders. This has raised the clinical legitimacy of the problem and has highlighted the need for further scientific research, even though recent advances embrace a variety of perspectives,^{12,13} including more controlled designs,¹⁴ reviews,¹⁵ bibliometric studies,¹² meta-analyses,¹⁶ and meta-syntheses.^{8,17}

IUD is now considered as a behavioral addiction, a new, broad clinical entity that refers to repetitive impulsive behaviors that have negative effects on the lives of users and their relatives, and which is associated with mood, obsessive-

compulsive, and, above all, substance use disorders.¹⁸ Specifically, IUD is considered as a complex psychological construct that can be defined as a technological (behavioral) addiction related to nonessential, personal Internet activities (i.e., leisure, pleasure, or recreational)^{3,5,19,20} that increase the time spent online and that cause marked disturbances in the subject's life. The symptoms include preoccupation, salience, tolerance, withdrawal, unsuccessful attempts to cut back on use, continued excessive use despite the negative consequences, engaging in Internet activities to alter moods (to escape or relieve them), relapse, craving, and conflict with others or with oneself (causing functional impairment that affects eating, sleeping, and physical activity²¹). According to Griffith,⁶ the Internet seems to provide a medium for this kind of behavioral addiction that develops certain teenagers as a result of online activities to counteract other psychological or physical deficiencies, or as a pseudocoping strategy.

Since 2001, a small number of IUD scales have been designed and validated for use with adolescents to measure their generalized PIU.²² To date, seven scales have been developed for adolescents (see Table 1), almost all of them in Asia, and based on self-reports of high school students.

Epidemiological studies in this age group have been carried out above all in several Asian and European countries to estimate the prevalence of IUD (see Table 2). Observed

TABLE 1. INTERNET USE DISORDER SCALES FOR ADOLESCENTS (INSTRUMENT, BASIS, RATING SCALE, DIAGNOSIS, RELIABILITY, VALIDITY, AND USER'S CATEGORIES)

<i>Instrument (Acronym) [Reference]</i>	<i>Basis</i>	<i>Rating scale</i>	<i>Diagnostic symptoms</i>	<i>Reliability Cronbach α</i>	<i>Validity</i>	<i>User's categories based on cut-off points</i>
Internet Addiction Scale for Taiwanese high school students (IAST) [23]	Literature on common IA diagnostic criteria	29 4-point Likert scale	Tolerance; compulsive use and withdrawal; family, school and health problems; Interpersonal and financial problems	0.88	EFA –4 factors (the symptoms). Association with Young Diagnostic Questionnaire (YDQ [1])	Internet-dependent (scores more than 80) and non-dependent (scores of 80 or less)
Chen Internet Addiction Scale for Adolescents (CIAS) [24]	DSM-IV-TR criteria for impulse control disorder and substance use, IA diagnostic criteria, clinical experience	26 4-point Likert scale	Tolerance, compulsive use and withdrawal. Negative impact on interpersonal relationships, health and time management	0.79–0.93	Associations with hours spent weekly on Internet activity	If score was higher than 75 th percentile, screening and diagnostic (63/64) and accuracy cut-off points (67/68).
Adolescent Pathological Internet Use Scale (APIUS) [25]	Davis's model: behavioral, emotional, and maladaptive cognition symptoms. Chinese situation	-	Saliency, mood alteration, social comfort, tolerance, compulsive Internet use/withdrawal symptoms, negative outcomes	Test-retest and satisfactory Cronbach alpha	EFA-CFA: 6 factors (the symptoms). Content, convergent, discriminant validity. Associations	Sensitivity, specificity, and diagnostic accuracy.
Problem Internet-Use Screening Tool (SCREEN) [26]	IA Young criteria and theories of gambling for Chinese adolescents' Internet-use based on endogenous and exogenous factors	26 5-point Likert scale	Endogenous and exogenous factors of maladaptive Internet use	0.66 split-half reliability	EFA-35 reduced to 9 factors. Association with exogenous variables as criteria of maladaptive Internet use	Problematic (from percentile 95: 17 or above), at-risk (from percentile 80: 12–16), regular (from percentile 15: 4–11), and occasional users (below percentile 15: 3 or lower)
Internet Addiction Scale for Turkish high school students (IAS) [27]	DSM-IV substance dependence criteria and 2 additional Griffiths criteria	27 5-point Likert scale	Compulsive use, withdrawal, tolerance, interpersonal and health problems, time management problems, salience, and mood modification	0.94 (Test-retest: 0.98)	EFA-1 factor: IA. Associations with BDI and SAS	Cutoff score of 81/135 (3×27 items) indicative of possible Internet addiction
Internet Dependence Scale (IDS) [28]	DSM-IV criteria, opinions of secondary education Turkish students and literature	35 5-point Likert scale	Withdrawal, control difficulty, malfunctioning, and social isolation	0.94	EFA-4 factors: withdrawal, controlling difficulty, disorder in functionality, social isolation. CFA to test the fit of model, RMSEA confirms EFA findings	Two-step cluster analysis: addicted, addiction risk, threshold, and non-addicted
Scale for Internet Addiction of Lima (SIAL) [29]	DSM-IV-TR criteria for impulse control disorder or gambling. Revision of other IA tests (i.e., IAT and CIAS)	11 4-point Likert scale	Symptoms (salience, tolerance, withdrawal, loss of control, and relapse) and dysfunctional characteristics (academic, family, and interpersonal problems)	0.84	EFA-2 factors: IA symptomatology, IA dysfunction. Associations with weekly hours using Internet, gender, indiscipline, future plans, and school absenteeism	-

