

Prevalence of Multiple Forms of Sexting Behavior Among Youth A Systematic Review and Meta-analysis

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IMPORTANCE The existing literature on sexting among youth shows that sexting is a predictor of sexual behavior and may be associated with other health outcomes and risky behaviors. However, there remains a lack of consensus on the prevalence of sexting, which is needed to inform future research, intervention, and policy development.

OBJECTIVE To provide a meta-analytic synthesis of studies examining the prevalence of multiple forms of sexting behavior, analyzed by age, sex, geography, and method of sexting.

DATA SOURCES In an academic setting, electronic searches in MEDLINE, PsycINFO, EMBASE, and Web of Science were conducted for the period January 1990 to June 2016, yielding 1147 nonduplicate records.

STUDY SELECTION Studies were included if participants were younger than 18 years and the prevalence of sexting explicit images, videos, or messages was reported.

DATA EXTRACTION AND SYNTHESIS Literature review and data extraction followed established PRISMA guidelines. Two independent reviewers extracted all relevant data. Random-effects meta-analyses were used to derive the mean prevalence rates. Thirty-nine studies met final inclusion criteria.

MAIN OUTCOMES AND MEASURES Meta-analyses of the prevalence of sending, receiving, and forwarding without consent, as well as having one's sext forwarded without consent.

RESULTS Among 39 included studies, there were 110 380 participants; the mean age was 15.16 years (age range, 11.9-17.0 years), and on average 47.2% were male. Studies were available for sending (n = 34), receiving (n = 20), forwarding without consent (n = 5), and having a sext forwarded without consent (n = 4). The mean prevalences for sending and receiving sexts were 14.8% (95% CI, 12.8%-16.8%) and 27.4% (95% CI, 23.1%-31.7%), respectively. Moderator analyses revealed that effect sizes varied as a function of child age (prevalence increased with age), year of data collection (prevalence increased over time), and sexting method (higher prevalence on mobile devices compared with computers). The prevalence of forwarding a sext without consent was 12.0% (95% CI, 8.4%-15.6%), and the prevalence of having a sext forwarded without consent was 8.4% (95% CI, 4.7%-12.0%).

CONCLUSIONS AND RELEVANCE The prevalence of sexting has increased in recent years and increases as youth age. Further research focusing on nonconsensual sexting is necessary to appropriately target and inform intervention, education, and policy efforts.

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Sexting—the sharing of sexually explicit images, videos, or messages through electronic means—has received mounting attention from the popular press and an accumulating amount of attention in the empirical literature. However, the true public health importance of youth sexting is unclear at present because the field is handicapped by inconsistent information regarding its prevalence. With the published rate of youth sexting ranging from 1.3% to 60%,¹⁻³ the extent to which health care professionals, school personnel, policymakers, and parents should be concerned about this behavior is unknown.

One of the first published studies on youth sexting was conducted in 2009 before the current prolific use of smartphones among youth.⁴ Among youth aged 12 to 17 years, results indicated that 4% reported sending and 15% reported receiving nude or seminude images. A 2012 study² revealed a low prevalence of sexting among participants aged 10 to 17 years, with 2.5% and 7.1% of predominantly older youth sending and receiving sexts, respectively. That study had notable strengths, including a nationally representative sample, an explicit definition of sexting, and a wide age range. However, several methodological limitations likely resulted in the underreporting of sexting, including the use of landlines to conduct the survey and interviews with youth in the presence of parents. Recent studies reveal that sexting is an increasingly common practice, with the prevalence increasing each year until youth reach the age of 18 years.³

While it is becoming clear that a sizable number of adolescent boys and girls participate in sexting, research examining sex differences has been inconsistent. A few studies^{2,5,6} have found that female youth were more likely to send a sext than their male counterparts, while other studies^{3,7,8} have not revealed any sex differences with respect to sending sexts. Some evidence suggests that adolescent boys are more likely than girls to receive⁹ and request³ sexts.

Although research on sexting is no longer in its infancy, there is a lack of consensus on the prevalence of sexting behaviors, which is critically important to informing future research and policy. We aim to extend the literature by examining the mean prevalence of sending and receiving sexts, as well as the rate of the nonconsensual forwarding of sexts. Moreover, we aim to determine whether prevalence rates vary as a function of sex, age, and time, as well as other potential moderators.

