



Sexting among adolescents: The role of Dark Triad in its prevalence and severity depending on sex

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ABSTRACT

Sexting is an increasingly common form of communication among adolescents. Although this is not in itself a reprehensible or harmful act, it can become dangerous if this sharing is done under pressure, in a non-consensual manner, or has negative consequences for one of the parties involved. For this reason, this study aims to explore in depth the characteristics of the Dark Triad that may be related to the distribution of intimate images in the adolescent population and to investigate the possible differences in this relationship based on sex. Data were collected from a sample of 1570 adolescents aged 13 to 18. The results show a greater sexting behavior by girls, especially when it is carried out through social networks. Similarly, narcissistic and psychopathic traits are the traits most strongly associated with the presence and severity of image-sharing behavior in both boys and girls, with their importance varying according to the medium in which the image exchange takes place. Only Machiavellian traits seem to be associated with the occurrence of sexting among girls when it is done via mobile phones. In short, dark personality traits are relevant factors in the presence and severity of image-sharing behavior among adolescents, with differences observed according to the sex of the adolescents and the technological medium used.

1. Introduction

The use of the internet, social media, mobile phones, or any other type of technology for communication is a reality today, and it also serves as a means of social interaction and management of romantic and intimate relationships, especially among adolescents and young adults (Cooper et al., 2016; Delevi & Weisskirch, 2013). This current landscape, in turn, represents new relational opportunities provided by information and communication technologies for this population (Peris et al., 2021). Consequently, this widespread use of social media and new technologies among adolescents has been shown to have a great impact on their sexual behavior (Arsad et al., 2021). For this reason, one of the most common online behaviors among this population that has received special attention recently is sexting (Dully et al., 2023; Madigan et al., 2018).

Sexting is defined as the sending or receiving of text messages, photos, and videos containing explicit or provocative sexual content via

technological devices (Mori et al., 2020). Regarding adolescents, this type of behavior can be considered an accepted practice, but it can also involve behaviors of humiliation, harassment, or intimidation and even constitute a criminal act involving minors (Barrense-Dias et al., 2017; Dodaj et al., 2024; Marengo et al., 2020). Specifically, sexting may not be intrinsically harmful or criminal. However, it carries certain risks, as it can evolve into aggressive and violent behaviors associated with various issues and potentially become a risky behavior leading to victimizations such as grooming, sextortion, and cyberbullying, where adolescents represent a particularly vulnerable demographic group (Gassó et al., 2019; Martínez Soto et al., 2024). From this perspective, although some arguments suggest that sexting can favor the positive sexual development of young people through the participants' trust and intimacy, sexting can also affect them negatively by increasing the likelihood of victimization or generating feelings of shame or humiliation by being rejected or stigmatized by their peers (Doyle et al., 2021; Pistoni et al., 2023).

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The study of sexting becomes even more relevant when considering its prevalence among adolescents. Although the incidence of this behavior varies depending on the criteria used for its definition, the data obtained indicate high rates of sexting and an increasing prevalence of sending and receiving sexual messages among this population (Molla-Esparza et al., 2020; Ojeda et al., 2020). The results of some research on this issue suggest a prevalence ranging from 6 to 34.8% of young individuals who engage in or have engaged in consensual sexting at some point (Foody et al., 2023; Gil-Llario et al., 2020; Kim et al., 2020; Kopecký & Szotkowski, 2018; Madigan et al., 2018; Mori et al., 2022). Ultimately, these data show that sexting is a common and prevalent behavior among adolescents (Bianchi et al., 2021; Van Luot et al., 2024).

In addition, several findings identify differences in the prevalence of sexting according to the participants' sex, although the results do not seem to be consistent. On the one hand, some studies suggest more frequent sexting behaviors among girls (Clancy et al., 2019; Gewirtz-Meydan et al., 2018; Mariamo et al., 2024), whereas others report greater involvement of boys in sexting and non-consensual sexting activities (Barroso et al., 2023; Hernández et al., 2021; Ojeda et al., 2020; Van Luot et al., 2024), and some works even identify a higher propensity of boys to send sexts and a higher likelihood of girls to receive sexts (Wei et al., 2024). Conversely, some studies find no sex differences in sexting involvement (Gámez-Guadix & Mateos-Pérez, 2019; Resett et al., 2022).

Consequently, sexting is among the online behaviors among adolescent populations that have garnered significant research interest in recent years (Molla-Esparza et al., 2020; Thulin et al., 2023; Verrastro et al., 2023). Sexting is a complex and common behavior among adolescents, and it is important to identify those factors associated with the involvement of this population in sexting behaviors (Barroso et al., 2021; Foody et al., 2023). Consequently, several approaches have been proposed to understand and explain this behavior in relation to different variables such as sex, age, emotions, attitudes, internet use, attachment or personality traits (Barroso et al., 2023; Cucci et al., 2024; Currin, 2022; Howard et al., 2023; Morelli et al., 2023; Ragona et al., 2023; Van Ouytsel et al., 2014). Considering personality in the study of sexting may provide insight into the motives that lead adolescents to engage in these behaviors; likewise, individual personality differences have come to constitute risk factors for behavioral and psychological problems (Alonso & Romero, 2019; Kokkinos et al., 2024; Morelli et al., 2020). Some of these traits that appear to increase the likelihood of engaging in sexting behaviors include the presence of higher levels of sensation-seeking, impulsivity, emotion-regulation difficulties, and low self-control (Foody et al., 2023; Gil-Llario et al., 2020; Houck et al., 2014; Howard et al., 2023). Furthermore, behavioral problems, insensitivity traits, and low emotional responsiveness also seem to be personality variables associated with sexting (Mariamo et al., 2024) and abusive sexting behaviors in this population (Barroso et al., 2021, 2023; Morelli et al., 2023). Ultimately, personality traits appear to be important factors contributing to online sexual behavior in adolescents, but their study concerning sexting in this population is not yet well-developed (Hernández et al., 2021).

