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Adolescent Sexting: A Narrative Review

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ABSTRACT

This narrative review is based on a literature search on PsycINFO and PubMed that involved entering the terms adolescent sexting for papers published during the last five years. Following exclusion criteria, 52 papers could be classified as sexting studies including research on the prevalence, effects/comorbidities, risk factors and interventions for those problems. Most of the studies have been conducted in the U.S. where the prevalence of sexting has ranged from 5% to 29%. Sexting has typically been consensual, or at least the recipient has been known, although some forwarding of sext messages has occurred. The effects of sexting have included sexual activity, problematic relationships, mental health problems, other addictions and legal problems. The predictor or risk variables have included male gender, extraverted personality, low self-esteem, depression, impulsivity, peer pressure and the lack of parental monitoring. Like other literature on adolescent problems, this research is limited by primarily deriving from self-report and parent report and by the absence of longitudinal data that might inform whether the data being reported are effects of or risk factors for adolescent sexting and the need for prevention/intervention research.

Keywords: sexting, adolescents, sexual activity

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This narrative review is based on a literature search on PsycINFO and PubMed that involved entering the terms adolescent sexting for peer-reviewed papers published during the last five years (2014-2019). This time frame was selected because the earlier literature (2012-2014) had already been reviewed (Barrense-Dias, Berchtold, Suris & Akre, 2017). Exclusion criteria were non-English papers and case studies. Following exclusion criteria, 52 papers could be classified as sexting studies including research on the prevalence, effects/comorbidities and risk factors for those problems.

Sexting (a term that combines sex and texting) has been defined as the sending, receiving or forwarding sexually explicit messages, images or photographs/videos typically via electronic means. The term sexting first appeared in Webster's dictionary in 2012, although some research reports were published before that time. Snapchat has reputedly been used more than Facebook for sexting as it allows users to send photos for a maximum of 10 seconds before the photos self-destruct. Reputedly, sex joking comprises approximately a quarter of the messages on Snapchat (Utz, Muscanell & Khalid, 2015). Other applications like Kik and WhatsApp are popular because of their anonymity. The earlier research focused on reasons for sexting. For example, in one study, the participants listed sexting as being sexy or initiating sexual activity (approximately 85% of the participants), followed by gaining attention from a partner (80%), as being fun and flirtatious (65%), responding to pressure from friends or dating partners (30%), and as a form of self-expression (30%) (Henderson and Morgan, 2011). In a qualitative study that compared the perceptions of adolescents, parents and teachers, the adolescents viewed texting as a positive and respectable communication between two consenting people (Barrense-Dias et al, 2019). And even though sexting has typically been viewed as a risk behavior, especially for its legal risk, it was reported as not being a marker of risk behavior when it has

occurred between romantic partners (Van Ouystel, Lu, Ponnet, Walrave & Temple 2019).

Peer pressure has been considered the most frequent motive for sexting (Englander, 2012). Other motives for sexting were boredom, making intimate contact with the opposite sex, a form of self-representation, peer influence, to arouse the recipient, and accidentally or unintentionally. An Associated Press/MTV survey revealed that 17% of those who received sext messages forwarded them to someone else (Associated Press and MTV, 2012). The most common reasons given for forwarding sexts were assuming that others wanted to see them (55%), showing off (35%), as a joke (31%), to be funny (30%), and boredom (26%). Approximately 14% of those who shared a sexual video or photo of themselves expected that it would be shared with someone else without their permission.

Most of the recent research has focused on the prevalence of sexting, the effects of sexting and the risk factors for sexting. The effects of sexting have included sexual activity, mental health problems, comorbid addictions and legal problems. The predictor or risk variables have included male gender, extraverted personality, low self-esteem, depression, impulsivity, peer pressure and the lack of parental monitoring. Like other literature on adolescent problems, this research is limited by primarily deriving from self-report and by the absence of longitudinal studies that might inform whether the data being reported are effects of or risk factors for adolescent sexting. This review is accordingly divided into sections on the prevalence of adolescent sexting, the effects/correlates of sexting, the predictors/risks of sexting, and the limitations and potential directions for future research.

Prevalence of Adolescent Sexting

As already noted, most of the recent research on adolescent sexting has taken place in the U.S. where the incidence has ranged from 5–29% (see table 1 for list of prevalence data). A couple studies from other countries including Peru and

Australia have reported an even greater prevalence. Several problems related to the reporting on prevalence include the use of different recruitment strategies, different assessment measures and the psychosocial and legal risks associated with reporting sexting.

