Risk factors associated with witnessing cyberbullying in primary education

Factores de riesgo asociados a los testigos de ciberacoso en Educación Primaria

Fatores de risco associados às testemunhas de cyberbullying no Ensino Primário

小学教育背景下与网络暴力目击者相关的危险因素

López-Castro, Leticia (iD) , **López-Ratón, Mónica** (iD)

University of Santiago de Compostela, Spain.

Abstract

Cyberbullying is a harmful and intentional act of an aggressor/s to a victim, through technology, which causes an imbalance of power. The role of bystanders is key for early intervention in the phenomenon. The objective of the study is to detect risk factors associated with cyberbystanders in Primary Education based on individual variables related to the use of technologies (number of technologies, type of technology, frequency, purpose of use, time slot, and place of connection) and experiences as victims or aggressors of cyberbullying. A sample of 1169 families whose children were in 5th or 6th grade of Primary Education was selected and surveyed using a self-administered questionnaire that measures all the indicated variables ($\alpha = .84$). The study of the risk factors was carried out using binary logistic regression (bivariate models and multivariate model) with the software R version 4.1.0. Bivariate analyses identified: a) using a mobile phone with the Internet, b) Internet connection to talk with friends, c) cybervictimization, and d) cyberperpetration as possible individual risk factors ($p < .05$). The multivariate model showed joint predictors of the risk of being cyberbystanders in Primary Education: cyberperpetration, cybervictimization, number of technologies used and using the Internet to talk with friends. The interrelation between the roles of cyberbullying and the risk derived from the very frequent use of various technological devices is evidenced. Implications for educational practice are studied.

Keywords: cyberbullying; school violence; primary education; multiple regression analysis

Resumen

El ciberacoso es un acto dañino e intencional de un agresor/es a una víctima, mediante las tecnologías, que provoca un desequilibrio de poder. El papel de los testigos es clave a la hora de intervenir de manera temprana en el fenómeno. El objetivo del estudio es detectar factores de riesgo asociados con los cibertestigos en Educación Primaria a partir de las variables individuales relacionadas con el uso de las tecnologías (número de tecnologías, tipo de tecnología, frecuencia y finalidad de uso, franja horaria y lugar de conexión) y las experiencias como víctimas o agresores de ciberacoso. Se seleccionó una muestra de 1169 familias cuyos hijos cursaban 5º o 6º de Educación Primaria, encuestada mediante un cuestionario autoadministrado que mide todas las variables indicadas ($\alpha = .84$). El estudio de los factores de riesgo se llevó a cabo mediante la regresión logística binaria (modelos bivariantes y modelo multivariante). Los análisis bivariantes identificaron: a) uso del teléfono móvil con Internet, b) conexión a Internet para hablar con amigos, c) ser víctima de ciberacoso y d) ser ciberperpetrador como posibles factores de riesgo individuales ($p < .05$). El modelo multivariante mostró como predictores conjuntos del riesgo de ser cibertestigos en Educación Primaria: ser ciberagresor, ser víctima de ciberacoso, número de tecnologías empleadas y usar Internet para hablar con amigos. Se evidencia la interrelación de los roles de ciberacoso y el riesgo derivado del uso muy frecuente de varios dispositivos tecnológicos. Se estudian las implicaciones para la práctica educativa.

Palabras clave: ciberacoso, violencia escolar, educación primaria, análisis de regresión múltiple

Corresponding author / Autor de contacto: Leticia López Castro. Faculty of Education Sciences, University of Santiago de Compostela. C/ Xosé María Suárez Núñez S/N, Santiago de Compostela, 15782 -A Coruña, Spain. correo-e: leticia.lopez@usc.es

Resumo

O cyberbullying é um ato prejudicial e intencional de um agressor ou uma agressora a uma vítima, através das tecnologias, que provoca um desequilíbrio de poder. O papel das testemunhas é fundamental para uma intervenção precoce no fenómeno. O objetivo do estudo é detetar fatores de risco associados ao cyberbullying no Ensino Primário a partir das variáveis individuais relacionadas com a utilização das tecnologias (número de tecnologias, tipo de tecnologia, frequência e finalidade de utilização, intervalo horário e local de ligação) e as experiências como vítimas ou agressores de cyberbullying. Selecionou-se uma amostra de 1169 famílias cujos filhos estavam no 5.º ou 6.º ano do Ensino Básico, que foram inquiridas utilizando um questionário autoadministrado que mede todas as variáveis indicadas (α = .84). O estudo dos fatores de risco foi realizado mediante a regressão logística binária (modelos bivariantes e modelo multivariante). As análises bivariantes identificaram: a) uso do telemóvel com Internet, b) ligação à Internet para falar com amigos, c) ser vítima de cyberbullying e d) ser um ciberperpetrador como possíveis fatores de risco individuais (*p* < .05). O modelo multivariante mostrou como preditores conjuntos do risco de ser um testemunhas de cyberbullying no Ensino Primário: ser ciberagressor, ser vítima de cyberbullying, número de tecnologias utilizadas e utilizar a Internet para falar com amigos. A inter-relação dos papéis de cyberbullying e o risco derivado da utilização muito frequente de vários dispositivos tecnológicos é evidente. As implicações para a prática educativa são estudadas.

