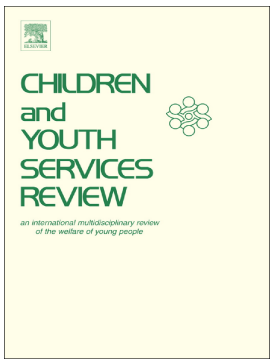
**The associations between sex drive, sexual self-concept, sexual orientation, and exposure to online victimization in Italian adolescents: Investigating the mediating role of verbal and visual sexting behaviors**

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PII: S0190-7409(19)30141-0
DOI: https://doi.org/10.1016/j.childyouth.2019.04.023
Reference: CYSR 4318

To appear in: *Children and Youth Services Review*

Received date: 10 February 2019
Revised date: 18 April 2019
Accepted date: 21 April 2019

Please cite this article as: D. Marengo, M. Settanni and C. Longobardi, The associations between sex drive, sexual self-concept, sexual orientation, and exposure to online victimization in Italian adolescents: Investigating the mediating role of verbal and visual sexting behaviors, Children and Youth Services Review, https://doi.org/10.1016/j.childyouth.2019.04.023

# The Associations between Sex Drive, Sexual Self-Concept, Sexual Orientation, and Exposure To Online Victimization in Italian Adolescents: Investigating the Mediating Role of Verbal and Visual Sexting Behaviors

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**Abstract**

Adolescents' involvement in online sexual behaviors is influenced by their developmental need to explore, define, and assert their own sexual identity. Among these behaviors, engaging in sexting behaviors has been shown to have negative consequences for adolescents' well-being because it increases the risk of exposure to different forms of online victimization. Based on these considerations, the present study aimed to examine the associations between two types of sexting behaviors, namely, verbal and visual sexting, and three specific dimensions of adolescents' sexuality, namely, their perceived sex drive, sexual self-concept, and sexual orientation. Next, we tested the hypothesis that involvement in sexting behaviors might be a mediator of the link between sexuality dimensions and exposure to online unwanted sexual solicitations, and cyberbullying victimization. The sample consisted of 653 high school students (66.9% females, Mean age = 16.31, SD = 1.34). We found both verbal and visual sexters to be older, have a stronger sex drive, and sexual self-concept than non-involved adolescents (i.e., non-sexters; while visual sexters were more likely to report non-heterosexual orientation than were verbal sexters and non-sexters. Further, involvement sexting behaviors increased the risk of exposure to both cyberbullying victimization and unwanted online sexual solicitations. Regression analysis showed visual sexting acted as a mediator of the links between the sexuality dimensions and both forms of online victimizati on. These findings have practical implications for the development of programs aimed at educating adolescents and their caregivers about the negative consequences of the uncontrolled online sharing of visual sexts, as well as providing involved adolescents with the skills to cope with these consequences.

***Keywords***: Sexting, Adolescents, Online victimization, sexual orientation, sex drive, sexual self-concept

## Introduction

Sexting refers to the sending or receiving of messages that include sexually explicit texts, images, or videos. These messages, also known as "sexts", are sent primarily via mobile devices connected to the Internet, typically in private form (Klettke, Hallford, & Mellor, 2014). Individuals may send sexts as a way to start and sustain intimacy in romantic relationships or to show interest to potential partners, or as a surrogate for physical sexual activity (e.g., in long-distance relationships) (Döring, 2014). Individuals may also engage in sexting because of perceived pressure from friends or dating partners, for fun, or as a form of self-expression (Klettke, Hallford, & Mellor, 2014). Among adults, sexting has shown average prevalence rates as large as 56%, with the prevalence of involvement declining with age and peaking among young adults (Klettke, Hallford, & Mellor, 2014). Studies on adolescents tend to indicate a lower prevalence, ranging from 10% to 33% of high school–aged adolescents involved in the behavior (e.g., Gámez-Guadix, De Santisteban, & Resett, 2017; Klettke, Hallford, & Mellor, 2014). Previous studies have typically found older adolescents to be more likely to sext than younger peers, and the sending of sexts to be more prevalent among females, while males tend to be more likely to receive sexts (Klettke, Hallford, & Mellor, 2014). As regards Italy, prevalence rates of adolescent sexting appear to have increased significantly during the last decade, with recent findings indicating percentages as large as 75% and 54% of high school–aged adolescents respectively reporting having received or sent sexts at least once, with an increased prevalence among males, and older adolescents (e.g., Morelli, Bianchi, Baiocco, Pezzuti, & Chirumbolo, 2017).

Findings indicate sexual aims (e.g., flirting, facilitating the involvement in sexual activity) represent a major motivation for sexting among adolescents (Bianchi, Morelli, Baiocco & Chirumbolo, 2017), suggesting individual differences in engagement in sexting may be

related to differences in perceived sex drive (Florimbio et al., 2018). Similarly to other online risk behaviors (Baumgartner, 2013), studies suggest that adolescent sexting should be looked at from a developmental perspective, recognizing its role in facilitating developmental tasks, such as the exploration of sexuality, sexual identity formation and body image development (Bianchi et al. 2017; 2018). In this view, it is anticipated that adolescents' involvement in sexting behaviors will also be influenced by how they perceive themselves as sexual persons, both in terms of how mature and confident they feel about sex, that is, their sexual self-concept (e.g., Bobkowski, Shafer, & Ortiz, 2016; van Oosten & Vandenbosch, 2017), as well their sexual orientation (Gámez-Guadix, De Santisteban, & Resett, 2017). Adolescents with a stronger sexual self-concept tend to be more comfortable presenting themselves in a more sexually intense way on social media (Bobkowski, Shafer, & Ortiz, 2016), which in turn has been shown to be associated with an increased willingness to sext, in particular among adolescent girls (van Oosten & Vandenbosch, 2017). With regard to sexual orientation, the findings indicate a higher prevalence of involvement in sexting among sexual minorities than among exclusively heterosexual individuals (Gámez-Guadix, De Santisteban, & Resett, 2017; Morelli, Bianchi, Baiocco, Pezzuti & Chirumbolo, 2016). Indeed, for sexual-minority adolescents, sexting could represent a mean by which they can explore their sexuality and meet and interact with partners while avoiding some of the undesired negative social consequences that are more likely to arise when interacting in person, such as discrimination or stigma (Brown, Maycock, & Burns, 2005) or the undesired outing of their sexual orientation (Hertlein, Shadid, & Steelman, 2015).