Table 1. Prevalence of sexting.

<u>Prevalence</u>	<u>Location</u>	<u>First Author</u>
29% consensual 3% nonconsensual	Pennsylvania	Frankel
57% asked to send 31% asked someone to send	Texas	Temple
16% males, 14% females sent 41% males, 31% females sent		Strassberg
5% sent 20% received	Los Angeles	Rice
3% age 12 36% age 17	Spain	Gamez-Gaudix
35% Males 13% sent	Peru	West
43% sent, 54% received text 26% sent, 42% received image	Australia	

In a cross-sectional study on 6021 9th–12th grade students from Pennsylvania, 29% reported consensual sexting, while only 3% reported nonconsensual sexting, suggesting that the majority of students who are sexting each other at least know each other (Frankel, Bass, Patterson, Dai & Brown, 2018). Female students were 49% less likely to report sexting, and sexting was significantly more prevalent in students who had engaged in cyberbullying, who had depressive symptoms, who had current

tobacco and alcohol use and who were involved in sexual activity. A similar prevalence was reported on a public high school sample (N=948) of evenly distributed African-American, non-Hispanic white and Hispanic adolescents from southeast Texas (Temple, Paul, van den Berg, Le, McElhany & Temple 2012). More than half the sample (57%) had been asked to send a sext message and 31% reported having asked someone for a sext message. These studies combined suggest that consensual sexting

happens more frequently than nonconsensual sexting.

The persistence of sexting is suggested by a longitudinal study on private high school students who completed two surveys four years apart (Strassberg, Cann & Velarde, 2017). The prevalence was similar at both time points, with 16% of males and 14% females sending explicit cell phone photos and 41% of males and 31% of females receiving these messages. These data, i.e. twice the numbers receiving as sending sext messages, suggest that many adolescents were not reporting their sending sext messages. This is further illustrated in a review that included 18 studies published between 2012 and 2014 for adolescents up to 18 years of age (Barrense-Dias, Berchtold, Suris & Akre, 2017). The prevalence rates varied from .9% to 60%, apparently related to the different definitions of sexting. When a comparison was made between sending and receiving sext messages, the prevalence was again greater for receiving than sending. And the rates for sending versus receiving have also been lower in younger middle school students. For example, in the Youth Risk Behavior Survey in Los Angeles (N=1285 adolescents), 20% of middle school students reported receiving sext messages as opposed to only 5% reportedly sending them (Rice, Gibbs, Winetrobe, Rhoades, Plant et al., 2014). Underreporting may relate to the psychosocial and legal risks associated with sexting by minors.

Although sexting is prevalent even at a younger age in middle schools, the rates are lower at the younger age. This is illustrated by a comparison of the sexting prevalence at age 12 versus age 17 in a sample of 3223 Spanish adolescents (Gamez-Guadix, de Santisteban & Ressett, 2017). The rate for the younger adolescents was only 12% the rate of the older adolescents (3% versus 36%).

The prevalence of sexting has also varied across cultures from 20% to 50% based on data from separate studies in this recent literature. In a cross-sectional questionnaire study on 949

Peruvian high school students, 20% of the sample reported at least one instance of sexting, although the rate was significantly higher for boys than girls (35% versus 13%) (West, Lister, Hall, Crookston, Snow et al., 2014). In contrast, a much higher incidence of sexting occurred in Australian high school students (N= 2114) based on a report from the National Survey of Australian Secondary Students and Sexual Health (Patrick, Heywood, Pitts & Mitchell, 2015). In this sample, approximately half the students had received (54%) or had sent (43%) a sexually explicit written text message. And, 42% of students had received a sexually explicit image, while only one in four students reported sending a sexually explicit image (26%), again illustrating the greater rate for receiving than sending. Further, as many as 10% of the sample reported sending a sexually explicit image of someone else.

Effects of Sexting

Several studies in the recent literature have focused on the negative effects of sexting in adolescents (see table 2 for list of studies). Although these are categorized here as effects, they might also be considered comorbid conditions as they have derived most frequently from cross-sectional rather than longitudinal studies. These have included sexting effects on sexual activity, mental health issues, other addictions and legal problems. The most frequent studies have focused on sexual activity that accompanied sexting.

