Negative Online Experiences, Worry, and Risk Perception Among Adolescents: Gender Differences and Implications for Cybercrime Awareness

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Abstract

The present aims to explore the negative online experiences in adolescence, as well as examine the associations of those and their interaction patterns with the frequency of worry and risk perception in relation to several types of online victimization. We conducted a cross-sectional survey study conducted between 2022 and 2023. We collected a non-probabilistic sample of 824 Spanish adolescents. We elaborated a questionnaire based on measures of online victimization to collect the data about the fear about and risk perception of online victimization. The sample was composed by 48.3% females, 49.5% males and 1.8% gender non-binary, aged between 12 and 18 years old (mean = 14.53, standard deviation = 1.48). The results showed a prevalence point of negative experiences in the use of social networking or messaging apps of 23.4%, with older adolescents (aged 15-18 years) having a slightly higher prevalence than younger adolescents. Additionally, negative online experience was higher among female adolescents. The bivariate analyses of the high frequency of worry about and risk perception of online victimization and gender revealed that, overall, adolescents are more worried about online victimization than they perceive risk. The log linear regression shows different types of associations among, the high frequency of worry about or risk perception of online victimization, negative online experiences, and gender.

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Note

This is the self-archirved version of the Accepted Manuscript of the following published manuscript: Trinidad, A., Marcos, V., Montes, A., & Seijo, L. (2025) Negative Online Experiences, Worry, and Risk Perception Among Adolescents: Gender Differences and Implications for Cybercrime Awareness. *Cyberpsychology, Behavior, and Social Networking, 28*(5). Final publication is available from Mary Ann Liebert, Inc.: https://doi.org/10.1089/cyber.2024.0476

Introduction

In recent years, the widespread adoption of emerging Information and Communication Technologies has transformed the ways people interact and socialize, (1,2) particularly among younger populations(3–5). Despite the many benefits and opportunities these technologies offer, there is growing concern about victimization behaviors occurring in digital spaces(6,7). Recent research highlights the most harmful risks for young people (8), including cyberbullying, sexual harassment, exposure to harmful content, sexting, and contact with strangers (9–11). However, despite some progress, the literature on risk perception and concerns about online victimization—particularly its connection to negative online experiences—remains in its early stages (12). Understanding how adolescents perceive these risks is essential both theoretically and practically. Theoretically, this exploratory research contributes to refining existing theoretical models by identifying the conditions under which concerns about online victimization arise. Practically, it contributes to improving selective intervention programs aimed at addressing adolescents' risk perceptions and reducing their vulnerability to online threats.

The fear of crime[1] is commonly understood as a subjective perception of insecurity that arises in a specific situation or context. While there has been considerable debate about its definition and conceptualization, it is generally seen as a response to crime when perceived as a personal threat—essentially, the anxiety of becoming a victim (13). In this regard, Alfaro-Beracoechea et al.(14) highlight in their meta-analysis that fear of crime is associated with a higher prevalence of mental health disorders, such as depression and anxiety, and a decrease in subjective well-being. Despite the extensive literature on conventional fear of crime, research on worry and risk perception related to online victimization remains limited.

Previous studies emphasize the importance of analyzing risk perception and fear of crime in the context of online victimization (15,16), as both cognitive processes influence how individuals navigate online experiences (17,18), According to the literature, risk perception in the virtual space is a cognitive process shaped by the information individuals possess, which they process by forming value judgments that, in turn, influence their behavior (19). This perception

[1]For brevity we use in this manuscript fear of crime (or cybercrime) as an umbrella term of perceptions about cybercrime.

plays a crucial role in adopting and maintaining cybersecurity-related practices (20).

As in the study of conventional fear of crime, gender differences also emerge in the perception and concern about cybercrime and antisocial online behaviors. Research has shown that women tend to classify certain forms of online harassment as more severe than men do (21), indicating a higher level of sensitivity. This difference may reflect greater awareness among women, but it could also stem from a heightened perception of vulnerability. The vulnerability hypothesis has been widely debated in the context of conventional fear of crime and can also be applied to the digital sphere. In this context, women may feel more emotionally vulnerable (psychological distress) (22), particularly because society tends to stigmatize them more harshly than men if intimate photos or videos are made public (23).