**Sexting as a risk factor for online victimization**

Recent studies indicate that the involvement in sexting behaviors represents a risk factor for the exposure to unwanted sexual solicitations and cyberbullying victimization among

adolescents and young adults (Chang et al., 2016; Jasso, López, & Gámez-Guadix, 2018; Marcum, Ricketts, & Higgins, 2010; Longobardi, Iotti, Jungert, & Settanni, 2018; Reyns et al., 2013). In the online environment, unwanted sexual solicitations are defined as the receipt of undesired requests to talk about sex or to do something sexual (e.g., Chang et al., 2016; De Santisteban & Gámez-Guadix, 2018; Marengo, Jungert, Iotti, Settanni, Thornberg, & Longobardi, 2018), while cyberbullying refers to the intentional and repetitive aggression carried out by a bully against defenseless individuals in the online environment; it may include spreading malicious rumors about the victims or posting embarrassing media online involving the victims (e.g., text, images, or videos) against their will (Hinduja & Patchin, 2008). The links between adolescents' involvement in sexting and their exposure to unwanted online sexual and cyberbullying victimization can be interpreted in light of the increased risk of non-consensual forwarding of sexts, also called secondary sexting (Gámez-Guadix & Mateos-Pérez, 2019; Holoyda, Landess, Sorrentino, & Friedman, 2018; Villacampa, 2017). Because of the increased likelihood of having sexts shared online with unknown peers or adults, adolescents who sext may be more likely to be exposed to unsolicited sexual requests in the online environment and having these messages used by perpetrators to threaten them (e.g.,Baumgartner, Valkenburg, & Peter, 2010; Longobardi, Prino Fabris, & Settanni, 2017; 2019; Reyns, Burek, Henson, & Fisher., 2013). At the same time, bullies may publicly share leaked sexts to blackmail or damage the reputation of the victim (Van Ouytsel, Van Gool, Walrave, Ponnet, & Peeterset, 2017). In this regard, it seems plausible to expect that the leaked sexts, including either nude or semi-nude images of the victims (i.e., visual sexts) may ultimately pose increased harm for victims when compared to text-only sexts (i.e., verbal sexts) (Venema & Lobinger, 2017). In spite of the relevance of this distinction, the majority of studies investigating sexting behaviors and their correlates in adolescence have mostly focused on one type of sexting behavior while excluding the other, or have examined involvement in

sexting using composite indicators (for a review, see Barrense-Dias, Berchtold, Suris, & Akre, 2017). Upon examining existing studies on adolescent samples, we could only find one study that investigated the correlates of verbal and visual sexting as distinct behaviors (Houck et al., 2014). In their study, Houck and colleagues (2014) explored the prevalence of sexting behaviors and their association with demographic variables and sexual risk behaviors among early adolescents. Compared with verbal sexters, visual sexters were more likely to be girls and more liked to report early involvement in sexual risk behaviors. To our knowledge, no previous studies have been conducted to explore the separate links between frequency of involvement in verbal and visual sexting and exposure to online victimization. With the present study, we plan to extend previous findings by examining the associations between the involvement in each form of sexting, adolescents' sexual characteristics, and different forms of victimization in the online environment.

**Aims and Hypotheses**

Findings from previous studies indicate that adolescents' involvement in online sexual risk behaviors, including sexting behaviors, is influenced by their developmental need to explore, define, and assert their own sexual identity (e.g., Baumgartner, 2013). However, engaging in sexting behaviors can also have negative consequences for adolescents' well-being because it increases the risk that they might be exposed to different forms of victimization in the online environment (Gámez-Guadix & Mateos-Pérez, 2019). In light of these considerations, the present study aims to examine these links further by distinguishing between adolescents' involvement in two different types of sext message, namely, verbal and visual sexts, and by examining their association with three specific dimensions of adolescents' sexuality, namely, their perceived sex drive, sexual self-concept, and sexual orientation. Then,

we evaluate and compare adolescents' engagement in verbal and visual sexting behaviors as separate predictors of exposure to different forms of online victimization, that is, unwanted online sexual victimization and cyberbullying victimization. In particular, we examine the role of adolescents' engagement in these distinct forms of sexting as mediators of the link between adolescents' sexual dimensions and their exposure to online victimization. In light of the previous literature (e.g., Bobkowski, Shafer, & Ortiz, 2016; van Oosten & Vandenbosch, 2017), our hypothesis is that, when compared with adolescents with a low sexual self-concept and sex drive, adolescents with a stronger sexual drive and sexual self-concept may be more likely to engage in each form of sexting. In turn, we expect that, because of this increased engagement in sexting behaviors, these adolescents will be at increased risk of exposure to different forms of online victimization. With regard to adolescents' sexual orientation, we expect to confirm previous findings of an increased frequency of sexting and exposure to online victimization in sexual-minority adolescents (e.g., Gámez-Guadix, Almendros, Borrajo, & Calvete, 2015; Gámez-Guadix, De Santisteban, & Resett, 2017), and to determine the differential role of verbal and visual sexting as possible mediators of the association between sexual orientation and online victimization. In all predictive analyses presented in the study, we control for gender, age, and time spent online, since these characteristics have been shown to be significantly associated with individual differences in the frequency of sexting, or the exposure to online victimization in adolescence (e.g., Atwood, Beckert, & Rhodes, 2017; Gámez-Guadix & Mateos-Pérez, 2019; Park, Na & Kim, 2014).

## Method

### Procedure and sample

We initially invited 30 schools to take part in the research. They were randomly selected among upper-secondary schools in urban and rural areas from different regional areas of Italy during the 2017–2018 school years. Eleven schools expressed their availability to participate in the research (Northern Italy: n = 5, Central Italy: n =2, Southern Italy: n =4). In order to achieve a regionally balanced sample, two schools per macro-area were retained in the sample, resulting in six upper-secondary schools equally distributed in urban and rural areas of Northern, Central, and Southern Italy. Ethical approval to conduct research was obtained from the University of Turin IRB (protocol no. 256071). The recruited participants were asked to fill in an anonymous questionnaire using paper and pencil. Informed consent was collected from both parents and students in accordance with the Declaration of Helsinki.

From the initial sample of students who were invited to participate in the study (*N* = 820, 33 classrooms), only 80.7% returned a signed parental consent. For this reason, sample consisted of 662 adolescents attending grades 9 to 13 (age range: 13-20 years). Upon inspection of collected questionnaires, we found that 1.3% of participants (N = 9) had missing data on the sexual orientation scale. Since the students who were missing data on sexual orientation did not vary significantly in terms of demographics and outcome variables, we decided to remove these observations. After their removal, the final sample consisted of 653 adolescents with complete questionnaire data (66.9% Females; Mean age = 16.31, SD = 1.34; Males: Mean age =16.33, SD = 1.48; Females: Mean age = 16.30, SD = 1.26).