Sexual activity

Some have suggested that sexting might be a safe alternative to engaging in physical intercourse as it avoids the risks of getting pregnant or getting a sexually transmitted disease (Lippman and Campbell, 2014). However, data from dozens of studies in the recent literature on sexting have suggested that sexting not only leads to earlier and more frequent sexual activity but also to related problems including pornography, sextortion, socially transmitted infections including HIV, and dating violence.

Table 2. Effects of sexting.

<u>Effects</u>	<u>First Author</u>
<u>Sexual Activity</u>	
Increased sexual activity	Frankel
Early & frequent sexual activity	
Early sex & with multiple partners	Brinkley
Risky sexual behavior	Billgrami, Sevcikova, Ybarra, Romo
Sexually transmitted infections	de Graaf, Rice, Maas
Sexual coercion/ sextortion	Choi, Patchin
Dating violence	Maas, Morelli, Bianchi
<u>Mental health issues</u>	
Emotional problems	Sevcikova
Depression	Frankel, van Ouytsel
Suicide attempts	Frankel
Borderline personality	Brinkley
<u>Comorbid addictions</u>	
Internet addiction	Gansner
Cyberbullying	Frankel, West, van Ouytsel
Substance use	Sevcikova, Temple, Ybarra, van Ouytsel
Legal issues	Holoyda, Cornwell, Lorang

Early and more frequent sexual activity. In a recent cross-sectional study on 6021 9th to 12th grade students, sexual activity (odds ratio=5.21) and the combination of sexual activity and alcohol use were more prevalent in those students who reported consensual sexting (OR=7.02) (Frankel, et al., 2018). In a systematic review and meta-analysis, data from

nine studies including 9676 adolescents suggested that the odds of reporting sexual activity were 6.3 times higher for adolescents who sent sexts versus those who did not (Hands Schuh, La Cross & Smaldone, 2019). Longitudinal studies have also documented sexting as a significant predictor of sexual activity. For example, in a study on 181 10th grade students, sexting at age 16 was associated with early sexual activity, having multiple sex partners and engaging in drug use in combination with sexual activity at age 18 (Brinkley, Ackerman, Ehrenreich & Underwood, 2017). In another longitudinal study on ethnically diverse students with a mean age of 16 years, the odds of being sexually active (intercourse, risky sex) one year later at age 17 was 1.32 times greater for youth who had sexted at age 16 (Temple, Le, van den Berg, Ling, Paul, et al. 2014).

Risky sexual behaviors. Several research groups have documented sexting as a risk factor for risky sexual behavior and have been exploring the types of risky sexual behavior. In a systematic review of 94 papers published since 2006 the authors concluded that excessive sexting led to risky sexual behavior (Bilgrami, McLaughlin, Milanaik & Adesman, 2017). In a study on a large sample from 25 European countries (N=17,016), sexting was associated with vaginal sex in both younger and older boys, but for girls, the association was only significant for the older group (Sevcikova, 2016). In a study on a U.S. sample of 13–18–year–old adolescents, sharing sexual photos was significantly related to all types of sexual behaviors including vaginal sex and oral sex as well as risky sexual behaviors, as in having concurrent sexual partners and more last–year partners (Ybarra & Mitchell, 2014).

Sexting of any kind has also been associated with higher rates of sexual behaviors by adolescents as young as seventh graders including touching genitals over clothes (OR= 1.98), vaginal sex (OR= 2.23), and oral sex (OR= 2.66). This was also addressed in younger

Los Angeles middle school students (N= 1285) whose excessive sexting was associated with unprotected sex (OR=12.1) (Rice et al., 2014). In a sample of Hispanic adolescents 13–21 years old, “ever sexters” had greater odds of penetrative sex (oral, vaginal and anal) as well as hormonal contraception (Romo, Garnett, Younger, Stockwell, Soren, et al., 2017). In this sample, sexting was also associated with more lifetime and recent sexual partners. Surprisingly, despite the association between sexting and frequent sexual behavior, these have not been associated with adolescent pregnancy in the recent literature.