In order to shed light into the fear of cybercrime literature, we post this research the following research question: How common are negative online experiences among adolescents, and how do they relate to their worry and risk perceptions of online victimization? Our specific aim is twofold: 1) to provide updated point prevalence data on online negative experiences among adolescents, and 2) to examine the negative experience association and interaction patterns with the frequency of worry and risk perceptions regarding various types of online victimization. Specifically, the study examines risk perception and concern regarding cyberbullying (school-related online bullying), dating violence, and sexual harassment as cyber-enabled offenses, along with general cyber-dependent crimes[2].

Methods

Participants and Procedure

A non-probabilistic convenience sampling survey was conducted in schools across a region of Spain. Schools were first contacted for participation approval, and once granted, informed consent was obtained from parents or legal guardians (mandatory for participants under 16 years old). Participants then completed the questionnaires voluntarily, anonymously, and individually under the supervision of professional staff. The assessments took place during school hours. To minimize potential interaction effects between variables, the order of measurements was counterbalanced using a standard rotation procedure. Data collection, storage, and processing were conducted in compliance with the Spanish Data Protection Act (25).

The final total sample was composed by 824 Spanish adolescents. From which 48.3% identified themselves as females ($n = 395$), 49.5% males ($n = 408$) and 1.8% non-binary ($n = 15$) ($n = 6$ missing data in this variable). The age ranged

[2]For a more comprehensive explanation of cybercrime definitions, we refer readers to the National Cybercrime Strategy Guidebook by Interpol(24)

between 12 and 18 years old ($M = 14.53$, $SD = 1.48$).

Instruments

An ad hoc questionnaire was made up to obtain socio-demographic information (i.e., gender, age, academic year and type of school). As for the assessment of prevalence of online negative experience ("Have you experienced any negative or unwanted situation using social media or messaging apps in the past year?"), worry about online victimization and online risk perception, an ad hoc questionnaire was used, based on validated victimization scales (26,27), risk perception scale in online contexts (28) and fear of crime. We developed ad hoc questionnaires because, to the best of our knowledge, no existing scales comprehensively evaluate this issue. Most research relies on either single-question measures or multiple items addressing different types of victimization, such as harassment or specific cybercrimes like online scams (12). However, most fail to assess specific behaviors, such as the non-consensual sharing of intimate photos. Some exceptions exist incorporating specific behaviors into their studies (29–31). However, they adapted existing scales that had not been validated, or it did not fully meet our research needs. This gap is critical because broad categorizations may overlook important nuances in how adolescents perceive and experience online victimization. By focusing on specific behaviors rather than generalized categories, we can capture a more accurate and detailed understanding of their experiences, concerns, and risk perceptions (16). Our ad hoc scale consists of 29 items about the types of online victimization, structured in 2 measures: risk perception (5-point Likert scale 0-4) and the frequency of worry (6-point Likert scale 0-5). The scale presented, a good reliability (internal consistency), with α values between .87 and .92.

Data Analysis

To address our research question, we defined two specific objectives. The first was to update the point prevalence of negative experiences on social networks and messaging apps. To achieve this, we estimated the likelihood of experiencing a negative situation within the past 12 months. This was tested against the null hypothesis that the probability is equal to 0.5 (32). Cohen's *h'* (33) was used as the effect size measure, with bootstrapped 95% confidence intervals (CIs) based on 1,000 resamples. We chose these methods to analyze the prevalence for several key reasons. Testing against the null hypothesis of 0.5 helps ensure the results are not due to random chance. Cohen's *h'* provides a clear measure of effect size, making the findings more meaningful beyond statistical significance. Additionally, using bootstrapped 95% confidence intervals with 1,000 resamples improves reliability by reducing reliance on normality assumptions and increasing precision.