According to these previous findings, the Dark Triad traits should be taken into account when studying adolescent sexting behaviors and their consequences, especially considering the negative impact and serious repercussions that these personality traits can have on this type of behavior (Leite et al., 2023; Manuoglu & Öner-Özkan, 2022). The Dark Triad refers to three personality traits that are differentiated from each other but, in turn, overlap: Machiavellianism, understood as the tendency to manipulate for personal gain; psychopathy or lack of empathy or remorse and a tendency to impulsivity and sensation-seeking; and finally, narcissism conceptualized as the tendency to have an exaggerated positive self-image while feeling contempt for others (Paulhus & Williams, 2002). It is particularly interesting to observe how these traits interconnect, emerge, and predict antisocial or delinquent behaviors among adolescents (Moreira et al., 2024; Muris et al., 2023; Wright

et al., 2017), especially focusing on online antisocial or criminal behaviors such as cyberbullying, online harassment, grooming, or online trolling (Demircioğlu & Göncü-Köse, 2023; Leite et al., 2023; Moor & Anderson, 2019; Pabian et al., 2015). More specifically, this growing interest is due to these traits' association with a lower level of kindness and self-control, a tendency to manipulate, insensitivity and superficiality in relationships, and, more specifically, with conduct problems, aggression, and problematic social media use in adolescent samples (Demircioğlu & Göncü-Köse, 2023; Muris et al., 2022).

From this perspective, an in-depth study of the relationship between the Dark Triad traits and sexting in adolescents may allow us to broaden our knowledge of the motivations underlying this type of behavior, with special emphasis on the dissemination of non-consensual sexts that may involve sexual harassment and victimization. Such knowledge, in turn, may facilitate its prevention (Clancy et al., 2020). Hence, interest in understanding the role of these dark personality traits in adolescent sexting behaviors has increased (Morelli et al., 2021; Resett et al., 2022).

The data regarding the findings obtained in the research performed to clarify this issue do not seem to be unanimous. Some results show a higher level of Dark Triad traits, specifically a greater tendency to possess narcissistic traits among young people who disseminate sexts, but revenge or resentment were uncommon among participants who disseminated sexts (Clancy et al., 2020). In other cases, an independent capacity of Dark Triad traits to predict sexting could not be identified (Clancy et al., 2019). Other studies have sought to provide empirical evidence of these personality traits' power to predict sexting behaviors (Morelli et al., 2021; Resett, 2019; Resett et al., 2022). Resett's (2019) research, while also identifying the three dark personality traits as predictors of sexting, singles out Machiavellianism as the most influential predictor of this behavior. Machiavellianism, in addition to narcissism, also positively predicted self-sexting in Morelli et al.'s (2021) study, although psychopathy was the trait that joined Machiavellianism in predicting abusive sexting behavior.

In addition, sex has also been considered a relevant variable in the study of sexting behaviors and their associated consequences due to the sex differences found in the motivations and repercussions of sexting (Mariamo et al., 2024). In other words, it has been found that these sex differences can provide relevant information about boys' and girls' different reasons for such behaviors, as well as the possible associated outcomes (Symons et al., 2018). Different results found in sexting behaviors of boys and girls concerning the Dark Triad traits reveals these traits' different predictive capacity as a function of sex, implying the need to improve the understanding of the motivations, associated behaviors, and consequences of sexting in adolescents of both sexes (Clancy et al., 2019). Therefore, to some extent, sex may condition the capacity of these traits to predict sexting behavior, as found in the study by Resett et al. (2022), where psychopathy was identified as a predictor of sexting behaviors but only in young women. However, these are not the only findings on the subject, as Hernández et al. (2021) identified narcissism, lack of empathy, disinhibition, and extraversion as the personality variables that best predict sexting behavior in boys, whereas in girls, only narcissism and disinhibition were identified as predictors. However, although very few studies consider sex when evaluating the role of the Dark Triad traits in sexting behaviors, and despite the lack of unanimity in the reviewed results, these findings confirm the importance of the role of sex in the predictive capacity of the Dark Triad traits for sexting in adolescents.

The purpose of this study is to analyze the relationship between the traits of the Dark Triad (psychopathy, Machiavellianism, and narcissism) and the presence and severity of sexting behaviors among adolescents, seeking differential patterns according to sex. Likewise, we also want to determine which technological means are used by adolescents more engaged in sexting occurrence and severity, also including a differential sex pattern. Clarifying the contribution of the Dark Triad traits in adolescent sexting behaviors may be a considerable advance in establishing prevention and intervention measures at school or online

safety campaigns. Likewise, the possible contribution of sex will facilitate greater individualization of these measures.

Given the above, it was hypothesized that a different intensity of the Dark Triad traits would be found in sexting behaviors based on the sex of adolescents. Further, it was hypothesized that the existence of differences regarding the technological medium used by adolescents to share intimate images based on sex. Finally, it was hypothesized that the influence of Dark Triad traits on the occurrence and frequency of sexting behaviors in adolescents would differ depending on sex.

