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# Impact of ICT and social networks on students: An analysis of gender-based attitudinal profiles

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## Abstract

High levels of Internet usage are prevalent among young people. Alongside this increased use, dangerous attitudes and practices among students have been observed. This study aimed to analyse the use of Information and Communication Technologies (ICT) among high school students, their attitudes, and the relationship with gender. A sample of 869 participants aged 11 to 18 was selected, and we developed the Internet Use and Attitudes Scale for Virtual Social Networks (VSN). This scale comprises subscales assessing VSN dependence, parental control, enhancement of social relationships, and engagement in violent behaviour and consumption of inappropriate content. After validating this scale, we employed latent profile analysis to discern unique behavioural and attitudinal profiles among the students. The analysis yielded three distinct groups. The majority (66%) fell into the "Positive Attitude" group (52% female, 48% male). The "Negative Attitude" group represented 29% (49.5% female, 50.5% male), and the "Dangerous Attitude" group comprised 5% (28.3% female, 71.7% male). The "Dangerous Attitude" profile exhibited the highest levels of VSN dependency, violence, and inappropriate content consumption. Males were overrepresented in this category. These findings provide greater insight into problematic Internet use among students, revealing gender disparities. Males were more likely to engage in dangerous online activities like cyberbullying and accessing inappropriate content. Targeted interventions addressing negative attitudes and violent cyberbehaviours are needed, especially for male students. This research enriches our understanding of youth's online habits, attitudes, and risks.

**Keywords** Secondary education · Gender · Internet · Social networks · ICT

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## 1 Introduction

Numerous studies have identified young people and adolescents as the primary population engaged in the widespread use of Information and Communication Technologies (ICT) and the Internet (Devine & Lloyd, 2012; Fernández-Rovira, 2022). As noted by these researchers, Virtual Social Networks (VSN) are not only common communication tools; they also serve as platforms for establishing new interpersonal relationships and joining larger friendship groups (Echeburúa & De-Corral, 2010; Hearn & Foth, 2007). While these tools appeal because of their easy access and instant gratification, their use is not without risk: misuse or overuse of ICT can result in isolation, dependency, and violent behaviours in social relationships (Secades-Villa, 2014).

Yana-Salluca et al. (2022) argue that addiction among high school students, particularly during the critical period of the coronavirus pandemic, has resulted in increased VSN consumption. This, in turn, contributes to heightened academic procrastination and addictive behaviours. The increasing time high school students spend on VSNs warrants analysis, given its potential academic consequences, including school dropout, attention deficits, and social difficulties (Pascoe et al., 2020). Regarding gender, studies indicate that females tend to spend more time on VSNs connecting with strangers, engaging in discussions with friends and relatives, and expressing heightened concern when lacking Internet access (Ballesta-Pagán et al., 2021). Additionally, there seems to be limited parental oversight regarding their children's access to VSNs, irrespective of gender (Zhang et al., 2022). In relation to dangerous practices associated with ICTs and VSNs, high school students might exhibit violent attitudes and find themselves in dangerous online situations (Masrom et al., 2021). These practices encompass various dimensions, which are outlined below.

### 1.1 Virtual Social Network dependency

The frequency of use is closely linked to dependency on the Internet and VSN (Martínez-Ferrer & Ruiz, 2017). While many adolescents claim to be addicted, they often lack the initiative to self-regulate and undergo a detoxification process. Giraldo-Luque and Fernández-Rovira (2020) suggest this can be attributed to the VSN communication interface design, which functions as a reward mechanism. A recent literature review highlights that Internet addiction in adolescents is not just a phenomenon but has serious psychological consequences. It presents multiple risk factors that span individual, family, and psychosocial dimensions (Rojas-Jara et al., 2018).

Fernández-Rovira's (2022) study found that young people spend an average of 5.5 h per day on VSNs. It also confirmed that users' attention focuses on a limited number of platforms, with Instagram being the most popular in terms of consumption among high school students. Regarding gender differences, females spend an additional 0.7 h on Instagram compared to males, whereas males devote 0.5 more hours to YouTube than females. This study highlights the heightened VSN consumption, aligning with other researchers' conclusions that have noted a rise in usage

among young people and adolescents in recent years (Ahmed, 2019). Echeburúa and De-Corral's (2010) research also identifies the main warning signs that predict VSN dependency. Given these consequences and the latest data on adolescents' digital practices, the importance of studying this dimension becomes evident.