Methods

Search Strategy and Study Selection

This meta-analysis was conducted in an academic setting following the recommendations and standards set by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). A medical librarian conducted an electronic search in MEDLINE, PsycINFO, EMBASE, and Web of Science (January 1990 to June 2016) using the following combination of keywords: (youth*, adolescen* youth* child* girl* boy*, young people OR student*) and (image*, photo* or picture*, messag*) or (sext or sexting), or (sex*, nude, or explicit), or (cyber or internet or online). No language or publication restrictions were applied. In addition, references of all articles meet-

Key Points

Question What is the prevalence of sexting behavior among youth?

Findings Among 39 studies (with 110 380 participants) in this meta-analysis, the mean prevalences for sending and receiving sexts were 14.8% and 27.4%, respectively, with prevalence rates increasing in recent years and as youth age. The prevalences of forwarding a sext without consent and having a sext forwarded without consent were 12.0% and 8.4%, respectively.

Meaning Sexting is becoming a more common practice among youth; therefore, age-specific information on sexting and its potential consequences should regularly be provided as a component of sex education.

ing study inclusion were reviewed for additional studies, and online reports were also searched.

Studies met inclusion criteria if (1) participants were younger than 18 years; (2) the study reported the prevalence of 1 or more act of sending, receiving, or forwarding without consent or having one's sext forwarded without consent; (3) the definition of sexting was consistent with the sending, receiving, or forwarding of sexually explicit images, videos, and/or messages, a definition consistent with previous literature reviews¹⁰; (4) both prevalence and sample size were provided; and (5) the study was available in English. Two of us (A.L. and C.R.) reviewed the titles and abstracts of all studies identified in the search strategy.

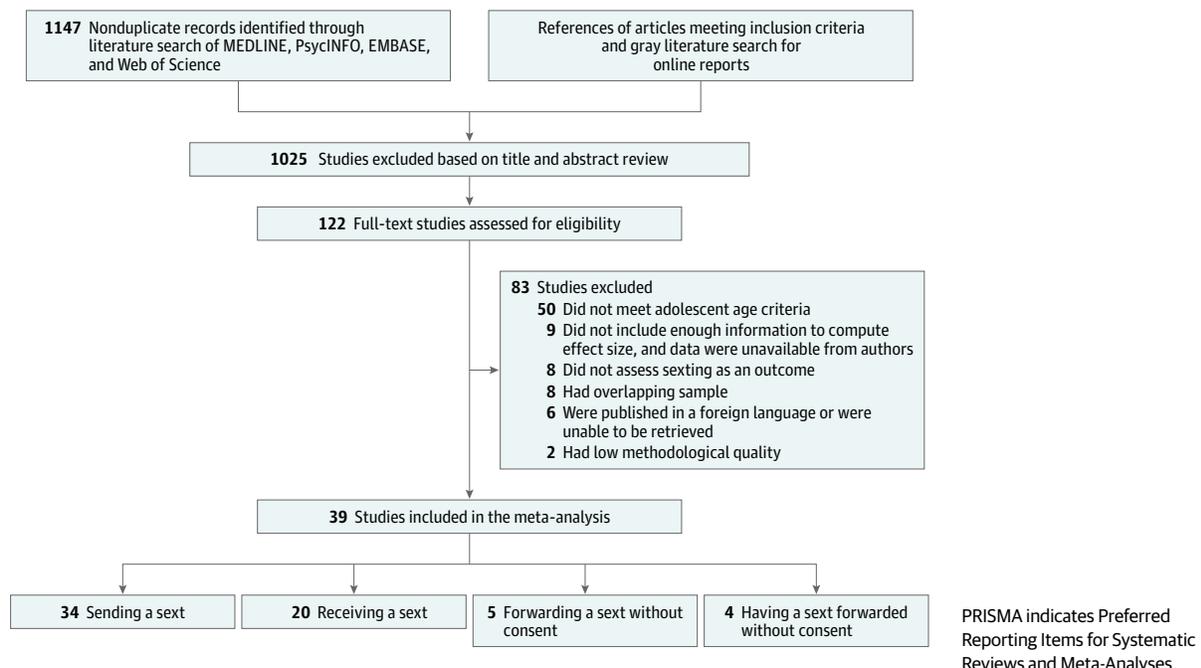
Data Extraction

Extracted data included prevalence and sample size, as well as potential moderators, including the following: (1) age, examined continuously as a mean; (2) sex, examined as the percentage of boys in the sample; (3) earliest year of data collection; (4) method of sexting (mobile device vs computer); and (5) message content (images only, images/videos, or images/videos/explicit messaging). In addition, we extracted (6) study location (United States, Europe, or other) and (7) publication status (published in peer-reviewed journal vs dissertation or report). To avoid oversampling effect size estimates from individual studies, only the total study's sexting prevalences of sending, receiving, and/or forwarding sexts are represented (rather than sexting data stratified by age, sex, or country). For the nonconsensual forwarding of sext, data were extracted based on the total sample of youth in the study (as opposed to sexting youth only). When data from more than one wave of data collection were provided or when data from one sample were presented across multiple publications, we selected the wave or publication with the largest sample size and the most comprehensive data extraction information. To ensure accuracy and reliability, all studies were double coded, and discrepancies were resolved by consensus.