**Instruments**

**Sexting behaviors.** Sexting was measured by administering three items asking participants to indicate how frequently they engaged in the following sexting behaviors: (1) "sending sexy messages via mobile device," (2) "talking about sex or intimacy via mobile device," and (3) "sending nude or semi-nude photos via mobile device." Participants rated the

items using a 9-point scale ranging from 0 = "never" to 8 = "almost every day." In following previous studies (e.g., McDaniel & Drouin, 2015), items 1 and 2 were averaged into a single indicator of participants' frequency of engagement in verbal sexting, while item 3 was analyzed separately as an indicator of frequency of engagement in visual sexting behaviors. On the basis of these two indicators, we classified participants by distinguishing between non-sexters (adolescents who have never sent a sext message), verbal sexters (adolescents who have engaged in verbal sexting at least once but have never sent a visual sext), and visual sexters (those who have engaged in visual sexting at least once in the past, alone or combined with verbal sexting). Using this classification, we found our sample included 240 (37%) non-sexters, 202 (31%), verbal sexters and 211 (32%) visual sexters, resulting in 413 (63%) adolescents reporting having engaged in sexting at least once. The prevalence rates for sending sexts is in line with that reported in previous studies on Italian adolescents (Morelli et al., 2017).

**Sexual orientation.** Sexual orientation was assessed on a 5-point Kinsey-type scale (Kinsey, 1948), with the following response categories: 1) exclusively heterosexual, 2) bisexual but primarily heterosexual, 3) bisexual, 4) bisexual but primarily homosexual, and 5) exclusively homosexual. In our sample, 480 participants (73.5%) described the mselves as exclusively heterosexual, 156 participants rated themselves as partly or completely bisexual (23.9%), while only 17 described themselves as exclusively homosexual (2.6%). The resulting variable was analyzed as a continuous indicator, with higher scores indicating a stronger homosexual orientation.

**Sex drive.** Participants' sex drive level was assessed by administering an adapted version of the scale from Lippa (2006). The scale consists of five items asking participants to rate how much they agreed with the following statements: "I have a strong sex drive," "I frequently think about sex," "It doesn't take much to get me sexually excited," "I think about sex almost

every day," and "Sexual pleasure is the most intense pleasure a person can have." Participants rated each item on a 7-point rating scale ranging from 1 = disagree completely to 7 = agree completely. For the purposes of the present study, the scale showed high reliability (α = .89).

**Sexual self-concept.** Participants completed an adapted version of Winter's (1988) sexual self-concept scale, which originally consisted of 14 questions assessing self-perceived sexual readiness and sexual self-efficacy, as well as adolescents' confidence about using contraceptives and talking about their use with peers, parents, etc. For the purposes of the present study, we administered an adapted version of the scale, including nine items assessing adolescents' confidence and positive attitude toward sex (e.g., "I consider myself emotionally ready for a sexual relationship"; "I feel it's wrong for me to have sex" [reversed item]), while excluding items referring to contraceptive use. Respondents answered using a six-point scale, ranging from 1 = "Disagree completely" to 6 = "Agree completely." The scale showed adequate internal consistency (α = .78).

**Unwanted online sexual solicitation and cyberbullying victimization.** Participants' exposure to unwanted online sexual solicitation and cyberbullying victimization was assessed using two scales adapted from a questionnaire by Chang and colleagues (2016). Exposure to unwanted online sexual solicitations was measured using two items that asked participants to indicate the frequency with which someone (1) asked them to talk about sex online when they did not want to, and (2) asked them to do something sexual online that they did not want to. Cyberbullying victimization was assessed using four items asking participants to indicate the frequency with which someone 1) made or posted rude comments to or about them online; 2) posted embarrassing or nude photos of them online; 3) spread rumors about them online; and 4) made threatening comments to hurt them online. Participants rated the frequency of each event using a 5-point rating scale with the following response categories: 1) "never," 2) "once,"

3) “seldom/a few times a year,” 4) “sometimes/a few times a month,” and 5) “often/a few times a week.” Items were summed to create a total score for unwanted sexual solicitation (α = .80) and cyberbullying victimization (α = .65)

**Time spent online.** Participants were asked to report the number of hours they spent online for personal use outside of school responsibilities. The item included a stem providing students with a few examples of personal use (e.g., the average time spent on social media, instant messaging, Internet browsing, online gaming, or other entertainment purposes). Participants rated the item using an 8-point scale: 1) never, 2) spend less than an hour, 3) spend 1 to 3 hours, 4) spend 4 to 6 hours, 5) spend 7 to 9 hours, 6) spend 10 to 12 hours, 7) spend 13 to 15 hours, and 8) spend 16 hours or more online.

**Analysis strategy**

Before running predictive analyses, we computed descriptive statistics (mean, standard deviation) for the study variables in the whole sample, and by sexting group. We also explored the association between study variables; for this purpose, given some of the key study measures were expected not to comply with the normal distributions (i.e., frequency of sexting behaviors, and victimization measures), association were examined by computing Spearman’s non-parametric rank correlation coefficient.

Then, as a first aim, we explored the role of specific dimensions of adolescents’ sexuality, namely, sex drive, sexual self-concept, and sex orientation, as predictors of involvement in different types of sexting behavior. More specifically, we estimated a multinomial logistic regression model using the sexting classification (i.e., non-sexters, verbal sexters, and visual sexters) as the outcome variable and the investigated dimensions of adolescents’ sexuality as independent variables. The model was used to compare verbal and visual sexters with adolescents uninvolved in sexting (non-sexters) on the examined sexual

dimensions, controlling for age, gender, and time spent online. Then, a logistic regression model was estimated using the same set of predictors to predict a dichotomous variable distinguishing between the two type of sexting (0 = verbal sexting, 1 = visual sexting). This model was used to compare visual sexters with verbal sexters as regards the investigated dimensions of adolescents' sexuality, while controlling for age, gender, and time spent online.

As a second goal, we tested the role of adolescents' frequency of verbal and visual sexting behaviors as mediators of the association between the dimensions of adolescents' sexuality and online victimization measures, namely, exposure to unwanted online sexual solicitation and cyberbullying victimization. Analyses were performed with Preacher and Hayes's Process macro for SPSS. Specifically, mediation effects were tested using a multiple mediation modeling approach via multiple linear regression, which allowed for the conjoint investigation of the mediating effects of verbal and visual sexting frequency. In the following analyses, frequency of verbal and visual sexting were examined as continuous scores. Fig. 1 shows the diagram for the tested regression paths.

