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**Assessing the Role of Self-Control and Technology Access on Adolescent Sexting and Sext Dissemination**

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**Abstract**

Concern over juvenile sexting behaviors has increased substantially over the last decade, leading to criminological inquiries of the correlates of sexting. Evidence suggests that sexting behavior is associated with one's level of self-control, such that individuals with low self-control are unable to constrain themselves from acting on opportunities to offend. Though self-control is correlated with sexting, few have considered the ways that situational opportunities associated with technology access and self-control influence one another. This study attempted to address this gap in the literature through an analysis of 1,328 adolescents enrolled in secondary schools located in a large metropolitan region of South Australia. The findings from three binary logistic regression models illustrated that low self-control, and online opportunity factors were associated with sexting behaviors, though self-control was mediated by the inclusion of opportunity measures. The implications of this analysis for our understanding of criminological theory is discussed in detail.

***Key words:***

**Sexting, cybercrime, adolescents, self-control, sexuality**

## **Introduction**

The impact of technology on all facets of life cannot be overstated, particularly regarding the role of social media, text messaging, and the audio-visual recording capability of mobile devices and computers in interpersonal communications (Lenhart et al., 2010; Holt & Bossler, 2016). The Internet has been especially transformative for young people, who have quickly adapted to online environments for all manner of social and romantic engagements (Strasburger et al., 2019). These advancements have facilitated unique changes in the developmental tasks which occur during adolescence, specifically social and sexual interactions and communications with peers (Dahl et. al, 2018; Dir et al., 2013).

Access to smart phones embedded with audio and video recording capabilities coupled with applications like Instagram, Snapchat, Facebook, and Tinder create opportunities to record, share, and circulate images of oneself to attract or retain romantic partners, as well as promote sexual intimacy and gratification (Handyside & Ringrose, 2017; Hasinoff, 2012). These behaviors have been referred to as *sexting*, or the use of technology to send, receive, or forward sexually explicit content via electronic mediums, such as text messages, smart phones, and social media sites (Ferguson, 2011; Kletkke et al., 2014; Lenhart, 2009; Ringrose, 2012; Wolak & Finkelhor, 2011).

Sexting behaviors can be understood as normative adolescent romantic and sexual behaviors (e.g. Uhls et al., 2017). At the same time, youth adaptations of sexual and emotional development into online spaces create opportunities to engage in potentially risky sexual behaviors with possible legal consequences (American Psychological Association, 2010; Calvert, 2009; Willard, 2010). Specifically, sexting may increase the risk for victimization and harm through the misuse of sexted content (Maas et al., 2019; Shenk et al., 2009; Powell et al., 2018). Individuals may inadvertently receive sexts or view sexts on others' devices, thereby limiting the

sender's privacy. In much the same way, sexts distributed to the intended recipient can be immediately shared with or without the creator's consent, which may constitute sexual violence with negative emotional and psychological consequences (Dake et al., 2012; Henry & Powell, 2014; Klettke et al., 2014; Morelli et al., 2017; Powell et al., 2018).

Policymakers and criminal justice practitioners have raised concerns regarding youth technology use to engage in sexting behaviors, or the sharing of nude or sexual images and video featuring others (Gillespie, 2011; Leary, 2010; Sherman, 2011; Szymialis, 2010). The dissemination of sexual images or media of individuals under the age of 18 related to sexting can be treated as a criminal offense in nations like Australia and the United States under statutes related to child sexually abusive materials (Gillespie, 2011; Leary, 2010; Sherman, 2011; Szymialis, 2010). There has been a move to decriminalize the sexting exchanges between minors in the Australian states of New South Wales and Victoria, though the extant laws have lagged behind technological advances and are inconsistently applied (Henry & Powell, 2015).

Given the potential misuse and abuse of sexting content, criminological scholars have explored the correlates of this activity. Specifically, Gottfredson and Hirschi's (1990) general theory of crime, which proposes that individuals with low self-control are more likely to utilize situational opportunities to engage in crime, has been used to account for involvement in sexting behaviors (e.g. Lee et al., 2015; Marcum et al., 2016; Reyns et al., 2013; Reyns et al., 2014). Few studies to date have examined the relationships between self-control, opportunity, and sexting behaviors (Reyns et al., 2014), particularly among adolescent populations (see Marcum et al., 2016; Van Ouytsel et al., 2019). Such research is essential to improve our understanding of the theoretical dynamics influencing involvement in sexting (Reyns et al., 2014; Schreck et al., 2002; Stewart et al., 2004).