Study Quality

To examine methodological quality and validity of findings, a 9-point critical appraisal assessment tool was developed based on previous meta-analyses.¹¹⁻¹³ The coding criteria for the quality scoring of all studies meeting inclusion criteria

Figure 1. PRISMA Flow Diagram Detailing the Search Strategy



are listed in eTable 1 and eTable 2 in the [Supplement](#). Articles were given a score of 0 (no) or 1 (yes) for each criterion and summed to give a total score out of 9. The classification system used identified studies of low (≤ 2), moderate (3-5), or high (≥ 6) quality.¹⁴

Calculation of Effect Sizes

All data were extracted and entered into Comprehensive Meta-Analysis (CMA) software (version 3; Biostat).¹⁵ A series of meta-analyses were conducted for each type of sexting behavior, presented as a mean prevalence, with associated 95% CIs around the estimate. Comprehensive Meta-Analysis software transforms the prevalence rate into a logit event rate effect size with a computed standard error. Subsequently, effect sizes are weighted by the inverse of their variance, giving greater weight to studies with larger sample sizes and thus more precise estimates. Finally, logits are retransformed into proportions to facilitate ease of interpretation. Random-effects models were selected to calculate effect sizes because they represent a more conservative estimate of the mean prevalence.

Sensitivity Analysis and Publication Bias

Outlier detection was used to determine if the mean prevalence of each sexting behavior was affected by extreme values.¹⁶ Inspection of box plots¹⁷ derived in SPSS (version 23.0; IBM Corporation) were examined, and detected outliers were removed from the calculation of the effect size if prevalence rates were affected by these values. Publication bias was examined using inspection of funnel plots and the Egger test.^{18,19}

Assessment of Statistical Heterogeneity and Subgroups

The Q and I^2 statistics were computed to assess for statistical heterogeneity of effect sizes.^{20,21} A significant Q statistic suggests

that study variability in effect size estimates is greater than sampling error, and moderators should be explored. The I^2 statistic examines the rate of variability across studies due to heterogeneity rather than chance. The I^2 statistic ranges from 0% to 100% and can be interpreted as no (0%) and maximal (100%) heterogeneity. Between-study heterogeneity was examined using the Q statistic (categorical moderators) and meta-regressions.^{15,22}

Results

As shown in the PRISMA flow diagram ([Figure 1](#)), our electronic search yielded 1147 nonduplicate records. A total of 122 articles were identified as potentially meeting inclusion criteria, and full-text articles were retrieved. On review of all full-text articles, 41 studies met inclusion criteria.

Study Quality Evaluation

The mean study quality score across the 41 articles meeting inclusion criteria was 6.2 (eTables 1 and 2 in the [Supplement](#)). Two studies^{23,24} (4.9%) fell in the low-quality range, and 10 studies (24.4%) were in the moderate-quality range, with the remaining 29 studies (70.7%) in the high-quality range. The 2 studies deemed to have low methodological quality were removed from analyses. Therefore, the remaining 39 studies were used in subsequent meta-analyses.

Sample Characteristics of Included Studies

A total of 39 studies met all study and methodological inclusion criteria. Studies were available for sending ($n = 34$), receiving ($n = 20$), forwarding without consent ($n = 5$), or having a sext forwarded without consent ($n = 4$). The [Table](#) summarizes included studies. In total across the 39 studies,

Table. Characteristics of All Studies Included in the Meta-analysis on Youth Sexting