Palavras-chave: cyberbullying, violência escolar, ensino primário, análise de regressão múltipla.

摘要

网络暴力是施暴者通过科技手段，对受害者进行的有意图的危害行径，网络暴力直接导致了权利平衡的偏失。在对网络暴力的早期干预中目击者的角色至关重要。目标：该研究的目的是通过与科技使用相关的独立变量（科技数量、科技种类、使用频率和目的、连接时间段和地址）来发现小学背景下与网络暴力目击者相关的危险因素，同时发现作为网络暴力施暴者或受害者的相关经历。我们选择了由 1169 个家庭组成的样本，这些家庭的共同特点是他们的孩子正处于小学的五、六年级。我们采用自编问卷对样本的上述变量进行测量（α = 0.84）。对危险因素的研究采用了二元逻辑回归（双变量模型和多变量模型）。通过双变量分析确定：（1）使用联网的手机；（2）联网与朋友沟通；（3）是网络暴力的受害者；（4）是网络暴力的施暴者，这四项可能的独立危险因素（p <0 .05）。多变量模型显示了在小学背景下作为网络暴力目击者所面临危险的共同预测因素：是网络暴力施暴者、是网络暴力的受害者、科技数量和使用网络跟朋友交流。一方面研究显示出了网络暴力不同角色的相互关系、多科技设备的频繁使用所带来的风险都是十分突出的问题，另一方面也探讨了该研究在教育实践中的应用。

关键词: 网络暴力、校园暴力、小学教育、多元回归分析

Introduction

Bullying, according to the definition proposed by Olweus (1991), is described as an intentional act of harming or hurting another that is carried out repeatedly and triggers an imbalance of power between the victim and the aggressor/s. Cyberbullying is the extension of bullying to the virtual space. It is defined as an aggressive, harmful and intentional act, in which the victim is targeted through technology. It produces an imbalance of power that implies that the victim cannot easily defend themselves (Smith et al., 2008). This definition is widely accepted by the scientific community, although debate over its definition and measurement remains active. Thus, disparity in prevalence rates emerge due to differing definitions, methodologies and, potentially, cultural differences, amongst other factors (Smith, 2019). Between 40 and 55% of primary school students have witnessed cyberbullying (Sánchez et al., 2016). In addition, the COVID-19 pandemic has led to an increase in technology use by young people due to them having more free time. This has significantly increased levels of cyberbullying (Ruíz-Martín et al., 2019).

In relation to this phenomenon, three main roles can be distinguished: aggressor, victim and bystander (Garaigordobil, 2015). Aggressors carry out the act, victims are on the receiving end and bystanders play witness to the act. In this sense, Salmivalli et al. (1996) identify two types of bystanders based on their involvement: 1) passive (does not take sides with either the victim or the aggressor) and 2) active (actively participates either by reinforcing or helping the aggressor or by defending or consoling the victim).

The importance of bystanders in the prevention of bullying has been recognized. This is known as the *bystander intervention approach* (American Educational Research Association, 2013). This approach is based on mobilizing bystanders in defence of the victim. Thus, active bystanders who act as defenders contribute to increasing victims' perceptions of social support and overcoming bullying (Cohen et al., 2000). Conversely, bystanders with negative attitudes towards bullying victims are more likely to be bullies themselves (Salmivalli & Voeten, 2004).

Research into cyberbullying has paid more attention to examining factors associated with victims and aggressors, especially, in compulsory secondary education. Some individual factors have been associated with certain roles in cyberbullying. One group of factors specifically relates to the media and entertainment, describing the way in which young people use technological devices. Thus, problematic internet use (PIU) is a predictor of involvement in cyberbullying (Machimbarrena et al., 2021). One risk factor is owning a mobile phone (Álvarez-García et al., 2015; Domínguez-Alonso et al., 2017), with a another being the frequent access to social networks (Guo, 2016). In fact, Sittichai & Smith (2020) argue that high risk is associated with frequent Internet use, specifically, several times a day or 15 to 20 hours per week and more. Likewise, Feijóo et al. (2021) revealed that individuals involved in cyberbullying tend to spend more time online. Similarly, children having a computer in their room and using the Internet in an unusual space at home increases the risk

of taking part in this phenomenon (González et al., 2016; Stald & Ólafsson, 2012). In short, using computers to access chat rooms poses a greater risk (Tsimtsiou et al., 2018), as does sending text messages (Rice et al., 2015), due to these being forms through which personal information tends to be shared (Sabater & Lopez, 2015). Finally, findings reported by Epelde-Larrañaga et al. (2022) indicate that cyberbystanding is the strongest predictor of cybervictimization. Holfeld and Mishna (2018) indicate that cyberbystanders share inherent characteristics with cybervictims. Thus, the different roles in the phenomenon are conditioned by each other, as indicated by previous studies (González, 2016). This leads to a tendency for proliferation, with bystanders often turning into victims or aggressors.