The present study explored these issues through a series of three binary logistic regression models for different forms of sexting behaviors within a sample of 1,328 adolescents living in Adelaide, South Australia. The results demonstrated significant relationships between self-control, opportunity, and sexting activities. The implications of this analysis for our understanding of criminological theory to account for sexting behaviors are explored in depth, as are the policy implications derived from the findings.

### **Sexting as a Normative Behavior**

Adolescence represents a critical period of growth and learning where youth begin to practice core competences in their identities, attachments, and meaning making (Dahl et al., 2018). Extant research suggests that the use of technology and social media are inextricably intertwined with these aspects of youths' development (for a review see: Uhls, Ellison, & Subrahmanyam, 2017). Adolescents can now connect with peers in ways that change the frequency or immediacy of experiences, amplify experiences and demands, alter the qualitative nature of interactions, and create both new behaviors and compensatory activities within peer networks (Nesi et al., 2018a. p. 267). Social media use is especially salient in the development of self-identity and autonomy, relationships with peers, and intimacy, all which are reflected and reproduced offline (Subrahmanyam & Smahel, 2017; Schwartz et al., 2013; Uhls, 2015). Adolescents engage in selective self-presentation of their identities through the content they post, and evaluate themselves through the feedback they receive from peers (Subrahmanyam & Šmahel 2011; Valkenburg & Peter, 2011).

Another way in which the Internet has transformed adolescent social and sexual development is through access to Internet pornography (Cooper et al., 2000). Approximately 40 to 70% of adolescents are first exposed to internet pornography unintentionally and early

exposure is associated with more frequent sexual activity (Braun-Courville & Rojas, 2009; Peter & Valkenburg, 2016). Internet pornography can be used as an educational tool to learn about sex and may have offline implications. For example, individual consumption of online pornography may also be associated with involvement in sexting behaviors (Crimmins & Seigfried-Spellar, 2014; Morelli et al., 2017; Sevcikova, 2016; Van Ouytsel et al., 2014).

Sexting behaviors are increasingly common, although the prevalence of sexting varies by place (Madigan et al., 2018; Perloff, 2014; Van Oosten et al., 2015). A recent meta-analysis of American studies indicated an average of 14.8% of high school students sent sexts, and 27.4% received sexts (see Mori et al., 2020). In Australia, researchers have reported substantially wider uptake among youth audiences. For example, Lee et al. (2015) found that two-thirds of a large convenience sample of Australian high school students received a sext and almost half reported sending a sext of themselves (also see Patrick et al., 2015). Virtual proximity to others who may be interested in receiving sexting content may act as a provocation that leads some to engage in the creation and sending of sexts (Reyns et al., 2014).

Gender also plays a salient role in evaluations of sexting behaviors. Several studies indicate there are no gender differences in sexting behaviors (Madigan et. al, 2018; Samimi & Alderson, 2014; Strassberg et. al, 2013; Wysoki & Childers, 2011; Weisskirch & Delevi, 2011). Other studies have found gendered differences in the sending of a sext to another party, with girls being more likely to create send sexts and boys to receive them (Clancy et al., 2020; Englander, 2015; Lee, Moak, & Walker, 2013; Reyns et al., 2014; Ringrose et al., 2012). Sexting behaviors are also evaluated differently based on gender. When girls send sexts, they are more likely to be perceived as “sluts” who are deserving of any negative consequences which may ensue, while boys who sext report increases in social status (Choi et al., 2016; Ringrose et al.,

2012; Walker et al., 2013). Additionally, females who report feeling coerced to send sexts experience more sexual coercion offline (Choi et al., 2016).

Sext dissemination can be defined as the distribution of received sexts to audiences other than the initial recipient (Clancy et al., 2021; Madigan et al., 2018; Walker & Sleath, 2017). It is a broad term which includes what some refer to as *revenge pornography* as well other forms of non-consensual dissemination, such as images which have been stolen, hacked, or taken without the subject's knowledge or consent (Franks, 2013). The nonconsensual dissemination of sexts among adolescent ranges from 3.0% to 24%, although this could be a conservative estimate due to underreporting and the fact that individuals may not know that an image has been shared (Clancy et al., 2019; Walker & Sleath, 2017). A recent meta-analysis indicated that the prevalence of disseminating a sext without consent was 12% while 8% of students reported that they had had their images disseminated without consent. (Madigan et al., 2018). Like evaluations of sexting behavior, gender differences exist in motivations for dissemination of sexts; males are more likely to frame the sharing of images as a way to gain status and increase social worth (Clancy et al., 2019).