Note: On all the scales, higher total score showed increased IUD severity. EFA, exploratory factor analysis; CFA, confirmatory factor analysis.

prevalence rates have ranged widely, between 0 percent and 36.7 percent, due mainly to the use of scales designed for adults with different criteria and cut-off points. The most frequently used instruments are the Young Diagnostic Questionnaire (YDQ)¹ and the Internet Addiction Test (IAT),²¹ although these scales have nonetheless attracted some criticism.²³ Furthermore, a few of these scales have been validated in clinical samples, which would be necessary to ensure they measure clinically relevant aspects of IUD; the Chen Internet Addiction Scale for Adolescents (CIAS)²⁴ is the first to draw-up clinically validated criteria for adolescents, which showed high diagnostic accuracy, specificity, and acceptable sensitivity. As Beard²⁴ notes, this is a good start, but further studies are needed.

At present, there are at least five ways of establishing user categories according to the level of severity on IUD scales. The first is through the score on a specific scale: for example, it is diagnosed in subjects with five of the eight diagnostic criteria on the YDQ^{34,40,44,47,52,64,65}; or on the CIAS, it is diagnosed with a minimum score of 63/64.^{35,37,41,48,59} A second approach would be to extract categories using percentiles (P), such as the 75 P²⁴ or 95 P²⁶, similar to what is done in gambling research. Third, the problem user could be categorized by combining two common types of user that cause concern, namely the at-risk and addicted populations.^{34,44,57,62} Fourth, one could select dependent and nondependent individuals using the mean (M) \pm 1/2 standard deviation (SD).³² Finally, the categorization could be obtained through multivariate statistical analyses, such as cluster analysis.^{28,53,61}

In light of the above, the present study has three objectives: 1) to design and validate a new scale for adolescents, the Problematic Internet Entertainment Use Scale for Adolescence (PIEUSA), which centers on major Internet entertainments such as online video games (OVG) and social networking sites (SNS); 2) to examine the associations between patterns of Internet use identified with the PIEUSA and both gender and age groups; and 3) to estimate PIU prevalence using the categories from the classical pathological gambling literature to assess levels of severity.

Method

Participants

Students were recruited from public (state) and private schools in the city of Barcelona (Spain). The sample comprised 1131 adolescents aged 12 to 18 years ($M=14.55$, $SD=1.816$), and it was balanced in terms of both gender (53.5 percent male participants, 46.5 percent female participants) and age group (50.1 percent younger adolescents aged 12–14 and 49.9 percent aged 15–18).

Materials

This cross-sectional study applied an ad hoc paper and pencil questionnaire organized into three sections: 1) socio-demographic data (gender, age, family, substance consumption, and other hobbies); 2) patterns of Internet use (computer owner, user, age at first use, preferred online entertainments, self-rating of expertise from 1 inexperienced to 5 very expert, frequency [days per week], duration [average length of a regular session], longest session [maximum time connected in minutes], and perceived effect, which was assessed by asking

adolescents [using yes–no questions, plus three dichotomous items⁶⁷] whether they considered that Internet might affect them in any way); and 3) the PIEUSA, which was constructed using three sources: a text revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) criteria for substance dependence and pathological gambling disorders in adults; the diagnostic criteria proposed for IUD in adults and adolescents,^{1,4,24,35,68,69} and the literature on adolescent IUD prevalence. The scale contains 30 items rated on a seven-point Likert scale, from 1, strongly disagree, to 7, strongly agree. The total score therefore ranges between 30 and 210, with the highest score representing the maximum presence of the construct under study over the last 12 months (see instructions in Table 3).