2. Method

2.1. Participants

The participants ($N = 1570$) were adolescents aged between 13 and 18 ($M = 15.35$, $SD = 1.37$) who were enrolled in various educational levels across several secondary schools in the autonomous community of Galicia, Spain, where the authors have conducted workshops to raise awareness about gender violence among adolescents.

Of the sample, 46.6% (732) were boys and 51.3% (805) were girls; only 2.1% (33 people) did not report their sex. Regarding the participants' age, the girls' mean age (15.45) was higher than the boys' (15.23) ($t(1535) = -3.083$, $p < .01$).

Concerning social networks, 96.7% of the participants reported having a profile on a social network, while 3.3% said they had no social network profile. Of the adolescents who said they had social network profiles, 84% stated that their profile was configured as private, whereas 16% had no restrictions on access to their content by other social network users. Significant differences were observed in the social network profile depending on the adolescents' sex, with a higher percentage of girls claiming to have a public profile on social networks compared to same-age boys (91.6% vs 75%) ($\chi^2(1) = 132.491$, $p < .01$). The adolescent girls, therefore, make up the group that most frequently has a public network profile, which various authors consider a risky behavior on social networks (Steijn, 2014; Vannucci et al., 2020; Vente et al., 2020).

The adolescents claimed to have an average of 3 or 4 profiles in different social networks, with significant sex differences in the number of profiles, showing that females had a greater presence in social networks compared to their male peers (3.94 vs 3.07) ($t(1535) = -5.569$, $p < .001$). Almost half of the female adolescents claimed to participate in at least five social networks (41.6%) (see Table 1).

Regarding the type of social networks where adolescents are present, the results show that adolescents participate the most in social networks with audiovisual content, highlighting Instagram (16.4%) and TikTok (15.2%), and also that girls claim to participate more than same-age boys.

2.2. Measures

The Short Dark Triad Adolescent Version (SD3-A; Penado et al., 2024) is a psychometric adaptation of the Short Dark Triad Scale (SD3; Jones & Paulhus, 2014) for the Spanish adolescent population. The SD3 scale is specifically designed to measure the three dimensions (Machiavellianism, narcissism, and psychopathy) of the Dark triad. The scale

consists of 27 items (9 for each dimension), where participants rate their level of agreement on a Likert scale with five response options ranging from "strongly disagree" to "strongly agree." The items include statements indicative of narcissistic traits (*People see me as a natural leader*), psychopathic traits (*People who pick on me always regret it*), and Machiavellian traits (*It is unwise to tell your secrets*). Despite being widely used internationally, this instrument has not been adapted to the adolescent population and is used without alteration among individuals in the different phases of adolescence. The adaptation to the adolescent population proposed by the authors was based exclusively on statistical criteria, starting from the original scale with all the items that comprise it and analyzing its reliability and content validity with other instruments specially designed for the adolescent population.

The adapted version proposed from the data obtained with a sample of 1642 Spanish adolescents aged 11 to 19, with similar characteristics to the sample selected in this study, was reduced to 18 statements (six for each factor) while maintaining the three proposed factors in the original scale (Machiavellianism, narcissism, and psychopathy), with good reliability results ($\alpha = .854$). The reliability analyses obtained in the instrument for the selected sample maintain the psychometric results of the original adaptation of the scale ($\alpha = .818$).

The Intimate Images Diffusion Scale Among Adolescents (EDIMA; Penado et al., 2019) is specifically designed to assess behaviors related to the exchange and diffusion of intimate and personal content images, both sexual and of an erotic or provocative nature, among adolescents via mobile phones and social media platforms. When conceptualizing the instrument, the authors indicated the importance of updating the concept of sexting, understood as the sending and receiving of messages of explicit sexual content (Mori et al., 2020), and of designing an instrument that allows identifying the person with whom sexual images are exchanged (adolescents in romantic relationships, friends, acquaintances, and strangers). It also includes the sharing of sexual images not only through the messaging service but also through social networks. It consists of 20 statements that adolescents rate on a 5-point Likert-type frequency scale ranging from 1 (*the behavior never occurs*) to 5 (*the behavior occurs frequently or every day*). The scale refers to sending, receiving, requesting, or forwarding images of intimate and personal content and publishing intimate content on social networks. This provides information about the prevalence of sexting among adolescents. The instrument was validated in a sample of 602 Spanish adolescents aged 12 to 19, similar to that used in the present research, obtaining high reliability ($\alpha = .976$), which decreased slightly in the present investigation ($\alpha = .883$).

2.3. Procedure

To obtain information from the adolescents, we requested the participation of schools in which the authors were carrying out workshops on bullying or gender violence among adolescents. The centers' participation was voluntary, and the school managers indicated their interest in this training activity among their students to mark the workshop schedules.

All the adolescents in the study sample met the inclusion criteria of enrolment in a school in the autonomous community of Galicia, regardless of academic performance, being within the age ranges established in the selected instruments, and expressing their willingness to participate in the evaluation. The only exclusion criteria were being unable to read and write or presenting any mental or psychological pathology that would prevent their understanding the questionnaires' items.

Before data collection, informed consent was obtained from all parents, informing them of the goals of the intervention, the instruments used, and the sociodemographic data that would be requested from the minors. A link to the Google Forms application provided the same information to the students. The adolescents had to give their consent before gaining access to the questionnaires.

