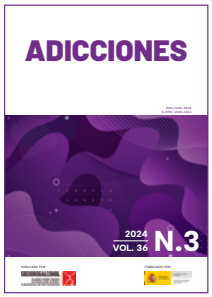
SOCIDROGALCOHOL
Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y las otras Toxicomanías

ADICCIONES
2024 ■ VOL. 36 ■ N. 3 ■ PAGES 247–256
www.adicciones.es



ORIGINAL

Problematic Internet Use among adolescents: Spanish validation of the Compulsive Internet Use Scale (CIUS)

Uso problemático de Internet en adolescentes: Validación en español de la Escala de Uso Compulsivo de Internet (CIUS)

Javier Ortuño-Sierra*,**, Julia Pérez-Sáenz*,**, Oliver Mason***, Alicia Pérez de Albéniz*,**, Eduardo Fonseca-Pedrero*,**.

* Departamento de Ciencias de la Educación, Universidad de La Rioja, España.
** Programa Riojano de Investigación en Salud Mental (PRISMA), España.
*** Universidad de Surrey, Guildford, Inglaterra.

Abstract

Problematic use of the Internet among adolescents has risen in the last decade. The Compulsive Internet Use Scale (CIUS) is one of the most frequently internationally-used tools developed to assess Problematic Internet Use (PIU). However, evidence concerning its validity and reliability in its Spanish version for the adolescent population is currently lacking. Thus, the main goal of the present study was to analyse the psychometric properties of CIUS scores in a large sample of Spanish adolescents. The sample consisted of 1,790 participants (53.7% female, mean age = 15.70 years old, *SD* = 1.26). The one-dimensional model displayed appropriate goodness of fit indices after error covariance of five items were allowed to correlate. Strong measurement invariance was found for the one-dimensional model across age and gender. The McDonald's Omega coefficient for the total score was 0.91. Furthermore, PIU was positively associated with different indicators of poor wellbeing and psychological difficulties and negatively associated with prosocial behaviour, self-esteem and sense of belonging to the educational centre. The study provided evidence of validity for the CIUS, confirming its utility for screening PIU in non-clinical adolescents.

Keywords: Problematic Internet Use, CIUS, psychometric properties, measurement invariance, adolescence

Resumen

La Escala de Uso Compulsivo de Internet (*Compulsive Internet Use Scale*, CIUS) es uno de los instrumentos más empleados a nivel internacional para evaluar el Uso Problemático de Internet (UPI). Sin embargo, no existen evidencias de validez y fiabilidad de las puntuaciones de la versión española en población adolescente. Por ello, el principal objetivo de este estudio fue analizar las propiedades psicométricas de las puntuaciones de la CIUS en una muestra representativa de adolescentes españoles. La muestra contó con 1.790 participantes (53,7% mujeres, edad media = 15,70 años, *DT* = 1,26). El análisis de la estructura interna del instrumento mostró unos índices de bondad de ajuste apropiados para el modelo unidimensional después de que se permitiera correlacionar la covarianza de errores de cinco ítems. Se encontró invarianza de medición fuerte para el modelo unidimensional en las variables de edad y género. El coeficiente Omega de McDonald para la puntuación total fue 0,91. Además, el UPI se asoció positivamente con diferentes indicadores de malestar y dificultades psicológicas y negativamente con el comportamiento prosocial, la autoestima y el sentido de pertenencia al centro educativo. Este estudio arroja evidencias de validez de la CIUS, y sugiere que puede ser una herramienta apropiada para medir el UPI en adolescentes de la población general.

Palabras clave: Uso Problemático de Internet, CIUS, propiedades psicométricas, invarianza de medición, adolescencia

■ *Received: February 2022; Accepted: April 2022.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

■ **Send correspondence to:**
Eduardo Fonseca Pedrero. Universidad de La Rioja, Departamento de Ciencias de la Educación. C/ Luis de Ulloa, 2 (Edificio Vives), 26004, Logroño, España. Tel: (+34) 941 299 396. Email: eduardo.fonseca@unirioja.es

Adolescence sees a wide range of physical, psychological, and social changes (McGrath et al., 2016). It entails a period of vulnerability for different psychological and behavioral difficulties, including so-called Problematic Internet Use (PIU) (Fonseca-Pedrero et al., 2021; Rial Boubeta, Golpe Ferreiro, Gómez Salgado & Barreiro Couto, 2015). The number of studies focused on it is rapidly increasing (Moreno, Eickhoff, Zhao, Young & Cox, 2019). Recent studies reveal the relationship between behavioral, emotional, and social difficulties as well as externalizing behavior, boredom, poor mental health, high levels of distress and other substance use disorders with PIU (Díaz-Aguado, Martín-Babarro & Falcón, 2018; Jorgenson, Hsiao & Yen, 2016; Sussman, Harper, Stahl & Weigle, 2018; Pedrero-Pérez et al., 2018). Moreover, a recent study has shown that cyberbullying seems to be associated with both PIU and online behaviors such as sexting, gambling, and contacting strangers (Feijóo, Foody, Norman, Pichel & Rial, 2021).