Before running regression analyses, in order to determine the level of multicollinearity in the predictors set, we examined tolerance and variance inflation factor (VIF). Inspection of tolerance and VIF values indicated that no concerns with multicollinearity existed in the predictors set (tolerance > 0.4 and VIF < 2.8 for all predictors). Then, multiple mediation analyses required comparing the results of six separate multiple linear regression models. First, we estimated two separate regression models to test the dimensions of adolescents' sexuality as predictors of each type of online victimization (path *c* in Fig. 1). Next, we performed two regression analyses testing sex drive, sexual self-concept, sexual orientation, (path *a* in Fig. 1) as predictors of adolescents' frequency of each type of sexting behaviors (i.e., verbal, and visual sexting). As a final step, we tested two regression models, including all the investigated

dimensions of adolescents' sexuality and frequency of both type of sexting as predictors of each form of online victimization (paths *b* and *c'* in Fig. 1). In all regression analyses, we control for the effects of gender, age, and time spent online. Total, direct, and indirect effects and their relative 95% confidence intervals were estimated using bias-corrected nonparametric bootstrapping techniques with 5000 bootstrap samples (Preacher & Hayes, 2004). Effects were deemed statistically significant if estimated 95% confidence intervals did not span zero. We choose to perform regression analyses using a bootstrap approach a because of some theoretical properties which make it preferable when performing linear regression on dependent and predictor variables that are expected to deviate from normality. The main advantage of performing linear regression using the bootstrap method is that it does not impose distributional assumptions on the residuals, hence allowing for inference even if the errors do not follow normal distribution or constant error variance (e.g., Efron & Tibshirani, 1993; Fox, 2015; Preacher & Hayes, 2008). For clarity of results, 95% confidence intervals of indirect effects are reported using four decimal points. Analyses were performed using SPSS, version 23.

INSERT HERE FIGURE 1

## Results

### Descriptive statistics and correlation among study variables

Table 1 shows Spearman's rank correlations computed among the study variables, while table 2 shows descriptive statistics of study measures in the sexting groups (i.e., non-sexters, verbal sexters, and visual sexters. With regard to gender, being female showed small negative correlations with sexual self-concept and frequency of verbal sexting, and small positive correlations with sexual orientation and frequency of unwanted online sexual solicitation. Further, being female showed a moderate negative correlation with sex drive. Age showed

small positive correlations with sexual orientation, sex drive, frequency of visual sexting, unwanted online sexual solicitation, and cyberbullying victimization; further, it showed moderate positive correlations with sexual self-concept, and frequency of verbal sexting. Time spent online showed small positive correlation with being female, frequency of verbal and visual sexting, unwanted online sexual solicitation, and cyberbullying victimization.

As regards the dimensions of adolescents' sexuality, namely sexual orientation, sex drive, and sexual self-concept, all showed positive inter-correlations. However, sexual orientation showed only small correlations with the other measures, which instead showed a strong positive inter-correlation. Similarly, sexual orientation showed small positive correlations with frequency of verbal and visual sexting, while both sex drive and sexual self-correlation showed moderate-to-strong positive correlations with both forms of sexting. All sexual dimensions showed small positive correlations with frequency of unwanted online sexual solicitation and cyberbullying victimization.

Frequency of verbal and visual victimization showed a strong positive inter-correlation, as well as a similar pattern of small positive correlation with frequencies of unwanted online sexual solicitation and cyberbullying victimization, which also showed a small positive inter-correlation.

INSERT HERE TABLE 1 AND TABLE 2

**Predictors of verbal and visual texting behaviors**

Results of the multinomial regression showed several significant effects (Table 3). Age, time spent online, sex drive, and sexual self-concept positively predicted both verbal and visual sexting behaviors. Sexual orientation emerged as a positive predictor of visual sexting, while

the effect on verbal sexting behaviors was non-significant. Gender did not emerge as a significant effect.

Next, using a logistic regression, we explored the predictors of visual sexting behaviors by using as a reference adolescents involved only in verbal sexting (Table 4). Adolescents' age, sexual orientation, and sexual self-concept all positively predicted the likelihood of visual sexting behaviors. Again, gender did not emerge as a significant effect.

INSERT HERE TABLE 3 AND 4

**Mediation analyses**

**Sexual dimensions and sexting behaviors as predictors of unwanted online sexual solicitation.** Table 5 reports the results of the regression analyses predicting adolescents' exposure to unwanted online sexual solicitation. In Step 1, we examined the impact of sex drive, sexual self-concept, and sexual orientation on adolescents' exposure to unwanted online sexual solicitation, controlling for gender, age, and time spent online. The results indicated that sex drive and sexual orientation both acted as significant positive predictors of adolescents' exposure to unwanted online sexual solicitation, while sexual self-concept did not emerge as a significant predictor. Being female also predicted increased frequency of unwanted online sexual solicitation.

INSERT HERE TABLE 5 AND TABLE 6

For Step 2 (not shown in the tables), we separately examined the effect of adolescents' sexual dimensions on the frequency of verbal ($R^2$ = .34) and visual sexting ($R^2$ = .23). Adolescents' frequency of both verbal and visual sexting was positively predicted by sexual self-concept (Verbal: B = 0.54, 95% CI [0.33, 0.75], p < .001; Visual: B = .25, 95% CI [0.09, 0.41], p < .01), and sex drive (Verbal: B = 0.50, 95% CI [0.37, 0.64], p<.001; Visual: B = 0.34, 95% CI

[0.23, 0.46], p<.001). Sexual orientation positively predicted frequency of visual sexting, while the effect on verbal sexting was not significant (Verbal: B = 0.19, CI [-0.02, 0.39], p = .07; Visual: B = .17, 95% CI [0.01, 0.34], p = .04). Adolescents' age (Verbal: B = 0.25, 95% CI [0.14, 0.37], p<.001; Visual: B = 0.17, 95% CI [0.08, 0.26], p<.001) and time spent online (Verbal: B = 0.22, 95% CI [0.09, 0.35], p<.001; Visual: B = 0.14, 95% CI [0.03, 0.25], p<.05) also showed a positive effect on the frequency of both types of sexting.