Table 1
Percentage of Adolescents by Number of Profiles in different Social Networks.

N° social networks	Total sample ($N = 1570$) %	Boys ($n = 732$) %	Girls ($n = 805$) %
0	.8	.8	.8
1	8	12.2	4
2	14.8	21.1	8.8
3	20.4	26	15.2
4	27.6	25.2	29.6
5	28.4	14.6	41.6

Data were collected in groups, in a computer room with Internet access, through the online link. No personal information that allowed identifying the participants was requested, emphasizing their anonymity and assuring them that their opinions would not be accessible to their parents or school teachers. The responses were stored electronically using the researchers' private access data, thus preventing access to anyone at the adolescents' schools. One of the researchers was present during the evaluation, ensuring that the instructions were understood and resolving any doubts that could arise during the evaluation. The need to give sincere answers consistent with their experiences was underlined.

The study design was approved by the Ethics Committee of the International University of La Rioja (UNIR) with code 080/2024. The recommendations of the Declaration of Helsinki were followed.

2.4. Data analyses

Data analysis began with the verification of the normal distribution of the sample, using the Kolmogorov-Smirnov statistic to ensure the reliability of our findings. After confirming the normal distribution of the sample, we analyzed the relationship between the Dark Triad personality traits (narcissism, psychopathy, and Machiavellianism) and the sexting behaviors through social networks and mobile devices. The EDIMA differentiates adolescents who have never performed in sexting behaviors from those who have performed this behavior at least once, specifying whether the sharing was done through social networks or messaging systems services implemented in mobile phones. Among the individuals who claimed to have sometimes shared their images, the instrument also provides an estimate of the frequency of this behavior: whether it is sporadic (*once or twice a month*), occasional (*two or three times a month*), frequent (*two or three times a week*) or very frequent (*every day*).

Student's *t*-tests were used to estimate differences in the expression or intensity of the Dark Triad traits depending on sex. Pearson's χ^2 was used to analyze possible sex differences between adolescents who sometimes shared images of intimate content and those who never performed this behavior. Taking into account the severity or frequency of image-sharing behaviors and dark traits (narcissism, psychopathy, and Machiavellianism), Pearson correlations were calculated to determine their possible association, performing separate calculations based on the adolescents' sex.

After confirming the association between the intensity of the Dark Triad traits and the presence and severity of sexting behaviors, logistic regression analyses were performed to verify whether the presence of Dark Triad traits can predict the intimate image-sharing. Stepwise linear regression analysis was performed to determine whether, in addition to predicting the performance of image-sharing, the Dark Triad traits of narcissism, psychopathy, and Machiavellianism could also predict the frequency or severity of such behavior. All the Dark Triad personality traits were introduced in the linear regression analyses, progressively eliminating those that did not meet the established statistical criteria.

The IBM SPSS Statistics program (v.25) was used for the analyses.

3. Results

3.1. Descriptive results based on participants' sex

The descriptive results obtained in the average scores of the instruments showed low scores in the Dark Triad traits and the sexting behaviors, with sex differences of varying magnitude and significance.

Concerning the sexting behaviors, the mean scores indicate a low frequency of this phenomenon in the entire sample analyzed, with a greater frequency—albeit nonstatistical—of this behavior among girls than among their male classmates. When analyzing the mean scores of the Dark Triad traits, the presence of these traits in the adolescent sample did not reach severe or worrying levels. However, significant sex

differences were observed, with adolescent boys scoring higher in the dark traits both on the overall scale ($t(1243) = 4.016, p < .001, d = .34$) and in the subfactors of Narcissism ($t(1241) = 2.432, p < .05, d = .30$), Psychopathy ($t(1241) = 3.262, p < .01, d = .27$), and Machiavellianism ($t(1243) = 4.335, p < .001, d = .30$) (see Table 2).

In addition to the mean scores obtained in the instruments, the prevalence of adolescents who claimed never to have performed sexting among their peers was analyzed, regardless of the medium used, without considering the frequency of the behavior.

Results showed 60% of the adolescents claim to have engaged in sexting behavior at some point, with very similar percentages for both boys (58.2%) and girls (61.9%). Taking into account the medium used to exchange images it is more common for adolescents to exchange intimate images through the messaging services of their mobile phones; 58.9% of the adolescents admitted having shared images this way rather than publishing images on social networks, where only 21.5% of the sample claimed to have published this content. Depending on sex, a differential and significant pattern was obtained in both behaviors. Compared to their male classmates, a higher percentage of girls claimed to have shared intimate images through social networks (26.8% vs. 15.8%, $\chi^2 [1] = 106.123, p < .01$) and also through messaging services on their mobile devices (60.1% vs. 57.6%, $\chi^2 [1] = 10.319, p < .01$) (see Table 3).

Finally, considering the prevalence results obtained, the participants had a low intensity in the Dark Triad traits, with significant sex differences. The boys showed a greater intensity in all the traits compared to the girls. Concerning the adolescents' behavior of intimate image-sharing, its severity or frequency were considered low but with significant sex differences, indicating that this behavior is carried out mainly by adolescent girls, especially using social networks. Girls' higher intimate image-sharing and boys' greater intensity of Dark Triad traits are consistent with the results of prior research, which specifically indicated a greater presence of girls on social networks and boys' pattern of the traits of narcissism, psychopathy, and Machiavellianism.