### 1.2 Parental control

The degree of parental control strongly influences students' use of ICTs and VSNs (Livingstone et al. 2015). Parental control encompasses the measures parents adopt to shield their children from online threats. It has been identified as a protective factor against threats such as cybervictimization (Sasson & Mesch, 2017). This study specifically verifies that, with the right parental guidance on sharing personal information and maintaining proper online behaviour on VSNs, adolescents' risk of cyberbullying victimisation diminishes. However, even though parental control typically begins in pre-adolescence, research indicates that it may lose effectiveness during later developmental stages (Kowalski et al., 2014). This underscores the need for parents to consistently monitor their children's activities in virtual environments at both younger and older ages (Padilla-Walker et al., 2020). Within this context, proactive parental control could mitigate cybervictimization by encouraging responsible VSN usage (Martin-Criado et al., 2021).

Concerning the gender aspect of parental control, Álvarez-García et al.'s (2019) findings indicate that girls felt their families monitored their Internet usage more stringently than boys did. Moreover, females displayed symptoms consistent with specific addictive behaviours, notably excessive social network usage and feelings of unease or anxiety when deprived of mobile phone access. On the other hand, males were found to have a higher likelihood of encountering other Internet-related issues, including exposure to inappropriate content, video game addiction, and problems with online gaming and gambling. This dimension becomes significant when investigating secondary school students' usage and attitudes towards ICTs and VSNs, highlighting the role of parents and potential gender differences.

### 1.3 Improvement of social relationships

VSNs have significantly increased the accessibility of social relationships by fostering online connections and interactions (Lin & Erickson, 2008). Research shows that that adolescents mainly interact online with individuals they already know offline (Ángel-Franco & Alzate-Marín, 2015; Solano et al., 2013). Hence, online relationships typically extend offline social ties, allowing students to forge friendships and connect over mutual interests. However, Cornejo and Tapia (2011) note that adolescents using VSNs also interact, to some extent, with individuals they have only met online. While secondary school students increasingly use ICTs for socialisation, some research suggests these platforms might diminish face-to-face interactions, potentially leading to adverse outcomes (Espinel-Rubio et al., 2020). Due to these conflicting effects and the lack of studies examining gender differences in this dimension, analysing secondary school students' social relationships is crucial.

### 1.4 Violent use and consumption of inappropriate content

The high level of dependency on VSNs is associated with involvement in relational violence for both genders, as well as with cyberaddiction, bullying, and cyberbullying (Martínez-Ferrer & Ruiz, 2017). Additionally, this study observed that females are more likely to misuse VSNs, which in turn leads to increased expression of violent behaviours towards their peers at school. The authors contend that research into both virtual and non-virtual problematic behaviours among adolescents should incorporate a gender perspective.

Regarding the violent use of ICTs, studies have observed that boys are more likely than girls to admit disseminating compromising images with sexual or suggestive content without the victim's consent (Álvarez-García et al., 2017). Conversely, a larger proportion of girls indicate being pressured into engaging in unwanted activities by threats to share private conversations or intimate images of themselves. Given these findings, numerous studies encourage further exploration of adolescents' violent use of ICTs and VSNs, especially concerning gender differences.

### 1.5 The present study

Given the concerning trends regarding adolescents' problematic Internet and social media use outlined in the literature (Rojas-Jara et al., 2018; Secades-Villa et al., 2014), this study aimed to develop a comprehensive tool for assessing these behaviours. Our review of prior research highlighted the need for a multidimensional scale evaluating the various factors influencing students' online activities and attitudes. While existing studies have examined dimensions such as Internet addiction (Giraldo-Luque & Fernández-Rovira, 2020; Fernández-Rovira, 2022), online violence (Martínez-Ferrer & Ruiz, 2017), and parental mediation (Livingstone et al., 2015) independently, few have assessed these aspects concurrently within a single measure. Furthermore, prior work analysing online behaviours has focused on specific populations and contexts (Masrom et al., 2021; Vanderhoven et al., 2014), but has not examined gender differences in depth. Our review highlighted a lack of research exploring how problematic Internet use, risky online activities, and parental mediation may vary by gender among adolescents. Several studies have analysed these factors independently through a gender lens (Ballesta-Pagán et al., 2021; Álvarez-García et al., 2019), but comprehensive tools assessing multiple dimensions concurrently from a gender perspective are scarce.