In the final step, we examined the role of adolescents' sexual dimension variables as a predictor of unwanted sexual solicitation while also including the frequency of both verbal and visual sexting in the model. This analytical step resulted in a significant increase in the explanatory power of the model ($R^2$ change = .06, p<.01) and a loss of significance of the effect of sex drive. Both verbal and visual sexting emerged as significant positive predictors of unwanted online sexual solicitation. The results of the mediation analyses are reported in Table 6. The estimated indirect effects showed that both verbal and visual sexting acted as significant mediators of the links between each sexual dimension and unwanted online sexual solicitation.

**Sexual dimensions and sexting behaviors as predictors of cyberbullying victimization.** Table 7 reports the results of the regression analyses predicting adolescents' involvement in cyberbullying victimization events. In Step 1, we examined the impact of sex drive, sexual self-concept, and sexual orientation on adolescents' exposure to cyberbullying victimization, controlling for gender, age, and time spent online. The results indicated that only sexual orientation acted as a significant positive predictor of cyberbullying victimization, while sexual self-concept and sex drive did not show significant effects. Results of the regression analyses exploring the role of the investigated dimensions of adolescents' sexuality as predictors of the

frequency of sexting behaviors are identical to those reported in Step 2 of section 3.3.1 and thus are not reported again here.

In the final step, we examined the effect of the sexual dimensions on exposure to cyberbullying victimization while also including the frequency of both verbal and visual sexting in the model. The inclusion of sexting behaviors in the model resulted in a significant increase in its explanatory power ($R^2$ change = .05, $p<.01$); however, only adolescents' involvement in visual sexting emerged as a significant positive predictor of cyberbullying victimization. The results of the mediation analyses are reported in Table 8. The estimated indirect effects showed that visual sexting acted as a significant mediator of the links between each sexual dimension and cyberbullying victimization, while verbal sexting did not.

INSERT HERE TABLE 7 AND TABLE 8

## Discussion

The present study had several goals, the first of which was to examine the impact of different aspects of adolescents' sexuality, namely, sex drive, sexual orientation, and sexual self-concept, as factors in their engagement in verbal and visual forms of sexting behaviors. Based on the results of multinomial regression analyses, it was found that adolescent verbal and visual sexters were more likely to be older, to spend more time online, to have a higher sex drive, and to have a higher general sexual self-concept than were adolescents who did not report involvement in sexting behaviors (i.e., non-sexters). Furthermore, visual sexters were more likely to report non-heterosexual orientations than were verbal sexters and non-sexters, and to be older and report a higher sex drive than verbal sexters. Overall, the results are in line

with those from the previous literature, showing a positive association between age, frequency of Internet use, sexual orientation, and frequency of sexting in adolescence (e.g., Baumgartner et al., 2014; Gámez-Guadix & Mateos-Pérez, 2019). Our results also extend previous findings by showing that two specific aspects of adolescents' sexuality, namely, their perceived sex drive and sexual orientation, are associated with a stronger inclination to share visually explicit images of themselves when messaging online with peer partners. The emerging positive link between sex drive and engagement in sexting behaviors appears coherent with previous findings indicating sexual motivations as a major component of adolescents' involvement in sexting (Bianchi et al., 2017). In turn, the increased prevalence of engagement in sexually explicit forms of sexting (i.e., visual sexting) among non-heterosexual adolescents may be interpreted as a consequence of an increased inclination to use sexting as a computer-mediated alternative to physical sexual activity (e.g., Döring, 2014; Renfrow & Rollo, 2014). In this regard, our findings are also coherent with those by studies indicating that non-heterosexual adolescents may be more inclined to interact with partners in the online environment because it is perceived as more private than engaging in face-to-face offline interaction, limiting potential unwanted negative social consequences (Brown, Maycock, & Burns, 2005; Hertlein, Shadid, & Steelman, 2015).

As a second goal, we investigated the role of adolescents' sexual dimensions, as well frequency of involvement in verbal and visual sexting behaviors, as a predictor of exposure to different forms of online victimization, namely, unwanted sexual solicitation and cyberbullying victimization. With regard to the investigated control variables, female adolescents were more likely to report exposure to online sexual solicitations, while the amount of time spent online by adolescents was directly related to their risk of exposure to both forms of online victimization (e.g., Atwood, Beckert, & Rhodes, 2017; Gámez-Guadix & Mateos-Pérez, 2019). With regard to adolescents' sexual dimensions, we found that sex drive and sexual orientation

had a direct effect on adolescents' exposure to unwanted sexual solicitation in the online environment, while sexual self-concept did not. Additionally, when frequency of verbal sexting and frequency of visual sexting were included in the model, both emerged as positive predictors of unwanted sexual solicitation, while the effect of sex drive was no longer significant. The inspection of indirect effects indicated that adolescents' frequency of engagement in both verbal and visual sexting behaviors mediated the relationship between each dimension of adolescents' sexuality, and their risk of exposure to unwanted online sexual solicitations. Results concerning cyberbullying victimization showed a more differentiated pattern of associations. Among the different aspects of adolescents' sexuality, only sexual orientation showed a positive direct effect on the frequency of involvement in cyberbullying victimization. After the inclusion of sexting variables in the model, only frequency of involvement in visual sexting emerged as a positive predictor of exposure to cyberbullying victimization behaviors; verbal sexting did not show a significant effect. Furthermore, results showed the effects associated with adolescents' sexual characteristics on cyberbullying victimization were mediated by their frequency of engagement in visual sexting behaviors.

Thus, results from the present study are coherent with the literature highlighting the association between involvement in sexting behaviors and increased exposure to different forms of online victimization, such as cyberbullying victimization (Reyns, Burek, Henson, & Fisher, 2013) and unwanted online sexual solicitation (Gámez-Guadix, Almendros, Borrajo, & Calvete, 2015), in particular among adolescents (Gámez-Guadix & Mateos-Pérez, 2019). Furthermore, the present study highlights the role of some aspects of adolescent sexuality as potential risk factors for their exposure to multiple forms of online victimization by means of their positive association with sexting behaviors. That is, adolescents who are self-confident about engaging in sexual activity and feel a stronger desire for sex are more likely to engage in sexting, a behavior that in turn may expose them to a greater risk of victimization when they

are online. With regard to adolescents' sexual orientation, findings are coherent with the previous literature in showing that non-heterosexual adolescents are at an increased risk of sexual solicitation (Gámez-Guadix, Almendros, Borrajo, & Calvete, 2015) and cyberbullying victimization (Walker, 2015; Wiederhold, 2014). The emerging links between sexual orientation and exposure to online forms of victimization are not surprising, as a growing literature exists indicating that as with traditional bullying, sexual-minority youth tend to be targeted at significantly higher rates than heterosexual adolescents in the online environment (e.g., Ramsey, DiLalla & McCrary, 2016). In this regards, our study extends existing literature by highlighting the role of visual sexting behaviors as potential mediators of these links.