3.2. Dark Triad traits, sharing of sexts, and sex

To better understand the characteristics of these behaviors, we examined the correlation between adolescents' image-sharing and Dark Triad traits, generally observing a significant and positive association between the scales that comprise both instruments. In this sense, the features of the Dark Triad increased with the frequency of adolescents' sharing of intimate images, regardless of whether this was done through messaging services on their mobile devices or through publications on social networks.

This greater presence of the Dark Triad traits co-occurring with the higher frequency of intimate image-sharing was generally observed for all subscales (narcissism, psychopathy, and Machiavellianism) except for the sharing through social networks. In this case, there was no significant increase in Machiavellianism despite adolescents' increased

Table 2

Adolescents' mean scores on the dark triad and on sharing intimate images via mobile and social media by sex.

Scales	Variables	Total sample (N = 1570) M (SD)	Boys (n = 732) M (SD)	Girls (n = 805) M (SD)
EDIMA	Mobile	1.28 (.44)	1.22 (.34)	1.29 (.40)
	Social media	1.11 (.30)	1.09 (.34)	1.12 (.24)
	Total	1.24 (.38)	1.19 (.30)	1.26 (.36)
SD3-A	Machiavellianism	2.60 (.84)	2.69 (.83)	2.50 (.80)
	Narcissism	2.46 (.75)	2.50 (.73)	2.40 (.72)
	Psychopathy	2.03 (.83)	2.07 (.80)	1.93 (.80)
	Total	2.37 (.68)	2.42 (.65)	2.28 (.65)

Note. EDIMA = Intimate Images Diffusion Scale Among Adolescents; SD3-A = Short Dark Triad Adolescent Version.

Table 3

Prevalence of adolescents sharing intimate images via mobile and social media.

EDIMA Scales	Total sample (N = 1570)		Boys (n = 732)		Girls (n = 805)	
	Yes	No	Yes	No	Yes	No
Mobile	58.9%	41.1%	57.6%	42.4%	60.1%	39.9%
Social media	21.5%	78.5%	15.8%	84.2%	26.8%	73.2%
Total	60.1%	39.9%	58.2%	41.8%	61.9%	38.1%

frequency of using social networks to publish intimate content (see Table 4).

In addition to a global analysis of the association between the sample variables, the adolescents' sex was considered specifically, observing differences in the significance of the associations, as shown in Table 5. Thus, all the Dark Triad features increased, as the girls performed sexting more frequently, regardless of the medium used. In the case of the boys, this significant association only occurred when boys used their mobile phones, without observing a greater intensity of the Dark Triad traits when they used social networks.

The lack of association between the Dark Triad traits and boys' behavior of sharing images through social networks can be interpreted by the low incidence of this behavior in boys compared to girls of the same age. As previously analyzed, only 15% of the boys published sexual images on their social networks, compared to almost twice that percentage in the girls (26.8%).

3.3. Dark Triad traits and the emergence of sexting behavior via mobile phones and social media

In addition to analyzing the association between these two variables, we examined the meaning of this association, to determine whether narcissism, psychopathy, and Machiavellianism can influence the emergence of adolescents' sexting behaviors or affect its frequency. To examine whether the Dark Triad traits predict the emergence of adolescents' image-sharing, regardless of its frequency or severity, we performed binary logistic regression analyses, considering the performance of image-sharing as a dependent variable and the personality traits of narcissism, psychopathy, and Machiavellianism as independent variables.

The results indicate that psychopathy ($\beta = 3.080, p < .001$) and narcissism ($\beta = 2.298, p < .05$) differentially predicted the emergence of these behaviors in boys depending on the type of diffusion carried out. Psychopathy increased the probability of image exchange and sending through mobile devices, and narcissism enhanced the probability of this behavior via social media platforms. In the case of adolescent girls, the Dark Triad traits also differentially increased the probability of image-shared depending on the medium employed. Machiavellianism increased the likelihood of girls exchanging intimate images through messaging services on their mobile phones ($\beta = 2.294, p < .001$). However, psychopathy ($\beta = 1.696, p < .05$), and especially narcissism ($\beta = 2.430, p < .01$), were associated with the publication of this content on social media platforms (see Table 6).

These results reveal the association between the Dark Triad traits and adolescents' intimate image-sharing, showing the influence of narcissism in their sharing through social networks, regardless of sex. In this sense, egocentrism, the need for admiration, and high self-esteem that

Table 4

Correlations between scales of image-diffusion and dark triad factors.

	Mobile	Social media	Total
Machiavellianism	.20**	.08	.20**
Narcissism	.31**	.27**	.33**
Psychopathy	.36**	.21**	.36**
Total	.36**	.23**	.37**

Note. ** $p < .01$.

Table 5

Correlations between image diffusion scales and dark triad traits in adolescent girls (below) and boys (above).

	MAQ	NAR	PSY	SD3-A	Mobile	Social media	EDIMA
MAQ	–	.48**	.61**	.85**	.24**	.03	.22**
NAR	.48**	–	.53**	.79**	.40**	.21**	.41**
PSY	.68**	.52**	–	.86**	.33**	.14	.33**
SD3-A	.86**	.78**	.88**	–	.40**	.15	.40**
Mobile	.26**	.32**	.37**	.39**	–	.29**	.98**
Social media	.18*	.36**	.32**	.35**	.62**	–	.49**
EDIMA	.26**	.34**	.38**	.40**	.99**	.70**	–

Note. MAQ = Machiavellianism; NAR = Narcissism; PSY = Psychopathy; SD3-A = Short Dark Triad Adolescent Version; EDIMA = Intimate Images Diffusion Scale Among Adolescents.