PIU is defined as a generalized and compulsive use of the Internet associated with a loss of control, and negative consequences for the individual (Caplan, 2002). The need for social contact and reinforcement obtained online produces an increased desire to remain within a virtual social life (Díaz-Aguado et al., 2018). Given that information technologies are frequently used for purposes such as learning, socializing, and professional activities, it is crucial to discover and prevent risks related to technology use. As a result of the degree of interference in the individual's life, different terms are used in the literature, varying from Internet Addiction, Pathological Internet Use, Internet Dependency, Compulsive Internet Use or PIU (Christakis, 2010; Ferreiro, Folgar, Salgado & Boubeta, 2017; Kuss, Griffiths, Karila & Billieux, 2014). It is important to clarify the construct, particularly with regard to measurement, in a wide range of culturally and linguistically diverse contexts, partly to enable comparisons at the international level.

PIU has not yet been recognized by diagnostic classification systems, but it has received increasing research and clinical attention. It is related to a constant preoccupation with the Internet together with an uncontrolled and continued use of the Internet regardless of its negative consequences (Caplan, 2010). The literature included in the present review revealed some of the variables associated with PIU, such as: sleeping and eating disorders, social skills deficits, sedentary lifestyles, family conflicts, and poor school performance (Ferreiro et al., 2017; Rial Boubeta et al., 2015; Vila, Carballo & Coloma-Carmona, 2018). Nevertheless, it is not clear whether it should be considered as a mental disorder or it just reflects other underlying clinical condition (Chamberlain, Ioannidis & Grant, 2018; Vink, Van Beijsterveldt, Huppertz, Bartels & Boomsma, 2016). The DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organization, 2018) do not include it. In the last few years, international and national prevalence rates of PIU are high and particularly disturbing among adolescents (Díaz-Aguado et al., 2018; Rial Boubeta et al., 2015). For instance, a cross-sectional study of 14-17-year-old adolescents conducted in seven European countries found a widely variation between countries, from 7.9% in Iceland to 22.8% in Spain (Tsitsika et al., 2014). Durkee et al. (2012) found that up to 4.4% of adolescents from 11 European countries were pathological Internet users and 13.5% maladaptive users. Recent studies suggest that culture is an interesting variable to study (López-Fernández, 2015; Panova, Carbonell, Chamarro & Puerta-Cortés, 2021). Spanish studies variously show percentages of 26.6% (Rial Boubeta et al., 2015), 23.5% (Plan Nacional sobre Drogas -ESTUDES-, 2021), and 16.3% (Gómez, Rial, Braña, Golpe & Varela, 2017).

Increasing research interest has led to the development of numerous scales. Laconi, Rodgers & Chabrol (2014) list more than 45 available questionnaires to measure this construct. Among the different tools, the Compulsive Internet Use Scale (CIUS) (Meerkerk, Van Den Eijnden, Vermulst & Garretsen, 2009) is one of the most frequently internationally adapted instruments for research and practice. The CIUS was found to have adequate psychometric properties in different populations and contexts. Besides its psychometric quality, the CIUS has other important advantages, as it is a short questionnaire with 14 items answered on a 5-point Likert scale easy to answer and understand (López-Fernández et al., 2019; Sarmiento, Zych, Herrera-López, Delgado Sánchez & Oksanen, 2020). Items emerged from the diagnostic criteria listed for substance dependence and gambling in the DSM-IV-R (American Psychiatric Association, 2002), behavioral addictions (Griffiths, 1999; Meerkerk et al., 2009) and obsessive-compulsive disorder (López-Fernández et al., 2019). Several studies have analyzed its reliability and validity (Alavi, Jannatifard, Maracy, Alaghemandan & Setare, 2014; Khazaal et al., 2012; López-Fernández et al., 2019; Van den Eijnden, Spijkerman, Vermulst, van Rooij & Engels, 2010). For instance, López-Fernández et al. (2019) reported its psychometric properties across eight languages (2019). Khazaal et al. (2012) indicated that the one-factor solution fitted the data well. In addition, Meerkerk et al. (2009) revealed the measurement invariance (MI) of the instrument across variables such as gender. Worth noting, Meerkerk et al. (2009) revealed a one-dimensional structure after correlating the error variances of different items. It showed excellent psychometric properties in adaptations and validations in various languages and countries, including French (Khazaal et al., 2012), Portuguese (Sales, Silva, Lopes & Silva, 2018), German (Wartberg, Petersen, Kammerl, Rosenkranz & Thomasius, 2014), Japanese

(Yong, Inoue & Kawakami, 2017) and Chinese (Dhir, Chen & Nieminen, 2015).

In this research context, the main goal of this paper was to analyze the psychometric properties of the Spanish version of the CIUS in a representative sample of adolescent. Therefore, the specific objectives were a) to estimate the prevalence of PIU; b) to analyze the internal structure of the CIUS; c) to estimate the reliability of the CIUS scores; d) to study the MI of the CIUS across gender and age; and e) to analyze the relationship between the PIU and other indicators of mental health, well-being, and socio-emotional adjustment.

Method

Participants

Stratified random cluster sampling, with the classroom as the sampling unit, from a population of 15,000 students in the region of La Rioja (northern Spain) was conducted in the year 2019. The layers were created as a function of the geographical zone and the educational stage.

An initial sample was composed of 1,972 students. Those students with a high score in the Oviedo Infrequency Scale-Revisited (Fonseca-Pedrero, Lemos-Giráldez, Paino, Villazón-García & Muñiz, 2009; Fonseca-Pedrero, Pérez-Albéniz, Díez-Gómez, Ortuño-Sierra & Lucas-Molina, 2019) (two or more points) (n = 146) or an age higher than 19 years-old (n = 36) were eliminated. Thus, the final sample was composed of 1,790 students, 816 men (45.6%), 961 women (53.7%), and 13 (0.7%) with gender diversity. Mean age was 15.70 years-old (SD = 1.26).