In short, evidence exists that individual variables play a prominent role in cyberbullying. However, as research is relatively recent and less focused on cyberbystanding, there is a lack of consensus regarding the role that these variables play in the phenomenon. This highlights the need to delve into the main risk factors in order to detect those that might help in the prevention of cyberbullying. In light of this, the following research questions arise: 1) Do the characteristics of technology use (number of technological devices, type of technology, frequency, purpose of use, time slot and place of connection) have a significant influence on the involvement of minors in cyberbullying bystanding?; and 2) Does cyberbullying victimization and perpetration increase the risk of cyberbullying bystanding in minors? In this line, the aim of the present study is to detect risk factors associated with cyberbystanding in primary education from the individual variables related to technology use (number of technological devices, type of technology, frequency, purpose of use, time slot and place of connection). To this end, the following research hypotheses are proposed:

- H1. Children who use many different internet-connected technologies (mobile phone, laptop, desktop computer, tablet

and games console) are more at risk of being a cyberbullying bystander.

- H2. The type of technology with Internet access (mobile phone, laptop, desktop computer, tablet, and game console) influences the probability of cyberbystanding.

- H3. Students who use internet-connected technologies more often (daily, several hours a day) are at greater risk of being a cyberbullying bystander.

- H4. Minors who connect to the Internet at night are more likely to witness cyberbullying than those who do so at a different time.

- H5. Children who access the Internet in non-common areas of the home are at greater risk of being cyberbystanders.

- H6. The motive for using the Internet will influence the likelihood of witnessing cyberbullying.

- H7. Students who cyberbully others will be at greater risk of witnessing cyberbullying.

- H8. Children who are cyberbullied are more likely to also become cyberbystanders.

- H9. The number of technological devices used, technology type, frequency and purpose of use, time used, place of connection, cybervictimization and cyberperpetration will significantly influence the risk of cyberbystanding in primary education.

Method

Study design and sample selection

A correlational and cross-sectional study was carried out. The sample was selected via two-stage sampling with the aim of, first, selecting the educational centres and, second, selecting families from selected centres. Centre selection was randomly stratified according to conglomerates. Educational centres chosen at random according to strata (centre type) provided the primary unit of analysis, whilst

educational level provided the secondary unit. A total of 26 educational centres participated. 17 were early childhood and primary education centres (CEIP), 7 were private centres (CPR) and 2 were integrated public centres (CPI), which represented 3% of their reference stratum. This type of sampling for the centres enabled centres of different sizes (rural, semi-urban and urban) from the four provinces that make up the autonomous region of Galicia (Spain) to be represented. The families invited to participate in the study had to comply with criteria of having a child enrolled in the 5th or 6th year of primary education at any of the participating centres. 2094 families were invited, with 1169 ultimately participating.

Sample characteristics

82% of those surveyed were women and 17% were men. Modes pertaining to age showed a predominance of the 41 to 50 year age group (63%), followed by the 30 to 40 year group (29%) and the above 50 and below 30 year groups (5% and 1%, respectively). With regards to education, 38% had university studies, 27% had vocational training, 18% had primary school studies, 15% had compulsory secondary school studies and 1% had no academic studies. In short, 87% of participating families were of Spanish origin, whilst 71% were two-parent families, compared to 30% who reported another type of family structure, such as a single-parent home (13%) or extended family (12%).

Instrument

Information was collected from families using a self-report questionnaire corresponding to four dimensions: a) family profile, b) families' educational practices, c) technology use by minors, and d) childrens' experiences of cybervictimization, cyberbystanding and cyberbullying. With regards to dimension c), 21 items were analysed relating to the characteristics of the different technologies used: frequency of use (number of times per month and number of hours per day), purpose of use, time of the day of Internet connection and place of access within the home. With

regards to dimension d), families responded if their child had been involved in cybervictimization, cyberbystanding or cyberbullying on at least one occasion during the previous six months. For this, the cyberbullying definition proposed by Smith et al. (2008) was used. This defines cyberbullying as a repeated act over time (not a specific incident), in which there is an intention to harm another (s) and where the victim is in a disadvantageous situation, meaning that they cannot easily defend themselves from the aggressor or aggressors.

Instrument validity and the reliability were evaluated. Overall validity was evaluated in accordance with three types of validity: construct, criteria and content. This was evaluated by two experts in cyberbullying. Questionnaire reliability was measured with the Cronbach alpha coefficient, obtaining *α value = .84*. In addition, exploratory factor analysis of principal components with Oblimin rotation and Kaiser correction was carried out. This grouped items in relation to six types of cyberbullying: teasing (.825), threats (.839), insults (.840), intimidations (.855), false rumours (.796) and social exclusion (.727). For the sake of simplicity, items were dichotomised to indicate whether participating minors were involved in witnessing any type of cyberbullying (or not) on at least one occasion over the previous six months.