Procedure

The instruments were administered by researchers during a regular classroom hour, having previously obtained permission from the head teachers of each school. To increase the validity of the students' responses, teachers were asked to be absent during the administration. The researchers instructed students, asked them to answer honestly, and guaranteed the confidentiality of their responses; all the students gave voluntary consent to participate.

Results

Sample characteristics

Students were living with an M of four family members ($M=4.02$, $SD=1.050$). Their parents had at least secondary or sometimes higher education (82.15 percent), and both were employed (88.65 percent). There was a significant relationship between parents' educational level and the adolescents' total score on the PIEUSA (fathers: $U=18246.500$, $z=2.426$, $p<0.05$, $r=0.12$; mothers: $U=22547.500$, $z=-2.011$, $p<0.05$, $r=0.09$), specifically in terms of the difference between parents with only primary education [median (Mdn) in relation to fathers in this group was 91; for mothers: Mdn=92.5] and those with higher education (fathers: Mdn=80; mothers: Mdn=84). Almost a quarter of the students (23.2 percent) reported consumption of alcohol and/or tobacco, but this was not related to PIEUSA scores. Seventy-nine percent reported having other hobbies that did not involve technologies (mainly sports and arts), and these respondents obtained lower scores on the PIEUSA (Mdn=84) than did those whose hobbies were all technology based (Mdn=101) ($U=49573.00$, $z=-4.828$, $p<0.001$, $r=0.16$).

Psychometric properties of the PIEUSA

Factor validity. An EFA using the principal components technique was conducted on the 30 items of the PIEUSA. The value of the Kaiser-Meyer-Olkin index ($KMO=0.931$) verified the sampling adequacy ($N=909$), while Bartlett's test of sphericity ($\chi^2_{(435)}=9975.033$; $p<0.001$) indicated sufficient correlations between items. Application of the Kaiser criterion ($\lambda \geq 1$) indicated that a combination of five components explained 50.6 percent of the variance, while the screen plot showed two inflections after the first and fourth components. The largest fall was after the first factor, which explained 31.28 percent of the variance and had the highest eigenvalue. The scale could therefore be considered unidimensional.⁷⁰ A factor loading of 0.30 was used as a cut-off for items.⁷¹

TABLE 2. STUDIES OF INTERNET USE DISORDER IN ADOLESCENTS (AUTHORS AND YEAR OF PUBLICATION, COUNTRY, SAMPLE SIZE, AGE, GENDER, TEST, PREVALENCE, AND CUT-OFF POINT)

Authors, year [Reference]	Country	N	Age range (M;SD)	Gender: % boys-% girls	Test [Adolescent/Adult scale]	Prevalence rate (%boys-%girls)	Cut-off point for IUD
Tsai and Lin, 2001 [23]	Taiwan	753	16-17	67.5-32.5	IAS [Adolescent]	11.69	80/116
Nalwa and Anand, 2003 [32]	India	100	16-18	-	DOCS [Adult]	18	M±half SD
Kaltiala-Heino, et al., 2004 [33]	Finland	7229	12-18 (M=15.6)	-	Pathological gambling criteria of DSM-IV [Adult]	(1.7-1.4)	4/7
Johansson and Götestam, 2004 [34]	Norway	3237	12-18	58.07-41.92	YDQ [Adult]	1.98 (2.42-1.51)	5/8
Ko, et al., 2005 [24, 35]	Taiwan	454	12-19 (M=15.25; SD=1.36)	68.06-31.94	CIAS [Adolescent]	19.8	63 or 64/84
Kim, et al., 2006 [36]	South Korea	1573	15-16	35-65	IAS (Korean IAT version) [Adult]	1.6	70/100
Ko, et al., 2007 [37]	Taiwan	570	12-16 (M=13.62; SD=0.91)	53.16-46.84	CIAS [Adolescent]	18.2	64/84
Bayraktar and Gün, 2007 [38]	North Cyprus	686	12-17 (M=14.4; SD=1.62)	50-50	IAS=IAT [Adult]	1.1	100-120
Cao and Su, 2007 [39]	China	2620	12-18 (M=15.19)	50.23-49.77	YDQ (Chinese YDQ version) [Adult]	2.4	1/5 plus any one criteria
Yang and Tung, 2007 [40]	Taiwan	1708	17-19	56-44	YDQ [Adult]	13.8	5/8
Yen, et al., 2007 [41]	Taiwan	3480	-	62.9-37.1	CIAS [Adolescent]	20.7	63/84
Ha, et al., 2007 [42]	South Korea	452	(M=15.47;SD=1.65)	56.4-43.6	YIAS (Korean IAT version) [Adult]	1.8	80/100
Jang, et al., 2008 [43]	South Korea	851	(M=15.8;SD=0.41)	25.7-74.3	IAS (Korean IAT version) [Adult]	4.3 (6.8-3.5)	70/100
Siomos, et al., 2008 [44]	Greece	2200	(M=13.9)	49.1-50.9	YDQ [Adult]	5.9 (4.4-1.5)	5/8
Ghassemzadeh, et al., 2008 [45]	Iran	1968	12-18 (M=15.34; SD=1.66)	52.29-47.71	IAT (Persian version of IAT) [Adult]	3.8	70/100
Park, et al., 2008 [46]	South Korea	903	-	69.6-30.4	IAS (=IAT) [Adult]	10.7	70/100
Gong, et al., 2009 [47]	China	3018	11-23 (M=15.8; SD=2.1)	47-53	YDQ [Adult]	5 (7.8-2.5)	5/8
Yen, et al., 2009 [48]	Taiwan	8941	11-23 (M=14.7; SD=1.7)	48.04-51.96	CIAS [Adolescent]	(22.5 young boys, 26.6 old boys; 12.2 young girls, 13.8 old girls)	63 or 64/84