As regards the interpretation of these emerging links, it is important to note that the association between each form of victimization and adolescents' sexuality dimensions (i.e., sex drive, sexual self-concept, sexual orientation) should not be interpreted as indications that these dimensions represent risk factors *per se.* Similarly, the associations between adolescents' sexuality variables and their involvement in sexting behaviors may well be seen as an expression of normative developmental instances. However, because of the uncontrolled and public nature of the environment in which sexting takes place, i.e., the Internet, involvement in sexting behaviors may ultimately increase the risk that adolescents may be exposure to several negative consequences for their overall well-being (e.g., Bianchi et al., 2018).

With regard to the role of sexting in behaviors as predictors of online victimization, the present study shows some novel results concerning the differential impact of verbal and visual sexting behaviors. In particular, we were able to demonstrate that the strength of the link between sexting and online victimization varies according to the type of sexting message, as well as the specific form of victimization. Findings from the present study show that

adolescents who engage in both types of sexting report more frequent exposure to undesired requests to engage in sexual activities when in the online environment, while adolescents' exposure to cyberbullying victimization appears to be linked primarily with their frequency of visual sexting. With regard to the link between sexting and unwanted sexual solicitation, multiple interpretations are possible. First, compared with non-sexting peers, adolescent sexters are at an increased risk of having sexually explicit messages leaked online and ultimately to attract the undesired sexual attention of either known or unknown peers and adults. Furthermore, as noted in previous studies (e.g., van Oosten & Vandenbosch, 2017), adolescent sexters are more likely than non-sexters are to use sexy pictures when presenting themselves on social media. Thus, the link between sexting and exposure to sexual solicitation may be interpreted as the consequence of a general inclination of sexters to present themselves in a sexual way in the online environment. In turn, the specific link between cyberbullying victimization and visual sexting can be interpreted as a consequence of the fact that, when compared with verbal sexts, visual sexts are more likely to be more sexually explicit, and to be traced back to the victims (e.g., because of the increased recognizability of the victim). For these reasons, leaked visual sexts may be more easily used by cyberbullies to threaten or damage the reputation of the victims among their online peers.

Even though the present study provides novel findings concerning the relationship between adolescents' sexuality, sexting behaviors, and online victimization, these must be interpreted with caution, since the use of a non-random sample and a cross-sectional research design should be taken into account. With regard to the sample, we were not able to implement a randomized sample design; thus, results may not be directly generalizable to the reference population. However, as a tentative solution to this problem, schools were selected to include students from each macro-region of Italy (i.e., Northern, Central, and Southern regional areas), as well as both urban and rural areas. With regard to the use of a cross-

sectional design, although studies investigating mediating effects using this kind of the design are quite common, the use of a longitudinal design would have permitted a clearer understanding of the associations between adolescents' characteristics, their involvement in sexting behaviors, and their exposure to online victimization. The next limitation is theoretical and concerns the direction of causality of the link between sexting behaviors and exposure to online victimization. As has been done in previous studies on adult samples (e.g., Gámez-Guadix, Almendros, Borrajo, & Calvete, 2015; Reyns Burek, Henson, & Fisher, 2013), we explored the link between the two constructs by hypothesizing a direction of causality that goes from sexting behaviors to online victimization. However, recent findings using longitudinal data show that, while this link holds, the relationship can also be reciprocal; that is, involvement in sexting tends to increase among victimized adolescents ( Gámez-Guadix & Mateos-Pérez, 2019). Given this, the present study is better understood as an exploratory investigation of the interplay between the considered constructs, and caution should be applied when interpreting the findings as supportive of the existence of causal relationships. Future studies exploring the link between adolescents' sexuality characteristics, sexting behaviors, and online victimization should consider collecting longitudinal data in order to increase the robustness of our findings. Moreover, while self-reporting is common in this kind of study, over-reliance on such measures is another important limitation of our study that may have introduced alterations in the associations between the investigated constructs due to common method bias. Future studies should consider collecting information from different sources, e.g. by recruiting adolescents' partners to collect information about their involvement in sexting behaviors, or by using adolescents' peers as informants about their involvement in online victimization.

To conclude, to our knowledge, the present study is the first to investigate the association between adolescents' involvement in sexting, the specific aspects of adolescents'

sexuality, and the risk of exposure to online victimization by considering two distinct forms of sexting behavior, namely, verbal and visual sexting. By conducting this investigation, we were able to highlight the existence of differential links between each form of sexting and both adolescents' sexuality and their risk of being victimized in the online environment. In particular, the findings from the present study indicate that adolescents' involvement in visual sexting may put them at increased risk of both undesired sexual solicitations and exposure to cyberbullying behaviors when in the online environment, this process being particularly evident among sexual-minority adolescents. These findings have practical implications for the development of programs aimed at educating adolescents (as well as their parents and teachers) in the use of computer-mediated communication technologies, such as instant-messaging and social network sites. In particular, given the increasing inclination toward the sharing of visual-based media among young generations (Anderson & Smith, 2018; Marengo, Longobardi, Fabris, & Settanni, 2018), these programs should address the potential negative consequences of visual sexting behaviors for both senders and receivers of visual sexts, in particular among minors. These includes possible legal consequences linked to both the sharing and the possession of sexually explicit images and videos depicting minors, even if performed by consenting partners meeting the legal age of consent (for a review, see Spooner, K., & Vaughn, 2016). Further, these programs should address the personal risks linked with the indiscriminate online sharing of visual data, and in particular those including sexually explicit images, as this is expected to pose adolescents at increased risk for online victimization behaviors. In this view, this study underscore the need for the development of secondary intervention programs aimed at raising awareness of this increased risk among adolescents who have already engaged in visual sexting behaviors, as well as providing them (and their caregivers) with the life skills (Wachs, Junger, & Sittichai, 2015) required to improve their resiliency against different forms of online victimization.

