

Article

Addiction to New Technologies and Cyberbullying in the Costa Rican Context

Raquel Lozano-Blasco ¹, Alberto Quilez-Robres ², Roxana Rodriguez-Araya ³ and Raquel Casanovas-López ^{2,*}¹ Facultad de Educación, Universidad de Zaragoza, 50009 Zaragoza, Spain² Facultad de Ciencias Humanas y de la Educación, Universidad de Zaragoza, 22003 Huesca, Spain³ Instituto de Estudios Interdisciplinarios de la Niñez y la Adolescencia (INEINA), Universidad Nacional, Heredia 40101, Costa Rica

* Correspondence: rcasanovas@unizar.es

Abstract: Addiction to new technologies (Internet, smartphone and video games) as well as cyber-aggression presents a growing incidence at a global level. Correlational research is proposed with a sample of $n = 127$ Costa Rican adolescents, with a mean age of 16.32 years, comprising 67 men and 60 women. The objective was to determine the prevalence of Internet, smartphone and video game addiction and its close relationship with cyberbullying (cyber-victim role, cyberbully role and mixed role) in the Costa Rican context. The results show a high rate of abusive use (connection time) of the Internet and “smartphones”, and the correlation study, multiple regressions, backward elimination method and network analysis show how the behavior of cyberbullies is moderately mediated by “Lack of control of Smartphone” and to a large extent by “Avoidance and social problem video games”, while that of victims is moderately mediated by “Avoidance and social problem video games”, and is slightly mediated for “Lack of control of Smartphone” and for “Lack of control of Internet”. In addition, there is a strong relationship between holding both the role of cyber-victim and cyberbully, developing feelings of revenge and lack of empathy. The practical implications, and the relevance of the socio-demographic and social explanatory variables of both phenomena are discussed. It is concluded that there is evidence of an explanatory and close relationship between the phenomena of cybervictimization, cyber-aggression and addiction to the Internet, smartphone and video games.

Keywords: internet addiction; cyberbullying; smartphone and video games

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1. Introduction

New technologies have risen as a new ecosystem in which adolescents share experiences and relate to each other, many times searching to overcome socioemotional needs of this evolutionary stage [1,2]. These new digital generations are marked by a postmodern society, in which the theatrical experiences shown in social media have become part of the adolescent's reality [3,4]. Therefore, adolescence is characterized as a period of special vulnerability, in which the problematic use of technology, addiction and cyberbullying are increasing to a worrisome level [5–7].

Thus, internet usage transcends information searching, to a space of coexisting, where people interact and share private information or events. In the case of teenagers, it is necessary to understand the internet as a social environment, however it brings risks for which they may need adult orientation to produce a healthy internet experience [8]. Nowadays, the average amount of time people use for smartphones is three and a half hours a day [9–12]. In the same way, the usage of social media networks such as Facebook, Twitter, and Instagram are registering an exponential increase of the users [13], it is estimated that in the year 2022, smartphones were the first tool used to access the Internet for 6.8 million users [14,15]. This is important because although the prolonged use of a cellphone does not necessarily lead to the development of an addiction, it could enhance the chances of it [16].

The addiction to internet has not been considered a disorder by the World Health Organization, nor by the American Psychological Association (APA), although the addiction to online games is considered one (TGI) [17]. The scientific community claims that there are new forms of addictions, and it has asked the international organizations to unify and clarify the diagnosis criteria; this will allow researchers to develop and evaluate, in a more reliable way, programs and other forms of services and interventions for people within this situation [18–22]. Therefore, meta-analysis studies have shown an alarming increase in the development of pathologies [23–27]. Although, in the demographic variables, there is not a consensus, most research shows females as being more prone to suffer addiction to new technologies, while age is considered to be a protecting factor [28,29]. An exception to that is in the Internet Gaming Disorder (TGI), in which males are more affected than females [30,31].

It is unknown if the addiction to internet is the initial cause, or it is the consequence of a variable factor. In that sense, the need to become a part of the community, and developing a sense of belonging and self-worth, could be the cause of the increase of internet usage in teens [32]. This emotion of being permanently connected, and an active member of an online society is often described as a “fear of missing out”, or being left out in the social interaction [33]. The fear of not being available to quickly respond or of losing connectivity can produce an increased anxiety level [33,34]. Thus, other research studies have shown that technology can help introverts with their communication problems face-to-face [35]. This personality characteristic and a low self-esteem and self-concept may turn into the construction of online profiles that represent a different idea of themselves [36].