Instruments

The Compulsive Internet Use Scale (CIUS) (Meerkerk et al., 2009). The CIUS has 14 items on a five-point Likert scale. It covers five dimensions: loss of control (items 1, 2, 5, and 9), preoccupation (items 4, 6, and 7), withdrawal symptoms (item 14), coping or mood modification (items 12 and 13) and conflict (items 3, 8, 10, and 11). In this study we administered the Spanish version used in the ESTUDES (2021).

The Adolescent Behavioral Suicide Scale (SENTIA) (Díez-Gómez, Ortuño-Sierra, Pérez de Álbeniz & Fonseca-Pedrero, 2020). The SENTIA scale is a self-report instrument developed to screen for suicidal behavior in adolescents. The extended version is formed by 16 items in a dichotomous format (yes/no). Previous studies have shown that the SENTIA scores have adequate psychometric properties (Díez-Gómez et al., 2020).

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), self-reported version. The SDQ is composed of a total of 25 statements distributed across five subscales. It has a three-point Likert-type response format. The Spanish version translated and validated of the SDQ (Ortuño-Sierra, Chocarro, Fonseca-Pedrero, Riba & Muñiz, 2015) was used in the present study.

The Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965). This instrument is a one-dimensional scale that measures self-esteem. The scale has 10 items that all use a four-point Likert scale. The Spanish version with adequate psychometric properties has been used in the present study (Martín-Albo, Núñez, Navarro & Grijalvo, 2007).

The Reynolds Adolescent Depression Scale Short Form (RADS-SF) (Reynolds, 2002). The RADS-SF is a self-report tool for screening depressive symptoms in adolescents. It has 10 items that all use a four-point Likert scale. The Spanish version, adapted and validated for adolescents of the instrument, was used (Ortuño-Sierra et al., 2017).

The Prodromal Questionnaire–Brief (PQ-B) (Loewy, Pearson, Vinogradov, Bearden & Cannon, 2011). The PQ-B consists of 21 dichotomous items (true/false) and two additional Likert scale questions that screen for psychosis-risk. Previous studies have shown adequate psychometric properties of the instrument (Fonseca-Pedrero, Gooding, Ortuño-Sierra & Paino, 2016).

The Maryland Safe and Supportive Schools Climate Survey (MDS3) (Bradshaw, Waasdorp, Debnam & Johnson, 2014)**.** This multidimensional measure of school climate contains 56 items and was developed by the Johns Hopkins Center for Youth Violence Prevention measures Safety, Engagement in school, and Environment. For the present study, we chose 14 items that use four point Likert scales as previously used in a Spanish language context (Díez-Gómez et al., 2020).

The Oviedo Infrequency Scale-Revisited (INF-OV-R) (Fonseca-Pedrero et al., 2009; Fonseca-Pedrero et al., 2019). This scale aims to detect pseudorandom or dishonest responding using 10 items on a 5-point Likert scale. Students with two or more incorrect responses on the INF-OV-R scale were eliminated from the sample.

Procedure

The present study was approved by the Ethical Committee of Clinical Research of La Rioja. With the aim to standardize the administration process, all researchers followed a protocol throughout. The questionnaires were filled out on computers and in groups of 10 to 30 students. Participants were informed about the voluntary nature of the study. Informed consent was obtained from parents or legal guardians.

Data analysis

First, we calculated the descriptive statistics and the percentage distribution of the CIUS items. Second, with the aim of gathering evidences about the internal structure of the questionnaire, we conducted two different confirmatory factor analysis (CFA) attending to the models proposed by Meerkerk et al. (2009) and following the guidelines provided by Ferrando, Lorenzo-Seva, Hernández-Dorado & Muñiz

(2022). The parameters were obtained from Muthén's quasi-likelihood estimator (Muthén & Muthén, 1998). Then, to test MI, successive multigroup CFAs were conducted. Delta parameterization was used (Muthén & Muthén, 1998). Fourth, we analyzed the internal consistency of the scores. To this end, McDonald's Omega was calculated. Finally, we analysed the sources of validity evidence of the CIUS with external variables. SPSS 17.0 (IBM Analytics, 2016) and JASP Team (2019) were used for data analyses.

Results

Descriptive statistics and prevalence rates

Table 1 shows descriptive statistics of the CIUS for the final sample. In addition, Table 1 includes the percentages of the different answers' options for the CIUS.

Evidence of validity based on internal structure of the CIUS

We tested a one-dimensional model in the CFA. As shown in Table 3, goodness-of-fit index were poor with CFI and RMSEA values under .90 and over .10 respectively. We then examined the model proposed by Meerkerk et al. (2009), allowing the error variances of items 1 and 2, 6 and 7, 8 and 9, 10 and 11, and 12 and 13. As shown in Table 3, the inclusion of this error correlation displayed adequate goodness-of-fit indices, with CFI values over .90 and RMSEA values around .08.

Measurement invariance of the CIUS scores across gender and age

With the aim of examining MI across age, the sample was divided into two subgroups (14–16-year-olds and 17-18-year-olds), according to the stages of the Spanish educational system (compulsory/post-compulsory). Strong invariance for gender and age was confirmed (see Table 2).

Estimation of the reliability of the CIUS scores

The McDonald's Omega coefficient for the total score of the CIUS was 0.91. All the discrimination indices were over .30.