Source	No. ^a	Mean Participant Age, y	% Male	Sexting Type	Message Format	Message Content	Geography
Baumgartner et al, ²⁵ 2014	14 946	13.49	49.7	S	Both	P, V, M	Europe multinational
Campbell and Park, ²⁶ 2014	552	14.88	52.4	S, R	Mobile	P, V	United States
Cox Communications, ⁶ 2009	655	15.50	50.0	S, R, FW-V	Both	P	United States
Dake et al, ⁷ 2012	1289	14.58	51.7	S	Both	P, V, M	United States
Dowdell et al, ²⁷ 2011	2077	16.03	44.6	R	Online	P	United States
Fleschler Peskin et al, ²⁸ 2013	1034	16.34	37.4	S, R, FW-P	Both	P, V, M	United States
Harris et al, ²⁹ 2013	123	16.60	44.7	S, R, FW-P	Both	P, V, M	United States
Houck et al, ³⁰ 2014	410	12.34	53.4	S	Both	P, M	United States
Kerstens and Stol, ³¹ 2014	4453	13.90	51.2	S, R	Online	P, V	the Netherlands
Kopecný, ³² 2015	1237	14.00	44.9	S	Both	P, V	Czech Republic
Kopecný, ³³ 2014	21 372	14.00	44.6	S, FW-V	Online	P, V, M	Czech Republic
Lee et al, ³⁴ 2016	1612	16.00	35.7	S	Mobile	P, V	Republic of Korea
Lee et al, ³⁵ 2015	683	15.50	47.0	S, R	Unspecified	P, V	Australia
Lenhart, ⁴ 2009	800	15.07	53.6	S, R	Mobile	P, V	United States
Lippman and Campbell, ³⁶ 2014	51	14.55	51.0	S, R	Mobile	P, V	United States
Livingstone and Gorzig, ³⁷ 2014	15 619	13.50	50.0	R	Online	P, M	Europe multinational
Marcum et al, ³⁸ 2014	1617	15.77	49.9	S	Mobile	P	United States
Mishna et al, ³⁹ 2010	2186	14.50	45.3	FW-V	Both	P, M	Canada
Mitchell et al, ² 2012	1560	14.20	49.7	R	Online	P, V	United States
Murray, ⁴⁰ 2014	467	15.96	48.4	S, R, FW-P	Both	P, V	United States
O'Sullivan, ⁴¹ 2014	269	17.00	34.0	S, R	Both	P	United States
Patrick et al, ⁴² 2015	2114	16.00	38.4	S, R	Both	P, V	Australia
Rice et al, ⁸ 2012	1714	15.23	51.9	S	Mobile	P, M	United States
Rice et al, ⁴³ 2014	841	11.86	51.5	S, R	Mobile	P, M	United States
Ricketts et al, ⁴⁴ 2015	1617	15.77	49.0	S	Mobile	P	United States
Schloms-Madlener, ⁴⁵ 2013	189	14.00	50.6	S	Both	P	South Africa
Ševčíková, ⁴⁶ 2016	17 016	16.00	49.0	S	Online	P, V, M	Europe multinational
NCPTUP, ⁴⁷ 2008	163	14.50	49.0	S	Both	P, V	United States
Strassberg et al, ⁹ 2013	606	15.90	54.3	S, R	Mobile	P	United States
Temple et al, ³ 2012	948	15.80	44.1	S	Both	P	United States
Van Ouytsel et al, ⁴⁸ 2014	1028	16.68	42.0	S	Both	P	Belgium
Van Ouytsel et al, ⁴⁹ 2014	329	16.71	39.8	S, R	Both	P, V	Belgium
Vanden Abeele et al, ⁵⁰ 2014	1943	15.28	50.6	S	Mobile	P, V	Belgium
Velarde, ⁵¹ 2014	635	Not available	53.4	S, R, FW-P	Mobile	P	United States
Walrave et al, ⁵² 2014	498	16.50	46.0	S	Mobile	P, M	Belgium
Walrave et al, ⁵³ 2015	217	16.72	38.2	S	Both	P, V, M	Belgium
Wolfe et al, ⁵⁴ 2016	625	14.79	51.5	R	Mobile	P, V	United States
Wood et al, ⁵⁵ 2015	3170	15.27	50.0	S, R, FW-V, FW-P	Mobile	P, M	Europe multinational
Ybarra and Mitchell, ⁵⁶ 2014	3715	15.50	43.3	S	Both	P	United States

Abbreviations: Both, study focuses on sexting via either a mobile device or the internet; FW-P, study focuses on whether respondents shared others' sexts without their consent; FW-V, study focuses on whether respondents had sexts shared with others without their consent; M, sexually explicit messages; Mobile, study focuses on sexting via mobile devices; NCPTUP, National Campaign to Prevent Teen and Unplanned Pregnancy; Online, study focuses on sexting over