** $p < .01$; * $p < .05$.

define narcissism seem to be important traits for both boys and girls to expose themselves on social networks with images considered sexual, intimate, or provocative.

Regarding the sharing of images through mobile devices, we observed sex differences in the expression of the Dark Triad traits. Psychopathic traits motivated the sexting behaviors in boys, which seems to indicate that traits characteristic of this construct such as the lack of empathy, high impulsivity, and manipulation could lead adolescent boys to share intimate images through mobile devices. However, Machiavellianism explained the emergence of this phenomenon in girls, which in this case seems to show a higher incidence of traits such as manipulation, the objectification of people, and the absence of remorse in their sexting behaviors through these devices.

3.4. Dark Triad traits and the severity of mobile and social media sexting behaviors

In addition to analyzing the influence of the Dark Triad traits on the appearance of adolescents' image-sharing, we examined the role of these traits in the severity or frequency of these behaviors, using stepwise linear regression analysis, with the frequency of sexting behaviors as the dependent variable and the Dark Triad traits as independent variables.

These results, especially in the case of boys, underline the important role of narcissism and psychopathy in the frequency of sharing intimate images through mobile devices. The percentage of explained variance was 15% in the case of narcissism and 2.8% in the case of psychopathy. In the case of image-sharing through social media, similar to mobile devices, narcissism appeared to be the only variable affecting the frequency of sexting behaviors among boys.

When analyzing exclusively adolescent girls who engage in sexting behaviors through mobile devices, psychopathy exerted influence, explaining 13% of the variability in this type of behavior. Narcissism was a second-order variable with a minor contribution (2% of the observed variance). However, if girls' image-sharing was done through social media, the same variables, psychopathy and narcissism, were observed to exert influence, but their importance was reversed: narcissism explained 12.3% of the variance in the frequency of intimate image-sharing, followed by psychopathy (2.6%) (see Table 7).

Regarding the influence of the Dark Triad traits on the frequency of intimate image-sharing on social networks, the results corroborate the influence of narcissism, regardless of the adolescents' sex. Considering the exchange and sending of such images through mobile devices, the combination of psychopathic and narcissistic traits aggravated or increased its frequency, regardless of sex.

Table 6

Incidence of image-sharing among adolescent boys and girls.

						95% CI			
		B	SE	p	β	LL	UL	OR	ES
Boys									
Mobile	PSY	1.125	.279	.000	3.080	1.783	5.321	3.080	S
SM	NAR	.832	.339	.014	2.298	1.182	4.467	4.298	M
Girls									
Mobile	MAQ	.831	.237	.000	2.294	1.442	3.653	2.84	S
SM	NAR	.888	.322	.006	2.430	1.292	4.571	4.374	M
	PSY	.528	.264	.045	1.696	1.011	2.845	1.674	S

Note. NAR = Narcissism; PSY = Psychopathy; SM = Social Media; CI = Confidence Interval; LL = Lower Level; UL = Upper Level; ES = Effect Size; S = Small; M = Medium.

Table 7

Severity of image-sharing behaviors via mobile devices and social media for boys and girls.

								95% CI			
		R	R ²	Adjusted R ²	SE	ΔR ²	p	LL	UL	OR	ES
Boys	Mobile										
	NAR	.398	.159	.153	.31757	.159	.000	1.241	4.301	2.392	S
	PSY	.432	.187	.176	.31321	.028	.022	.005	.454	2.194	S
	SM										
Girls	NAR	.208	.043	.037	.33866	.043	.009	.095	.808	4.232	M
	Mobile										
	PSY	.369	.136	.131	.40444	.136	.000	.107	.601	3.290	S
	NAR	.400	.160	.150	.40010	.024	.033	.280	3.711	3.230	S
	SM										
	NAR	.358	.128	.123	.23700	.128	.000	.339	.786	4.469	M
	PSY	.392	.154	.144	.23413	.026	.025	.010	.079	2.178	S

Note. NAR = Narcissism; PSY = Psychopathy; SM = Social Media; CI = Confidence Interval; LL = Lower Level; UL = Upper Level; ES = Effect Size; S = Small; M = Medium.

4. Discussion

The research results show a low prevalence of sexting behaviors through social networks and mobile devices among adolescents, but sex differences must be carefully analyzed. In this sense, adolescent girls claim to have shared intimate images more than boys of the same age, aligning with previous research (Clancy et al., 2019; Hernández et al., 2021; Resett et al., 2022) and indicating the importance of sex when studying sexting behavior. We highlight that the greater presence of females in the sexting behaviors is especially significant when carried out through adolescents' social network profiles, as indicated by other authors such as Molla-Esparza et al. (2021). Girls' frequency of this behavior and their use of social networks are increasing, showing their greater tendency to use this type of media when interacting with their peers than boys (Yépez-Tito et al., 2020).

As with image-sharing, our research corroborates a different expression and intensity of the Dark Triad traits depending on the adolescents' sex, revealing a greater intensity of the Dark Triad traits in adolescent boys, confirming the cross-cultural sex differences observed (Klimstra et al., 2014; Muris et al., 2013; Navas et al., 2020). Thus, in line with previous research (Clancy et al., 2019; Hernández et al., 2021; Resett et al., 2022), this indicates the importance of sex in analyzing the interaction of the two variables.