Table 1
Prevalence and Descriptive statistics of the Compulsive Internet Use (CIUS) for the total sample

	Prevalence (%)					Descriptive Statistics			
Item	Never	Rarely	Sometimes	Often	Very Often	Mean	*SD*	Skewness	Kurtosis
1	9.6	32.3	34.9	17.8	5.4	1.77	1.02	0.24	-0.45
2	28.2	29.7	25.3	12.2	4.6	1.35	1.15	0.51	-0.59
3	15	26.4	31	18.4	9.2	1.81	1.17	0.17	-0.78
4	30.4	39.8	21.1	6.6	2	1.10	0.98	0.75	0.18
5	24.7	32.2	24.6	12.9	5.6	1.42	1.16	0.50	-0.57
6	33.5	41.1	17.4	7.2	0.9	1.01	0.94	0.77	0.07
7	11.2	33.1	37.9	14.5	3.2	1.66	0.97	0.21	-0.29
8	11.5	25.8	34.5	19.9	8.3	1.88	1.11	0.10	-0.65
9	32.9	34.9	23	6.5	2.7	1.11	1.02	0.74	0.04
10	28	34.7	24.2	9.9	3.2	1.26	1.07	0.60	-0.30
11	33.2	35.2	20.7	8.2	2.6	1.12	1.05	0.75	-0.07
12	14.5	22.9	29.4	23.1	10.1	1.91	1.20	0.01	-0.90
13	21.8	25.1	24.5	19.8	8.9	1.69	1.26	0.21	-1.01
14	43.1	35.8	14.6	4.4	2.1	0.87	0.96	1.14	1.02

Table 2
Goodness of fit indices for the hypothetical models tested and measurement invariance across gender and age

Model	χ^2	*df*	CFI	TLI	RMSEA (IC 90%)	SRMR	AIC	BIC	ΔCFI
1 factor	2309.348	77	.774	.733	.012 (.123-.132)	.066	66932.549	67163.128	
1 factor + CE	662.264	72	.94	.925	.068 (.063-.072)	.039	65295.465	65553.494	
Measurement Invariance									
Gender									
Male (*n* = 816)	1344.970	72	.932	.914	.068 (.061-.075)	.043	29862.363	30083.471	
Female (*n* = 961)	401.333	72	.944	.929	.069 (.062-.075)	.039	35312.734	35542.16	
Configural invariance	746.303	144	.939	.923	.068 (.064-.073)	.041	65175.097	65691.154	
Metric invariance	772.991	158	.937	.928	.066 (.061-.071)	.05	65173.786	65612.984	-.01
Scalar invariance	924.159	171	.923	.918	.070 (.066-.075)	.056	65298.953	65666.781	-.01
Age									
14-15 years old (*n* = 883)	662.264	72	.94	.925	.068 (.063-.072)	.042	65267.465	65448.634	
16-18 years old (*n* = 907)	417.823	72	.928	.901	.073 (.066-.080)	.047	33267.809	33426.543	
Configural invariance	736.278	144	.94	.924	.068 (.063-.071)	.041	65303.878	65819.935	
Metric invariance	751.801	158	.94	.931	.065 (.060-.069)	.045	65291.401	65730.444	-.01
Scalar invariance	800.768	171	.936	.932	.064 (.060-.069)	.047	65314.368	65682.196	-.01

Note. χ^2 = Chi square; *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; IC = Interval Confidence; SRMR = Standardized Root Mean Square Residual; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; ΔCFI = Change in Comparative Fit Index.

Table 3
Factor Loadings for the one-dimensional model with five correlated errors

	Factor Loadings	SE	CI 95%	
Item			Lower	Upper
1	0.666	0.023	0.621	0.711
2	0.752	0.026	0.701	0.802
3	0.682	0.027	0.629	0.735
4	0.511	0.023	0.466	0.556
5	0.649	0.027	0.596	0.701
6	0.543	0.022	0.501	0.586
7	0.615	0.022	0.572	0.658
8	0.588	0.026	0.536	0.639
9	0.671	0.023	0.625	0.716
10	0.686	0.024	0.638	0.733
11	0.659	0.024	0.613	0.706
12	0.635	0.028	0.580	0.690
13	0.658	0.030	0.600	0.716
14	0.614	0.022	0.571	0.656

Note. SE = Standard Error; CI = Confidence Interval.

Table 4
Pearson's Correlation Matrix between the Compulsive Internet Use (CIUS) scores and different indicators of well-being and mental health

Well-Being and mental health variables	CIUS
Suicidal Behaviors (SENTIA)	0.301*
Psychotic-like Experiences (PQ-B)	0.330*
Depressive symptoms (RADS-SF)	0.396*
Emotional Problems (SDQ)	0.340*
Behaviors Problems (SDQ)	0.231*
Peer Problems (SDQ)	0.158*
Hyperactivity (SDQ)	0.251*
Prosocial Behaviors (SDQ)	-0.127*
Self-Esteem (RSE)	-0.353*
Feeling of belonging (MDS3)	-0.170*

Note. * $p < 0.01$ SENTIA = Adolescent Behavioral Suicide Scale; PQ-B = Prodromal Questionnaire-Brief; RADS-SF = Reynolds Adolescent Depression Scale Short Form; SDQ = Strengths and Difficulties Questionnaire; RSE = Rosenberg Self-Esteem Scale; MDS3 = Maryland Safe and Supportive Schools Climate Survey.