Sext dissemination is an increasingly normative behavior, as some adolescents consider it to be part of online sexual interactions creating an *exchange behavior*. Sexts are used as social currency with some expectation that content will be disseminated (Clancy et al., 2019; Walker & Sleath, 2017). Despite sext dissemination being a normative behavior, the practice can lead to criminal sanctions within both the US and Australia on the basis of existing child sexually abusive materials legislation, so long as the content involves someone under the age of majority (O'Connor et al., 2017).



In some cases, dissemination of sexts can be classified as *image based sexual abuse*, which is a broad term that includes the production, distribution, or threat of dissemination of images as a form of bullying, intimate partner violence, or sexual violence (McGlynn, Rackley, & Houghton, 2017; Powell et al., 2018). Powell and associates (2018) found that among a sample of 16–49-year-old Australian residents, 11% reported that they had engaged in image-based sexual abuse behaviors. Thus, there are negative consequences and harmful outcomes which can occur as a result of sexting behaviors which may differentially affect adolescent populations.

### **Sexting and the Role of Impulsivity**

The developmental and psychological literature has demonstrated that youth sexting behaviors are associated with higher levels of impulsivity (Temple et al., 2014). Impulsivity can influence decision-making and influence calculations and perceptions of risk (Gottfredson & Hirschi, 1990; Reyns et al., 2014; Smith & Anderson, 2001). Youth who are impulsive and risk taking are also heavily influenced by the views of their peers, especially those who feel a fear of social exclusion (Blakemore & Mills, 2014). To that end, peer pressure is one of the most salient factors in both sexting images of the self and sexting images of others (Lee et al., 2016). Youth tend to value short-term benefits over longer term safe alternatives and engage in increased risky decision making when peers are present (Albert et al., 2013; Chein et al., 2011; Gottfredson & Hirschi, 1990). In fact, adolescents' immaturity, impulsivity, and deficits in rational thinking are associated with risky online behaviors generally (Holt & Bossler, 2016; O'Keefe et al., 2011; Ostrager, 2010; Van Ouytsel et al., 2014).

In criminological theory, the concept of impulsivity has been treated as an important component of a cluster of attitudinal dynamics that shape an individual's likelihood of offending.

Specifically, Gottfredson and Hirschi (1990) proposed their general theory of crime, recognizing that self-control intersects with opportunity to produce individual involvement in crime.

Individuals with low self-control are impulsive, short-sighted, and risk-seeking which makes them less able to empathize or assess the negative consequences of their actions (Gottfredson & Hirschi, 1990). One's level of self-control stems from parental controls exerted over their child's behavior through direct monitoring, recognition, and punishment of anti-social behaviors from an early age. Individuals whose behaviors are not sufficiently regulated during early adolescence are more likely to have low self-control and be oriented toward behaviors that produce immediate gratification (Gottfredson & Hirschi, 1990).

Low self-control has been found to be a significant correlate of sexting behaviors among adolescent and young adult samples (Lee et al., 2016; Marcum et al., 2016; Reynolds et al., 2013; Reynolds et al., 2014). Youth who engage in sexting often report that they do so for excitement, thrill, or the possibility of sexual encounters (Lenhart, 2009; Van Ouytsel et al., 2014). Those with low self-control may also be less capable of understanding the potential adverse consequences of sexting, whether for themselves or others (Reynolds et al., 2014). Low self-control is also associated with viewing pornography (see Holt & Bossler, 2016) which may be an indicator of sexual maturation among early adolescents.

Low self-control is not the only factor that may shape youth involvement in sexting behaviors. It is likely that the routine activities individuals engage in while online may be more pertinent predictors for sexting behaviors, due to the exposure to possible targets and activities that create opportunities to sext (Reynolds et al., 2014; Wolfe et al., 2018). These opportunities are more likely to be recognized and acted upon by those with low self-control (Gottfredson & Hirschi, 1990; Hay & Forrest, 2008). Specifically, the ability to create and share content is

dependent on the individual's situational access to and use of technology, particularly use of specific applications (Reyns et al., 2014; Wolfe et al., 2018). Adolescents with lower levels of self-control report increased time spent online and social media use, creating opportunities to engage in deviant behavior (Burnay et al., 2015; Cao et al., 2007; Dong et al., 2010; Holt et al., 2013).

Opportunities to engage in sexting depend on social and situational factors which vary over time (Hay & Forrest, 2008; Longshore, 1998; Pratt & Cullen, 2000). Offline opportunities to engage in risky behaviors are typically associated with parental monitoring of youths' behaviors, time spent outside of the home, and unsupervised time with peers (Hay & Forrest, 2008). Extant research demonstrated that these factors are not associated with the receipt of sexts (Wolfe et al., 2018). The creation and sending of a sext is commonly performed alone due to the personal nature of the content (Powell & Henry, 2014). This may be a function of youths' ability to engage in self-monitoring behaviors to reduce their likelihood of detection by others (Martinez-Prather & Vandiver 2014).