(continued)

TABLE 2. (CONTINUED)

Authors, year [Reference]	Country	N	Age range (M;SD)	Gender: % boys-% girls	Test [Adolescent/ Adult scale]	Prevalence rate (%boys-%girls)	Cut-off point for IUD
Milani, et al., 2009 [49]	Italy	98	14-19 (M=16.28; SD=1.56)	46.9-53.1	IAT (Italian IAT version) [Adult]	36.7	50/100
Choi, et al., 2009 [50]	South Korea	2336	(M=16.7; SD=1.0)	57.5-42.5	YIAT (Korean IAT version) [Adult]	2.3 (2.5-1.9)	70/100
Lam, 2009 [51]	China	1618	13-18	45.4-54.6	IAT= YIAS [Adult]	0.6	80/100
Fu, 2010 [52]	China	208	15-19	57.21-42.79	YDQ (Chinese version of YDQ) [Adult]	6.7	5/8
Kayri and Günuç, 2010 [30, 53]	Turkey	754	(M=15.82; SD=1.18)	58.8-39.9	IDS	10.1	Cluster analysis
Kim, et al., 2010 [54]	South Korea	853	13-15 (M=14)	44.8-55.2	KIAS (Korean IAT short version) [Adult]	21.81 (31.4-14)	52/80
Canan, et al., 2010 [27]	Turkey	292	14-19 (M=16.3; SD=1.2)	54.7-45.2	IAS (Turkish version) [Adolescent]	11.6	81/135
Wang, et al., 2011 [55]	China	14260	10-23 (M=15.6)	48.7-51.3	YIAT [Adult]	12.2	50/100
Kormas, et al., 2011 [56]	Greece	866	-(M=14.7)	46.7-53.3	YIAT [Adult]	1.5	70/100
Cao, et al., 2011 [57]	China	15538	10-24 (M=16.4; DS=2.8)	49.8-50.2	YIAT (Chinese IAT version) [Adult]	8.1	50/100
Jeong and Kim, 2011 [58]	South Korea	600	12-18	53.2-46.8	IAT [Adult]	2.2	80/100
Cheung and Wong, 2011 [59]	China	719	10-20 (M=14.7; SD=2.02)	60.4-48.8	CIAS [Adolescent]	17.2	63 or 64/84
Liberatore, et al., 2011 [60]	Puerto Rico	71	13-17	54.9-45.1	IAT [Adult]	0	80/100
Villella, et al., 2011 [18]	Italy	2853	13-20 (M=16.7; SD=1.9)	60-40	IAT [Adult]	1.2 (1.3-1)	70/100
Koronczai, et al., 2012 [61]	Hungary	438	15-17 (M=16; SD=0.69)	44.5-55.5	PIUQ [Adult]	18	Cluster analysis
Tsitsika, et al., 2011 [62]	Greece	411	-(M=14.9;SD=0.54)	46.7-53.3	YIAT [Adult]	14.1	40/100
Poli and Agrimi, 2012 [63]	Italy	2533	14-21 (M=16.4; SD=1.51)	44.3-55.7	IAT [Adult]	0.79 (1.3-1)	80/100
Fisoun, et al., 2012 [64]	Greece	1270	14-19	48.3-51.7	YDQ, IAT [Adult]	11 in YDQ (13.8-8) 6.2 in IAT (7.2, 5.1)	YDQ: 5/8, IAT: 70/100
Siomos, et al., 2012 [65]	Greece	2017	12-19	51.8-48.2	YDQ, [Adult]	15.2 in YDQ	5/8
Hawi, 2012 [66]	Lebanon	833	10-22 (M=15; SD=2.12)	43-57	YIAT (Arabic IAT version) [Adult]	4.2	70/100