**Conflict of interest** The authors declare that they have no conflict of interest.

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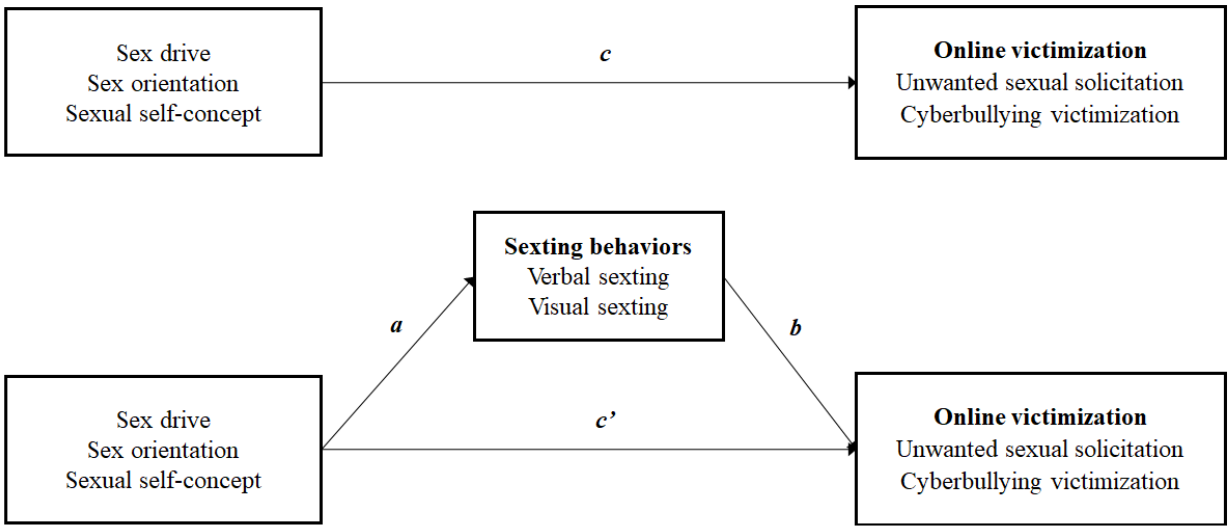


**Figure 1. Paths estimated in regression analyses**

**Table 1. Descriptive statistics and Spearman's rank correlation for study variables (N=653)**

| | | M/% | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Gender (1 = female; 0 = male) | 66.9 % | | | | | | | | | | |
| 2 | Age | 16.31 | 1.34 | -.01 | | | | | | | | |
| 3 | Time spent online | 3.88 | 1.15 | .17** | .06 | | | | | | | |
| 4 | Sexual orientation | 1.44 | 0.89 | .10* | .11** | .07 | | | | | | |
| 5 | Sex drive | 3.20 | 1.61 | -.33** | .20** | -.00 | .16** | | | | | |
| 6 | Sexual self-concept | 3.75 | 0.96 | -.25** | .34** | -.02 | .11** | .64** | | | | |
| 7 | Verbal sexting | 2.04 | 2.35 | -.14** | .32** | .12** | .18** | .53** | .51** | | | |
| 8 | Visual sexting | 0.98 | 1.79 | -.14** | .28** | .09* | .19** | .41** | .42** | .72** | | |
| 9 | Unwanted online sexual solicitation | 2.54 | 1.37 | .11** | .12** | .12** | .17** | .13** | .11** | .30** | .28** | |
| 10 | Cyberbullying victimization | 5.33 | 2.13 | -.04 | .11** | .13** | .21** | .19** | .16** | .29** | .28** | .29** |

Note. * $p < .05$, ** $p < .01$

**Table 2. Descriptive statistics for study measures among sexting groups**

| | Non-Sexters (N= 240) | | Verbal sexters (N =202) | | Visual sexters (N=213) | |
|---|---|---|---|---|---|---|
| | M/% | SD | M/% | SD | M/% | SD |
| Gender (1 = male; 0 = female) | 74.6% | | 68.8% | | 56.4% | |
| Age | 15.88 | 1.31 | 16.30 | 1.36 | 16.82 | 1.18 |
| Time spent online | 3.71 | 1.13 | 3.90 | 1.02 | 4.05 | 1.25 |
| Sexual orientation | 1.27 | 0.67 | 1.37 | 0.79 | 1.70 | 1.11 |
| Sex Drive | 2.34 | 1.39 | 3.31 | 1.47 | 4.08 | 1.46 |
| Sexual self-concept | 3.24 | 0.92 | 3.78 | 0.85 | 4.31 | 0.74 |
| Unwanted online sexual solicitation | 2.14 | 0.62 | 2.54 | 1.34 | 3.01 | 1.80 |
| Cyberbullying victimization | 4.67 | 1.34 | 5.31 | 2.11 | 6.13 | 2.59 |

**Table 3. Multinomial regression estimating predictors of verbal and visual sexting behaviors, versus non-involvement in sexting (N = 653; *Nagelkerke* $R^2$ = .35)**

| | Verbal Sexters Vs. Non-Sexters | | | | Visual Sexters Vs. Non-Sexters | | | |
|---|---|---|---|---|---|---|---|---|
| | *B* | *SE* | *exp(B)* | *p* | *B* | *SE* | *exp(B)* | *p* |
| Intercept | -5.82 | 1.38 | | | -12.50 | 1.63 | | |
| Gender (1 = male; 0 = female) | 0.08 | 0.24 | 1.08 | .75 | -0.29 | 0.26 | 0.75 | .26 |
| Age | 0.16 | 0.08 | 1.18 | .04 | 0.36 | 0.09 | 1.44 | <.01 |
| Time spent online (hours) | 0.19 | 0.09 | 1.21 | .04 | .36 | 0.11 | 1.44 | <.01 |
| Sexual orientation | 0.04 | 0.14 | 1.04 | .80 | 0.35 | 0.14 | 1.42 | .01 |
| Sex drive | 0.39 | 0.09 | 1.47 | <.01 | 0.50 | 0.10 | 1.65 | <.01 |
| Sexual self-concept | 0.30 | 0.14 | 1.35 | .03 | 0.90 | 0.17 | 2.45 | <.01 |

**Table 4. Logistic regression estimating predictors of visual sexting versus verbal sexting (N = 413; *Nagelkerke* $R^2$ = .21)**

| | *B* | *SE* | *Exp(B)* | *p* |
|---|---|---|---|---|
| Intercept | -6.87 | 1.54 | | |
| Gender (1 = female; 0 = male) | -0.39 | 0.24 | 0.68 | .10 |
| Age | 0.20 | 0.09 | 1.22 | .02 |
| Time spent online (hours) | 0.17 | 0.10 | 1.19 | .08 |
| Sexual orientation | 0.35 | 0.12 | 1.42 | <.01 |
| Sex drive | 0.13 | 0.09 | 1.14 | <.01 |
| Sexual self-concept | 0.61 | 0.16 | 1.84 | <.01 |