The results also show how the presence of narcissism and psychopathy, in different intensities, underlie the emergence and severity of image-sharing among adolescents of both sexes. In contrast, Machiavellianism plays a residual role, where its importance is only observed when explaining the emergence of image-exchanging through mobile phones in adolescent girls. Other studies have also found associations between Dark Triad traits and sexting behaviors (Clancy et al., 2020; Morelli et al., 2021; Resett, 2019), and these behaviors have been associated with other personality traits related to the Big Five and HEXACO models (García et al., 2015; Lee et al., 2013; Paulhus & Williams, 2002). In particular, sexting in adolescents has been found to be

related to high levels of extraversion, low agreeableness, and low conscientiousness (Alonso & Romero, 2019), as well as to emotionality and extraversion (Morelli et al., 2020). These traits, in turn, are linked to the Dark Triad traits that are predominantly present in our research, such as narcissism and psychopathy. Similarly, variables such as lower self-control, low emotionality, superficial affection, insensitivity, and impulsivity, mainly related to these two Dark Triad traits, seem to play an even more relevant role in non-consensual sexting behaviors (Barroso et al., 2023; Morelli et al., 2023).

Although Machiavellianism has been mentioned in previous studies as an explanatory variable of sexting behaviors (Morelli et al., 2021; Resett, 2019), studies indicating its importance have not included or delved into its relationship with the means of sharing provocative or intimate images. This gap may be an explanatory variable of the emergence image-sharing through mobile phones carried out by adolescent girls.

In addition to the general analysis of Dark Triad traits in adolescents' sexting behaviors, the present study aimed to determine whether these traits predict the occurrence of such phenomena and their severity. The results also reflect sex differences, which aligns with previous research (Hernandez et al., 2021; Morelli et al., 2021; Resett et al., 2022).

Specifically, our results show how, when intimate or sexual images are shared through social networks, narcissism stands out as a first-order trait that influences both the emergence of this behavior and an increase in image publication in both boys and girls. In the case of girls, the results seem to denote, besides the need for admiration, high ego, and self-esteem, and grandiosity typical of narcissism, a lesser influence of psychopathic traits such as lack of empathy and concern for others is observed. The results for mobile phone sharing and broadcasting are mixed; in particular, psychopathy seems to predict the occurrence of this behavior in boys, whereas Machiavellianism predicts its occurrence in girls. However, when analyzing the severity of sexting behavior, narcissistic and psychopathic traits stand out as more relevant for both girls and boys, with differences only in the importance of their influence.

The results obtained show the importance not only of the Dark Triad traits and sex in adolescents' onset and severity of provocative image-sharing, but also in the need to analyze how these images are exchanged: social networks or messaging services of mobile devices.

Therefore, it seems that an inflated view of the self, the pursuit of self-esteem, ego reinforcement, and the need for admiration may be related to adolescents' sharing or posting intimate images via social media. However, as the frequency of this behavior increases, these narcissistic traits may become dangerous, making individuals prone to arrogance, aggression, and problematic romantic relationships (Buffardi & Campbell, 2008). These findings are particularly important given that narcissistic personalities are more likely to use social media as a self-regulation strategy (Gnambs & Appel, 2017), to engage in their problematic use (Hou et al., 2023), and to post and edit selfies on social media. All this implies a need to build a self-image that can be publicly known, praised, and that increases their self-esteem (Vanhoffelen et al., 2024; Wang, 2019). Social media is a breeding ground for adolescents with a narcissistic profile due to their characteristic need for social comparison (Back et al., 2013). They can use social media as a compensatory strategy to cope with their prosocial difficulties and to seek gratification (Musetti et al., 2022). However, they are more likely to develop an addiction to social networks and to participate in non-consensual sexting (Hernández et al., 2021; Kong et al., 2020).

Regarding the use of mobile phones for sexting, it seems that traits such as a lack of emotionality, empathy, social concern, and high impulsivity may explain these behaviors in boys. However, in girls, a manipulative interpersonal style, typical of Machiavellianism, seems to promote their occurrence. In girls, the severity tends to be associated with traits such as a lack of consideration for others and extreme irresponsibility for one's actions. In contrast, for boys, arrogance, aggressiveness, and ego damage are denoted as explanatory factors of their severity. Together, these traits tend to be associated with a predisposition to selfish and antisocial behavior (Koehn et al., 2018), which can turn healthy sexting behavior into unpleasant, negative behavior with dire consequences for some participants.

It is also noteworthy that Machiavellian traits appear to be associated only in isolation with adolescent girls' likelihood of image-sharing via mobile phones. These results may have relevance when considering the relationship between Machiavellianism, sexual harassment, and cyber, psychological, and sexual violence within a romantic relationship found in previous research (Schokkenbroek et al., 2024; White et al., 2024).

In summary, the results and the literature show how the relationship between the Dark Triad traits and adolescents' sexting behaviors is complex and multidimensional, and must consider not only variables such as the adolescents' sex but also other aspects, such as the media used for the exchange (social networks or messaging services) or whether the exchange is a frequent or unusual behavior among adolescents. The different associated consequences and the influence of diverse personality variables justify the detailed and thorough prevention and intervention in these behaviors. We should seek increasingly specific strategies to prevent this behavior from dysfunctional occurring or exacerbating in adolescents.