TABLE 3. ITEM ANALYSIS AND INTERNAL CONSISTENCY RELIABILITY IN PROBLEMATIC INTERNET ENTERTAINMENT USE SCALE FOR ADOLESCENCE

Item	M	SD	Corrected item-total correlation	Cronbach alpha if item is deleted
1. When I am not in class, I usually think about OVG and/or SNS (the last time I played or enjoyed my scores or friends, my previous sessions, etc.)	2.53	1.790	0.520	0.920
2. When I play/enjoy myself online I spend more time than I had planned	4.14	2.104	0.499	0.921
3. When I finish playing, I look forward to my next session of entertainment with OVG and/or SNS	2.71	1.916	0.537	0.920
4. When I begin accustomed to playing a game or to an entertainment website, I need more time to derive enjoyment than I did at first	3.63	2.153	0.567	0.920
5. When I play OVG or visit SNS, I can forget my homework	3.17	2.262	0.507	0.921
6. When I play OVG or visit SNS, I can forget my household chores (making my bed, washing dishes, walking the dog, etc.)	3.37	2.188	0.498	0.921
7. When I play OVG or visit SNS, I can forget everything	2.30	1.957	0.550	0.920
8. When I play OVG or visit SNS I become very tense, even a little agitated, trying to answer quickly and correctly	3.01	2.056	0.527	0.920
9. When I play OVG or visit SNS, other people (parents, brother/s, sister/s, friend/s, etc.) complain about the length of time I spend	3.72	2.179	0.586	0.919
10. I get annoyed when people ask me what I'm doing while I'm playing OVG or visiting SNS	4.08	2.307	0.532	0.920
11. I have tried not to spend so much time with OVG or SNS, but I find it difficult	2.72	1.984	0.495	0.921
12. I am unable to leave a session half-finished, I have to finish somehow	2.84	2.140	0.513	0.920
13. When I stop playing it's because I just can't go on and have been playing for one or more hours	2.61	2.039	0.437	0.921
14. When, for any reason, I have to stop playing before I want to, I get irritable, nervous, in a bad mood, tired...is short, I feel bad.	2.13	1.726	0.514	0.920
15. OVG or SNS help me to forget my daily problems for a while and just enjoy myself	4.24	2.201	0.554	0.920
16. A world without OVG or SNS would not be fun	3.41	2.217	0.504	0.921
17. I have met new people through this kind of entertainments (OVG or SNS)	4.55	2.281	0.505	0.921
18. Through this kind of entertainment (OVG or SNS) I have made new friends	4.28	2.293	0.485	0.921
19. I have occasionally got hooked on this kind of entertainment (OVG or SNS): when the video game is new, during the holidays, when I meet something or someone new through SNS, etc.	4.08	2.176	0.617	0.919
20. I have lost my appetite or missed a meal on account of OVG or SNS	1.75	1.576	0.451	0.921
21. I have lost sleep due to the time I spend playing OVG or visiting SNS	2.28	1.890	0.526	0.920
22. I have told lies about the time I spend on OVG or SNS	2.18	1.816	0.527	0.920
23. I have hidden things that I found out through OVG or SNS	2.02	1.762	0.463	0.921
24. I have spent money on OVG or SNS entertainment	1.45	1.365	0.279	0.923
25. I have sometimes preferred OVG or SNS to being with my friends	1.63	1.360	0.398	0.922
26. I have tried everything possible to get more time to play or obtain new video games, friends...	2.04	1.667	0.569	0.920
27. When I am playing OVG or visiting SNS it is usual for me to ask my parents/ brother(s)/sister(s) to let me play a little longer	3.28	2.146	0.613	0.919
28. I get completely absorbed when I am playing online	2.81	1.965	0.526	0.920
29. I like to keep up-to-date with anything new in OVG or SNS	3.55	2.175	0.474	0.921
30. My main entertainment is OVG or SNS	3.13	2.122	0.597	0.919

Note: Instructions: Please answer each of the following questions about Online Video Games (OVG) and/or Social Networking Sites (SNS) as Internet entertainments used in the past year. In each question you are asked to consider your answers from 1 to 7 in this way: 1=I strongly disagree, and 7=I strongly agree.