Therefore, our study addresses critical gaps in the literature by: (a) introducing a novel validated scale measuring multiple facets of Internet and social media use, including problematic areas frequently assessed in isolation; and (b) leveraging this tool to identify unique user profiles and analyse gender differences through latent analysis on a large general sample of adolescents. Overall, our proposed system enables a more holistic examination of this population's online habits and risks, with an emphasis on providing new insights based on gender.

To achieve this, we developed the Internet and Virtual Social Networking Use and Attitudes Scale, assessing the following subscales: Internet and VSN Dependency,

Parental Control, Enhancement of Social Relationships, and Violent Usage and Consumption of Inappropriate Content. Five specific objectives were established to address the gaps: (1) Assess the validity and reliability of the Internet and Virtual Social Networking Use and Attitudes Scale; (2) Analyse gender differences in Internet and VSN dependency; (3) Explore gender-based variations in parental control over Internet and VSN usage; (4) Examine the role of gender in online and VSN social relationships; (5) Investigate gender differences in violent usage and consumption of inappropriate content on the Internet and VSNs.

## 2 Materials and methods

The research carried out in this study is quantitative and cross-sectional. This section presents information on the sample, the instrument used, its subscales, the procedure followed, and the data analysis techniques employed.

### 2.1 Sample

The sample comprised 869 high school students, with an average age of 14.99 years (SD = 1.85), 50.2% male and 49.8% female. Participants were drawn from both public and private secondary schools from Spain. The students ranged from Grade 7 to 12, including those enrolled in Intermediate Level Vocational Training (*Ciclos Formativos de Grado Medio* in Spanish).

### 2.2 Procedure

We contacted several high schools via email, phone calls, and in-person visits. We explained the study's objectives and procedural requirements to the schools' management teams. Upon receiving authorisation, we randomly selected classes to achieve a representative sample were randomly selected, and a date and time were scheduled to administer the questionnaire to the students. The school informed the parents about the questionnaire and requested written consent. Students completed the questionnaire anonymously and individually, always in the presence of the responsible personnel We handled the data ethically, ensuring confidentiality and objectivity in line with academic research guidelines.

### 2.3 Instrument

The development of the Internet and Virtual Social Networking Use and Attitudes Scale led to a 20-item questionnaire that evaluates four subscales using a Likert scale ranging from 1 (Never) to 6 (Always). The assessed subscales are as follows:

- Dependence on VSN: Drawing on previous work analysing the characteristics of ICT dependency (Echeburúa et al., 2009; Echeburúa & De-Corral, 2010), a 6-item subscale was created. Characteristics assessed by these items include time

spent on VSNs, emotional instability associated with the inability to connect, sacrificing sleep, and excessive VSN usage.

- Parental control: This 4-item subscale was developed based on prior research examining the various strategies parents employ to supervise their children's online usage to protect them from risks and dangers (Livingstone et al., 2015; Martin-Criado et al., 2021). Specifically, the subscale evaluates the presence of rules and schedules for social network usage, as well as restrictions and parental control over the websites visited.
- Improving social relationships: Building on research that underscores adolescents' tendencies to share their real identities on social networks (Kim & Kim, 2019; Krämer & Schäwel, 2020; Tello, 2013), a 5-item subscale was developed. Students were asked about the frequency of adding and chatting with strangers on social media, whether they find this enjoyable, and if they have met any online acquaintances in real life.
- Violent use and consumption of inappropriate content: Drawing insights from research on adolescents' inappropriate Internet use (Kowalski et al., 2014; Mascheroni & Ólafsson, 2014), this 5-item subscale was devised. The items include questions assessing cyberbullying, accessing violent websites, and sites promoting alcohol and drug use.

### 2.4 Data analysis

In this research, two separate blocks of analysis were conducted. First, the scale used was validated and subjected to factor analysis. Second, a latent profile analysis was performed.

#### 2.4.1 Validation and reliability analysis of the Internet and Virtual Social Network Use and Attitudes Scale

The factor structure of the scale was evaluated using Exploratory Structural Equation Modelling (ESEM; Asparouhov & Muthén, 2009). We opted for ESEM as our method of analysis because it allows for a more comprehensive examination of the factor structure by testing a wider range of alternative models compared to confirmatory factor analysis (Fig. 1). Two- to five-factor solutions were considered, and the fit of the different models was analysed to determine the optimal number of factors. Following the methodology outlined by Milton et al. (2018), several fit indices were used to compare the models, including the comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA). For evaluating each model's goodness of fit, we referred to the cut-off values recommended by Hu and Bentler (1999): CFI and TLI above 0.90 and 0.95, respectively, and RMSEA below 0.08 and 0.06. These values are considered as indicators of acceptable and excellent fit, respectively.