4.1. Implications and future research

These results are particularly relevant if we consider previous findings highlighting the large amount of time adolescents spend on mobile phones and social networks and the link between the use of new technologies, addiction to them, and sexting behavior (Ragona et al., 2023; Yépez-Tito et al., 2020).

In this sense, we can assess the importance of educating adolescents about healthy and consensual sexting, which has been shown to promote positive sexual development in this population (Pistoni et al., 2023). The relevant role of personality in this behavior should also be taken into account, establishing prevention and intervention strategies for profiles that can be considered at risk for abusive sexting behaviors.

This research also recognizes the need to consider sex differences when implementing education, prevention, and intervention strategies. Specifically, it seems appropriate to implement intervention strategies to foster emotional domains such as self-control, promoting prosocial emotions, and emotion recognition in girls. Likewise, in boys, skills related to emotional intelligence, emotion regulation, and empathy should be promoted (Jambon et al., 2024; Nguyen et al., 2022; Underwood et al., 2021). In addition, it is necessary to prevent and intervene in non-consensual sexting behaviors by focusing on emphasizing consent and addressing sexting positively (Naezer & van Oosterhout, 2020).

Given the relationship found between Dark Triad traits and adolescents' offensive online behavior (Moor & Anderson, 2019; Pabian et al., 2015) and the dire consequences abusive sexting behavior can have for the victims (Doyle et al., 2021), further research into the relationship of these traits with sexting behavior is warranted. Such research should increase knowledge about sex differences and the technological media used, as well as differentiate between consensual and non-consensual sexting behavior. Finally, on a positive note, educational programs to guide the use of healthy sexting among adolescents should be developed.

In terms of the possible implications of these results for future research, the type of sexting that takes place among adolescents and the influence of personality traits depending on the type of behavior should be investigated in depth. Specifically, considering specific sexting behaviors (sending, receiving, forwarding, soliciting, dissemination) when analyzing the influence of variables such as Dark Triad or sex on adolescent sexting seems important. Furthermore, knowing what other psychological factors, such as emotions or motivations, may be involved in adolescents' sexting behavior would allow us to have a broader understanding of this phenomenon.

Likewise, the sex differences found and the technological media for adolescents' sexting behaviors need further investigation. Analyzing cultural influences or the role of peer networks in sexting behavior also seems relevant to determine whether these factors moderate the impact of the Dark Triad traits on these behaviors in different demographic groups (Wachs et al., 2021). Finally, longitudinal studies should be performed to understand how these traits and behaviors evolve during the different changes experienced during adolescents' development and as they enter adulthood because age may become a variable of great interest (Fanti & Lordos, 2022; Ling et al., 2023).

4.2. Limitations

This research has some limitations that must be considered to avoid overgeneralizing the conclusions. Firstly, the estimation of sexting was made according to the frequency of sharing sexually explicit images and not the typology of this behavior. In other words, we did not consider whether the images were their own or other people's property, nor whether the sharing was performed against the will or without the permission of the person whose image was shared. This can be regarded as another phenomenon with very different consequences for the people involved. Likewise, the different typologies of adolescent sexting behavior - receiving, sending, sharing, dissemination, requesting, and forwarding - were also not analyzed. Each of these behaviors is different and is characterized by different motivations and associations, which may involve factors of interest in the study of these behaviors.

Furthermore, when collecting data in the form of self-reported questionnaires with questions of an intimate and personal nature, despite insisting on the confidentiality of the data, the information provided may be biased, reducing the presence of responses that participants may consider problematic or inadequate.

The sample comprised school-aged adolescents without any psychopathology or additional problem, which may cause the association between the variables to be underrepresented. These psychopathologies and maladaptive traits are expected to be low in intensity in a normalized sample but may explain sexting behaviors when high or worrying levels are reached.

Finally, it should be noted that the cross-sectional design of the research does not allow us to establish longitudinal relationships between the variables, so we cannot accurately establish causality between them, nor can we know how these traits and behaviors evolve over time. The results could be further enriched with qualitative methods that allow the collection of other types of data, such as the participants' motivations, their perceptions of sexting, and the opinions of family members and teachers.

5. Conclusions

Overall, the results obtained in this research showed a low presence of psychopathic traits in the sample, as well as the participants' reduced frequency of sexting behaviors on social networks and mobile devices.

However, sexting among adolescents is shown to be a common but complex behavior, and it is worth highlighting the role that dark personality variables can play depending on sex and the technological media used.

The behavior of sharing images with provocative or intimate content is more frequent in female adolescents, especially if this sharing is done through social networks.

Narcissism, as a dysfunctional personality trait, is associated with more frequent sharing of intimate images among adolescents regardless of sex, especially when considering the profiles that adolescents have on different social networks.

If the sharing is carried out through messaging services available on adolescents' mobile devices, psychopathy plays a secondary explanatory role in both the emergence and the frequency of the sexting.

Finally, influence of Machiavellianism was only observed when analyzing the sexting behaviors through messaging services carried out by adolescent girls, explaining the emergence of this behavior but not its severity or high frequency.

CRedit authorship contribution statement

Tara Alonso del Hierro: Writing – original draft, Visualization, Investigation, Conceptualization. **María Penado Abilleira:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **María-Paula Ríos-de-Deus:** Resources, Project administration. **María-Luisa Rodicio-García:** Writing – review & editing, Resources, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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