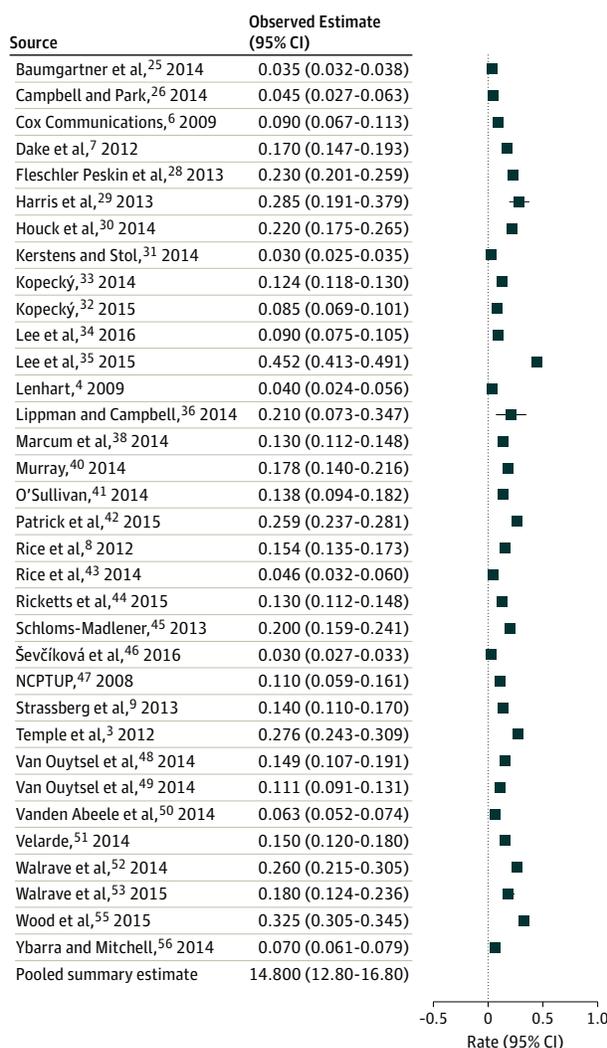
the internet; P, pictures; R, study focuses on receiving messages; S, study focuses on sending messages; Unspecified, study does not provide sufficient information to determine the mode of sexting; V, videos.

^a Number varies slightly based on sexting type. These numbers reflect receiving messages.

110 380 participants were included, with a mean age of 15.16 years (age range, 11.9-17.0 years). On average, 47.2% of participants were male. Twenty-two studies (56.4%) were from the United States, 12 studies (30.8%) were from Europe, 2 studies (5.1%) were from Australia, 1 study (2.6%) was from Canada, 1 study (2.6%) was from South Africa (2.6%), and 1 study (2.6%) was from South Korea. Eighteen studies (46.2%) examined sex-

ting using mobile devices and computers, with 6 studies (15.4%) using computers only, 14 studies (35.9%) via mobile devices only, and one study (2.6%) providing insufficient information for determination. Eleven studies (28.2%) asked participants about sexting via images, 14 studies (35.9%) via images or videos, 7 studies (17.9%) via images and/or explicit messages, and 7 studies (17.9%) via images, videos, and/or ex-

Figure 2. Forest Plot of the Effect Sizes for Each Study Included in the Meta-analysis on the Prevalence of Sending a Sext



Shown is a forest plot of studies^{3,4,6-9,25,26,28-36,38,40-53,55,56} included in the meta-analysis. The overall summary estimate for sending a sext was 14.8% (95% CI, 12.8%-16.8%). NCPTUP indicates National Campaign to Prevent Teen and Unplanned Pregnancy.

plicit messages. Note that no study examined sexting via sexually explicit messaging alone. Finally, 31 studies (79.5%) were published in peer-reviewed journals, and 8 studies (20.5%) were unpublished.

Combined Prevalence of Sending a Sext

The random-effects analysis of the 34 studies on sending a sext yielded a mean prevalence of 14.8% (95% CI, 12.8%-16.8%) (Figure 2). The Egger test provided evidence that studies with smaller sample sizes had more extreme prevalence estimates (eFigure 1 in the Supplement). A sensitivity analysis was conducted to determine the presence of potential outliers, and one study was identified. Heterogeneity of effect sizes remained present with ($Q = 3765.13$, $P < .001$, $I^2 = 99.04\%$) and without ($Q = 3699.53$, $P < .001$, $I^2 = 99.08\%$) the outlying study; therefore,

potential moderators were explored with all studies included, and results are summarized in eTable 3 in the Supplement.

A meta-regression analysis revealed a linear increase in prevalence as age increased ($\beta = 0.037$; 95% CI, 0.024-0.050). Effect sizes were also moderated by year of study data collection, with a demonstrated increase in the prevalence of sending a sext over time ($\beta = 0.026$; 95% CI, 0.012-0.039). Messaging outlet also explained between-study variability, with a higher prevalence of sexting on mobile devices ($k = 13$; 13.4%; 95% CI, 9.0%-17.7%) compared with computers ($k = 4$; 5.5%; 95% CI, 2.3%-8.6%), where k indicates the number of studies. Prevalence was not moderated by sex, geographical location, message content, or publication status.