Sexually transmitted infections. Associations between sexting, unprotected sex and sexually transmitted infections have been reported in a few studies. In a study on Dutch adolescent sexting, for example, approximately 11% of the sample had more than one partner in the last six months and had not used condoms consistently with their last partner (De Graaf, Verbeek, Van den Borne & Meijer, 2018). And these participants had a 3.6 times greater likelihood of being diagnosed with a sexually transmitted infection. And, in a longitudinal survey, high use sexting at time one was predictive of HIV risk at time two in a sample of ethnically and socioeconomically diverse female adolescents (N=296) (Maas, Bray, & Noll, 2019).

Sexual coercion and sextortion. Sexting has been considered an online extension of off-line forms of sexual coercion. In a cross-sectional study on ethnically diverse female adolescents (N=450) from Southeast Texas, sexting naked images as well as receiving naked images without giving permission were associated with off-line sexual coercion (Choi, Van Ouytsel & Temple, 2016). In a national survey of U.S. middle and high school students (N=5,568), sexting was associated with sextortion (a form of blackmail in which sexual information or images are used by sexting to extort sexual favors from the victim) (Patchin & Hinduja, 2018). In this sample, 5% of students reported that they had been victims and 3% reported threatening others

who had shared an image with them in confidence. Males more often targeted others, and those who threatened sextortion were more likely to have been victims of sextortion.

Dating violence. Sexting and online sexual experiences have been associated with dating violence in at least a few recent studies. In a longitudinal survey of 14-16-year-old female adolescents (N=296), nude image exchange and sexual chatting at time one were associated with the number of physically violent romantic partners and the occurrence of sexual assault at time two (Maas et al., 2019). In a larger survey sample (N=1334) of both female and male adolescents, those who were high/moderate users of sexting committed more off-line and online dating violence (Morelli, Bianchi, Baiocco, Pezzuti & Chirubolo 2016). Sexting in exchange for something, as in sextortion, has been related to both dating violence perpetration and dating violence victimization based on hierarchical regression analyses of survey data from 171 adolescents (Bianchi, Morelli, Nappa, Baiocco & Chirumbolo, 2018).

Mental Health Issues

Surprisingly, unlike other adolescent social media-related problems that have been associated with mental health issues, e.g. Internet addiction (Field, 2018), cyberbullying (Field, 2019a) and gaming (Field, 2019b), the literature is mixed on the association between sexting and mental health problems. Some studies have suggested sexting-associated mental health problems, while others have found no relationship between sexting and mental health issues. In a large database from 25 European countries (N=17,016 adolescents age 11-16), sexting was associated with emotional problems irrespective of age and gender (Sevcikova, 2016). Emotional problems were relatively severe especially in younger and older boys. In the Youth Risk Behavior Survey (N=6021 high school students), sexting was significantly more prevalent in students who reported depressive symptoms (OR=1.46) and students who reported suicide attempts

(OR=1.96) (Frankel, et al., 2018). Similarly, in a study based on data from 11 secondary schools in Belgium (N=1028 adolescents), sexting was significantly linked with depression (Van Ouytsel, Van Gool, Ponnet & Walrave 2014). In a systematic review on 94 articles, excessive sexting was related to quality of sleep and to mental well-being (Bilgrami et al., 2017). An even more serious mental health problem, namely borderline personality, has been predicted by sexting (Brinkley et al., 2017). In this longitudinal study (N=181), sexting during 10th grade (age 16) predicted borderline personality features during 12th grade (age 18).

In contrast, at least two studies in the recent literature reported no relationships between sexting and mental health problems. In one study on adolescents from multiple high schools (N= 937), adolescent sexting was significantly associated with symptoms of depression, but it was no longer a marker of mental health after adjusting for prior sexual behavior, age, gender, race/ethnicity and parent education. In a larger sample (N=1334), although moderate to high sexting use was associated with off-line and online dating violence, no differences were noted between high and low users on psychological distress including anxiety and depression symptoms (Morelli et al., 2016).

Comorbid Addictions

Sexting has rarely been called an addiction, probably because there are no long-term studies on sexting and because most of the questions addressed in this recent literature were phrased in terms of recent sexting instead of persistent or long-term sexting. However, other addictions have been related to sexting including internet addiction, cyberbullying and substance use. Given that most of the studies are cross-sectional instead of longitudinal, the direction of effects cannot be determined. It is not clear whether sexting resulted in other addictions or other addictions resulted in sexting or whether multiple addictions were contemporaneous.