**Table 5. Multiple linear regression analyses predicting unwanted online sexual solicitation (N = 653)**

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| | | *B* | *SE* | *p* | LL | UL |
| | Intercept | -0.37 | 0.67 | | | |
| | Gender (1 = female; 0 = male) | 0.3 | 0.12 | <.01 | 0.17 | 0.57 |
| | Age | 0.07 | 0.04 | .04 | 0.00 | 0.13 |
| | Time spent online | 0.16 | 0.05 | .01 | 0.05 | 0.27 |
| | Sexual self-concept | -0.03 | 0.07 | .61 | -0.17 | 0.10 |
| | Sexual orientation | 0.27 | 0.06 | < .01 | 0.11 | 0.43 |
| | Sex Drive | 0.10 | 0.04 | .03 | 0.02 | 0.19 |
| Step 1 | $R^2$ = .09 | | | | | |
| | Intercept | 0.87 | 0.67 | | | |
| | Gender (1 = female; 0 = male) | 0.34 | 0.11 | <.01 | 0.15 | 0.53 |
| | Age | 0.02 | 0.04 | .46 | -0.04 | 0.09 |
| | Time spent online (hours) | 0.12 | 0.04 | .02 | 0.02 | 0.22 |
| | Sexual self-concept | -0.11 | 0.07 | .12 | -0.26 | 0.03 |
| | Sexual orientation | 0.23 | 0.06 | .01 | 0.07 | 0.40 |
| | Sex Drive | 0.01 | 0.04 | .75 | -0.07 | 0.10 |
| | Verbal sexting | 0.08 | 0.03 | .03 | 0.01 | 0.16 |
| | Visual sexting | 0.14 | 0.04 | .03 | 0.02 | 0.26 |
| Final step | $R^2$ = .16 | | | | | |
| | $R^2$ *change* = .07** | | | | | |

Note. Bias-corrected confidence intervals are reported. Bootstrapped sample size = 5000. CI = confidence interval; LL = lower limit; UL = upper limit.

**Table 6. Multiple mediation analysis of verbal and visual sexting on unwanted online sexual solicitation (N = 653)**

| Indirect effects | *Estimate* | *SE* | 95%CI LL | 95%CI UL |
|---|---|---|---|---|
| Self-concept -> Verbal sexting -> Unwanted sexual solicitation | 0.0440 | 0.0217 | 0.0082 | 0.0951 |
| Self-concept -> Visual sexting -> Unwanted sexual solicitation | 0.0349 | 0.0189 | 0.0073 | 0.0885 |
| Sex drive -> Verbal sexting -> Unwanted sexual solicitation | 0.0398 | 0.0194 | 0.0073 | 0.0840 |
| Sex drive -> Visual sexting -> Unwanted sexual solicitation | 0.0487 | 0.0234 | 0.0099 | 0.1036 |
| Sexual orientation -> Verbal sexting -> Unwanted sexual solicitation | 0.0154 | 0.0117 | 0.0004 | 0.0501 |
| Sexual orientation -> Visual sexting -> Unwanted sexual solicitation | 0.0242 | 0.0170 | 0.0017 | 0.0726 |

Note: Bias-corrected confidence intervals are reported. Bootstrapped sample size = 5000. CI = confidence interval; LL = lower limit; UL = upper limit.

**Table 7. Multiple linear regression analyses predicting cyberbullying victimization**

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| | | *B* | *SE* | *p* | LL | UL |
| | Intercept | 1.61 | 1.04 | | | |
| | Gender (1 = female; 0 = male) | -0.11 | 0.18 | .56 | -0.47 | 0.26 |
| | Age | 0.09 | 0.06 | .09 | -0.01 | 0.20 |
| | Time spent online (hours) | 0.24 | 0.07 | .01 | 0.09 | 0.40 |
| | Sexual self-concept | 0.10 | 0.11 | .28 | -0.08 | 0.29 |
| | Sexual orientation | 0.51 | 0.09 | <.01 | 0.27 | 0.78 |
| | Sex Drive | 0.01 | 0.07 | .08 | -0.02 | 0.27 |
| Step 1 | $R^2$ = .10 | | | | | |
| | Intercept | 3.18 | 1.05 | | | |
| | Gender (1 = female; 0 = male) | -0.16 | 0.18 | .38 | -0.54 | 0.20 |
| | Age | 0.04 | 0.06 | .50 | -0.06 | 0.14 |
| | Time spent online | 0.19 | 1.05 | .01 | 0.04 | 0.34 |
| | Sexual self-concept | 0.01 | 0.11 | .89 | -0.18 | 0.20 |
| | Sexual orientation | 0.46 | 0.09 | <.01 | 0.24 | 0.70 |
| | Sex Drive | 0.01 | 0.07 | .85 | -0.13 | 0.17 |
| | Verbal sexting | 0.05 | 0.06 | .31 | -0.05 | 0.15 |
| | Visual sexting | 0.24** | 0.07 | .01 | 0.06 | 0.43 |
| Final step | $R^2$ = .15 | | | | | |
| | $R^2$ change = .06 (p<.001) | | | | | |

Note. Bias-corrected confidence intervals are reported. Bootstrapped sample size = 5000. CI = confidence interval; LL = lower limit; UL = upper limit.

**Table 8. Multiple mediation analysis of verbal and visual sexting on online cyberbullying victimization (N = 653)**

| Indirect effects | *Estimate* | *SE* | 95%CI LL | 95%CI UL |
|---|---|---|---|---|
| Self-concept -> Verbal sexting -> Cyberbullying victimization | 0.0285 | 0.0285 | -0.0229 | 0.0908 |
| Self-concept -> Visual sexting -> Cyberbullying victimization | 0.0615 | 0.0317 | 0.0152 | 0.1436 |
| Sex drive -> Verbal sexting -> Cyberbullying victimization | 0.0272 | 0.0275 | -0.023 | 0.0848 |
| Sex drive -> Visual sexting -> Cyberbullying victimization | 0.0823 | 0.0335 | 0.0229 | 0.1567 |
| Sexual orientation -> Verbal sexting -> Cyberbullying victimization | 0.0101 | 0.0124 | -0.0051 | 0.0468 |
| Sexual orientation -> Visual sexting -> Cyberbullying victimization | 0.0421 | 0.0295 | 0.0039 | 0.1228 |

Note: Bias-corrected confidence intervals are reported. Bootstrapped sample size = 5000. CI = confidence interval; LL = lower limit; UL = upper limit.

Highlights

- We examine sexuality dimensions in relation with sexting
- Sexting is predicted by sex-drive, self-concept, and orientation
- Sexting mediates their link with online victimization
- Visual sexting is related to different form of victimization