Combined Prevalence of Receiving a Sext

The random-effects analysis of the 20 studies on receiving a sext yielded a mean prevalence of 27.4% (95% CI, 23.1%-31.7%) (Figure 3). The Egger test provided evidence that studies with smaller sample sizes had more extreme prevalence estimates (eFigure 2 in the Supplement). No outliers were detected. Heterogeneity of effect sizes was present ($Q = 1415.99$, $P < .001$, $I^2 = 98.66\%$), and results of moderator analyses are summarized in eTable 4 in the Supplement.

The prevalence of receiving a sext increased as age increased ($\beta = 0.068$; 95% CI, 0.035-0.100). Meta-regression analyses revealed that year of study data collection explained between-study heterogeneity. Specifically, the prevalence of receiving a sext has increased over time ($\beta = 0.060$; 95% CI, 0.032-0.088). Effect sizes also varied as a function of messaging outlet, with a higher prevalence of sexting on mobile devices ($k = 9$; 27.6%; 95% CI, 20.7%-34.6%) compared with computers ($k = 4$; 13.6%; 95% CI, 9.8%-17.4%). Prevalence was not moderated by sex, message content, geographical location, or publication status.

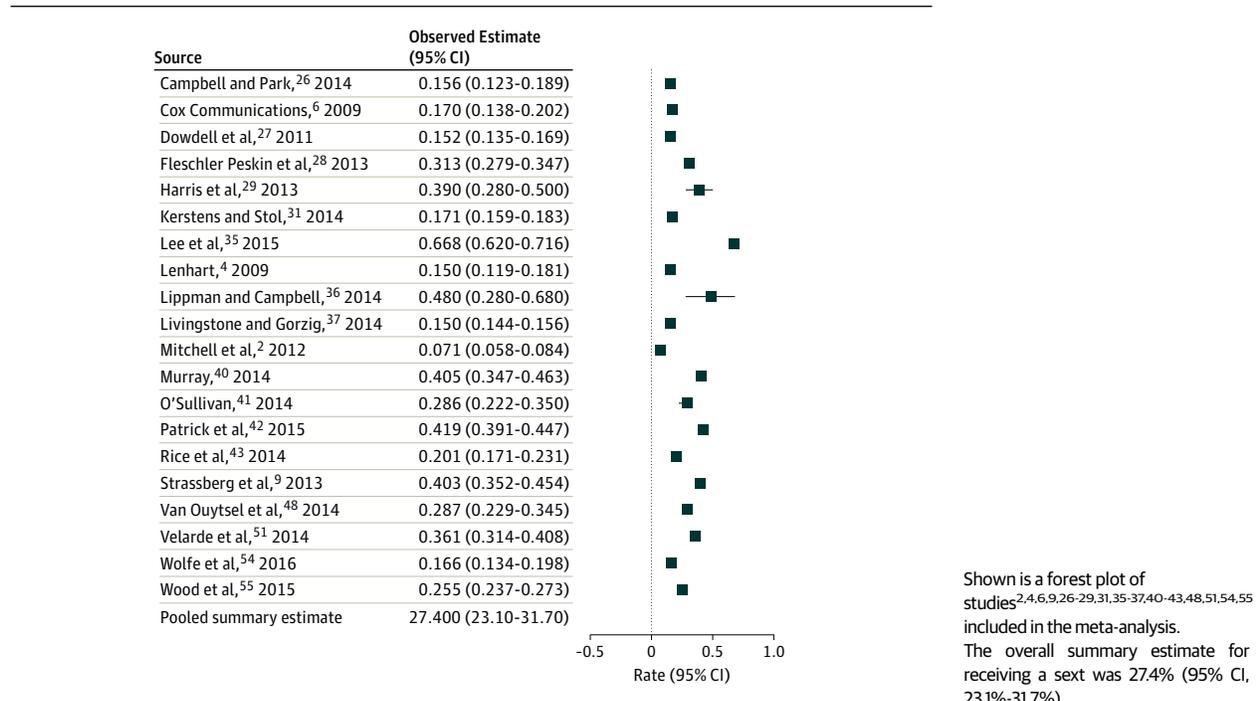
Forwarding a Sext Without Consent

The random-effects analysis of the 5 studies on forwarding a sext without consent yielded a mean prevalence of 12.0% (95% CI, 8.4%-15.6%) (eFigure 3 in the Supplement). No publication bias (eFigure 4 in the Supplement) or outliers were detected. Heterogeneity of effect sizes was present ($Q = 33.64$, $P < .001$, $I^2 = 88.11\%$), and moderators were explored. Neither age ($\beta = -0.051$; 95% CI, -0.113 to 0.105) nor sex ($\beta = 0.002$; 95% CI, -0.005 to 0.009) moderated prevalence. No other moderators could be explored due to limited studies at each level of the moderators.