Internet addiction. Surprisingly very few papers in this recent literature have noted an

association between Internet addiction and sexting, although most of the sexting has occurred on the Internet. In one study, the frequency of Internet use was significantly associated with peer sexting (N=314 high school students). And, in a systematic review, Internet addiction was associated with sexting in the majority of studies (Gansner, Belfort, Cook, Leahy, Colon-Perez, 2019).

Cyberbullying. Online bullying has been associated with sexting in at least three studies. In the Youth Risk Behavior Survey on 9th–12th grade students (N=6021), sexting was significantly more prevalent in students who reported electronic bullying (OR=1.46) (Frankel, et al., 2018). As the authors suggested, further research is needed to clarify the temporality of the associations between sexting and cyberbullying.. In a study on Peruvian high school students (N= 949), sexting and cyberbullying were correlated problems, but only for girls (West et al., 2014). In one of the very few longitudinal studies, links were explored between sexting and traditional face-to-face bullying victimization as well as cyberbullying victimization (Van Ouystel et al., 2019). In this study, three waves of data were collected from ethnically diverse adolescents in public high schools in Texas. Cross-lagged panel analysis was performed and several relationships were noted. Sexting was associated with cyberbullying victimization across all time points and time three cyberbullying victimization was correlated with sexting at time four. A cross-lagged effect was also found between time three sexting and time four off-line bullying. Time three sexting mediated the effects of time two sexting on time four traditional bullying victimization. These complex longitudinal effects suggest reciprocal relationships between sexting and cyberbullying victimization and between sexting and traditional bullying victimization. It is not clear why cyberbullying and traditional bullying perpetration were not explored in this study, although those data are more difficult to obtain from self-reports given that adolescents are less

likely to report, for example, cyberbullying perpetration than cyberbullying victimization (Field, 2019).

Substance use. Sexting has been related to substance use including alcohol and illicit drug use and, in at least one study it was related to both alcohol and drug use. In the large 25 European country study (N=17,016 adolescents aged 11–16), sexting was associated with alcohol use irrespective of age and gender (Sevcikova, 2016). In the Texas sample (N=937), a single item assessed substance use with the following question “have you ever used alcohol, marijuana or other illicit substances (cocaine, inhalants, ecstasy, non-prescribed prescription drugs)?”(Temple et al., 2014). Sexting was significantly associated with substance use (both alcohol and drug use). In this sample, 79% of the students who had sent a sext had used the substances versus 56% of the students who had never engaged in sexting. In a larger sample of randomly selected youth across the United States (N=3,715 13-18-years-old), those adolescents who shared sexual photos via sexting were more likely to use multiple substances (Ybarra et al., 2014). Another research group assessed the association between sexting and substance use within or outside of a romantic relationship (N=1187) (Van Ouystel, Walrave, Lu, Temple & Ponnet, 2018). Those adolescents who engaged in sexting outside of a romantic relationship were more likely to report substance use as compared to those who were sexting with a romantic partner. In the only longitudinal study that explored the relationship between sexting and drug use, engaging in sexting at age 16 was associated with engaging in drug use in combination with sexual activity at age 18 (Brinkley, Ackerman, Ehrenreich & Underwood, 2017).

Legal Issues

One of the most serious effects of sexting is that sexters may be prosecuted under state or federal child pornography laws or state-specific sexting laws (Holoyda, Landess, Sorrentino &

Friedman, 2018). As such, this could be considered one of the most severe effects as well as a major risk factor. The pornography laws reputedly disregard the consent and the age of the sexter. Because of suicides and other sexting-related tragedies, many jurisdictions are attempting to create sexting offenses that are separate from child pornography and that are less serious (Cornwell, 2013). Several states

have enacted legislation that differentiates child pornography from sexting by minors (Lorang, McNeil & Binder, 2016). This has happened in part because of the reputed difference in motivation for sexting (e.g. relationship building and pleasure) and child pornography (e.g. exploitation and abuse), and the typical age difference and the circulation difference between sexting and pornography (Primack, 2017).

Table 3. Risk factors for sexting.