Evidence of validity based in relationships with other variables: Relation of the Problematic Internet Use with Well-Being and mental health indicators

The correlation between CIUS scores and different indicators of socio-emotional adjustment was studied. Results are depicted in Table 4. CIUS scores were positively associated with suicidal behavior, depressive symptoms, emotional and behavioral problems, and psychotic-like experiences. Moreover, CIUS scores were negatively correlated with self-esteem, prosocial behavior, and the feeling of belonging to the educational center.

Discussion

Problematic Internet Use (PIU) has received an increasing amount of attention in the last years. Recent research have found that internet use has almost doubled in the last decade among children across different European countries (Smahel et al., 2020). In addition, adolescence is a critical developmental stage in which different psychological difficulties may arise and even worsen into adulthood (Fonseca-Pedreto et al., 2021; McGrath et al., 2016). Thus, PIU screening is very relevant at this developmental timepoint.

Results found in the present study reveal that adolescents have moderate prevalence rates for PIU. Adolescents indicated compulsive internet use *often* and *very often* in several items of the CIUS. Previous studies revealed similar data among Spanish adolescents. For instance, the national prevalence study showed percentages about 23.5% (ESTUDES, 2021). Similarly, the study of Gómez et al. (2017) found a percentage of 16.3% for PIU. Prevalence rates in international studies are somehow similar. For example, the cross-sectional study conducted by Tsitsika et al. (2014) in seven European countries revealed prevalence rates between 7.9% and 22.8%.

In terms of factorial structure, the results of the CFA showed that the CIUS was basically one-dimensional. Similar to our results, previous research have revealed a one-dimensional structure both in adults (Khazaal et al., 2012; López-Fernández et al., 2019; Meerkerk et al., 2009; Yong et al., 2017) and adolescents (Dhir et al., 2015; Mak et al., 2014). For example, the study of López-Fernández et al. (2019) indicated that the CIUS was basically one-dimensional across eight languages. Nonetheless, it is worth noting that the one-dimension structure revealed poor goodness-of-fit indices, and adequate fit was only reached after error terms of different items were allowed to correlate.

The present study provided evidence of strong MI by gender and age, suggesting factorial equivalence by these characteristics. These results are similar to other studies that have found total factorial equivalence of the CIUS across different groups including gender or internet use (Meerkerk et al., 2009). The study of MI across age and gender provides essential evidence of construct validity for the CIUS scores in a developmental stage, like adolescence, where relevant biopsychological changes occur across the stage and are different for males and females.

Attending to the evidence of relation with other variables, the results found reveal that the CIUS scores were statistically significant associated with different indicators of mental health, including psychotic-like experiences, depressive symptoms, and suicidal behavior (positive correlation).. Also, statistically significant correlations were found between the CIUS and indicators of well-being such as emotional difficulties, behavioral problems, as well as prosocial behavior. A negative correlation was found for self-esteem and feeling of belonging. It may indicate that they act as protective factor (Mei, Yau, Chai, Guo & Potenza, 2016). Previous studies have also shown the relation between problematic internet use and depressive symptoms and insomnia (Jain et al., 2020), anxiety (Lee & Stapinski, 2012), mood symptoms (Gao et al., 2020), attention deficit hyperactivity disorder (Cakmak & Gul, 2018), substance abuse and suicidal behavior (Bousoño Serrano et al., 2017). Considering the special relevance of this developmental stage, results are of particular interest. Prevention strategies should focus on detecting problematic internet use among adolescents, as it is a variable related with different psychological difficulties that are diminishing adolescents' well-being. With this regard the evidence found in this work may also have relevant implications, for instance in clinical fields. In general, it can be affirmed that psychological treatments have been shown to be efficient and effective for a wide range of psychological disorders in a variety of contexts (Fonseca-Pedrero et al., 2021). Considering that the PIU is increasing in adolescence, and the fact that CIUS's scores are statistically significant correlated with measures of depression, suicidal ideation or psychotic-like experiences, screening for PIU could be relevant with clinical purposes.

The present study has some limitations. First, there are problems inherent to any research based on questionnaires. Thus, future works may benefit of the use of experimental data from other levels of analysis (neuroimaging, neurocognition, etc.). Second, the cross-sectional nature of the study precludes establishing cause-effect correlations, and future longitudinal studies could analyze this aspect. Finally, given the peculiarities and diversity of the country, future studies should examine the psychometric properties of the instrument in other regions and/or geographic areas.

Notwithstanding these limitations, results found in the present study have clear implications for the use of the CIUS in adolescents. Previous studies have confirmed the psychometric adequacy of the CIUS across other languages and countries. Nonetheless, this study contributes

to the evidence of reliability and validity of the CIUS in its Spanish version and in adolescents' populations. Moreover, future research should continue gathering new validity evidence of the CIUS for its use with adolescents. Screening for problems such as Internet abuse in a relevant developmental stage like adolescent could provide relevant information to prevent a problematic that is reaching serious levels.

Acknowledgments

This research was funded by the "*Convocatoria 2015 de Ayudas Fundación BBVA a Investigadores y Creadores Culturales*", the "*Ayudas Fundación BBVA a Equipos de Investigación Científica 2017*", the "Beca Leonardo a Investigadores y Creadores Culturales 2020 de la Fundación BBVA", the "financiación del Ministerio de Universidades para estancias de movilidad de profesores e investigadores en centros extranjeros de enseñanza superior e investigación", and co-funded with "*Fondos FEDER en el PO FEDER de La Rioja 2014-2020 (SRS 6FRSABC026)*".

Conflict of interests

Authors declare that they have no conflict of interest.