Therefore, the situation escalates when cyberbullying and addiction to technologies merge, creating an increase in vulnerability [7,37–40]. The role of cyberbullying (cyber-victim, cyberbully, or mixed-role) modifies the use of mobile phones, video games, and the Internet [7,40,41]. Cyberbullying is understood as harassment that takes place via the Internet, the cyberbully is the person who engages in cyberbullying and the cyber-victim is the person who suffers from it [7]. In that sense, victims use social media as a way of avoidance, reducing the emotional stress experience, [40,42] while bullies use social media to amuse themselves or to create conflict [41]; therefore, they present a high abstinence rate when they withdraw from information and communication technology (ICT) [43]. Adolescents believe that social networks lead to increased bullying and general rumor-spreading [1], that is, cyberbullying. Additionally, familiar dysfunction is a risk factor for internet addiction, especially in families with the uninvolved parenting role, known as “laissez faire” [9,44–46]. In the same way, family can be a protecting factor for cyberbullying [47]. Recently, researchers have reported a mixed role in which victims become aggressors, exposing revenge, coldness, and emotional disconnection feelings [48,49].

The following research questions arise regarding the present study; is there a comorbid relationship between internet addiction and cyberbullying? Are there differences between the role of a bully–victim and the symptomatology presented? Are there different functions in internet, smartphone, and online gaming addiction in the relationship among bullies, victims or those with the mix of both role? Are sociodemographic variables important? Overall, the research objective was the following: to determine the prevalence of internet addiction, and smartphone and videogame usage related to the comorbid role among the studied variables in Costa Rican teenagers.

The hypotheses are:

- H1.** *There are gender differences in the use and prevalence of internet addiction, smartphone users and videogames, with women more prone than men to this prevalence.*
- H2.** *Age is a protective variable.*
- H3.** *There is an increase of comorbid factors among the new addictions to internet.*
- H4.** *There is a comorbid pattern if the different addictions to new technologies and cyberbullying, although the role in cyberbullying is uneven.*

2. Methodology

2.1. Participants

The study sample was formed by 127 adolescent students residing in Costa Rica, from 3 different high schools, with an age range between 12 and 18 years of age. The mean age was 16, 32 years. Of these participants, 67 were male and 60 were female. The type of sampling was for convenience, and the students were in schools that collaborate with the Instituto de Estudios Interdisciplinarios de la Niñez y la Adolescencia (INEINA) of the Universidad Nacional de Costa Rica.

The socio-demographic characteristics of the school, family type and parents' educational level are shown in Table 1.

Table 1. Descriptive data.

School Type	Frequency	Percent	Mean	Std. Deviation
Public	87	68.50		
Private	40	31.49		
Family type				
Extended family	21	16.53		
Nuclear	74	58.26		
Divorce parents	24	18.89		
Mixed family	7	5.51		
Single parent	1	0.78		
Mean number of siblings			1.75	1.28
Extended family	21	16.53		
Mother educational level				
Incomplete Elementary School	11	8.66		
Complete Elementary School	28	22.04		
Incomplete High School	22	17.32		
Complete High School	27	21.26		
University	39	30.70		
Father educational level				
Incomplete Elementary School	10	7.87		
Complete Elementary School	31	24.40		
Incomplete High School	23	18.11		
Complete High School	30	23.62		

2.2. Design and Procedure

A quantitative correlational study was conducted, in which the moderating effect of the study variables were analyzed: internet and smartphone addiction, video games and cyberbullying. The instruments were completed through an online survey during school hours. The estimated time for completing the survey was 60 min.

Following the ethical criteria established in Helsinki by the World Medical Association (WMA), all bioethical principles were followed. In addition, this study complied with the ethical protocol of the National University of Costa Rica and obtained a favorable rating in "ethics in human research" from the Research Center Institute for Interdisciplinary Studies of Children and Adolescents (INEINA). This center is part of the National University of Costa Rica. The families or legal guardians were asked to sign a consent form, as well as the students. The data was anonymized, guaranteeing the privacy of all the participants. In the case of detecting cases of cyberbullying or high rates of addiction that endangered the health of adolescents, the schools were informed.

The statistical analysis of the psychometrics data was performed through JASP 0.16.3, and the following treatments were used: descriptive and prevalence, correlations, multiple

regressions with backward elimination method, and a social media study that allowed us to understand the multiple interactions among variables.

In addition, a qualitative analysis of the open-ended responses was performed. First, stop-words were searched for (automatically by the NVivo software). In this way, words that did not make sense before the semantic study were eliminated. Thus, most of the words were nouns, adjectives and verbs, because these reflect the complexity of the discourse to a greater extent [50].

2.3. Instruments

The psychometrics instruments used to measure the variables were:

Cyberbullying: The Screening of Harassment among equals [51], aimed at adolescents between 12 and 18 years of age, studies cyberbullying (aggressors and victims) through 15 items distributed in two scales (one for victims and one for aggressors), Likert-style, with responses from 0 (never) to 3 (always). In addition, two short-answer questions were asked about the contextualization of aggression, as well as a multiple-response question about the feelings and emotions experienced. Regarding reliability, high indices are exposed, showing the internal consistency of cybervictimization ($\alpha = 0.82$), cyber-aggression ($\alpha = 0.71$) and cyber-observation.