In addition, prior work has found that time spent online is not positively associated with sexting behaviors (Gordon-Messer et al., 2013; Reyns et al., 2014). Instead, specific aspects of online activity are significant risk factors, such as regular use of social media sites and forums where youth can request sexts and share that content with others based on what they perceive as indicators of target vulnerability, such as online provocative displays and behavior (DeHart et al. 2017; Milton et al., 2019). These findings are consistent with the general theory of crime, as opportunity cannot be treated as a constant, otherwise it negates its interaction with low self-control (Hay & Forrest, 2008). For instance, access to the Internet is virtually constant, and

thereby has less utility as a predictor relative to variable activities, like time spent using specific applications (Holt & Bossler, 2016; Reynolds et al., 2019).

### **The Present Study**

Taken as a whole, there appear to be key relationships between self-control and opportunities via technology use that shape involvement in sexting behaviors among youth. First, low self-control should be associated with various sexting behaviors (Reynolds et al., 2014). Second, this relationship may be partially or fully mediated in the presence of opportunity factors as measured through technology use behaviors (Reynolds et al., 2014). Specifically, simple access to technology should not be associated with sexting behaviors due to the prevalence of devices and the relatively intimate nature of sexting generally (Gordon-Messer et al., 2013; Reynolds et al., 2014). The use of social media, forums, and viewing pornography should increase individual involvement in sexting behaviors due to their role in increasing opportunities or rationales to sext (Bossler, Holt, & May, 2012; Holt et al., 2012). The extent to which young people view pornography may create situational provocations that increase their willingness to request, create, send, and receive sexts. Finally, we expect gender to be associated with specific forms of sexting, though it is unclear how opportunities to offend may influence these relationships.

This study attempted to test these hypotheses using an analysis of three forms of self-reported sexting behaviors in a sample of 1,328 youth enrolled in secondary schools across a large metropolitan region in Adelaide, South Australia. Three binary logistic regression models were estimated to understand the relationships between opportunity, self-control, youth sending and receiving sexts, and the dissemination or sharing of sexts without the consent of the sender.

### **Data and Methods**

The data for this study was generated from the first wave of a longitudinal survey of adolescents living in the Adelaide Metropolitan Region in the state of South Australia, Australia. The sample population consisted of 1,921 youths who began Grade 8 in 2018 at 18 public schools that agreed to participate in the project. The research team gained ethics approval through the host University, and approval was obtained from the State Government, all Principals within each school, and the respective classroom instructors where the survey would be administered. In addition, informed consent was obtained from parents and students through an opt-out procedure. Responses were collected between July and December 2018 during the homeroom period in all schools using a paper-based self-report questionnaire. The participation rate for respondents who were physically present on the day of data collection was 94% in total.

The final sample population for this study was 1,328 respondents due to listwise deletion of missing data (see Table 1). Though this is approximately a 30% reduction in the overall population, the final sample was demographically similar to the full population on the basis of both gender (51.2% male compared to 50.8%) and racial composition (75.9% white compared to 74.5%). As a result, the reduced sample appears appropriate for use and reflective of the full population, enabling us to proceed with statistical analyses.

### ***Dependent Variables***

Three binary variables were used to explore aspects of sexting behaviors among youth. Respondents were presented with three questions asking them to assess “Over the last 12 months, how often have you done the following things using any of your device(s)”: 1) “shared sexual content (e.g. text, images or videos) of yourself” (*sent a sext*); 2) “seen sexual content (e.g. text, images or videos) of someone you know” (*received a sext*); and 3) “shared sexual content (e.g. text, images or videos) of someone else without their consent” (0=never; 1=less than weekly;

2=about once a week; 3=several times a week; 4=about once a day; and 5=several times a day). These measures closely mirrored operationalizations of various sexting behaviors captured in prior research (Clancy et al., 2020; Milton et al., 2019; Mitchell et al., 2012; Reyns et al., 2014; Van Ouytsel et al., 2019; Walker & Sleath, 2017; Wolfe et al., 2018). Due to the limited number of respondents who engaged in these behaviors (see Table 1), the categorical responses were collapsed into a binary variable reflecting either no activity (0) or involvement (1) in 1) *sending sexts*, 2) *receiving sexts*, and 3) *disseminating sexts without consent*.