References

Alavi, S. S., Jannatifard, F., Maracy, M. R., Alaghemandan, H. & Setare, M. (2014). Comparison of national and personal identity between person with internet addiction disorder and normal internet users. *Journal of Education and Health Promotion*, *3*, 52-58. doi:10.4103/2277-9531.131926.

American Psychiatric Association (2002). *Diagnostic and Statistical Manual of Mental Disorders* (*Fourth edition*). Washington: American Psychiatric Association.

American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders (Fifth edition)*. Washington: American Psychiatric Association.

Bousoño Serrano, M., Al-Halabi, S., Burón, P., Garrido, M., Díaz-Mesa, M. E., Galván, G.,… Bobes, J. (2017). Uso y abuso de sustancias psicotrópicas e internet, psicopatología e ideación suicida en adolescentes. *Adicciones*, *29*, 97–104.

Bradshaw, C. P., Waasdorp, T. E., Debnam, K. J. & Johnson, S. L. (2014). Measuring school climate in high schools: A focus on safety, engagement, and the environment. *Journal of School Health*, *84*, 593–604. doi:10.1111/josh.12186.

Cakmak, F. H. & Gul, H. (2018). Factors associated with problematic internet use among children and adolescents with Attention Deficit Hyperactivity Disorder. *Northern clinics of Istanbul, 5*, 302–313. doi:10.14744/nci.2017.92668.

Caplan, S. E. (2002). Problematic Internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior*, *18*, 553–575. doi:10.1016/S0747-5632(02)00004-3.

Caplan, S. E. (2010). Theory and measurement of generalized problematic internet use: A two-step approach. *Computers in Human Behavior, 26*, 1089-1097. doi:10.1016/j.chb.2010.03.012.

Chamberlain, S. R., Ioannidis, K. & Grant, J. E. (2018). The impact of comorbid impulsive/compulsive disorders in problematic Internet use. *Journal of Behavioral Addictions*, *7*, 269–275. doi:10.1556/2006.7.2018.30.

Christakis, D. A. (2010). Internet addiction: A 21st century epidemic? *BMC Medicine*, *8*, 61. doi:10.1186/1741-7015-8-61.

Dhir, A., Chen, S. & Nieminen, M. (2015). Psychometric validation of the Chinese Compulsive Internet Use Scale (CIUS) with Taiwanese high school adolescents. *Psychiatric Quarterly*, *86*, 581–596. doi:10.1007/s11126-015-9351-9.

Díaz-Aguado, M. J., Martín-Babarro, J. & Falcón, L. (2018). Problematic internet use, maladaptive future time perspective and school context. *Psicothema*, *30*, 195–200. doi:10.7334/psicothema2017.282.

Díez-Gómez, A., Ortuño-Sierra, J., Pérez de Álbeniz, A. & Fonseca-Pedrero, E. (2020). SENTIA: Escala para la evaluación de la conducta suicida en adolescentes. *Psicothema*, *32*, 382–389. doi:10.7334/psicothema2020.27.

Durkee, T., Kaess, M., Carli, V., Parzer, P., Wasserman, C., Floderus, B.,… Wasserman, D. (2012). Prevalence of pathological internet use among adolescents in Europe: Demographic and social factors. *Addiction*, *107*, 2210–2222. doi:10.1111/j.1360-0443.2012.03946.x.

Feijóo, S., Foody, M., Norman, J. O., Pichel, R. & Rial, A. (2021). Cyberbullies, the cyberbullied, and problematic internet use: Some reasonable similarities. *Psicothema*, *33*, 198–205. doi:10.7334/psicothema2020.209.

Ferrando, P. J., Lorenzo-Seva, U., Hernández-Dorado, A. & Muñiz, J. (2022). Decalogue for the factor analysis of test items. *Psicothema, 34*, 7–17. doi:10.7334/psicothema2021.456.

Ferreiro, S. G., Folgar, M. I., Salgado, P. G. & Boubeta, A. R. (2017). Problematic Internet use and adolescents: Sport does matter. *Retos, 31*, 52–57.

Fonseca-Pedrero, E., Lemos-Giráldez, S., Paino, M., Villazón-García, U. & Muñiz, J. (2009). Validation of the Schizotypal Personality Questionnaire Brief form in adolescents. *Schizophrenia Research, 111*, 53–60. doi:10.1016/j.schres.2009.03.006.

Fonseca-Pedrero, E., Gooding, D. C., Ortuño-Sierra, J. & Paino, M. (2016). Assessing self-reported clinical

high risk symptoms in community-derived adolescents: A psychometric evaluation of the Prodromal Questionnaire-Brief. *Comprehensive Psychiatry*, *66*, 201–208. doi:10.1016/j.comppsych.2016.01.013.

Fonseca-Pedrero, E., Pérez-Albéniz, A., Díez-Gómez, A., Ortuño-Sierra, J. & Lucas-Molina, B. (2019). Escala Oviedo de Infrecuencia de Respuesta-Revisada. Unpublished document. Universidad de La Rioja.

Fonseca-Pedrero, E., Pérez-Álvarez, M., Al-Halabí, S., Inchausti, F., López-Navarro, E. R., Muñiz, J.,… Montoya-Castilla, I. (2021). Empirically supported psychological treatments for children and adolescents: State of the art. *Psicothema*, *33*, 386–398. doi:10.7334/psicothema2021.56.