Process

Contact with families was initiated by the tutors of selected groups-classes at each educational centre. Tutors distributed questionnaires in sealed envelopes to the minors during tutor time. Minors were instructed to deliver the questionnaire to their families and return it to the centre once completed (within a maximum period of one week). In this way, families were instructed to read the questionnaire and respond honestly, whilst being assured that anonymity and confidentiality would be preserved in accordance with recommendations of the Code of Good Scientific Practices of the Higher Council for Scientific Research (CSIC).

Data analyses

All analysed variables were expressed as frequencies and percentages. The risk factors associated with cyberbystanding were analysed using binary logistic regression (Cox, 1970; McCullagh & Nelder, 1983), given the dichotomous nature of the dependent variable. In a first step, bivariate logistic regression models were fitted to estimate the probability and risk of cyberbullying bystanding based on each of the individual variables studied. Risk was measured using odds ratios (OR) alongside their respective confidence intervals. In a second step, a multivariate logistic model was developed based on the bivariate outcomes to evaluate the overall association of several individual variables with the risk of cyberbystanding in primary education. To this end, an initial model made up of all examined variables with a *p-value < .25* in the bivariate models (Hosmer et al., 2000) were included. From this model, a stepwise procedure was carried out. Variables were introduced in each step and/or eliminated until the best predictive model was obtained in terms of the Akaike Information Criterion (AIC*)*, considering predictive power to be better when the AIC was lower.

As in the bivariate analyses, coefficients were contrasted using the Wald statistic, assessing the respective p-values, alongside the ORs and their confidence intervals. In order to assess goodness and of fit of the model obtained, a Chi-square likelihood ratio test (Li & Babu, 2019) was used. Non-significant outcomes indicated good model fit. McFadden's R^2 (McFadden, 1974) was also calculated, with R^2 values between .2 and .4 indicating good model fit and values greater than .04 meaning excellent fit (McFadden, 2021).

Statistical analyses were performed with the statistical program R in its version 4.1.0 (R Development Core Team, 2020). The stepwise procedure was carried out using the stepAIC function of the R MASS package and p-values < .05 were considered to indicate statistical significance.

Results

Of the total number of families who reported whether their child had any experience as a cyberbystander, 201 families (21%, 95% CI: 18% - 23%) indicated that their child had been a cyberbullying bystander at least once during the previous six months. Descriptive outcomes (see Table 1) show that, in addition, 68% of children were also cyberaggressors and 62% were both cyberbystanders and cybervictims. With regards to technology use, cyberbullying bystanders use mobile phones with the Internet more than those who do not (61% compared to 39%). This outcome was similar to that pertaining to the use of tablets with Internet access (68% of bystanders compared to 32% of non bystanders).

Table 1. Study outcomes as a function of being a bystander to cyberbullying in primary education

		Non bystander		Bystander on one or more occasions		Total	
		n	*%*	*n*	*%*	*n*	*%*
Use desktop computer with Internet	No	562	74%	145	73%	707	74%
	Yes	199	26%	53	27%	252	26%
	Total	**761**	**100%**	**198**	**100%**	**959**	**100%**
Use laptop with Internet	No	351	46%	86	43%	437	45%
	Yes	410	54%	112	57%	522	55%
	Total	**761**	**100%**	**198**	**100%**	**959**	**100%**
Use mobile phone with Internet	No	392	52%	77	39%	469	45%
	Yes	369	48%	121	61%	490	55%
	Total	**761**	**100%**	**198**	**100%**	**959**	**100%**
Use tablet with Internet	No	202	27%	64	32%	266	30%
	Yes	559	73%	133	68%	692	70%
	Total	**761**	**100%**	**197**	**100%**	**958**	**100%**
Use games console with Internet	No	438	58%	110	56%	548	57%
	Yes	323	42%	88	44%	411	43%
	Total	**761**	**100%**	**198**	**100%**	**959**	**100%**
Number of technologies used	≤1	141	18%	26	13%	167	16%
	two	283	37%	74	38%	357	37%
	3	211	28%	67	34%	278	31%
	≥4	126	17%	30	15%	156	16%
	Total	**761**	**100%**	**197**	**100%**	**958**	**100%**
Frequency of Internet connection at home	1 or 2 times/month	69	9%	19	10%	88	9%
	2 or 3 times/week	398	53%	86	44%	484	48%
	Every or almost every day	290	38%	91	46%	381	42%
	I don't know	1	<1%	1	<1%	2	<1%
	Total	**758**	**100%**	**197**	**100%**	**955**	**100%**
Daily hours of Internet connection	< 1	428	57%	99	51%	527	54%
	1-2	294	39%	84	43%	378	41%
	≥3	30	4%	10	5%	40	5%
	I don't know	4	<1%	2	1%	6	<1%
	Total	**756**	**100%**	**195**	**100%**	**951**	**100%**
Timing of Internet connection at home	Anytime	132	18%	36	19%	168	18%
	Afternoon	585	78%	138	73%	723	76%
	Nights	31	4%	13	7%	44	6%
	I don't know	2	<1%	1	1%	3	<1%
	Total	**750**	**100%**	**188**	**100%**	**938**	**100%**
Connects to the Internet anywhere in the home	No	563	74%	138	70%	701	72%
	Yes	195	26%	59	30%	254	28%
	Total	**758**	**100%**	**197**	**100%**	**955**	**100%**
	No	666	88%	172	87%	838	88%