Having a Sext Forwarded Without Consent

The random-effects analysis of the 4 studies on having a sext forwarded without consent yielded a mean prevalence of 8.4% (95% CI, 4.7%-12.0%) (eFigure 5 in the Supplement). No publication bias (eFigure 6 in the Supplement) or outliers were detected. Heterogeneity of effect sizes was present ($Q = 151.26$, $P < .001$, $I^2 = 98.02\%$), and moderators were explored. Neither age ($\beta = -0.017$; 95% CI, -0.077 to 0.042) nor sex ($\beta = 0.010$; 95% CI, -0.005 to 0.025) moderated prevalence rates. No other moderators could be explored due to limited studies at each level of the moderators.

Figure 3. Forest Plot of the Effect Sizes for Each Study Included in the Meta-analysis on the Prevalence of Receiving a Sext



Discussion

The heightened media attention over youth sexting has portrayed widespread involvement in this phenomenon, which in turn has created alarm in the public domain. However, the documented prevalence of youth sexting in emerging research varies considerably, creating difficulty in interpreting the composite of findings to either support or refute media portrayals. The present meta-analysis established that a sizable minority of youth engage in sexting (1 in 7 sends sexts, while 1 in 4 receives sexts), with rates varying as a function of age, year of data collection, and method of sexting. Of particular concern is the prevalence of nonconsensual sexting, with 12.5% (1 in 8) of youth reporting that they have forwarded a sext.

The meta-analysis revealed that the prevalence of receiving sexts was higher than the prevalence of sending sexts. Because the methods of assessing sexting typically use analogous items to measure both sending and receiving of sexts,^{2,57} the source of this discrepancy is likely not methodological in nature. Klettke et al¹⁰ suggest that this discrepancy may occur for several reasons: some respondents may underreport their active engagement in sexting, some sexters may send the same picture to multiple people, and/or those who receive a sext might not reciprocate the message.

Youth were more likely to send and receive sexts with increasing age. A higher rate among older youth is expected and generally corresponds to the age of sexual identity and exploration,⁵⁸ which lends credence to the notion that youth sexting may be an emerging, and potentially normal, component of sexual behavior and development.⁵⁹ Moreover, the in-

crease in prevalence rates with age is commensurate with older youth having greater access to and/or owning smartphones compared with younger youth.⁴ That said, there is a growing trend for tweens to have access to smartphones: in 2016, the mean age of first smartphone possession was estimated to be 10.3 years.⁶⁰ However, there is limited knowledge of sexting in youth under the age of 12 years. To our knowledge, the only existing study on sexting in youth younger than 12 years is by Mitchell et al,² who reported that 1% of youth aged 10 to 11 years appeared in, created, or received nude images or videos. However, because these data were collected in 2010-2011, this finding is likely outdated given the proliferation of smartphones and the trend for earlier age at first smartphone possession. Relationships among tweens are often transient,^{61,62} which may make them more vulnerable to having sexts forwarded without consent. Moreover, given their relative cognitive naïveté, tweens may be particularly vulnerable to sextortion (ie, nude images and/or videos are used as a form of threat or blackmail)⁶³ and, like youth who report early sexual debut, may be at risk for a host of risky behaviors and negative consequences.⁶⁴

With smartphone ownership becoming near ubiquitous in recent years,⁴ our finding that the prevalence of youth sexting was higher in more recent studies was not surprising. The finding that rates of sexting were also higher via mobile devices relative to computers was expected because mobile phones are a portable, convenient technology that allows for immediate, rapid, and seemingly private communication. These latter 2 findings help explain the low prevalence found in many early studies on sexting.^{2,4} Moreover, in recent years, smartphone apps have been developed that may (seemingly) facilitate privacy in the sharing and storing of videos/images,

which may have increased both awareness of and motivation for engaging in sexting. For example, the 4% prevalence of sexting found in the Pew Research Center study⁴ in 2009 is often cited as evidence that youth sexting is not common; however, that study took place before many youth had access to mobile devices. Therefore, inclusion of these earlier studies in our meta-analyses may have underestimated the mean prevalence of youth sexting.

It has been suggested that female youth and young adults may be more likely to sext due to perceived pressure by male peers to send nude images.^{65,66} Indeed, media portrayals of sexting often implicate adolescent girls as the senders of naked photographs and adolescent boys as the requesters. However, this popular belief and empirical proposition were not supported by the present meta-analysis, which found no significant sex differences in the rate of sending or receiving sexts.