Item analysis and internal consistency. Table 3 shows the items that obtained the highest scores ($M > 4$, $SD < 2.31$; items 2, 10, 15, 17, 18, and 19) and the lowest scores ($M < 2$, $SD < 1.6$; items 20, 24, and 25). According to homogeneity indices, only one item (24: "I have spent money on OVG or SNS entertainment") showed a low correlation with the corrected total score. However, its correlation was near the cut-off point, and omitting it did not improve the value of Cronbach's alpha. We therefore decided to maintain this item. The internal consistency of the scale was excellent ($\alpha = 0.923$).

Construct validity. The M total score on the PIEUSA for the 909 Spanish adolescents who correctly completed the scale was 89.66 ($SD = 33.51$). Spearman's correlation coefficient was then used to compare the PIEUSA total score with patterns of Internet usage, and revealed a positive relationship with frequency ($r = 0.383$; $p < 0.001$; $r^2 = 0.15$), average duration ($r = 0.412$; $p < 0.001$; $r^2 = 0.17$), and longer time in a regular session ($r = 0.383$; $p < 0.001$; $r^2 = 0.15$). Significant differences were also observed in relation to whether participants considered that their Internet use might affect them (yes: $M = 100.32$, $SD = 32.424$; no: $M = 89.93$, $SD = 32.330$;

$t_{(701)}=4.039$; $p<0.001$; $r=0.16$). The analysis of individual items related to the self-perception of having a PIU⁶⁷ also revealed significant relationships to PIEUSA scores. Specifically, the M total score was significantly higher for adolescents who responded affirmatively to the following items: I think I play/enjoy OVG/SNS too much ($t_{(887)}=10.174$; $p<0.001$; $r=0.32$; yes: $M=113.46$, $SD=31.253$; no: $M=84.66$, $SD=31.982$); I think I have some type of problem associated with my OVG/SNS ($t_{(889)}=7.344$; $p<0.001$; $r=0.24$; yes: $M=124.11$, $SD=33.247$; no: $M=87.79$, $SD=32.631$); and My parents are worried because they think I play/enjoy OVG/SNS too much ($t_{(881)}=8.710$; $p<0.001$; $r=0.28$; yes: $M=115.89$, $SD=32.886$; no: $M=86.15$, $SD=32.061$).

Patterns of Internet usage in relation to gender and age group. In this sample, 91.7 percent owned a computer with a home Internet connection, and 82.9 percent reported using it regularly for entertainment (at least once a week) during the last year. Only a slight difference was found between age groups, with younger adolescents using the Internet more than older ones ($\chi^2_{(2)}=20.375$; $p<0.001$; $V=0.135$). In the self-assessment of Internet expertise, male participants were significantly more likely to rank themselves as highly expert ($\chi^2_{(4)}=89.626$; $p<0.001$; $V=0.282$), as were younger subjects ($\chi^2_{(4)}=32.813$; $p<0.001$; $V=0.171$). Regular Internet use was initiated around the age of 10 ($Mdn=10$, $M=9.93$, $SD=2.698$). Male participants started at a younger age ($U=88709.500$, $z=2.798$; $p<0.01$, $r=0.09$), and the members of the younger age group had also started at earlier ages

($U=53907.500$, $z=12.007$; $p<0.001$, $r=0.4$). Female participants reported a preference for only SNS or both forms of entertainment, while male participants preferred only OVG or both ($\chi^2_{(2)}=30.592$; $p<0.001$; $V=0.184$). Younger subjects were more likely to use OVG ($\chi^2_{(2)}=20.064$; $p<0.001$; $V=0.149$). With regard to the frequency of use, 71 percent reported using the Internet around five days per week ($Mdn=5$, $M=4.75$, $SD=2.212$). The usual time per regular session ranged from one hour (in minutes: $Mdn=60$, $M=78.68$, $SD=74.191$) to two hours (in minutes: $Mdn=120$, $M=154.05$, $SD=156.522$). Overall, 31.6 percent of adolescents reported that the time spent affected them in some way (i.e., with regard to homework, friends, and sleep hours).

PIEUSA total score in relation to gender and age group. Inferential bivariate analyses showed that M scores on the PIEUSA (see Table 4) were higher in male participants ($F_{(1,903)}=10.251$; $p<0.01$; $r=0.12$) and in the younger age group ($F_{(1,903)}=9.030$; $p<0.01$; $r=0.1$). However, no interaction effect was found, and nor were there other statistical differences among the variables related to the adolescents' characteristics and their Internet use. A weak inverse correlation was detected between the PIEUSA total score and age ($r=-0.113$; $p<0.01$; $r^2=0.01$), as well as in relation to the age when Internet use was initiated ($r=-0.139$; $p<0.01$; $r^2=0.02$).