		Non bystander		Bystander on one or more occasions		Total	
		n	*%*	*n*	*%*	*n*	*%*
Connects to the Internet in own room	Yes	93	12%	25	13%	118	12%
	Total	**759**	**100%**	**197**	**100%**	**956**	**100%**
Connects to the Internet in common areas of the home	No	320	42%	79	40%	399	41%
	Yes	439	58%	118	60%	557	59%
	Total	**759**	**100%**	**197**	**100%**	**956**	**100%**
Connects to the Internet in a specific place in the home	No	676	89%	182	92%	858	91%
	Yes	82	11%	15	8%	97	9%
	Total	**758**	**100%**	**197**	**100%**	**955**	**100%**
Use the Internet for entertainment	No	87	11%	21	11%	108	11%
	Yes	674	89%	176	89%	850	89%
	Total	**761**	**100%**	**197**	**100%**	**958**	**100%**
Use the Internet to do tasks	No	126	17%	34	17%	160	17%
	Yes	635	83%	163	83%	798	83%
	Total	**761**	**100%**	**197**	**100%**	**958**	**100%**
Use the Internet to talk with friends	No	564	74%	124	63%	688	69%
	Yes	197	26%	73	37%	270	31%
	Total	**761**	**100%**	**197**	**100%**	**958**	**100%**
Unknown reason for Internet use by families	No	759	100%	197	100%	956	100%
	Yes	2	<1%	0	0%	2	<1%
	Total	**761**	**100%**	**197**	**100%**	**958**	**100%**
Cybervictimization	No	729	97%	114	62%	843	80%
	once or more	22	3%	70	38%	92	20%
	Total	**751**	**100%**	**184**	**100%**	**935**	**100%**
Cyberbullying perpetration	Nope	733	100%	113	68%	846	84%
	once or more	3	<1%	52	32%	55	16%
	Total	**736**	**100%**	**165**	**100%**	**901**	**100%**

Notes: n: number of cases; *%*: percentage of cases.

The following variables emerged as significant risk factors regarding cyberbystanding in primary education: a) the use of mobile phones with Internet connection ($p < .01$); b) Talking with friends online ($p < .01$); c) cybervictimization ($p < .001$) and d) cyberbullying perpetration ($p < .001$). Specifically, the risk of cyberbullying bystanding almost doubles for students who use mobile phones with Internet access and when the reason for connecting is to talk with friends. In addition, cybervictimization was associated with a 20-fold increase in risk, whilst cyberbullying perpetration saw 112-fold increase in risk.

With regards to the number of technological devices used by minors, although not statistically significant overall ($p > .05$), significant differences were obtained between those who used 1 or no devices and those who used 3 devices, with almost double the risk seen for those corresponding to the latter ($p < .05$). Similar outcomes were found for the frequency of Internet connection, with higher risk (almost double) seen in those who connected every or almost every day relative to those who connected 2 or 3 times a week ($p < .05$).

Table 2. Binary logistic regression outcomes pertaining to research variables and cyberbystanding in primary education.

	Coefficient	SE	p value	OR	95% CI
Use desktop computer with Internet					
No					
Yes	0.032	0.180	.860		
Use laptop with Internet					
No					
Yes	0.109	0.161	.499		
Use mobile phone with Internet					
No				1	
Yes	0.513	0.163	.002**	1.669	1.216 -2.303
Use tablet with Internet					
No					
Yes	-0.286	0.173	.098		
Use games console with Internet					
No					
Yes	0.081	0.161	.612		
Number of technological devices used			.175		
≤1				1	
2	0.349	0.250	.163		
3	0.544	0.255	.033*	1.722	1.055- 2.880
≥4	0.256	0.295	.386		
Frequency of Internet connection at home			.123		
2 or 3 times/week				1	
1 or 2 times/month	0.242	0.285	.395		
Every or almost every day	0.373	0.169	.027*	1.452	1.043 -2.024
I don't know	1.532	1.419	.280		
Daily hours of Internet connection			.448		
< 1					
1 - 2	0.211	0.167	.205		
≥3	0.365	0.382	.339		
I don't know	0.771	0.873	.377		
Timing of Internet connection at home			.369		
Anytime					
Afternoon	-0.145	0.211	.491		
Nights	0.430	0.380	.258		
I don't know	0.606	1.239	.625		
Connects to the Internet anywhere in the home					
No					
Yes	0.211	0.176	.232		
Connect to the Internet in personal bedroom					
No					
Yes	0.040	0.241	.868		
Connects to the Internet in common areas of the home					
No					
Yes	0.085	0.163	.602		
Connects to the Internet in a specific place in the home					
No					
Yes	-0.386	0.293	.187		
Use the Internet for entertainment					
No					
Yes	0.079	0.257	.760		
Use the Internet to do tasks					

		Coefficient	SE	p value	OR	95% CI
	No					
	Yes	-0.050	0.212	.814		
Use the Internet to talk with friends						
	No				1	
	Yes	0.522	0.169	.002**	1.685	1.207 - 2.344
Unknown reason for Internet use by families						
	No					
	Yes	-12.217	378.593	.974		
Cybervictimization						
	No				1	
	Once or more	3.013	0.264	.000***	20.347	12.312 - 34.850
Cyberbullying perpetration						
	No				1	
	Once or more	4.722	0.602	.000***	112.437	40.523 - 467.252

Notes: SE: standard error; OR: odds ratio; 95% CI: 95% confidence interval for the OR. *: $p < .05$; **: $p < .01$; ***: $p < .001$.