To further examine prevalence across demographic strata (e.g., gender and age group), we conducted bivariate analyses using χ^2 tests for 2x2 contingency tables. This method was chosen to identify statistically significant differences

between groups. The phi coefficient was reported as a standardized measure of effect size, along with 95% confidence intervals to quantify uncertainty. To construct the contingency tables, high worry about online victimization was categorized as mean scores at least one standard deviation above the sample mean. Similarly, risk perception was considered present if adolescents scored an average of 3 or higher on the Likert scale, as scores of 3 and 4 represented "some risk" and "a lot of risk," respectively.

Finally, to achieve the second objective, we used log-linear models to examine three-way association patterns and interactions involving gender, type of online victimization, and negative experiences. Log-linear models are well-suited for this analysis as they allow for the exploration of relationships among categorical variables without assuming a dependent-outcome structure. For each type of online victimization, different association models[3] were fitted, with the best model selected based on the Likelihood Ratio Test and lower AIC, ensuring model parsimony. To enhance interpretability, conditional log-odds ratios were transformed into Cohen's d[4] (33) providing a standardized measure of effect size. Higher-order terms were reported, as interpreting lower-order terms in their presence can be misleading. Cohen's d was qualitatively interpreted as 0.20 (small effect), 0.40 (medium effect), and 0.80 (large effect). All statistical analyses were conducted using R version 4.4.2[5] (34).

Results

The prevalence point of negative experience using social networks or message apps was 23.4% ($n = 811$) ($\chi^2 = 229.05$, $p < .001$) with 95 % CI [0.206, 0.264]. Cohen's h' for one sample corresponded with a medium effect size ($h' = .79$, bootstrapped 95 % CI [0.701, 0.886]) (33). In bivariate analyses (see Table 1), older adolescents (between 15 and 18 years old) presented a slightly higher prevalence than younger adolescents, although this association was rather weak ($\phi = 0.091$ 95 % CI [0.02, 0.16]). Age categories were created in order to keep the groups as balanced as possible. Additionally, online negative experience was higher in female adolescents (~ 30 %) than in males (~16 %).

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[3] 3-way association (saturated model): $log(\mu_{ijk}) = \lambda + \lambda_i^A + \lambda_j^B + \lambda_k^C + \lambda_{ij}^{AB} + \lambda_{ik}^{AC} + \lambda_{jk}^{BC} + \lambda_{ijk}^{ABC}$;
complete independence model: $log(\mu_{ijk}) = \lambda + \lambda_i^A + \lambda_j^B \lambda_k^C$;
joint independence model: $log(\mu_{ijk}) = log(\mu_{ijk}) = \lambda + \lambda_i^A + \lambda_j^B + \lambda_k^C + \lambda_{jk}^{BC}$;
conditional independence model: $log(\mu_{ijk}) = \lambda + \lambda_i^A + \lambda_j^B + \lambda_k^C + \lambda_{ij}^{AB} + \lambda_{jk}^{BC}$;
homogenous association model: $log(\mu_{ijk}) = \lambda + \lambda_i^A + \lambda_j^B + \lambda_k^C + \lambda_{ij}^{AB} + \lambda_{ik}^{AC} + \lambda_{jk}^{BC}$

[4] $d = \frac{\log(OR) \times \sqrt{3}}{\pi}$

[5] Due to data sensitivity, the data cannot be made publicly available. Researchers requiring access will be provided with a secure computer on-site, where the data are securely stored. The R syntax for reproducing the data wrangling and analysis is available in the following link under the "Files" tab: https://osf.io/rfnst/?view_only=c38713c7c10d484ebeb3d9371ec5f83c. Please contact the last author of this paper for further details. Note that funding for the stay at the center is not provided.

Table 1: PREVALENCE OF ONLINE NEGATIVE EXPERIENCES ACCORDING TO DEMOGRAPHIC VARIABLES.