After establishing the factor structure, we assessed the internal reliability of each factor employing McDonald's Omega. This metric was preferred due to its demonstrated higher

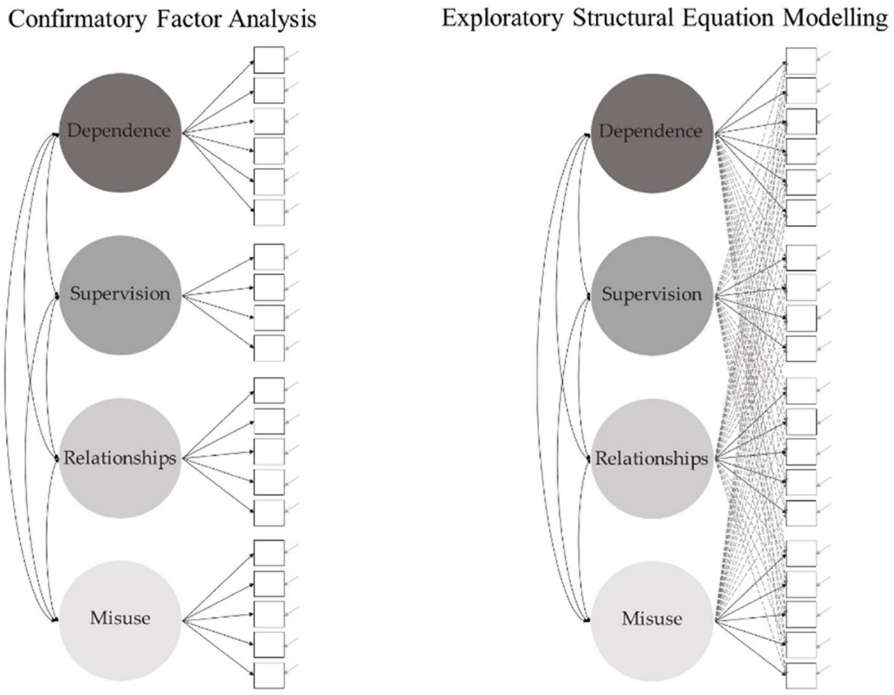


**Fig. 1** Factor analysis models. Note. Dependence = Dependence on VSN; Supervision = Parental control; Relationships = Improving social relationships; Misuse = Violent use and consumption of inappropriate content

accuracy over Cronbach's Alpha (McNeish, 2018). It is calculated as: $\omega = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum \theta^2_{\epsilon_i}}$, where $\lambda_i$ are the factor loadings and $\theta^2_{\epsilon_i}$ are the error variances. Values above 0.75 and 0.90 are considered indicators of good and excellent reliability, respectively.

### 2.4.2 Latent profile analysis

Upon determining the factor structure of the Internet and Virtual Social Network Use and Attitudes Scale and evaluating the internal reliability of each subscale, we conducted a latent profile analysis (LPA). This technique seeks to capture population variability with the fewest latent profiles (Korpipää et al., 2020). Unlike traditional cluster analysis, LPA allows deciding the number of profiles based on different fit indices (Morin & Marsh, 2015; Stanley et al., 2017): Akaike information criterion (AIC), Bayesian information criterion (BIC), and likelihood ratio test (LRT). Lower values of AIC and BIC indicate a better fit than higher values. Conversely, the LRT reports whether the fit of a model with k latent profiles is better than that of a model with k-1 profiles. A low p-value indicates that a model with k groups fits better than a model with k-1 groups (Lo et al., 2001).

In this study, solutions with one to six profiles were tested using standardized factor scores to mitigate the impact of measurement errors (Justice et al., 2011). The number of profiles selected was determined by plotting the Akaike information criterion (AIC) and Bayesian information criterion (BIC) values of the different solutions and looking for a clear change in the graph, which is an indicator of an adequate solution (Morin et al., 2016).

After determining the number of profiles, we analysed gender differences among students across these profiles using the Bolck-Croon-Hagenaars (BCH; Bolck et al., 2004) method (Asparouhov & Muthén, 2014b). In contrast to traditional ANOVA, the BCH method considers the probability of an individual's membership across multiple profiles instead of presuming they belong exclusively to one profile (Asparouhov & Muthén, 2014a).