ADITEC: Evaluation and Prevention of Internet, Mobile and Video Game Addiction [52] aimed at adolescents between 12 and 17 years old. The study variables allow us to know the addiction level to new technologies, specifically the degree of abuse, and the existence of difficulties in controlling the impulse, or the presence of obsession and disturbances in addiction to phones, internet and video games. It is a compendium of 3 Likert-type scales with 23 items and responses between option 0 (never) and 5 (always).

ADITEC-Internet: Abuse, abstinence, disturbance and lack of control and escape. Its internal consistency is adequate ($\alpha = 0.93$).

ADITEC-Mobile phone: Tolerance and withdrawal, difficulty controlling impulses, problems derived from financial spending and abuse. Its internal consistency is adequate ($\alpha = 0.93$).

ADITEC-Video play: Compulsive gaming, withdrawal, tolerance, and interference with other activities, associated problems, and escape. Its internal consistency is adequate ($\alpha = 0.95$).

3. Results

Addiction to new technologies is measured by three different scales (see Table 2), which in turn are segregated into different categories. In this case, it is observed how the score for total internet addiction (Mean = 2.13, SD = 1.25) and smartphone addiction (Mean = 2.126, SD = 1.517) is high in contrast to addiction to video games (Mean = 0.236, SD = 0.695) where there is no evidence of an addiction problem. However, the scales show differential values. In this sense, adolescents mainly show difficulties in "Abuse Internet" (Mean = 3.213, SD = 1.301), that is, they remain connected for many hours pending notifications from their social networks. In the same way, "Abuse Smartphone" (Mean = 2.252, SD = 1.491) is the category with the greatest difficulties. That is, there are not high abstinence rates, or interference with other activities or escape situations, but rather a very extended use in the time of connection to both social networks and the smartphone itself.

Regarding cyberbullying, we found relatively low rates in cybervictimization (Mean = 0.087, SD = 0.455) while in cyberbullying there are more cases (Mean = 0.118; SD = 0.762) (see Table 3). In this sense, the high relationship that exists between both roles is worrying ($r = 0.81$, $p < 0.001$) (see Table 5). In fact, 60% of the victims in the sample maintain an aggressive role.

Regarding the open-ended questions about cyberbullying (see Table 4), it is found that most adolescents do not inform reference figures such as parents or teachers. On the other hand, the feelings generated in the cyber-victim are mostly anger, followed by fear and concern, and the long-term effects that it generates are indifference (they manifest how they should not have given it importance), distrust and fear of using social networks. As

Table 4. Cont.

Questions	Word Cloud ¹
<p>“What effects have these situations had on you? Describe them: “ * Multiple choice answer</p>	
<p>Cyberbullies “Why do you carry out these behaviors towards other people?” * Multiple choice answer</p>	
<p>“How do you feel when you bother others in this way?” * Multiple choice answer</p>	

¹ A larger size and repetition of a word or phrase corresponds to a higher frequency of occurrence in the responses.
* The answer “other reasons” was part of the management questionnaire.

A correlation analysis has been carried out to determine the strength of the variables in the phenomenon of cyberbullying (cybervictimization and cyber-aggression) in addition to the internet, smartphones, and video games. Regarding sociodemographic variables, it was found that these have little predictive value. Although the correlation table (see Table 5) shows how gender has a weak relationship with “Total smartphone addiction”, the type of center with the internet abuse score, the results of the *t*-Student test showed no significant relationship. However, the results of the simple regression did show a predictive value of age such that the younger the age, the greater the probability of abusive use of the internet ($R^2 = 0.047$; $F = 6.190$; $t = 86.437$; $p = 0.014$). Regarding the type of center, the regression results did not show significant differences ($R^2 = 0.041$; $F = 2.627$; $p = 0.076$). However, the father’s educational training did explain 5.6% of the financial problems associated with the smartphone usage ($R^2 = 0.056$; $F = 7.372$; $t = 2.715$; $p = 0.008$). On the other hand, an important relationship was observed between cyberbullying and addiction to the internet, smartphone, and video games.