<u>Risk factors</u>	<u>First author</u>
<u>Demographic factors</u>	
Male gender	Frankel, West, Gregg
Older age	Sevcikova, Gamez-Guadix
<u>Personality characteristics</u>	
>extraversion	Gamez-Gaudix
<conscientiousness	Gamez-Gaudix
<self esteem	Ybarra, Livingstone
<u>Behavior problems</u>	
<emotional awareness	Houck
<emotion regulation	Houck
>impulsivity	Gregg, Temple
>sensation-seeking	van Ouytsel, Livingstone
>aggression	Gansner
>depression	van Ouytsel, Gamez-Gaudix
<u>Interpersonal factors</u>	
Peer pressure	Gregg, Vandeen Abeele, Walrave, Livingstone
Lack of parental monitoring	Ahern, Tomic, West

Risk Factors

Several risk factors have been identified for sexting behavior (see table 3 for list of risk

factors). These can be grouped as demographic factors including gender and age, personality characteristics like extraversion, behavior problems like impulsivity, peer pressure and lack

of parental monitoring. The research on sexting risk factors could also be considered research on sexting effects inasmuch as the studies are typically cross-sectional and the direction of effects cannot be determined. Nonetheless, these risk factors have been characterized as risk factors in the recent literature.

Demographic Factors

Male gender is the most frequently reported demographic risk factor for sexting behavior. Examples of this risk factor have been given in many survey studies in the U.S. and other countries. For example, in the Youth Risk Behavior Survey on 9th–12th grade students (N=6021), female students were 49% less likely than males to report consensual sexting (Frankel, et al., 2018). And, male students who reported sexting were more likely to engage in other risk behaviors including cyberbullying, sexual activity and alcohol use. In addition, they more frequently reported mental health problems including depressive symptoms and suicide attempts. In a Peruvian sexting study, males reported greater rates of sexting (35 versus 13%) (West et al., 2014). In this study, the significant risk factors for boys' sexting behavior were hyper-texting and fighting. Males were also found to more frequently report sexting than females in a survey of 314 high school students in a large Midwestern city (Gregg, Somers, Pernice, Hillman, & Kernsmith, 2018).

Age is another demographic factor that has been related to sexting, although the findings on this factor are mixed. In the large 25 European countries study called EU Kids Online II Project (17,016 adolescents), sexting was a problematic behavior in both early and late adolescence (Sevcikova, 2016). However, the negative effects of sexting decreased in older adolescents except for emotional difficulties which remained relatively high in older boys. On the other hand, in a longitudinal study (N=1208), older age at time one predicted more sexting at time two (Gamez-Guadix & de Santisteban, 2018).

Personality Characteristics

The personality characteristics that have been noted as risk factors for sexting include low self-esteem, less conscientiousness and greater extraversion. Low self-esteem has been considered a risk factor for sexting in at least two studies. In one of these, data were collected online from 13 to 18-year-old adolescents across the US (N=3715) (Ybarra 2014). In this sample, adolescents who shared sexual photos were less likely to have high self-esteem than their peers. In a review paper that was published the same year, low self-esteem was one of the personality risk factors (Livingstone & Smith, 2014). In a study that explored personality traits according to the Big Five model (N=1208 adolescents), measures were completed at baseline and at a one-year follow-up (Gamez-Gaudix et al., 2018). In this sample, lower conscientiousness and higher extraversion scores at time one led to greater sexting at time two.

Behavior problems

Behavior problems that have been considered risk factors for sexting include less emotion regulation, impulsivity, sensation-seeking, depression and aggression. In a study on seventh-grade students (between 12 and 14 years) (N=418), the adolescents were identified as being at risk by school counselors and then asked to complete a computer-based survey (Houck, Barker, Rizzo, Hancock, Norton, A. et al. 2014). This survey included four sexting behaviors that occurred during the last 6 months including "texting a sexual picture of yourself, texting someone a sexual message to flirt with them, emailing or messaging someone a sexual picture of yourself, and emailing or messaging someone a sexual message to flirt with them". The results revealed associations between having engaged in sexting and lack of emotional awareness as well as an association between sexting and lack of emotional regulation skills.

Impulsivity or impulsive decision-making has been associated with sexting in high school students in the Midwest (N=314) (N=314)

(Gregg et al., 2018)). Impulsivity was also a notable risk factor for sexting in high school students from Southeast Texas (N=937) (Temple et al., 2014). Sensation-seeking has also been noted as a risk factor for sexting after controlling for gender, age, family status and students' response to economic stress in high schools in Belgium (N=1028) (VanOuytsel et al., 2014). And, in the already mentioned review of the sexting literature, sensation-seeking was given as one of the personality risk factors (Livingstone et al., 2014). Sexting has also been associated with aggressive disorders in adolescents in at least one study (Gansner et al., 2019).