## 3 Results

The results of the validation and reliability analysis of the Internet and Virtual Social Networking Attitudes and Use Scale are presented in the following section. Furthermore, the key findings related to the variables analysed within the latent profile analysis model are also reported.

### 3.1 Validation and reliability analysis of the Internet and Virtual Social Network Use and Attitudes Scale

The starting point of this research consisted of the development of the Internet and Virtual Social Network Use and Attitudes Scale. The scale was designed with a total of 20 items assessing four subscales. The following table shows the results obtained after testing the factor structure of the scale by comparing the two- to five-factor solutions (Table 1).

The results of the ESEM models suggest that the two-factor solution is not optimal even though it has adequate fit indices. On the other hand, the rest of the solutions had fit indices that can be considered as good, in the case of the three-factor solution, and excellent, in the case of the four- and five-factor solutions. Based on the recommendations of Worthington and Whittaker (2006) and in alignment with our theoretical interpretation, we opted for the four-factor solution. The following table (Table 2) shows the standardized factor loadings of each item and the factor to which they belong.

**Table 1** Adjustment index of the different ESEM models

| Number of factors | $X^2$ | df | CFI | TLI | RMSEA |
|---|---|---|---|---|---|
| 2 | 1563.075* | 151 | 0.86 | 0.83 | 0.10 |
| 3 | 840.162* | 133 | 0.93 | 0.90 | 0.08 |
| 4 | 385.760* | 116 | 0.97 | 0.96 | 0.05 |
| 5 | 249.325* | 100 | 0.99 | 0.97 | 0.04 |

df = degree of freedom, CFI = comparative adjustment index; TLI = Tucker-Lewis index; RMSEA = Root Mean Square Error of Approximation; * = $p < .01$

**Table 2** Standardized factorial loadings of the four-factor exploratory structural equation modelling. Values in bold indicate the highest value for each item

| Item | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|
| Factor 1: Dependence on social networks | | | | |
| Item 2 | **0.61** | 0.14 | 0.10 | 0.02 |
| Item 3 | **0.70** | −0.02 | 0.01 | −0.05 |
| Item 6 | **0.64** | −0.04 | 0.10 | −0.09 |
| Item 7 | **0.89** | −0.01 | −0.02 | 0.02 |
| Item 9 | **0.71** | 0.02 | −0.08 | 0.11 |
| Item 11 | **0.59** | 0.02 | 0.03 | 0.20 |
| Factor 2: Parental control | | | | |
| Item 1 | −0.04 | **0.77** | −0.02 | −0.02 |
| Item 5 | 0.04 | **0.65** | 0.06 | −0.05 |
| Item 10 | 0.00 | **0.80** | −0.09 | 0.07 |
| Item 14 | 0.04 | **0.58** | 0.02 | −0.04 |
| Factor 3: Improvement of social relationships | | | | |
| Item 4 | 0.11 | −0.12 | **0.67** | 0.05 |
| Item 13 | 0.17 | 0.02 | **0.56** | −0.04 |
| Item 16 | 0.00 | −0.03 | **0.93** | −0.04 |
| Item 17 | −0.07 | 0.03 | **0.85** | 0.08 |
| Item 20 | 0.05 | 0.03 | **0.57** | 0.10 |
| Factor 4: Violent use and consumption of inappropriate content | | | | |
| Item 8 | 0.09 | −0.12 | −0.01 | **0.62** |
| Item 12 | 0.08 | 0.01 | −0.03 | **0.69** |
| Item 15 | −0.06 | −0.01 | 0.22 | **0.46** |
| Item 18 | −0.06 | 0.03 | 0.07 | **0.83** |
| Item 19 | 0.04 | −0.03 | 0.02 | **0.71** |

The factor loadings of the ESEM varied, and some items cross-loaded across the four factors (item 11, item 14, item 13, and item 15). Nevertheless, given that the cross-loading values were not high, the results support the four-factor structure of the Internet and Virtual Social Networking Use and Attitudes Scale that was proposed by the ESEM.

After confirming the scale factor structure, the internal reliability of each factor was analysed using McDonald's Omega. The results showed reliability values considered as good: 0.85 for the factor Dependence on VSN, 0.79 for the factor Parental control, 0.85 for the factor Improving Social Relationships, and 0.80 for the factor Violent Use and Consumption of Inappropriate Content.