Table 5. Correlations among variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Sex	—																				
2. Type of family	−0.02	—																			
3. Number brother or sister	0.03	0.14	—																		
4. Age	0.05	−0.17	−0.09	—																	
5. Type school	−0.13	−0.09	−0.04	0.38 ***	—																
6. Mother Education	−0.04	0.00	0.00	0.33 ***	0.54 ***	—															
7. Father Education	0.03	0.04	−0.08	0.37 ***	0.62 ***	0.66 ***	—														
8. Total internet addiction	−0.10	0.10	−0.13	−0.10	−0.03	−0.01	0.02	—													
9. Abuse internet	0.02	0.20 *	−0.01	−0.21 **	−0.12	−0.08	0.01	0.53 ***	—												
10. Withdrawal Internet	0.01	0.10	−0.06	0.03	0.03	0.04	0.08	0.45 ***	0.35 ***	—											
11. Lack of control Internet	−0.00	0.19	−0.05	−0.10	−0.04	−0.05	−0.00	0.62 ***	0.62 ***	0.55 ***	—										
12. Escape Internet	−0.01	0.12	−0.09	0.00	0.06	0.04	0.05	0.60 ***	0.43 ***	0.66 ***	0.55 ***	—									
13. Total smartphone addiction	0.19 *	0.02	0.00	0.06	0.14	0.08	0.19 *	0.24 **	0.30 ***	0.26 **	0.35 ***	0.22 ***	—								
14. Lack of control Smartphone	0.06	0.06	−0.05	−0.05	0.15	0.11	0.17	0.40 ***	0.36 ***	0.24 **	0.52 ***	0.35 ***	0.63 ***	—							
15. Economic Problem smartphone	0.14	0.04	−0.10	0.02	0.18 *	0.18	0.23 **	0.25 **	0.34 ***	0.21 *	0.35 ***	0.37 ***	0.62 ***	0.75 ***	—						
16. Abuse smartphone	0.08	−2.65	0.01	0.06	0.06	−0.01	0.14	0.17	0.31 ***	0.21 **	0.28 ***	0.18 *	0.68 ***	0.57 ***	0.67 ***	—					
17. Total video-games addiction	0.06	−0.01	−0.04	−0.03	0.13	0.09	0.11	0.21 *	0.01	0.16	0.10	0.19 *	0.19 *	0.35 ***	0.30 ***	0.14	—				
18. Interference in other activities—video-games	0.11	0.05	−0.11	−0.02	0.19 *	0.00	0.07	0.16	0.15	0.12	0.18 *	0.12	0.23 **	0.31 ***	0.27 **	0.24 **	0.40 ***	—			
19. Withdrawal video-games	0.04	−0.11	−0.07	−0.14	0.07	−0.16	−0.04	0.21 *	0.20 *	0.14	0.21 *	0.13	0.21 *	0.30 ***	0.25 **	0.27 **	0.43 ***	0.54 ***	—		
20. Escape and social problem video-games	0.20	0.06	−0.09	−0.09	0.13	−0.08	−0.04	0.25 **	0.16	0.18 *	0.19 *	0.18 *	0.21 *	0.30 ***	0.26 **	0.21 *	0.50 ***	0.77 ***	0.58 ***	—	
21. Cyber-victim	0.02	−0.03	−0.07	−0.13	−0.01	−0.10	−0.05	0.25 **	0.18	0.21 *	0.26 **	0.23 **	0.18 *	0.38 ***	0.34 ***	0.28 ***	0.48 ***	0.50 ***	0.47 ***	0.57 ***	—
22. Cyberbully	0.14	−0.04	−0.10	−0.13	0.02	−0.16	−0.11	0.27 **	0.19 *	0.23 **	0.27 **	0.27 **	0.22 *	0.38 ***	0.30 ***	0.22 *	0.48 ***	0.65 ***	0.62 ***	0.76 ***	0.81 ***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

That is why it is necessary to carry out a more in-depth study that allows us to understand the effect of addictions to new technologies in the roles of cybervictimization and cyberbullying. In this sense, multiple regressions have been done with the “background” [53,54] method to determine the relevance of each of the addictions in both roles of cyberbullying.

In the case of cyber-victims, we have found how internet addiction in total barely explains 6.7%, having a positive and significant relationship ($t = 2.99$; $p = 0.003$). Similarly, it was found that total addiction to smartphones explains 3.2% of victimization, with a positive and significant relationship ($t = 2.04$, $p = 0.04$). Finally, there is the total addiction to video games, explaining 23.7%, with a positive and statistically significant relationship ($t = 6.235$, $p < 0.001$). However, since the scales are made up of subscales, it is necessary to perform multiple regressions that allow us to look more in depth into which symptoms are the ones most closely related to cybervictimization. Regarding victimization, it is found to be explained by 6.9% by the subscale “Lack of control Internet” (Standard Error = 0.032; Standardized = 0.263, $t = 3.042$, $p = 0.003$) (see Table 6), by 14.8% by “Lack of control Smartphone” (Standard Error = 0.035; Standardized = 0.385, $t = 4.667$, $p = < 0.001$) (see Table 7) and by 35.9% by “Escape and social problem video-games” (Standard Error = 0.080; Standardized = 0.455, $t = 5.108$, $p < 0.001$) (see Table 8). In other words, the role of cybervictimization is reinforced by “Lack of control Internet”, “Lack of control Smartphone” and “Escape and social problem video-games”.