Gao, T., Li, M., Hu, Y., Qin, Z., Cao, R., Mei, S. & Meng, X. (2020). When adolescents face both Internet addiction and mood symptoms: A cross-sectional study of comorbidity and its predictors. *Psychiatry Research*, *284*, 112795. doi:10.1016/j.psychres.2020.112795.

Gómez, P., Rial, A., Braña, T., Golpe, S. & Varela, J. (2017). Screening of problematic Internet use among Spanish adolescents: Prevalence and related variables. *Cyberpsychology, Behavior, and Social Networking*, *20*, 259–267. doi:10.1089/cyber.2016.0262.

Goodman, R. (1997). The strengths and difficuties questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, *38*, 581–586. doi:10.1111/j.1469-7610.1997.tb01545.x.

Griffiths, M. D. (1999). Internet addiction: Fact or fiction? *Psychologist*, *12*, 46–50.

IBM. (2016). IBM SPSS Advanced Statistics 24. *Ibm*.

Jain, A., Sharma, R., Gaur, K., Yadav, N., Sharma, P., Sharma, N.,… Yadav, K. (2020). Study of internet addiction and its association with depression and insomnia in university students. *Journal of Family Medicine and Primary Care*, *9*, 1700. doi:10.4103/jfmpc.jfmpc_1178_19.

JASP Team. (2019). JASP (Version 0.11.1.0). *[Computer Software]*.

Jorgenson, A. G., Hsiao, R. C. & Yen, C. F. (2016). Internet addiction and other behavioral addictions. *Child and adolescent psychiatric clinics of North America, 25*, 509–520. doi:10.1016/j.chc.2016.03.004.

Khazaal, Y., Chatton, A., Horn, A., Achab, S., Thorens, G., Zullino, D. & Billieux, J. (2012). French validation of the compulsive internet use scale (CIUS). *Psychiatric Quarterly*, *83*, 397–405. doi:10.1007/s11126-012-9210-x.

Kuss, D., Griffiths, M., Karila, L. & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design*, *20*, 4026–4052. doi:10.2174/1381612811319999061 7.

Laconi, S., Rodgers, R. F. & Chabrol, H. (2014). The measurement of Internet addiction: A critical review of existing scales and their psychometric properties. *Computers in Human Behavior*, *41,*190–202. doi:10.1016/j.chb.2014.09.026.

Lee, B. W. & Stapinski, L. A. (2012). Seeking safety on the internet: Relationship between social anxiety and problematic internet use. *Journal of anxiety disorders, 26*, 197–205. doi:10.1016/j.janxdis.2011.11.001.

Loewy, R. L., Pearson, R., Vinogradov, S., Bearden, C. E. & Cannon, T. D. (2011). Psychosis risk screening with the Prodromal Questionnaire-Brief version (PQ-B). *Schizophrenia Research*, *129*, 42-46. doi:10.1016/j.schres.2011.03.029.

López-Fernández, O. (2015). Cross-cultural research on Internet addiction: A systematic review. *International Archives of Addiction Research and Medicine*, *1*, 2–6. doi:10.23937/2474-3631/1510011.

López-Fernández, O., Griffiths, M. D., Kuss, D. J., Dawes, C., Pontes, H. M., Justice, L.,… Billieux, J. (2019). Cross-cultural validation of the Compulsive Internet Use Scale in four forms and eight languages. *Cyberpsychology, Behavior, and Social Networking*, *22*, 451–464. doi:10.1089/cyber.2018.0731.

Mak, K. K., Lai, C. M., Ko, C. H., Chou, C., Kim, D. I., Watanabe, H. & Ho, R. C. (2014). Psychometric properties of the Revised Chen Internet Addiction Scale (CIAS-R) in Chinese adolescents. *Journal of Abnormal Child Psychology, 42*, 1237–1245. doi:10.1007/s10802-014-9851-3.

Martín-Albo, J., Núñez, J.L., Navarro, J.G. & Grijalvo, F. (2007). The Rosenberg Self-Esteem Scale: Translation and validation in University students. *Spanish Journal of Psychology, 10*, 458-467. doi:10.1017/s1138741600006727.

McGrath, J. J., Saha, S., Al-Hamzawi, A. O., Alonso, J., Andrade, L., Borges, G.,… Kessler, R. C. (2016). Age of onset and lifetime projected risk of psychotic experiences: Cross-national data from the world mental health survey. *Schizophrenia Bulletin*, *42*, 933–941. doi:10.1093/schbul/sbw011.

Meerkerk, G. J., Van Den Eijnden, R. J. J. M., Vermulst, A. A. & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): Some psychometric properties. *Cyberpsychology and Behavior*, *12*, 1–6. doi:10.1089/cpb.2008.0181.

Mei, S., Yau, Y. H., Chai, J., Guo, J. & Potenza, M. N. (2016). Problematic Internet use, well-being, self-esteem and self-control: Data from a high-school survey in China. *Addictive Behaviors, 61*, 74–79. doi:10.1016/j.addbeh.2016.05.009.

Moreno, M. A., Eickhoff, J., Zhao, Q., Young, H. N. & Cox, E. D. (2019). Problematic Internet Use: A longitudinal study evaluating prevalence and predictors. *The Journal of Pediatrics: X, 1*, 100006. doi:10.1016/j.ympdx.2019.100006.

Muthén, L. K. & Muthén, B. O. (1998). *Statistical Analysis With Latent Variables User's Guide*. www.StatModel.com.