Prevalence for the use of Internet entertainment. Following standard practice in gambling studies, we applied rigorous statistical criteria based on the 15, 80, and 95 percentiles,²⁶ for which the corresponding PIEUSA scores

TABLE 4. PROBLEMATIC INTERNET ENTERTAINMENT USE SCALE FOR ADOLESCENCE TOTAL SCORES (EXPRESSED BY INTERVALS) BY GENDER AND GROUPS OF AGES, FOLLOWED BY THE TOTAL DESCRIPTIVE (FREQUENCY, MEAN, MEDIAN, AND STANDARD DEVIATION)

Intervals of total Score	Male						Female					
	Age (years old)						Age (years old)					
	12-15		16-18		Total		12-15		16-18		Total	
n	%	n	%	n	%	n	%	n	%	n	%	
30-39	8	3.7	9	3.7	17	3.7	13	5.9	16	7.1	29	6.5
40-49	12	5.6	15	6.1	27	5.8	14	6.4	15	6.6	29	6.5
50-59	10	4.6	29	11.8	39	8.4	19	8.7	27	11.9	46	10.3
60-69	22	10.2	22	8.9	44	9.5	24	11.0	22	9.7	46	10.3
70-79	22	10.2	27	11.0	49	10.6	25	11.4	32	14.2	57	12.8
80-89	28	13.0	15	6.1	43	9.3	22	10.0	27	11.9	49	11.0
90-99	21	9.7	32	13.0	53	11.5	23	10.5	24	10.6	47	10.6
100-109	17	7.9	38	15.4	55	11.9	24	11.0	18	8.0	42	9.4
110-119	19	8.8	19	7.7	38	8.2	11	5.0	18	8.0	29	6.5
120-129	15	6.9	19	7.7	34	7.4	13	5.9	8	3.5	21	4.7
130-139	15	6.9	4	1.6	19	4.1	15	6.8	6	2.7	21	4.7
140-149	7	3.2	6	2.4	13	2.8	6	2.7	5	2.2	11	2.5
150-159	11	5.1	4	1.6	15	3.2	2	0.9	6	2.7	8	1.8
160-169	4	1.9	3	1.2	7	1.5	5	2.3	1	0.4	6	1.3
170-179	2	0.9	1	0.4	3	0.6	2	0.9	1	0.4	3	0.7
180-189	1	0.5	1	0.4	2	0.4	0	0.5	0	0	0	0
190-199	2	0.9	0	0	2	0.4	0	5.9	0	0	0	0
200-210	0	0	2	0.8	2	0.4	1	6.4	0	0	1	0.2
n	216		246		462		219		226		445	
M	96.76		89.84		93.308		89.41		83.07		86.17	
Mdn	92.50		91		91		85		80		83	
SD	35.383		32.834		34.187		33.872		30.922		32.527	

TABLE 5. PROBLEMATIC INTERNET ENTERTAINMENT USE SCALE FOR ADOLESCENCE
USER CATEGORIES RELATED WITH PATTERNS OF INTERNET USAGE

User Category	Initial age	Weekly frequency	Longest time	Duration of playing	Self-perceived effect
Occasional	10.71 (2.37)	3.66 (2.21)	89.87 (50.12)	38.72 (45.43)	15 (18.5)
Regular	10.07 (2.82)	4.72 (2.18)	147.90 (164.98)	75.76 (160.43)	152 (32.8)
At-risk	9.37 (2.54)	5.35 (2.10)	210.72 (182.45)	112.66 (173.43)	48 (39)
Problematic	9.25 (2.78)	6.63 (1.14)	233.64 (161.16)	134.85 (150.67)	17 (47.2)
<i>F</i>	5.182				
<i>H</i>		51.886	60.743	15.417	
χ^2					13.001
<i>p</i>	0.002	<0.001	<0.001	0.001	0.005

Note: The first four variables are quantitative, the numbers reflects the mean, and the standard deviation between brackets, the last variable is qualitative; the frequency is shown and the percentage between brackets.

were 54, 117, and 152 (out of 210). Of the sample who answered the entire scale, 14.7 percent were occasional Internet users (Mdn=45), 64.8 percent regular users (Mdn=84), 15.5 percent at-risk users (Mdn=129), and 5 percent problematic users (Mdn=162), although the latter category presented great variability. Significant differences were observed between these four categories ($H_{(3)}: \chi^2=654.643, p<.001$), as well as between each pair of them. When combining at-risk and problem users, the potential PIU prevalence increased to 20.5 percent.