### 3.2 Analysis of latent profiles

Once the hypothesized factor structure and the internal reliability of each factor had been tested, we conducted a latent profile analysis. Table 3 shows the results obtained for the one to six profile solutions.

**Table 3** Adjustment index of each latent profile analysis models

| Number of profiles | AIC | BIC | LTR p | % SG |
|---|---|---|---|---|
| 1 | 9766.946 | 9804.992 | - | 100 |
| 2 | 9047.942 | 9109.767 | 0.00 | 30 |
| 3 | 8749.642 | 8835.245 | 0.00 | 5 |
| 4 | 8639.201 | 8748.584 | 0.00 | 5 |
| 5 | 8535.01 | 8668.171 | 0.00 | 5 |
| 6 | 8447.211 | 8604.151 | 0.00 | 3 |

AIC = Akaike information criterion; BIC = Bayesian information criterion; LRT = likelihood ratio test; % SG = percentage of subjects in the smallest group

The six-profile model was discarded due to an insufficient percentage of subjects in its smallest profile. Such solutions, with minimal participants in a profile, may not reliably represent a single latent profile (Marsh et al., 2009). To determine between the two- and five-profile models, we graphically compared the AIC and BIC indices, noting that both had low p-values in the likelihood ratio test. After plotting these indices, the three-profile model was selected. It not only had lower AIC and BIC values than the two-profile model but also displayed a distinct bend in the plot, signifying an optimal solution (Fig. 2).

The first profile, comprising 570 students (66% of the sample), was characterized by high levels of parental control and low levels of dependence, extended social relationships, and violent use and consumption of inappropriate content. Based on these attributes, it was named the "Good Attitude". The second profile consisted of 249 students (29% of the sample) and, being the inverse of the "Good Attitude" profile in characteristics, was termed "Bad Attitude". This profile reported low levels of parental control and high levels of dependence, extended social relationships and violent use and consumption of inappropriate content.

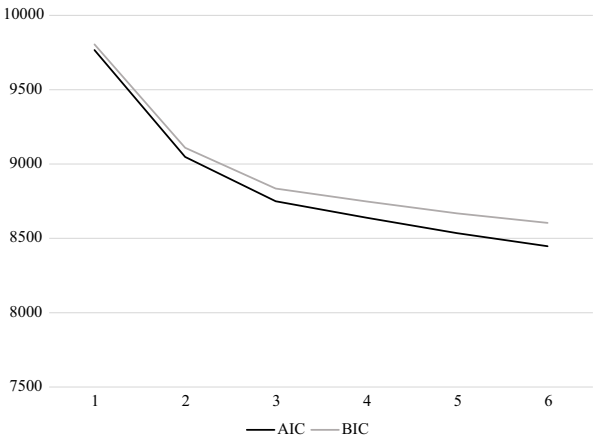


**Fig. 2** Elbow chart. Note. AIC = Akaike information criterion; BIC = Bayesian information criterion

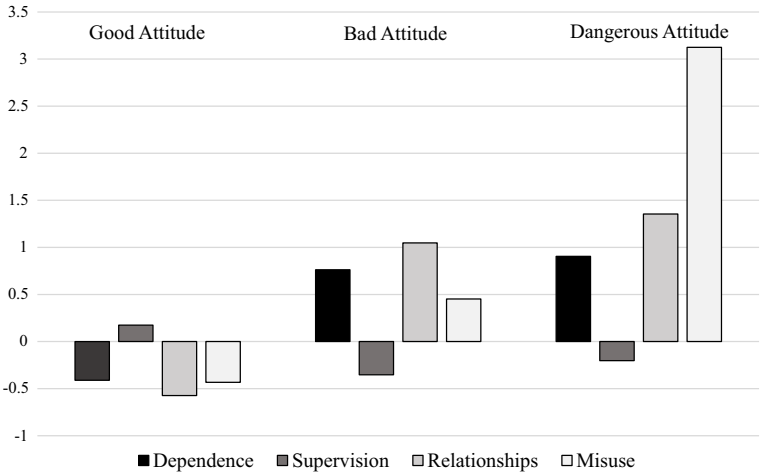


**Fig. 3** Result of latent profile analysis. Note. Dependence = Dependence on VSN; Supervision = Parental control; Relationships = Improving social relationships; Misuse = Violent use and consumption of inappropriate content. Mean values of standardized factor scores are plotted

The third profile, encompassing 40 students (5% of the sample), exhibited greater dependency and a desire to enhance relationships compared to the "Bad Attitude" profile. However, they were markedly distinct due to their pronounced violent behaviour and access to inappropriate content. Yet, their average score for parental control, while low, was not as diminished as that of the "Bad Attitude" profile. Due to these characteristics, the third profile was named "Dangerous Attitude". The results of the latent profile analysis are depicted in Fig. 3.