Results of this meta-analysis reveal that 12.0% and 8.4% of youth have forwarded a sext (perpetrator of nonconsensual sexting) or have had their sext forwarded (recipient of nonconsensual sexting) without consent, respectively. Neither age nor sex appeared to affect the prevalence of this phenomenon. The negative outcomes of this behavior have increasingly gained attention in the media as a growing number of cases highlight how the nonconsensual forwarding of sexts can lead to harassment by peers, cyberbullying, or blackmailing. In extreme cases, the deleterious effects of the nonconsensual forwarding of explicit photographs have been implicated in youth suicide.⁶⁷ Moreover, nonconsensual sexting may be a prelude to or a marker of in-person sexual assault.⁶⁶ An important caveat is that the sample sizes for the meta-analyses on nonconsensual sexting were small, warranting additional research in this area.

Public Health and Policy Implications

There are several public health and policy implications of our findings reported herein. A sizable minority of youth are sexting. It is possible that this behavior may be a normal part of sexual behavior and identity formation in the digital age. Consequently, efforts and resources to criminalize sexts should be redirected to educational programs on digital citizenship and healthy relationships. Moreover, given that the mean age of first smartphone acquisition is 10.3 years,⁶⁰ it is important for middle school educators, pediatricians, and parents to have ongoing conversations with tweens regarding sexting and digital citizenship. Several criterion-standard resources for engaging in conversations regarding mobile phone use and responsibilities, as well as sexting behavior, are available.^{68,69}

The rate of nonconsensual sexting among younger youth is concerning and, with respect to legislation on sexting, should continue to be a primary concern for policymakers. As parents, health care professionals, school administrators, and law enforcement authorities continue to grapple with educating youth on nonconsensual forwarding of sexts, it is promising to see that policymakers are responding to this problem by introducing and amending legislation (eg, laws against revenge porn) that makes it a criminal offense to share intimate images of a person without the person's consent.⁷⁰ However, because many existing laws were intended to punish adult

behavior, policymakers must be aware of the implications of these laws for adolescent offenders while not introducing legal loopholes for adult offenders.

Limitations

Although this meta-analysis includes a robust number of studies on sending and receiving sexts, there are comparatively fewer studies on nonconsensual sexting. Moreover, there were too few studies to examine the solicitation of sexts. A larger sample size in a meta-analytic inquiry leads to greater precision in estimations of the prevalence and increased capacity to detect factors that increase or decrease the mean prevalence rates. In the nonconsensual sexting meta-analyses, we could not adequately assess for potential moderators due to small sample sizes and, accordingly, a lack of statistical power. This meta-analysis is also limited in that it focuses solely on prevalence rates and not on variables that predict a proclivity for engaging in sexting behavior. Studies are devoting more attention to attitudinal and behavioral risks for sexting by examining motivations for sexting,⁶⁵ perceived risks associated with sexting,^{57,71} and negative experiences resulting from sexting.⁶⁵ These studies contribute to a more nuanced understanding of factors that motivate youth to sext, and their results can inform the development and delivery of educational interventions. Finally, meta-analyses are reliant on the methods used in individual studies. A notable limitation of sexting research in general is variability in definitions and sampling techniques.¹⁰ For example, while some studies define sexting as the sharing of sexually explicit images, videos, and/or text messages, others define sexting as the sharing of nude images or videos only. Moreover, many studies examined herein reported a combined prevalence rate for images, videos, and/or messages, rendering it impossible to parse out the prevalence of each digital method. The field of sexting would benefit from a uniform definition of sexting, and future research should strive toward the methodological practice of providing prevalence rates for each messaging method (images, videos, and texts) to better understand the nuances of youth sexting. As noted by Mitchell et al,² this methodological clarity is also important for policymakers seeking to draw on the existing literature to create or amend policies on the nonconsensual sharing of nude images/videos in particular.

Conclusions

Contrary to some earlier findings,⁴ our results indicated that consensual sexting is becoming a more common practice among youth, with 14.8% and 27.4% of youth sending and receiving sexts, respectively. Moreover, higher prevalence rates were found in more recent studies, with older youth, and with youth using a mobile device to sext. Troublingly, approximately 1 in 8 youth reports either forwarding or having a sext forwarded without their consent. An important area of future inquiry will be the identification of variables associated with nonconsensual sexting, as well as the evaluation of the effectiveness of educational campaigns and legal policies striving to mitigate nonconsensual sexting in youth.

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