### INSERT TABLE 1 ABOUT HERE

#### **Independent Variables**

Individual *self-control* was measured using a six-item scale derived from the National Longitudinal Survey of Youth. Though abbreviated compared to the Grasmick et al. (1994) scale, these parsimonious measures have been used by various researchers to assess the key aspects of self-control (e. g. Holt et al., 2014; Turner & Piquero, 2002). Respondents were asked to rate their agreement with the following six statements: 1) Planning takes all the fun out of things; 2) I enjoy taking risks; 3) I often get in a jam because I do things without thinking; 4) I enjoy new and exciting experiences even if it is a little frightening; 5) Life with no danger in it would be too dull for me; and 6) I have to use a lot of self-control to keep out of trouble. Responses ranged from strongly disagree (1) to strongly agree (4) and were summed to create a reliable scale ( $\alpha=.722$ ) where higher scores indicate lower self-control.

Opportunities to engage in sexting were measured through a series of questions based on both access to and use of various technologies. First, respondents were asked two binary measures for the availability of 1) a *laptop* computer or *ipad/tablet*, and 2) a *smartphone* (0=no; 1=yes) which they can use. Though sexting is primarily associated with the use of smartphones, individuals can also send and receive texts via tablets and laptops. This is particularly true for

Mac users, as one can send and receive texts across iPhones, iPads, and Mac laptops. Thus, including both measures enabled the researchers to explore any relationships between technology access and the three forms of sexting measured here.

To assess opportunities to sext on the basis of online activities, a series of seven measures were included asking respondents “Over the last 12 months, how often have you done the following things using any of your device(s)”: 1) “sent or received emails” (*sent email*); 2) “sent instant messages (SMS, iMessage, Facebook messenger, etc.)” (*sent text*); 3) “browsed social media (Facebook, Instagram, Twitter, etc.)” (*social media*); 4) “used the camera on any devices to take photos or record” videos (*used camera*); 5) “shared your photos (including posting to social media or sending via messaging apps)” (*shared photos*); 6) “shared your videos (including posting to social media, sending via messaging apps or video-calling)” (*shared videos*); and 7) “browsed or posted to an online forum” (*forum*). Respondents were provided with a six-item response for each activity (0=never; 1=less than weekly; 2=about once a week; 3=several times a week; 4=about once a day; 5=several times a day).

Respondents were also asked about their consumption of online pornography through the question: “over the last 12 months, how often have you done the following things using any of your devices”: “seen pornography on a website” (*viewed porn*). The same six-item response was provided (0=never; 1=less than weekly; 2=about once a week; 3=several times a week; 4=about once a day; 5=several times a day). This measure was included to assess the extent to which one’s engagement with pornography may also create opportunities or unique situational factors that increase an individual’s willingness to create, send and receive sext content.

Finally, a binary variable was also included as control for *gender* (0=female, 1=male) to assess the extent to which gender affects opportunities to engage in sexting behaviors.

## Results

To examine the relationships between sexting, low self-control and opportunities to access and use technology, three binary logistic regression models were estimated for each form of sexting activity. Variables were entered in blocks to first examine the effects of low self-control, then in block two to explore the relationships between use and opportunity factors, and then in block three to examine all factors simultaneously. There was no evidence of multicollinearity: no VIF was higher than 2.95, while no tolerance was below 0.338. The clustered nature of the data as a function of students being differentially situated within and across the schools sampled, required the use of statistical methods to reduce the size of both intra-cluster correlations and standard errors. Each regression was estimated using the cluster command (`vce(cluster clustvar)`) by schools ( $n=18$ ) using STATA 13 statistical software.

The first model estimated the role of various independent variables on individuals' sexting or sending their own sexual content to others (see Table 2). Model 1 demonstrated that individuals who sent sexts were more likely to have low self-control ( $OR=1.197^{***}$ ), though gender was not significant. Model 2, which included the technology use measures, demonstrated that youth who sexted were more likely to spend time in online forums ( $OR=1.309^{***}$ ) and view pornography ( $OR=1.633^{***}$ ). None of the technology access measures were significant as hypothesized.

### **INSERT TABLE 2 ABOUT HERE**

Model 3, which included low self-control, opportunity, and demographic factors simultaneously, demonstrated that self-control was completely mediated by the inclusion of opportunity measures. In addition, gender became significant, with females more likely to engage in sexting behaviors ( $OR=.457^*$ ). Time spent in forums ( $OR=1.315^{***}$ ) and viewing pornography ( $OR=1.718^{***}$ ) remained significant and in the same direction. Thus, this model



supported the hypotheses that access to technology was not as important as one's specific use of technology while online.