Variables	N	Negative Experience (%)	χ^2	p-value	ϕ	95% CI
12-14	69	18.75	6.14	0.01	0.091	[0.02 , 0.16]
15-18	112	26.41				
Female	116	29.97	20.98	0.00	0.166	[0.10 , 0.24]
Male	65	16.05				

Note on N: Cases with online negative experience. The N total for the gender was 792, after removing missing cases for gender (n = 6) and negative experience (n = 13) and cases identified as non-binary (n = 15). The total N for age group was 811.

The bivariate analyses of the high frequency of worry about and risk perception of online victimization and gender revealed that, overall, adolescents are more worried about online victimization than their perceived risk of experiencing it (see Figure 1). The high-frequency prevalence worry ranged between 12.42% (n = 57) for worry about online dating violence and 15.62% (n = 125) for worry about cybercrime (Table S1). In contrast, the prevalence of risk perception ranged between ~3% (n = 14) for perceived risk of dating violence and 5.56% (n = 44) for perceived risk of online bullying (Table S1).

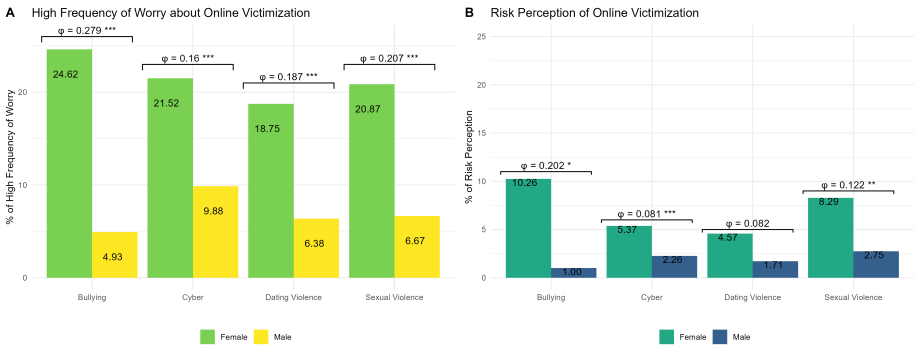


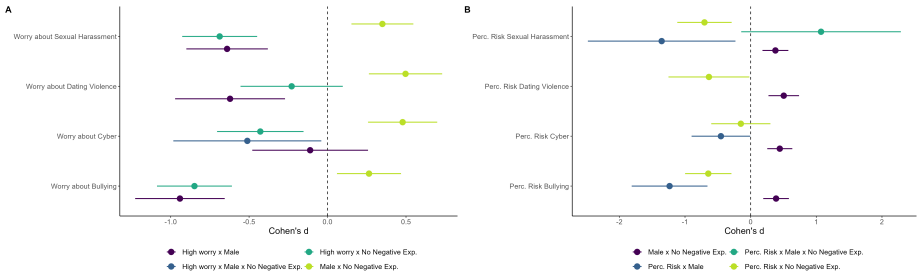
Figure 1: ASSOCIATION BETWEEN HIGH-FREQUENCY WORRY AND RISK PERCEPTION OF ONLINE VICTIMIZATION AND GENDER

Our data showed that female adolescents reported higher levels of worry and risk perception than male adolescents. Specifically, among those who reported being concerned about online bullying, females were five times more worried about being bullied online than males ($\chi^2 = 60.54$, $p < .001$, $= 0.279$, 95% CI [0.21, 0.35]). Similarly, females who reported perceiving the risk of being bullied online ($n = 81$) did so ten times more often than males ($n = 8$) ($\chi^2 = 30.53$, $p < .001$, $= 0.202$, 95% CI [0.13, 0.27]). For other types of online victimization,

female adolescents were about 3 times more concerned than males, with the differences being most notable in worries about sexual harassment and dating violence, and about twice as concerned about cybersecurity (see Figure 1 and Table S1).

It is relevant to note that approximately half of the sample did not respond to the scales measuring frequency of worry and risk perception of dating violence because they did not report having partner (n = 352; 42.72% and n = 358; 43.45%, respectively).