Ortuño-Sierra, J., Aritio-Solana, R., Inchausti, F., De Luis, E. C., Molina, B. L., De Albéniz, A. P. & Fonseca-Pedrero, E. (2017). Screening for depressive symptoms in adolescents at school: New validity evidences on the short form of the reynolds depression scale. *PLoS ONE*, *12*, e0170950. doi:10.1371/journal.pone.0170950.

Ortuño-Sierra, J., Chocarro, E., Fonseca-Pedrero, E., Riba, S. S. I. & Muñiz, J. (2015). The assessment of emotional and Behavioural problems: Internal structure of The Strengths and Difficulties Questionnaire. *International Journal of Clinical and Health Psychology*, *15*, 265–273. doi:10.1016/J.IJCHP.2015.05.005.

Panova, T., Carbonell, X., Chamarro, A. & Puerta-Cortés, D. X. (2021). La investigación del Internet Addiction Test desde una perspectiva intercultural: España, Estados Unidos y Colombia. *Adicciones*, *33*, 307–318. doi:10.20882/adicciones.1345.

Pedrero-Pérez, E. J., Ruiz-Sánchez De León, J. M., Rojo-Mota, G., Llanero-Luque, M., Pedrero-Aguilar, J., Morales-Alonso, S. & Puerta-García, C. (2018). Information and Communications Technologies (ICT): Problematic use of internet, video games, mobile phones, instant messaging and social networks using MULTICAGE-TIC. *Adicciones*, *30*, 19–32. doi:10.20882/adicciones.806.

Plan Nacional sobre Drogas. (2021). ESTUDES 2021. Encuesta sobre uso de drogas en enseñanzas secundarias en España, 1994-2021. Madrid: Ministerio de Sanidad. https://pnsd.sanidad.gob.es/profesionales/sistemasInformacion/sistemaInformacion/pdf/ESTUDES_2021_Informe_de_Resultados.pdf.

Reynolds, W. M. (2002). *Reynolds Adolescent Depression Scale – 2nd Edition. Professional manual.* Odessa: Psychological Assessment Resources, Inc.

Rial Boubeta, A., Golpe Ferreiro, S., Gómez Salgado, P. & Barreiro Couto, C. (2015). Variables asociadas al uso problemático de Internet entre adolescentes. *Health and Addictions/Salud y Drogas, 15*, 25–38. doi:10.21134/haaj.v15i1.223.

Rosenberg, M. (1965). *Society and adolescent sel- image*. Princenton: University Press.

Sales, H. F. S., Silva, F. M. de S. M. da., Lopes, B. de J. & Silva, C. F. de L. S, da. (2018). Adaptação da escala de uso compulsivo de Internet para avaliar dependência de smartphone. *Avances en Psicología Latinoamericana, 36*, 155-166. doi:10.12804/revistas.urosario.edu.co/apl/a.4649.

Sarmiento, A., Zych, I., Herrera-López, M., Delgado Sánchez, U. & Oksanen, A. (2020). Psychometric properties of the Compulsive Internet Use Scale in Spain, Colombia, and Mexico. *Cyberpsychology, Behavior, and Social Networking*, *24*, 108–116. doi:10.1089/cyber.2020.0046.

Smahel, D., MacHackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Olafsson, K., Livingstone, S. & Hasebrink, U. (2020). *EU Kids Online 2020: Survey results from 19 countries*. London School of Economics and Political Science.

Sussman, C. J., Harper, J. M., Stahl, J. L. & Weigle, P. (2018). Internet and video game addictions: Diagnosis, epidemiology, and neurobiology. *Child and Adolescent Psychiatric Clinics of North America*, 27, 307–326. doi:10.1016/j.chc.2017.11.015.

Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Ólafsson, K., Wójcik, S.,… Richardson, C. (2014). Internet addictive behavior in adolescence: A cross-sectional study in seven European countries. *Cyberpsychology, Behavior, and Social Networking*, *17*, 528–535. doi:10.1089/cyber.2013.0382.

Van den Eijnden, R. J., Spijkerman, R., Vermulst, A. A., van Rooij, T. J. & Engels, R. C. (2010). Compulsive internet use among adolescents: Bidirectional parent-child relationships. *Journal of Abnormal Child Psychology, 38*, 77–89. doi:10.1007/s10802-009-9347-8.

Vila, M. M., Carballo, J. L. & Coloma-Carmona, A. (2018). Rendimiento académico y cognitivo en el uso problemático de internet. *Adicciones*, *30*, 101–110. doi:10.20882/adicciones.844.

Vink, J. M., van Beijsterveldt, T. C., Huppertz, C., Bartels, M. & Boomsma, D. I. (2016). Heritability of compulsive Internet use in adolescents. *Addiction Biology, 21*, 460–468. doi:10.1111/adb.12218.

Wartberg, L., Petersen, K. U., Kammerl, R., Rosenkranz, M. & Thomasius, R. (2014). Psychometric validation of a German version of the compulsive Internet use scale. *Cyberpsychology, Behavior and Social Networking, 17*, 99–103. doi:10.1089/cyber.2012.0689.

World Health Organization. (2018). ICD-11 - Mortality and Morbidity Statistics. https://icd.who.int/browse11/l-m/en#/http%3A%2F%2Fid.who.int%2Ficd%2Fentity%2F1448597234.

Yong, R., Inoue, A. & Kawakami, N. (2017). The validity and psychometric properties of the Japanese version of the Compulsive Internet Use Scale (CIUS). *BMC Psychiatry, 17*, 201. doi:10.1186/s12888-017-1364-5.