Table 6. Multiple regression in cyber-victims in terms of internet addiction.

Model		β Unstandardized	Standard Error	B Standardized	t	p	R ²
4	(Intercept)	−0.130	0.081		−1.599	0.112	0.069
	Lack of control Internet	0.097	0.032	0.263	3.042	0.003	
3	(Intercept)	−0.174	0.088		−1.982	0.050	0.081
	Lack of control Internet	0.069	0.038	0.187	1.806	0.073	
2	Escape Internet	0.049	0.038	0.134	1.295	0.198	0.082
	(Intercept)	−0.183	0.092		−1.979	0.050	
	Withdrawal Internet	0.013	0.040	0.038	0.314	0.754	
1	Lack of control Internet	0.066	0.040	0.177	1.630	0.106	0.082
	Escape Internet	0.042	0.044	0.115	0.944	0.347	
	(Intercept)	−0.191	0.114		−1.685	0.095	
	Abuse internet	0.005	0.039	0.015	0.129	0.897	
	Withdrawal Internet	0.013	0.040	0.039	0.320	0.749	
	Lack of control Internet	0.063	0.047	0.169	1.325	0.188	
	Escape Internet	0.041	0.045	0.113	0.913	0.363	

Table 7. Multiple regression in cyber-victims in terms of smartphone addiction.

Model		β Unstandardized	Standard Error	B Standardized	t	p	R ²
3	(Intercept)	−0.170	0.067		−2.561	0.012	0.148
	Lack of control Smartphone	0.163	0.035	0.385	4.667	<0.001	
2	(Intercept)	−0.189	0.069		−2.747	0.007	0.156
	Lack of control Smartphone	0.120	0.053	0.284	2.262	0.025	
	Economic Problem smartphone	0.048	0.045	0.134	1.065	0.289	
1	(Intercept)	−0.202	0.074		−2.743	0.007	0.158
	Lack of control Smartphone	0.117	0.054	0.275	2.162	0.033	
	Economic Problem smartphone	0.037	0.050	0.102	0.728	0.468	
	Abuse smartphone	0.018	0.034	0.057	0.510	0.611	

Table 8. Multiple regression in cyber-victims in terms of video game addiction.

Model		β Unstandardized	Standard Error	B Standardized	t	p	R ²
2	(Intercept)	0.005	0.034		0.143	0.887	0.359
	Withdrawal video-games	0.159	0.069	0.205	2.305	0.023	
	Escape and social problem video-games	0.410	0.080	0.455	5.108	<0.001	
1	(Intercept)	0.004	0.034		0.113	0.910	0.364
	Interference in other activities video-games	0.092	0.092	0.116	1.007	0.316	
	Withdrawal video-games	0.147	0.070	0.190	2.102	0.038	
	Escape and social problem video-games	0.338	0.108	0.375	3.137	0.002	

Regarding cyberbullies, it was observed that 7.7% of this behavior is explained by total addiction to the internet ($t = 3.22, p = 0.002$), 5.2% is explained by total addiction to the smartphone ($t = 2.69, p = 0.01$) and 23.6% by total addiction to video games ($t = 6.21, p < 0.001$). None of the scales for internet addiction show a significant relationship with cyber-aggression (see Table 9). Regarding cyberbullying, the results of the multiple regressions show how this is explained by 14.6% by “Lack of control Smartphone” (Standard Error = 0.059; Standardized = 0.382, $t = 4.623, p < 0.001$) (see Table 10) and by 63.3% for “Escape and social problem video-games” (Standard Error = 0.102; Standardized = 0.612, $t = 9.088, p < 0.001$) (see Table 11). In other words, cyber-aggression behaviors are reinforced by “Lack of control Smartphone” and by “Escape and social problem video-games”.

Table 9. Multiple regression in cyberbullies in terms of internet addiction.

Model		β Unstandardized	Standard Error	B Standardized	t	p	R ²
3	(Intercept)	−0.364	0.146		−2.490	0.014	0.099
	Lack of control Internet	0.108	0.064	0.175	1.700	0.092	
	Escape Internet	0.111	0.063	0.181	1.761	0.081	
2	(Intercept)	−0.374	0.154		−2.436	0.016	0.099
	Withdrawal Internet	0.015	0.067	0.027	0.224	0.823	
	Lack of control Internet	0.104	0.067	0.168	1.554	0.123	
1	Escape Internet	0.102	0.074	0.167	1.388	0.168	0.099
	(Intercept)	−0.379	0.189		−2.011	0.047	
	Abuse internet	0.003	0.065	0.006	0.050	0.960	
	Withdrawal Internet	0.015	0.067	0.027	0.226	0.822	
	Lack of control Internet	0.102	0.078	0.164	1.301	0.196	
	Escape Internet	0.102	0.075	0.166	1.362	0.176	

Table 10. Regression in cyberbullies in terms of smartphone addiction.