Finally, the loglinear regression analysis explored three-way associations and reported different types of associations among (see Figure 2): a) the high frequency of worry about or risk perception of online victimization, b) negative online experiences, and c) gender. Since most of the two-way associations were detailed in the bivariate analysis, only three-way interactions were commented here (see model fit summaries in Table S2 and see Cohen's d in Table S3).



The model examining the high frequency of worry about online victimization showed the best fit for the homogeneous association, based on the likelihood ratio (LR) test and the lowest Akaike Information Criterion (AIC). This was true for all models except those related to the high frequency of worry about cyber victimization. As reflected in Figure 2 (A) the only one model in which a three-way interaction was observed implies a high level of worry about cyber victimization. Male adolescents who reported a high frequency of worry and did not have an online experience (n = 22) were less concerned than female adolescents (n = 48), d = -0.51; 95% CI [-0.983, -0.039].

Figure 2 (B) depicts Cohen's d for the three two-way interactions (and three-way interactions when present) for the perceived risk of online victimization. Based on the likelihood ratio (LR) test and the lowest Akaike Information Criterion (AIC), the model showed the best fit for the homogeneous association. This was true for all models except those related to the perceived risk of online sexual harassment. In addition, this three-way interaction was not statistically significant (d = 1.07; 95% CI [-0.144, 2.28]).

Discussion

In this study we asked how prevalent are negative online experiences among adolescents, and how do they relate to their worry and risk perceptions of on-

line victimization. To answer this question, we collected a non-probabilistic sample of adolescents that answered a crafted survey about online negative experience and concerns and risk perception of several online antisocial behaviors and crimes.

Our results indicate that 23.4% of adolescents reported negative experiences while using social networking or messaging apps, with older adolescents (aged 15–18) showing a slightly higher prevalence than younger ones, consistent with previous research(3,7,9). Additionally, negative online experiences were more common among female adolescents, aligning with prior studies 4,26 This is true even when controlling for the how concern there are or the perceived risk they report (see log liner models). This pattern persists even when accounting for their level of concern and perceived risk (see log-linear models). Moreover, female adolescents reported higher levels of worry and risk perception than males, particularly regarding sexual harassment and dating violence, even when controlling for negative experiences. Notably, experiencing a negative online incident was associated with increased concern and perceived risk across all adolescents, regardless of gender.

Our results emphasize the importance of distinguishing between concern about cybercrime and perceived risk, as previously discussed in offline contexts(35). This underscores the need for more nuanced theoretical models that account for cognitive-emotional interactions in online risk assessment, rather than conflating worry and risk perception. For example, female adolescents may report higher levels of concern about online harassment, particularly sexual harassment, due to societal awareness and stigma (22,23) even if their actual online behaviors do not expose them to greater risk. In contrast, male adolescents, despite engaging in potentially riskier online activities, may perceive their likelihood of victimization as lower due to differences in socialization and perceived vulnerability. This distinction is particularly relevant in digital environments, where risk perception can be more volatile and influenced by rapidly changing online dynamics and gendered experiences.

Practically, our findings can help inform practitioners, keeping in mind the limitations discussed in the next paragraph and the descriptive nature of the current study. Awareness campaigns and digital literacy programs should not only address actual risks but also help adolescents develop a realistic understanding of their vulnerability, reducing unnecessary fear while encouraging protective behaviors(36,37). Gender-sensitive approaches are also crucial(38,39); for female adolescents, strategies should focus on addressing heightened concerns and providing support against gender-based online threats, while for male adolescents, efforts should emphasize increasing awareness of potential risks they may underestimate.

While this study provides valuable insights, several limitations should be considered. First, the generalizability of the findings is constrained by the sample's size and sampling design. Second, the cross-sectional design not only limits our ability to examine how the variables evolve over time but also makes it difficult

to determine the direction of associations—whether worry and risk perception influence negative online experiences or vice versa. Third, the reliance on self-report measures may introduce response bias, as participants' perceptions and reporting tendencies can affect the results. Finally, unmeasured factors may have effects on the relationships analyzed, highlighting the need for future research to explore additional variables that could shape adolescents' perceptions of online risk and victimization.

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