Based on these analyses, the variables initially considered to be included in the multivariate model were the following: a) using a mobile phone with Internet access; b) using a tablet with Internet access; c) number of technological devices used; d) frequency of Internet connection; e) Connects to the Internet anywhere in the home; f) Internet access in a specific place in the home; g) uses the Internet to talk with friends; h) cybervictimization and i) cyberbullying perpetration.

Table 3. Factors associated with cyberbullying bystanding in primary education. Multivariate logistic regression model outcomes

		Coefficient	SE	p-value	OR (95% CI)
Cyberbullying perpetration	No				1
	1 time or more	3.802	0.639	.000***	44.796 (14.688 – 195.802)
Cybervictimization	Nope				1
	1 time or more	2.494	0.335	.000***	12.114 (6.333 – 23.748)
Number of technologies used	≤1 _				1
	2	0.750	0.363	.039*	2.118 (1.071 – 4.478)
	3	0.785	0.373	.036*	2.191 (1.082 – 4.718)
	≥4	0.171	0.440	.698	
Use the Internet to talk with friends	No				
	Yes	0.443	0.239	.063	

Notes: SE: standard error; OR: odds ratio; 95% CI: 95% confidence interval for the OR. *: $p < .05$; **: $p < .01$; ***: $p < .001$.

Multivariate analysis (see Table 3) showed that the variables of cyberbullying perpetration, cybervictimization ($p < .001$ in both cases), number of technological devices used ($p < .05$) and use of the Internet to talk with friends ($p > .05$) jointly influenced the risk of being cyberbystanders in primary education. In fact, minors who are involved in cyberbullying victimization and perpetration are much more likely to also be cyberbystanders than those who are not, with risk being almost 45 times higher in the case of cyberperpetrators and 12 times higher for victims of cyberbullying. Likewise, students who use 2 and 3 technological devices have twice the risk of those who use one or none.

In addition, Chi-square outcomes pertaining to the likelihood ratio of the multivariate model were not statistically significant and the McFadden R^2 coefficient of determination was .42.

Discussion

In the present research, individual variables associated with the risk of cyberbystanding in primary education were identified in relation to technology use and experiences as victims or aggressors of cyberbullying. This type of study can be considered of great interest because existing research on the phenomenon has tended to focus more on risk factors associated with cyberperpetration or cybervictimization at the compulsory secondary education stage.

With regards to the research hypotheses, the first hypothesis is partially confirmed [H1. Children who use many different Internet-connected technologies (mobile phone, laptop, desktop computer, tablet, and games console) are at greater risk of being a cyberbullying bystander. Although the number of technological devices used by minors was not statistically related overall ($p > .05$), significant differences did exist two groups, specifically, those who used one or no devices and those who use three devices. The latter presented greater risk than the former. The number of devices used may impact the risk of being a cyberbystander due to the difficulty of parental mediation when a number of devices are available. Educational programs encouraging parental mediation could be useful to teach families how to use and regulate technological devices (Halpern et al., 2021). In relation to this, Mishna et al. (2012) analysed the association between the number of computers in the home and cyberbullying, but did not detect a significant relationship. This may be because they considered the number of computers and not the number of different technological devices with Internet access at home.

The second hypothesis [H2. The type of technology with Internet access used by minors (mobile phone, laptop, desktop computer, tablet and games console) influences the likelihood of cyberbystanding] is also verified. Thus, minors who use mobile phones with Internet are at greater risk (almost double) than those who do not. This finding is consistent with those reported by Álvarez-García et al. (2015) who identified mobile phone ownership as a possible risk factor for involvement in cyberbullying. This may be because mobile phones are small technological device and, therefore, enable a large degree of independent and ubiquitous use. This may increase exposure to cyberbullying directed at peers and make it easier for minors to be accomplices when disseminating and transmitting information about others. This fact could make parental mediation, for example, through supervision, difficult.

With regards to the third research hypothesis [H3. Students who use Internet-connected technological devices more often (daily, several hours a day) are at greater risk of cyberbullying bystander], bivariate outcomes provide partial support. The frequency of Internet connection is not a significant factor, but a significantly higher risk was detected for those who connect every or almost every day compared to those who connect two or three times a week. These findings coincide with those of Guo (2016) who found the frequency of access to social networks to be a risk factor associated with participation in cyberbullying roles. Likewise, Sittichai and Smith (2020) found high risk to be related, in addition to other factors, to connecting to the Internet more often, i.e., several times a day or 15 to 20 hours per week or more. Feijóo et al. (2021) pointed out that people involved in the phenomenon of cyberbullying spend more time online. This may be explained by the fact that by spending more time on the Internet, minors witness cyberbullying more often. This would help expansion of the phenomenon to be more rapid, making it more difficult for families to mediate.