Model		β Unstandardized	Standard Error	B Standardized	t	p	R ²
3	(Intercept)	−0.309	0.112		−2.768	0.006	0.146
	Lack of control Smartphone	0.271	0.059	0.382	4.623	<0.001	
2	(Intercept)	−0.318	0.116		−2.747	0.007	0.147
	Lack of control Smartphone	0.251	0.090	0.353	2.794	0.006	
	Economic Problem smartphone	0.023	0.076	0.039	0.305	0.761	
1	(Intercept)	−0.316	0.124		−2.544	0.012	0.147
	Lack of control Smartphone	0.252	0.091	0.354	2.763	0.007	
	Economic Problem smartphone	0.025	0.085	0.042	0.296	0.768	
	Abuse smartphone	−0.003	0.058	−0.006	−0.054	0.957	

Table 11. Regression in cyberbullies in terms of video game addiction.

Model		β Unstandardized	Standard Error	B Standardized	t	p	R ²
2	(Intercept)	−0.063	0.044		−1.447	0.150	0.633
	Withdrawal video-games	0.341	0.087	0.263	3.899	<0.001	
	Escape and social problem video-games	0.926	0.102	0.612	9.088	<0.001	
1	(Intercept)	−0.065	0.043		−1.489	0.139	0.638
	Interference in toher activities video-games	0.152	0.116	0.113	1.307	0.194	
	Withdrawal video-games	0.321	0.088	0.248	3.633	<0.001	
	Escape and social problem video-gamesS	0.807	0.136	0.534	5.923	<0.001	

There is a complex situation in which it is observed how the influence of addiction to new technologies is differential according to the role of cyberbully or cyber-victim. In order to shed some light on this aspect, the “social networking” [53,54] methodology was applied by which the network of nodes was developed (see Figure 1). Thus, the figure is made up of 12 nodes or variables (addiction subscales and cyberbullying roles) generating 58 relationships out of 60 possible ones, and there is a mean sparsity of 0.12. In this way, we found that there is indeed a very strong relationship between the roles of victim and aggressor, and a differential addictive use. Considering the centrality parameters (see Table 12), it was analyzed how the role of aggressor is transcendent in the “Escape and social problem video-games”, the “Abuse internet” in such a way that they establish positive and intense relationships, while the “Abuse Smartphone” turns out to have a negative and less intense relationship. However, although as seen in the regression tests, the role of the victim is not largely explained by additions; it is affected by them, but does not have a high centrality or betweenness (see Table 12).

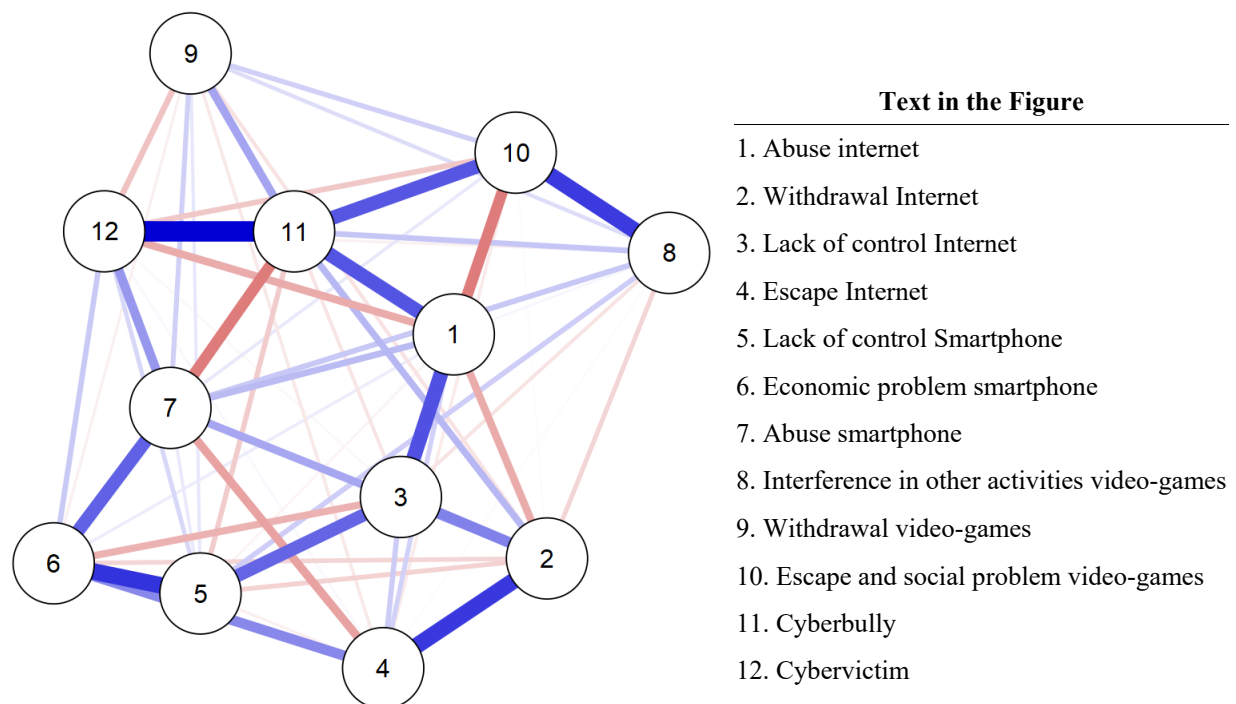
**Figure 1.** Network.