Finally, we used the BCH method to test for significant gender differences between the three profiles. Our results revealed significant gender differences between the "Dangerous Attitude" and "Good Attitude" profiles ($p = .01$), as well as between the "Dangerous Attitude" and "Bad Attitude" profiles ($p = .00$). In the "Good Attitude" profile, students' gender was almost evenly distributed with 52% female and 48% male. Similarly, in the "Bad Attitude" profile, it was 49.5% female and 50.5% male. However, this was not the case for the Dangerous Attitude profile, as 28.3% of the students belonging to this profile were female, whilst the remaining 71.7% were male.

## 4 Discussion

The primary aim of this study was to explore the attitudes and risky behaviours of high school students regarding the use of ICTs and VSNs, and to investigate potential differences based on gender. To achieve this aim, five specific objectives were established: (1) Assess the validity and reliability of the Internet and Virtual Social Networking Use and Attitudes Scale; (2) Analyse gender differences in Internet and VSN dependency; (3) Explore gender-based variations in parental

control over Internet and VSN usage; (4) Examine the role of gender in online and VSN social relationships; (5) Investigate gender differences in violent usage and consumption of inappropriate content on the Internet and VSNs.

Our findings confirm both the validity and reliability of the scale. The ESEM models suggested that a that the four-factor solution was most suitable and consistent with the theoretical interpretation. Reliability analysis revealed McDonald's Omega values above 0.75 for all factors, providing evidence of the instrument's reliability. To address the other objectives, a latent profile analysis was conducted, resulting in three profiles: "Good Attitude", "Bad Attitude", and "Dangerous Attitude". The first profile represented over half of the sample and corresponded to students who use VSNs as a communication tool and as a means to establish interpersonal relationships within friendship groups, in line with previous research (Echeburúa & De-Corral, 2010; Hearn & Foth, 2007). Both the "Bad" and "Dangerous Attitude" profiles showed warning signs of excessive activity potentially leading to addiction (Echeburúa & De-Corral, 2010). Notably, the Dangerous Attitude profile exhibited various explicit forms of violent use and risky behaviour, representing a minority within this study. Next, we delve into the results pertaining to specific objectives (SOs) two to five.

SO2: Our findings identified the "Dangerous Attitude" profile as the predominant one regarding VSN dependence, with almost three-quarters being males. To a lesser extent, the "Bad Attitude profile" also showed similar tendencies. These results align with the trend that Internet addiction in adolescents is a current phenomenon with severe psychological consequences and generates various risk behaviours (Rojas-Jara et al., 2018).

SO3: Over half of the high school students, fitting the "Good Attitude" profile, experience regular and consistent parental control, though I''s not overbearing. This profile has a similar representation of boys and girls, suggesting that parental control is not linked to the gender of adolescents. These findings align with the model described by Padilla-Walker et al. (2020), which posits that parental control should avoid differential treatment based on the gender of adolescent children.

SO4: The results indicate that individuals within the "Dangerous Attitude" profile mainly use VSNs for socializing, often adding strangers' profiles and meeting them face-to-face. In contrast, those in the "Good Attitude" profile does not use VSNs to expand socialization by adding strangers. In line with some studies (Solano et al., 2013; Ángel-Franco & Alzate-Marín, 2015), this may be because these students use social networks as a complementary tool to their previously established face-to-face contacts (schools, neighbourhoods, studies, family, etc.).

SO5: Boys within the "Dangerous Attitude" profile reported more pronounced violent behaviour on social media. This includes activities such as threatening, annoying others, concealing their identity, promoting alcohol and drug use, and even posting inappropriate content of other people. These findings support the study by García-Ruiz et al. (2018) where a larger proportion of adolescent boys compared to girls admitted to disseminating compromising images with sexual or suggestive content without the victim's consent. This also aligns with

research by García-Jiménez et al. (2022), which states that boys employ more obscene language than girls.