The present study did not find sufficient scientific evidence to support the fourth (H4. Minors who connect to the Internet at night are more likely to cyberbystand than those who do so at a different time of the day) or fifth hypotheses (H5. Children who access the Internet in non-common areas of the home are at greater risk of being cyberbystanders). The lack of influence of the timing of internet use

could be explained by the fact that cyberbullying perpetration occurs at any time of the day. This is one of the characteristics of this phenomenon that most affects the mental health of the victim (Kowalski et al., 2014) and also means that cyberbullying can be witnessed at any time. In relation to the place of connection at home, present findings do not agree with those of González et al. (2016) and Stald and Ólafsson (2012). This may be because aggressors prefer to isolate themselves by connecting in non-common areas of the home as a means to perpetrating acts without being discovered.

The sixth hypothesis (H6. The motive for Internet use influences the likelihood of cyberbystanding) is confirmed based on present outcomes. Minors who use technology to talk with friends are more at risk of cyberbullying bystanding than those who use it for other purposes, such as doing schoolwork. One justification for this is the need for minors to communicate with other people. Thus, Tsimtsiou et al. (2018) argued that the main reason minors involved in the phenomenon connected to the Internet was to access chat rooms. Rice et al. (2015) detected greater risk when the motive was to send text messages, a channel through which personal data is often shared (Sabater & López, 2015).

The seventh hypothesis of the study is also corroborated (H7. Students who cyberbully others have a higher risk of cyberbystanding). In fact, cyberbullying offenders can be up to 112 times more likely to become cyberbullying bystanders. This agrees with recent results reported by Epelde-Larrañaga et al. (2022) who indicated that cyberbullying aggressors of any type easily participates in other roles as well.

In addition, the eighth hypothesis is verified (H8. Children who are cyberbullied are more likely to also become cyberbystanders) since the risk of being a bystander increases up to 20 times in the case of cybervictims. This may be justified by the fact that cybervictims themselves may also be cyberbystanders. Holfeld and Mishna (2018) found that cyberbullying bystanding was positively associated with playing the role of cybervictim.

The confirmation of these last two hypotheses (H7 and H8) suggests that a close relationship exists between the three main roles in cyberbullying (perpetration, victimization and bystanding). This is also supported by previous scientific literature. For example, a recent study carried out by Epelde-Larrañaga et al. (2022) revealed that it is easier to attack in the presence of cyberbullying bystanders. Scientific research included in the systematic review conducted by González (2016) of risk factors based on the triple criminal risk (TRD) model also reported similar results. Thus, being a cybervictim or a cyberperpetrator has a very significant influence on being a cyberbullying bystanders, and vice versa.

Finally, present findings also confirm the ninth hypothesis (H9. The individual variables [number of technological devices, type of technology, frequency, reason for use, timing, place of connection, cybervictimization and cyberperpetration] significantly influence the risk of cyberbystanding in primary education). Thus, cyberbullying perpetration, cybervictimization, the number of technological devices used by minors and talking with friends online jointly predict cyberbystanding in primary education. In this sense, few existing studies examine the use of technology and the risk associated with cyberbullying bystanding. However, Domínguez-Hernández et al. (2018) identified factors such as empathy, moral disconnection, self-efficacy, friendship and the social setting. These authors also referred to the characteristics of technology-mediated communication, which may share similarities with the outcomes presented here.

Conclusions

With regards to the objectives of the present study, 7 of the 9 established research hypotheses were confirmed. Thus, it can be stated that the majority of the examined

variables are associated with cyberbullying bystanding, namely, the use of mobile phones with internet connection, talking with friends online, the number of technological devices with internet connection, the frequency of Internet connection, cybervictimization and cyberperpetration. These factors were identified using logistic regression models, with the McFadden pseudo-R^2 value and non-significant Chi-square value indicating good fit and prediction quality.

Present findings are useful for the design of cyberbullying prevention strategies in the education setting as a means to avoiding harmful consequences on academic performance and, especially, on the general well-being of the minors. Indeed, not only victims and aggressors see repercussions on their health such as anxiety, stress, social phobia, depression and suicidal ideation (Cuberos et al., 2018) but, also, cyberbystanders are negatively affected too. For this reason, Epelde -Larrañaga et al. (2022) argue that both active and passive bystanders also suffer from the consequences of their actions shortly afterwards. Such consequences include mental health problems, substance abuse, social isolation, emotional regulation difficulties, apathy, anguish, fear and feelings of helplessness. In short, psychological states that favour the internalisation of problems (Lambe et al., 2017) and lead to a reduction in quality of life (Garaigordobil & Oñederra, 2010).