Table 12. Weights matrix.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Abuse internet	0.000	0.000	0.494	0.127	−0.032	0.054	0.192	0.025	0.000	−0.370	0.482	−0.236
2. Withdrawal Internet	−0.236	0.000	0.356	0.560	−0.127	−0.118	0.247	−0.119	−0.082	0.008	0.202	0.000
3. Lack of control Internet	0.494	0.356	0.000	0.143	0.438	−0.217	0.000	−0.079	0.000	0.121	−0.076	−0.021
4. Escape Internet	0.127	0.560	0.143	0.000	−0.045	0.334	−0.262	−0.011	−0.065	−0.059	0.000	0.021
5. Lack of control Smartphone	−0.032	−0.127	0.438	−0.045	0.000	0.573	0.062	0.141	0.067	0.000	−0.142	0.112
6. Economic Problem smartphone	0.054	−0.118	−0.217	0.334	0.573	0.000	0.445	0.000	−0.045	0.000	−0.013	0.151
7. Abuse smartphone	0.192	0.247	0.000	−0.262	0.062	0.445	0.000	0.156	0.131	0.064	−0.371	0.292
8. Interference in toher activities video-games	0.025	−0.119	−0.079	−0.011	0.141	0.000	0.156	0.000	0.094	0.556	0.160	−0.042
9. Withdrawal video-games	0.000	−0.082	0.000	−0.065	0.067	−0.045	0.131	0.094	0.000	0.135	0.255	−0.171
10. Escape and social problem video-games	−0.370	0.008	0.121	−0.059	0.000	0.000	0.064	0.556	0.135	0.000	0.477	−0.155
11. Cyberbully	0.482	0.202	−0.076	0.000	−0.142	−0.013	−0.371	0.160	0.255	0.477	0.000	0.718
12. Cyber-victim	−0.236	0.000	−0.021	0.021	0.112	0.151	0.292	−0.042	−0.171	−0.155	0.718	0.000
13. Abuse internet	0.000	0.000	0.494	0.127	−0.032	0.054	0.192	0.025	0.000	−0.370	0.482	−0.236

4. Discussion

Internet, smartphone and video game addiction presents a challenge. However, the situation is not extremely serious for the sample, although there are cases of moderate or severe addiction. In coherence, it should not be forgotten how meta-analysis studies show a considerable growth of these pathologies [23–27]. Thus, although the entire sample is not addicted to new technologies, the increase in symptoms implies an alarming situation.

In this sense, the highest rates are shown by the time of connection to both the internet and the smartphone, while the prevalence of withdrawal, interference with other activities or escape situations is significantly lower. In this way, it coincides with previous research in that the daily connection to new technologies is increasingly high [9–12]. Although the amount of time devoted to these activities constitutes a symptom of addiction, prolonged use does not necessarily imply the appearance of addiction [16]. In this sense, we consider it necessary to expose how the internet connection, social networks and online video games are means to establish ties of belonging in the adolescent digital community, being coherent at the evolutionary moment an almost permanent connection [32]. In the same way, adolescence is characterized by marked social relationships of friendship in which the fear of being left out or not finding out about the latest news is a difficulty. For this reason, the well-known “fear of missing out” (FoMO) should not be ignored from the interpretation of the results [33]. However, our results confirm that excessive use has a high interrelation with other addictive symptoms, constituting a potentiating element.

Regarding the socio-demographic variable of gender, we found that smartphone use is not a determining factor even in internet addiction, coinciding with previous studies [29,55,56]. In this sense, the absence of the significance of the male gender in the rate of addiction to video games is surprising, since other research indicates its relevance [30,31].