Finally, to assess the validity of the model given the low response rate, a receiver operating characteristic (ROC) model was estimated to consider the validity of the findings (Pencina et al., 2008). The area under the curve was .861 (sig. = 0.000), which demonstrated that the model was able to classify individuals with accuracy, and was not random.

The first regression model estimating the factors associated with receiving sexts featuring people they know demonstrated that youth were more likely to have low self-control (OR=1.163\*\*\*; see Table 3, Model 1). Gender was again non-significant in this model. The technology access and use measures included in Model 2 demonstrated that youth who did not have access to a laptop or tablet (OR=.532\*) were more likely to receive sexts. In addition, youth who spent more time using their device cameras (OR=1.220\*), shared videos (OR=1.351\*\*\*), and viewed pornography (OR=1.703\*\*\*) were also more likely to receive sexts.

### **INSERT TABLE 3 ABOUT HERE**

The full model including all measures reflected another partial mediation of self-control through technology use (see Table 3, Model 3). Those with low self-control were significantly more likely to view sexts (OR=1.090\*\*), though opportunity measures were also significant. Youth were more likely to view sexts featuring individuals they knew if they did not have access to a laptop or tablet (OR=.505\*), spent more time IMing and texting (OR=1.079\*), using the camera in their devices (OR=1.179\*), sharing videos (OR=1.329\*\*\*), and viewing pornography (OR=1.760\*\*\*). In addition, females were more likely to look at sexts featuring people they knew (OR=.589\*).

The final model explored the factors associated with individuals disseminating sexts without others' consent (see Table 4). In Model 1, youths with low self-control (OR=1.232\*\*\*) were more likely to disseminate sexts without consent, though gender was again non-significant. Model 2 included only the technology use measures, and access to device measures were again non-significant. The only use measure that was significant was time spent viewing pornography (OR=1.953\*\*\*), similar to the prior models.

#### **INSERT TABLE 4 ABOUT HERE**

In the full model (Table 4, Model 3), the relationship between self-control and dissemination without consent was completely mediated by technology use and opportunity measures. The only significant technology use variable in the model was that individuals who viewed pornography more frequently (OR=2.082\*\*\*) were more likely to share content without other's consent.

Due the relatively limited number of respondents who reported engaging in dissemination of sexts without creator consent, an additional ROC model was estimated to assess the accuracy of the model. The area under the curve in this model was .886 (sig. = .000), supporting the notion that the model correctly classified respondents with greater accuracy than random chance (Pencina et al., 2008).

#### **Discussion and Conclusions**

Criminological scholarship has explored sexting behaviors among adolescent and young adult populations, with some emphasis on tests of Gottfredson and Hirshi's (1990) general theory of crime. This dominant criminological theory argues that individuals with low self-control are more likely to act on opportunities to engage in risky, deviant, or criminal behaviors (Lee et al., 2016; Marcum et al., 2016; Reyns et al., 2013; Reyns et al., 2014). Studies found low self-

control to be a correlate of sexting, though few considered the extent to which this relationship is mediated by situational opportunities to sext on the basis of technological access and use patterns (see Reynolds et al., 2014). The present study tested this relationship using a sample of South Australian youths' self-reported involvement in sending and receiving sexts, along with disseminating sexting content without the permission of the sender.

First, the respondents in this sample reported somewhat low rates of sexting behaviors, as 3.53% of youth sent sexts of themselves to others, 13.6% received a sext, and 1.13% disseminated a sext without consent. These rates are somewhat lower than in other studies using young adult samples (e.g. Clancy et al., 2021; Mori et al., 2020), though they are closer to studies utilizing early adolescent populations (Houck, Barker, Rizzo, Hancock, Norton, & Brown, 2014; Sevcikova, 2016; Van Ouytsel et al., 2019). The sample population were between the ages of 13 and 14 at the time of data collection. Many studies include young adult samples who may be more enmeshed in sexual relationships and have constant access to technology (Clancy et al., 2021), which helps to account for the increase in the frequency of sexting behaviors as individuals age (Temple et al., 2012). As a result, the normative relationship between sexting and age may have not yet been established for some respondents in the sample (Sevcikova, 2016; Van Ouytsel et al., 2019).

Second, this study found that low self-control was associated with involvement in all manner of sexting and sext dissemination (Lee et al., 2016; Marcum et al., 2016; Reynolds et al., 2013; Reynolds et al., 2014). The importance of self-control was, however, mediated by opportunities to engage in sexting as a function of one's online activities (see Reynolds et al., 2014). Differential access to technology creates opportunities to engage in sexting that may be more important than a person's general level of impulse control. The only model where self-control

retained significance while controlling for technology use was in receiving sexts featuring someone the respondent knew.