Interestingly, sexting was not associated with depressive disorders, but it was associated with suicidality (Gansner et al., 2019). However, this study was conducted on a psychiatric unit, so its sample may not be representative. The entire sample may have been depressed. In contrast, depression was a risk factor/predictor in at least two studies. In a survey study on Belgian adolescents, sexting was linked with both sensation-seeking and depression (N=1028) (Van Ouytsel, Ponnet & Walrave, 2014). And, in a longitudinal study, depressive symptoms at time one predicted sexting at time two (N=1208) (Gamez-Guadix et al., 2018).

Peer Pressure

Peer pressure is, not surprisingly, a risk factor for sexting since sexting is a peer-related activity. In one study on high school students, sexting was highly associated with reported peer pressure (N=314) (Gregg et al., 2018). Adolescents who were in relationships were at a particular risk of sexting in response to peer pressure. In another cross-sectional study from Belgium, the item used to measure sexting was whether the students ever used a mobile phone to send a picture or video of themselves in which they were naked or semi-naked (Vanden Abeele, Campbell, Eggermont & Roe, 2014). Significant relationships were noted in this study between sexting and pressure from romantic partners and friends as well as a need for

popularity. In a similar cross-sectional survey also from Belgium on 15 to 18-year-olds from two secondary schools (N=489), the students were asked if they had sent texts in the last two months including naked or semi-naked pictures of yourself or sexually exciting text messages with your mobile phone (Walrave, Heirman & Hallam, 2014). In this sample, structural equations modeling suggested significant associations between sexting and perceived pressure from romantic partners and friends. Also, in a review of the literature, peer pressure as well as lack of parental support were significant risk factors for sexting in adolescents (Livingstone et al., 2014).

Parental Monitoring

The lack of parental monitoring has been a notable risk factor for adolescent sexting. In one study, at least one third reported that their child had a friend who tried sexting, less than half the parents reported discussing sexting risks with their adolescents and one quarter of parents reported that they were not monitoring their adolescents' media use (Ahern, Kemppainen & Thacker, 2016). In a sample of Croatian adolescents (N=1265), parental monitoring was consistently and negatively associated with sexting behaviors regardless of the adolescents' gender (Tomic, Buric & Stulhofer, 2018). Higher levels of parental monitoring were associated with less frequent sexting. In a Peruvian study on 949 high school students, parental rules were significantly negatively correlated with texting for both girls and boys (West et al., 2014). The authors concluded that parents needed to set clear rules and expectations about sexting. In a study on Spanish adolescents, at least half of the participants reported that their parents had no access to their profiles on social media (Romo et al., 2017). And, parental discussion of privacy settings, which was higher for female adolescents, was found to be protective. These data collectively highlight the importance of parental monitoring in reducing sexting in adolescents. Surprisingly, no parent education

or parental monitoring interventions could be found in this recent literature.

Potential Underlying Mechanisms for Sexting

Adolescents have given their perspectives about why they have engaged in sexting including, as already mentioned, sexting being sexy or initiating sexual activity, followed by gaining attention from a partner, as being fun and flirtatious, responding to pressure from friends or dating partners, and as a form of self-expression (Henderson and Morgan, 2011). And, many of the risk factors/predictors are also potential underlying mechanisms. As already discussed, these include demographic factors, personality characteristics, mental health issues, behavior problems, peer pressure and the lack of parental monitoring.

Researchers have offered other perspectives on potential underlying mechanisms for adolescents engaging in sexting including, for example, avoidance of pregnancy and sexually transmitted viruses and avoidance of physical intimacy. Some have suggested that sexting might be a safe alternative to physical intercourse so that adolescents don't risk getting pregnant or sexually transmitted diseases (Lippman & Campbell, 2014). As was already elaborated, online sexual experiences at time one have predicted HIV risk at time two in a sample of adolescents 14 to 16 years of age (Maas et al., 2019). This partially supports the theory that sexting may be a safer alternative than physical intercourse. And, sexting may also be a way of increasing feelings of intimacy and closeness by those in relationships without running the risks of pregnancy and sexually transmitted disease, and, as has been suggested, as "an intervention for relationship satisfaction" (Parker, Blackburn, Perry & Hawks, 2013).