However, the age variable is a protective element in the abusive use of the internet, this being an explanatory variable. In this way, a younger age is an element of risk in excessive use of the internet, coinciding with previous studies [28,29,37].

Regarding cyberbullying, no differences were found between gender in the roles of cybervictimization or cyberbullying [57–59] or motivated by a specific age [60–62]. On the other hand, there is a strong relationship between being a cyber-victim and a cyberbully. In this sense, it is consistent with previous research that the most relevant factor for being a cyberbully is having been a victim [63–65]. In this way, a mixed profile is found in

which one performs behaviors typical of both roles. One of the most striking results is the emotional responses (anger or rage, fear) and the behavioral changes (indifference). These results are consistent with previous studies that describe the emotional consequences of cyber-victims [66–68].

In the same way, it is found that cyber-aggressors either do not have a clear notion of the reasons for their cyber-aggression or show a high emotional coldness. In addition, they do not show clear feelings when asked about the emotional response they experienced, or they show high rates of indifference. These results are consistent with previous research that indicates how difficulties in emotional intelligence, lack of empathy or emotional disconnection are determining elements in the behavior of aggressors [62,69,70].

However, in the research, most cyber-aggressors play the role of cyber-victim. The results in the emotional sphere agreed with previous research by showing a lower capacity to forgive [65] and lower levels of empathy [48,49,70].

On the other hand, a strong relationship between addiction to new technologies and cyberbullying is seen, coinciding with previous research [7,38–40]. In this way, it is evident how addictive symptoms modulate both the role of cyber-victim and cyber-aggressor, although in different measures. The behavior of cyberbullies is largely explained by “Lack of control Smartphone” and “Escape and social problem video-games”, unlike cyber-victims, who have a lesser influence of internet addiction, but “Lack of control Internet”, “Lack of control Smartphone” and “Escape and social problem video-games” are the most determining variables. These results are congruent, with a high interrelation between the two cyber-aggression roles.

Consequently, it coincides with previous research that there are differences in the affective needs of victims and aggressors in the use of new technology networks. However, our results show that not only are there victims who use video games as a means of escape, but that the aggressors also do it, even these present higher scores on this sub-scale. In this sense, it partially coincides with previous research regarding the role of victims [40,42] but it is necessary to ask new questions about cyber-aggressors. Similarly, authors in [43] agree on the lack of control to manage the absence of these devices and the anxiety symptoms generated.

The present study is not without limitations. On the one hand, it is necessary to carry out longitudinal research with the Costa Rican population to determine the development of internet, “smartphone” and video game addiction as well as their influence on the roles of cyber-victim, cyberbully and mixed roles. Regarding the prevalence of addictions to new technologies, it is necessary to determine the cause of the huge number of hours of connection. In this sense, future studies or extensions should be proposed that respond to: does the connection time have a link with the feeling of belonging to the community? What implications do the feeling of belonging and the FoMO have in the addictive use of technologies? Are these behaviors explained by unwritten relationship rules in adolescents? Are we facing a new approach to friendships? Could we find ourselves facing a new adolescent behavior instead of a disorder? In addition, it would be necessary to carry out research in which the socio-emotional consequences of suffering both addiction to new technologies and being involved in cyberbullying situations are analyzed. On the other hand, there is a limitation according to the sample. The sample is a convenience sample. This sampling option was selected due to the exceptional conditions of COVID-19 and the governmental structure of the nation of Costa Rica. Consequently, the results should be taken with caution.

On the other hand, attention must be paid to the practical applications of the research. In the first instance, the determination of the most influential scales at the level of Internet, Smartphone and video-game addiction allows us to trace preventive interventions in secondary education centers. Second, the determination of the strong prevalence of the mixed role of cyber-victim–aggressor raises challenges in the intervention policy of schools. In this sense, it is not only necessary to carry out awareness-raising policies, but to study to a greater extent what is happening with these Costa Rican adolescents. What is the

educational style of their families? How is adolescents' academic performance? Do they have quality relationships with their peers? What needs are covered by new technologies? Is it necessary to consider what intervention techniques are the most effective with this type of students?

5. Conclusions

Addiction to new technologies is a global challenge. Although the rates indicate prolonged use over time of the internet, the “smartphone” and video games, it is necessary to ask the socio-affective reason that is motivating it, without losing sight of their high rates of use, that is, to consider whether we are facing a possible pandemic of addiction to new technologies or a generalized change in human behavior mediated by the need for socialization. On the other hand, new technologies mediate the behavior of the cyber-victim and especially that of cyber-aggressors, showing how they escape routes for other problems while presenting difficulties in controlling these stimuli. However, it is especially dramatic regarding the situation of adolescents who, having been cyber-victims, become cyber-aggressors, showing feelings of revenge and little empathy.

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