It is also worth noting that the present study verified the existence of a close relationship between cyberbullying perpetration, victimization and bystanding, in accordance with findings reported by González (2016) in a systematic review of risk factors based on the triple criminal risk (TRD) model. Thus, cyberbullying is a complex and dynamic social phenomenon characterised by diverse acts that are also constantly changing and under the influence of technological development. This phenomenon can be understood from Bauman's theory of liquid modernity (2015), in the sense that cyberbullying constitutes a "liquid" phenomenon that flows, splashes and floods those involved. In addition, liquids, unlike solids, cannot be easily stopped as highlighted by Bauman (2015). Hence, given the trend towards expansion of the phenomenon, cyberbystanders must act proactively to seek help and support the victim, taking a role to reject violence. This argument coincides with the bystander intervention approach (American Educational Research Association, 2013), which is based on mobilising bystanders in defence of victims. Thus, active bystanders who act as advocates contribute to increasing victims' perceptions of social support, helping them to cope better with this phenomenon (Cohen et al., 2000).

For all these reasons, it is necessary to address the risk factors associated with cyberbystanding identified in the present research, as a means to preventing the phenomenon. One of the most widely used theoretical approaches to understand and intervene in cyberbullying is the socioecological or systemic theory developed by Bronfenbrenner (1979). This explains the development of minors based on the interrelationship of various social systems from the family and the peer group to the government and mass media. In this way, prevention and intervention regarding cyberbullying must consider the influence of the various systems in which minors develop in order to optimize the effectiveness of outcomes. Thus, an intervention proposal from this perspective could be separated into three axes of action to address all members of the educational community, overall policy (incorporating students, families and teachers/schools) and minors themselves (safe technology use, knowledge about cyberbullying and the improvement of emotional intelligence and social skills). This may be useful given that various programs have achieved significant outcomes reducing cybervictimization by taking this approach (Estévez et al., 2019).

As for families, it is important for children's access to Internet-connected technology to be regulated and for limits to be placed on the frequency of use and number of devices. This

will require the provision of advice and training. More specifically, aspects work on include: 1) improving digital competence, 2) developing skills that allow parents to regulate their children's technology use, and 3) developing closer relationships with schools and allied professionals. Thus, parental involvement in the lives of their children through support, communication and dialogue could be decisive when it comes to addressing this problem. Democratic types of parental mediation appear to be protective against cyberbullying. It is also crucial for mediation to be able to be carried out at schools (Halpern et al., 2021).

Educational centres must also play an important role in the prevention of cyberbullying. In this sense, it is necessary to carry out educational interventions that promote emotional education, inclusion, empathy, education on values and teamwork. For this, the continuous training of teachers, especially tutors, is important. Likewise, centres should promote family involvement in order to increase early detection and intervention in cyberbullying. Finally, this must begin at an early age, such as during primary education, although emotional education can be successfully addressed as early as early childhood education (Girón et al., 2021), thus increasing the possibility of primary prevention.

Limitations and future prospectives

The present study has a number of limitations to be considered. Firstly, data were hetero reported by families meaning that ignorance and social desirability could account for a lower prevalence than that which would have been indicated by students.

Secondly, the study considered individual variables related to technology use, but it would be interesting to also consider family variables and variables linked to the school in order to illustrate a more complete vision of cyberbullying that would, subsequently, enable more effective intervention program design.

Lastly, the sample was drawn exclusively from one country (Spain), which prevents elucidation of some of the cultural differences revealed by other studies.

Based on these limitations, future research could analyse risk factors pertaining to students who use technologies with a high frequency as a means to obtaining more in-depth outcomes. A transnational design could also be considered that systemically studies risk factors, longitudinally and qualitatively to obtain complementary information. This would provide information to explain the phenomenon in greater detail and inform preventive strategies with better chances of success.

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Authors / Autores
López-Castro, Leticia (leticia.lopez@usc.es) 0000-0003-3801-0602   PhD in Education from the University of Santiago de Compostela, graduated in Psychopedagogy and graduated as a teacher, specializing in Early Childhood Education, from the same university. She carried out her doctoral thesis on cyberbullying in primary education. She has been part of the research and/or teaching team at the University of Santiago de Compostela, the International University of La Rioja, the Camilo José Cela University and the Nebrija University. Likewise, she has collaborated with Goldsmiths, University of London where she has carried out various research stays. Currently, she is a postdoctoral fellow with a Margarita Salas grant at the University of Santiago de Compostela, conducting a research stay at the Department of Psychology of the University of La Coruña and member of the Educational Psychology Research Group (GIPED).
López-Ratón, Mónica (monica.lopez.raton@edu.xunta.gal) 0000-0002-2886-6282   PhD in Mathematics from the University of Santiago de Compostela, graduated in Mathematics with a specialty in Statistics and Operations Research and master's degree in Biostatistics from the same university. She did her doctoral thesis on the selection of optimal cut-off points in diagnostic tests. He has been part of research groups at the University of Santiago de Compostela and participated in various research projects on ROC Curves and Generalized Additive Models (GAM) in association, prediction and classification studies, and their applications in fields such as medicine and biology. Currently, member of the Educational Psychology Research Group (GIPED).

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