Others have suggested that sexting behavior may be a way of avoiding intimacy (Drouin & Landgraff, 2012). In this study, sexting was associated with an avoidant attachment style. Those with attachment avoidance were more

likely to engage in sexting behaviors as well as more casual sex. The authors concluded that sexting was acting as a buffer for physical intimacy for attachment avoidant individuals.

At this time, potential underlying mechanisms are merely speculative given the recency of the sexting literature and the predominant type of research being cross-sectional studies that cannot suggest directional effects on the prevalence, the effects and the risk factors for sexting. Further, many of the studies summarized here have had several methodological limitations.

Methodological Limitations of the Sexting Literature and Future Research Directions

The methodological limitations of the recent sexting literature can be categorized as limitations of sampling, cross-sectional studies, variability of the sexting definition, self-report measures, variability of the measures, variation on the grouping of data and variable data analyses. Most of the studies have been focused on prevalence, outcome effects and risk factors. Literally, no intervention or underlying mechanism studies could be found in this recent literature.

In addition, most of the studies have been conducted in the U.S., although a few were conducted in Belgium. Unlike other adolescent problems, for example Internet addiction and gaming, texting has not been studied in many cultures, probably because it is a newly documented phenomenon rather than one that is limited to the U.S., Belgium and a few other countries. This limits the representativeness and generalizability of the data. In addition, some of the samples have been drawn from clinics or hospital units, while others have been convenience samples, so most have not been randomly selected, again limiting generalizability. Some of the studies are limited to female or male gender. Others have been large age range samples and have, for example, combined 7th and 12th graders in their data analyses despite the expected variability across

age on the types of sexting as well as the frequency of sexting.

Almost all of the recent studies on sexting have been cross-sectional, making it impossible to determine causation or direction of effects. As has been noted, risk factors could also be considered effects and vice versa, as some variables sound like they could be antecedents and others could be consequents. Only longitudinal studies can correct for that, and longitudinal studies were rare in this literature.

The operational definition of the term sexting has varied significantly, as some researchers have included only sexual messages while others have included both messages and photos/videos in their definitions. Similarly, the measures have been highly variable in terms of how the questions are asked. They have varied, for example, in time of occurrence, with some asking about sexting that occurred in the last two months or the last six months or did sexting ever occur. Some have considered sexting the act of sending sexual material while others have combined both sending and receiving sexts as their measure. Some have also lumped consensual and nonconsensual sexting as well as friend, romantic partner and stranger sexting as their measure. And, in most cases, contexts and motives for sexting have not been measured.

Almost all of the studies have involved adolescents' self-reports as measures which could result in under-reporting or over-reporting. The greater prevalence for receiving sexts than sending sexts suggests that the senders may have been under-reporting and the receivers over-reporting. This is not surprising given the greater legal risk for sending than receiving sexts. Although most surveys have been online computer surveys, the adolescents have still been most frequently recruited at their schools. Adolescents could consider responding to surveys at school risky behavior, especially if they know the severe legal consequences of sexting that have been linked with child

pornography in most legislation in most states in the US.

Several directions for future research are suggested by the methodological limitations of the recent literature on sexting. Foremost is that longitudinal instead of cross-sectional studies are needed in order to determine direction of effects. In addition, ecological studies such as diaries and phone beeper studies would help determine the immediate precipitating factors as well as the predisposing risks. Qualitative interview studies might also address this problem and further elaborate the level and type of sexual explicitness that has been absent from this literature.

Unlike the other older literature on adolescent problems related to the Internet including Internet addiction, cyberbullying and gaming, this literature does not yet have studies on biochemical and physiological correlates such as neurotransmitter profiles and fMRI scans. A wider variety of variables might help in identifying risk profiles and protective factors. A wider variety of data analyses such as mediator/moderator and structural equations models might be informative. The absence of systematic reviews and meta-analyses to date are likely related to the variability in sampling and measures that have precluded these types of research.

Nonetheless, despite the methodological limitations and the paucity of recent research on sexting, the prevalence and severity of effects already reported highlight the need for future research. The sexual activity, the mental, behavioral and substance use problems that have resulted from sexting and the legal risks especially highlight the need for further research as well as prevention programs to help reduce sexting behavior and its comorbid problems in adolescents.

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