These analyses also demonstrated that device access was not as important to account for sexting behaviors as the ways that youths regularly use various applications and services (e.g. Reynolds et al., 2014; Reynolds et al., 2019). The only anomalous finding was that youth with no access to a laptop or tablet were significantly more likely to receive sexts. This may be a function of individuals inadvertently viewing sexts while using another person's device, or may reflect some participants who exclusively used smartphones while online. Additional research is needed to disentangle the foreground and situational factors that influence individual actions associated with receiving sexts relative to sending such content.

The findings of this study also reinforce the importance of specific online activities in creating situational opportunities to engage in sexting behaviors. Youth who spent more time using their device camera, sharing videos online, and participating in forums were more likely to engage in various sexting behaviors, which may be a function of increased proximity to others who may foster sexting behaviors. In addition, the significant relationship between viewing pornography and all sexting behaviors demonstrated that increased pornography consumption affects willingness to engage in sexting behaviors, particularly in sample of youth nearing sexual maturity. Since both viewing pornography and sexting behaviors are correlated with low self-control (Holt & Bossler, 2016), they may be analogous behaviors which reinforce one another (see also Crimmins & Seigfried-Spellar, 2014; Morelli et al., 2017; Van Ouytsel et al., 2014). Further study is needed to extricate this relationship and better assess the mechanics by which various forms of online sexual activities manifest themselves.

The relationship between gender and sexting behaviors in this analysis also reinforced the extant research. Gender was non-significant when examined with self-control, though being female became significant for both sending and receiving sexts in the full regression models when controlling for opportunity via technology use measures (Clancy et al., 2020). There was also no relationship identified between gender and disseminating sexts without consent, which is consistent with prior research (Clancy et al., 2020). Thus, this study reinforced the gendered nature of sexting, which may be a reflection of females receiving a greater degree of requests to send sexts, and doing so because of opportunities stemming from overall technology use.

The nature of the data also creates specific limitations that may impact this study's implications for our understanding of sexting. First, the cross-sectional nature of the data makes it difficult to assess the proper temporal ordering of theoretical relationships in the models. It is not possible to understand any potential pathways that lead youth into sexting behaviors over time. Second, the geographic boundaries of the sample to a large South Australian metropolitan region hinder the generalizability of its findings to other nations. Cross-cultural research is necessary to better understand the causal patterns of early onset sexting behaviors and identify any regional variations that may exist.

Third, the researchers could not control for the actual sexual activity of respondents, nor their involvement in romantic relationships with others which may increase opportunities for sexting. Such measures are essential in future models to better assess the way in which physical and sexual development impact youths' behaviors (e.g. Bianchi et al., 2019; Steinberg et al., 2019). Lastly, we did not ask for specific details about the dissemination surrounding motivation and content. While there is extant research on the motivations for dissemination (Clancy et al.,

2020), the content of what is disseminated, and how youth themselves define and experience dissemination, is critical to our understanding of these behaviors.

Despite these limitations, the findings provide clear policy implications which could prove useful to design improved models for communicating the benefits and risks of sexting behaviors through a health safety education framework (Strasburger et al., 2019). The normative relationship between sexting and adolescent development suggests there is minimal value in criminalizing sexting behaviors. Instead, programs targeted to adolescents focused on building skill sets to navigate pornography as part of sexual education and normative development could improve their ability to critically assess media messages and develop more realistic expectations for both sex and relationship development (Austin et al., 2006; Austin et al., 2015; Dawson et al., 2020). Such programming may be able to both promote healthy and safe sexting behaviors and minimize dissemination of sexts without consent to better inform youth decision-making. Additionally, programs which are focused on online disinhibition, or doing things online which one would not necessarily do offline, are crucial to media literacy which promotes safe and ethical online behaviors (Bhat, 2018; Bhat et al., 2018). While opportunity to sext abounds, education and intervention can serve as harm reduction mechanisms which may decrease nonconsensual dissemination.