This research contributes to understanding attitudes and dangerous practices among high school students in their use of ICTs and VSNs. Our findings revealed problematic behavioural profiles among a minority of adolescents, particularly males. This "Dangerous Attitude" group exhibited heightened VSN dependency and pronounced engagement in violent activities like cyberbullying, accessing inappropriate content, and hiding their identity online. These results align with prior studies indicating that VSN dependency can lead to violent attitudes and behaviours in youth (Martínez-Ferrer & Ruiz, 2017). Our research provides greater insight into how excessive Internet use may enable cyberviolence.

Furthermore, we introduced a novel validated scale that comprehensively assesses multiple factors influencing students' online activities. This multidimensional tool enables targeted interventions addressing the most problematic areas, like violence and addiction. Tailored educational programs focused on promoting responsible ICT habits are needed, especially for male students exhibiting negative attitudes. Future research should also continue investigating the interactions between violence, risky online behaviour, and gender in adolescence. Overall, this study significantly expands our understanding of high school students' Internet use, attitudes, gender differences, and dangerous online practices.

### 4.1 Limitations

This study encountered several limitations that could hinder the generalizability of the results. Firstly, data collection focused solely on adolescent students. Broadening the scope to include other age groups or demographics regarding their ICT behaviours and attitudes might enhance the comprehensiveness of the findings. Secondly, our research was limited to variables within the validated questionnaire and did not include other variables related to ICTs and VSNs that could have directly or indirectly influenced the results. Finally, the cross-sectional design and the use of self-report techniques pose the potential for participants to exhibit social desirability bias, which may affect the accurate representation of the results.

### 4.2 Future research

Our findings underscore the need for future research to minimize risks and dangerous practices in the academic environment, advocating for the responsible use of ICT and social media in teaching and learning processes. In the future, it would also be valuable to validate the test in other cultural contexts. Furthermore, delving deeper into the gender-related nuances of ICT and VSN usage remains crucial. The current trends and behaviours exhibited by high school students are not comprehensively understood, a gap that must be addressed to bolster detection and prevention programmes within these institutions (Vanderhoven et al., 2014).

## Appendix: Scale of use and attitudes on the Internet and Virtual Social Networks

| Number | Item (English) | Item (Spanish) |
|---|---|---|
| 1 | At home there are rules for being allowed to connect to the Internet | En casa hay normas para poder conectarme a Internet |
| 2 | I have been told that I spend too much time chatting | Me han dicho que estoy demasiado tiempo chateando |
| 3 | Social media is essential to me | Las Redes Sociales son imprescindibles para mi |
| 4 | I have sometimes added strangers to my profile | Alguna vez he agregado a mi perfil a desconocidos-as |
| 5 | My parents check which websites I have visited on the Internet | Mis padres comprueban que páginas he visitado en Internet |
| 6 | I connect to the Internet whenever I can | Me conecto a Internet desde que puedo |
| 7 | Social media has me "hooked" | Las Redes Sociales me tienen "enganchado-a" |
| 8 | I have accessed websites that promote drug and alcohol consumption | He accedido a webs donde se promueven el consumo de drogas y alcohol |
| 9 | When I can't connect, I get nervous | Cuando no puedo conectarme me pongo nerviosa-o |
| 10 | I have a schedule at home for connecting to the Internet | Tengo un horario en casa para conectarme a Internet |
| 11 | I don't mind losing hours of sleep just to be connected | No me importa perder horas de sueño con tal de estar conectado |
| 12 | I have made public intimate things about other people on the Internet | En la Red he hecho público cosas íntimas de otras personas |
| 13 | I use social media to meet new people | Utilizo las Redes Sociales para conocer gente nueva |
| 14 | My parents have restricted access to some websites for me | Mis padres me tienen limitado el acceso a alguna página Web |
| 15 | I have accessed violent websites | He accedido a páginas Web violentas |
| 16 | I have chatted with strangers before | Alguna vez he chateado con desconocidos-as |
| 17 | I enjoy chatting with strangers | Me divierto chateando con desconocidas-as |
| 18 | I have bothered or threatened someone, hiding my identity on the Internet | He molestado o amenazado a alguien, ocultando mi identidad en la Red |
| 19 | I have bothered someone online before | Alguna vez he molestado a alguien por Internet |
| 20 | I have met up with people I have met through chat | He quedado con personas que he conocido a través del chat |

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## Declarations

**Competing interests** The authors report there are no competing interests to declare.



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