The group of problematic users ($N=45$) did not differ from the other groups in terms of sociodemographic characteristics, but significant differences were found in relation to their Internet use (Table 5). Problematic users started using the Internet as entertainment earlier ($F_{(3,739)}=5.182; p<0.01; r=0.15$), did so with almost daily frequency ($H_{(3)}: \chi^2=51.886; p<0.001$), spent more than twice as long as occasional users ($H_{(3)}: \chi^2=60.743; p<0.001$), and were the group most likely to report that Internet entertainments were affecting them in some way ($\chi^2_{(3)}=13.001; p<0.01; V=0.136$). Of this group, 62.2 percent were male participants, and their average age was 14 ($SD=1.413$); furthermore, 30.2 percent consumed tobacco or alcohol; 28.9 percent had technologies as their main hobby; and 68.2 percent considered themselves to be highly expert. Finally, the median score of these problem users was above 5 on almost all the scale items, which means that they presented all the symptoms of IUD. The only items on which the median scores were five or lower were items 24 and 25, which correspond to an indicator of possible gambling and to the symptom of conflict, respectively.

Discussion

This psychometric study concerns the construction and validation of a new PIU scale, which constitutes a novel instrument for the rapid and accurate measurement of maladaptive patterns in the use of online entertainments such as OVG and SNS. At the time of the study design, the PIEUSA was set to be the first scale to be developed for adolescents in a Western language, since the CIAS was in Chinese. However, it can now be considered the fourth scale created exclusively for adolescents and incorporating user categories, after the CIAS,²⁴ the Problem Internet-Use Screening Tool (SCREEN),²⁶ and the Internet Dependence Scale (IDS).²⁸

The findings should be regarded as preliminary as the study presents several limitations. First, the cross-sectional nature of the design means that causality cannot be inferred,

and it therefore remains to be confirmed if higher PIEUSA scores or the category of problem users could predict the symptoms of IUD in adolescents. Second, the sample comprised a nonrandom selection of Barcelona high school students, and this narrows the generalizability of the findings; note however that the large number of participants and their answers, which are similar to those reported in other Spanish studies involving adolescents,^{72,73} suggest that the data are representative of the wider secondary student population. Third, the PIEUSA is a self-report instrument, although it was answered voluntarily, and in the presence of the researchers in an appropriate setting, which should increase the honesty of responses. Fourth, it was not possible to validate the scale with a clinical sample, this being a limitation of all the studies reviewed, except those concerning the CIAS.^{24,35}

Despite the above limitations, the PIEUSA does present similar psychometric properties to other IUD scales, showing a high reliability and acceptable validity.^{16,74} Furthermore, it fills a gap in the literature by addressing one of the most prominent issues in this field: assessing levels of problem use of online entertainment among adolescents.³¹ Having established the statistically highest cut-off points for PIU prevalence, the rates of problematic Internet entertainment use and potential PIU in these Spanish adolescents were found to be 5 percent and 20.5 percent, respectively, which are within the prevalence range reported in adolescent epidemiological studies.^{23,27,28,53} The prevalence of potential PIU was similar to that obtained with the CIAS,^{24,35,37,41,48,59} which seems to be the best IUD scale for use with adolescents; perhaps it could be considered as a gold standard.

Our study agrees with other adolescent Internet use studies in identifying the following as possible risk factors to consider: being male, being a young adolescent, living with parents,³⁶ daily Internet use, and recognition of a behavioral problem. We also detected a cohort effect: in that, younger adolescents start to use Internet as a form of entertainment earlier and gain expertise faster, and the longer they spend on it the more likely, they are to develop problem use. However, in contrast to other studies,^{24,34} the problematic user profile presented no evidence of sociodemographic differences;⁴⁸ only as regard the time of Internet use, they spent twice as long as nonproblematic users,⁴⁵ with an average of 2.25 hours per day and around 15–25 hours weekly.^{26,36,45,49}

To distinguish problem use from high engagement or temporary absorption, exploratory qualitative studies are

now required to shed light on IUD symptoms in adolescent patients,⁷⁵ and to assess the testimony of their counselors.⁷⁶ For example, screening clinical interview protocols^{30,75} could be used to obtain evidence of IUD to complement the data provided by the existing scales; likewise, confirmatory studies could help to establish new advances (for instance, in the psychological mechanisms underlying IUD). Proposals for diagnostic criteria in adolescents are also needed,^{24,31} as are scales aimed specifically at this population, with clear and common cut-off points.

In summary, after seventeen years of scientific production, this young field of research currently has at least three goals¹²: (1) to reach a consensus on the IUD construct and its operationalization; (2) to develop more reliable and validated scales for adolescents, scales that not only use clear methods to categorize severity, but that are also psychometrically adapted to different languages and cultures to facilitate comparative studies; and (3) to validate scales in clinical populations, which would help to identify and diagnose it more accurately, offering both sensitivity and specificity.

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