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**Table 1: Descriptive Statistics (n=1,328) Clustered by School (n=18)**

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Variables	Mean	SD	Min	Max
Sending sexts	.0353	.184	0	1
Receiving sexts	.1363	.343	0	1
Disseminating sexts without consent	.0113	.105	0	1
Self-Control	15.550	3.278	6	24
Laptop	.967	.177	0	1
Smartphone	.906	.291	0	1
Sent email	2.743	1.589	0	5
Sent Text	3.946	1.499	0	5
Social Media	3.836	1.747	0	5
Used Camera	3.052	1.591	0	5
Shared Photos	2.185	1.659	0	5
Shared Video	1.871	1.621	0	5
Forums	1.381	1.620	0	5
Viewed Porn	.464	1.008	0	5
Gender	.512	.500	0	1

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**Table 2: Binary Logistic Regression Estimating Sending Sexts (n=1,328) Clustered by School (n=18)**

Variables	Model 1			Model 2			Model 3		
	b	SE	OR	b	SE	OR	b	SE	OR
Self-Control	.180	.051	1.197**				.099	.064	1.104
Laptop				-.812	.244	.443	-.942	.219	.389
Smartphone				.015	.707	1.015	.073	.774	1.076
Sent email				.032	.094	1.032	.036	.096	1.037
Sent Text				-.096	.135	.907	-.117	.134	.889
Social Media				.017	.130	1.018	-.011	.125	.988
Used Camera				.209	.150	1.233	.170	.127	1.186
Shared Photos				.227	.158	1.255	.204	.146	1.226
Shared Video				.099	.118	1.104	.078	.113	1.082
Forums				.269	.072	1.309***	.274	.078	1.315***
Viewed Porn				.490	.166	1.633***	.541	.177	1.718***
Gender	-.019	.394	.980				-.782	.160	.457*
Constant	-6.250	.723	.001***	-4.927	.005	.007***	-5.720	1.093	.003***

Model 1: F=9.63\*\*; Model 2: F=12.37\*\*\*; Model 3=18.29\*\*; F= \*p<.05 \*\*p<.01 \*\*\*p<.001.

**Table 3: Binary Logistic Regression Estimating Receiving Sexts (n=1,328) Clustered by School (n=18)**

Variables	Model 1			Model 2			Model 3		
	b	SE	OR	b	SE	OR	b	SE	OR
Self-Control	.151	.024	1.163***				.086	.029	1.090**
Laptop				-.629	.141	.532*	-.682	.288	.505*
Smartphone				-.042	.578	.958	-.001	.638	.998
Sent email				-.059	.050	.942	-.048	.050	.952
Sent Texts				.085	.105	1.089	.064	.108	1.066
Social Media				.001	.062	1.001	-.019	.065	.980
Used Camera				.199	.102	1.220*	.164	.093	1.179*
Shared Photos				.077	.104	1.080	.067	.101	1.069
Shared Video				.301	.087	1.351***	.284	.087	1.329***
Forums				.041	.054	1.041	.043	.053	1.044
Viewed Porn				.532	.115	1.703***	.565	.144	1.760***
Gender	-.137	.273	.871				-.528	.145	.589*
Constant	-4.188	.430	.015***	-3.437	.020	.032***	-4.268	.012	.013***

Model 1: F=18.51\*\*\*; Model 2: 25.21\*\*\*; Model 3: F= 10.71\*\*; \*p<.05 \*\*p<.01 \*\*\*p<.001.

**Table 4: Binary Logistic Regression Estimating Disseminating Sexts Without Consent (n=1,328) Clustered by School (n=18)**

Variables	Model 1			Model 2			Model 3		
	b	SE	OR	b	SE	OR	b	SE	OR
Self-Control	.208	.066	1.232***				.065	.092	1.067
Laptop				-.763	.942	.465	-.907	.399	.403
Smartphone				-.653	.404	.520	-.651	.224	.521
Sent email				-.122	.137	.885	-.143	.115	.866
Sent Texts				-.063	.297	.938	-.047	.274	.953
Social Media				.318	.431	1.375	.291	.569	1.338
Used Camera				-.158	.156	.853	-.189	.122	.827
Shared Photos				.464	.235	1.590	.433	.351	1.541
Shared Video				-.130	.211	.878	-.157	.199	.854
Forums				.316	.176	1.372	.312	.239	1.367
Viewed Porn				.669	.126	1.953***	.733	.286	2.082***
Gender	-1.103	.551	.331				-.854	.315	.425
Constant	-7.210	1.420	.000***	-5.899	1.286	.002***	-6.118	.004	.002*

Model 1: F=12.81\*\*\*; Model 2: 7.44\*\*; Model 3: F=7.33\*\*; \*p<.05 \*\*p<.01 \*\*\*p<.001.

## Highlights

The sending and receipt of sexts was associated with lower levels of self-control and technology use measures.

Females were more likely to send and receive sexts when controlling for other independent variables.

Youth who shared sexts with others without the sender's consent were more likely to view online pornography frequently.

The role of self-control as a predictor for sexting behaviors was largely mediated by technology use measures.