

Longitudinal Association Between Teen Sexting and Sexual Behavior

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KEY WORDS

teen sexting, adolescents, sexual behavior

ABBREVIATIONS

CI—confidence interval

OR—odds ratio

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WHAT'S KNOWN ON THIS SUBJECT: Cross-sectional research indicates that teen sexting is common, may be associated with other adolescent behaviors such as substance use, does not appear to be a marker of mental well being, and is probably an indicator of actual sexual behaviors.



WHAT THIS STUDY ADDS: Although mounting evidence links teen sexting to sexual behavior, little is known about the temporal sequencing of these 2 behaviors. Knowing which comes first will aid tween- and teen-focused health care providers in their interaction with patients and patients' parents.

abstract



BACKGROUND: This study examines the temporal sequencing of sexting and sexual intercourse and the role of active sexting (sending a nude picture) in mediating the relationship between passive sexting (asking or being asked for a nude picture) and sexual behaviors.

METHODS: Data are from Wave 2 (spring 2011) and Wave 3 (spring 2012) of an ongoing 6-year longitudinal study of high school students in southeast Texas. Participants included 964 ethnically diverse adolescents with a mean age of 16.09 years (56% female; 31% African American, 29% Caucasian, 28% Hispanic, 12% other). Retention rate for 1-year follow-up was 93%. Participants self-reported history of sexual activity (intercourse, risky sex) and sexting (sent, asked, been asked). Using path analysis, we examined whether teen sexting at baseline predicted sexual behavior at 1-year follow-up and whether active sexting mediated the relationship between passive sexting and sexual behavior.

RESULTS: The odds of being sexually active at Wave 3 were 1.32 times larger for youth who sent a sext at Wave 2, relative to counterparts. However, sexting was not temporally associated with risky sexual behaviors. Consistent with our hypothesis, active sexting at Wave 2 mediated the relationship between asking or being asked for a sext and having sex over the next year.

CONCLUSIONS: This study extends cross-sectional literature and supports the notion that sexting fits within the context of adolescent sexual development and may be a viable indicator of adolescent sexual activity. *Pediatrics* 2014;134:e1287–e1292

Though still limited, research on teen sexting (defined herein as electronically sending sexually explicit images from 1 adolescent to another) has grown substantially in the past 3 years. Studies composed of middle school and high school students, ethnically diverse youth, community and at-risk adolescents, and regional and national samples have begun answering important questions about this emerging public health issue.¹ Specifically, we now know that teen sexting is common, occurring among 15% and 28% of adolescents,^{2–5} with a much higher proportion of college students and young adults engaging in this behavior^{6–8}; is associated with impulsivity in general and substance use in particular^{6,9,10}; does not appear to be a marker of mental well-being^{7,10}; and, perhaps most importantly, is probably an indicator of actual sexual behaviors and possibly risky sexual behaviors.^{1,5–7,11–13}

Despite these advancements in knowledge, all existing research is cross-sectional, thus limiting our ability to determine the temporal relationship between sexting and proposed correlates. For example, although sexting has consistently been linked to sexual behavior, it is unclear whether sexting precedes or follows engagement in sexual activity. An argument can be made for both. Indeed, it is possible that sexting operates as a way of introducing sex into the relationship (sexting → sexual behavior), or it may be that having sexual relations increases the level of comfort in sharing nude images (sexual behavior → sexting). The question of what comes first is not merely academic. If sexting precedes sexual behavior (especially risky sexual behavior), then safe sex interventions could be designed to specifically target sexting youth, and prevention programs could aim to reduce sexting as a means of reducing risky sex. Another gap in existing knowledge is whether passive sexting (receiving, asking for, or being asked for a nude picture) differs from active sexting

(sending a nude picture) as an indicator of sexual behavior. Although limited existing studies indicate that active and passive sexting are similarly associated with sexual behavior,^{5,6} analyses have not accounted for the fact that nearly all adolescents who sent a sext had also asked and been asked for one. Given that adolescents have control over whether they send a sext and that sending a sext demonstrates some comfort with their own sexuality, we argue that active sexting is the important component in the relationship between sexting and sexual behavior. Thus, we posit that sending a sext will mediate the effects of asking or being asked for a sext on sexual behavior such that passive sexting will be positively associated with sending a sext, and sending a sext will be positively associated with having sex the next year.

The current study extends the literature by examining the temporal sequencing of sexting and sexual behaviors and by examining the role of active sexting in mediating the association between passive sexting and sexual behaviors.

METHODS

Sample and Study Design

This study was approved by the institutional review board of the University of Texas Medical Branch. Current data are from Waves 2 and 3 of *Dating It Safe*, an ongoing longitudinal study of teen dating violence and other high-risk adolescent behaviors.¹⁴ Participants in Wave 1 (Spring 2010) included 1042 students recruited from 7 public high schools in 5 Houston-area school districts (62% response rate, which is above the 60% suggested by the Centers for Disease Control and Prevention). The current data were collected in spring 2011 (Wave 2, retention rate: 92.5%) and spring 2012 (Wave 3, retention rate: 85.8%). Sexting items were not assessed at Wave 1. Study recruitment occurred during school hours in courses with mandated attendance, and both parental permission

and student assent were obtained. Assessments at each time point occurred during school hours, and students received a \$10 gift card for participating. To increase reliability of adolescent self-report, teachers and other school administrators were not allowed to be present during questionnaire administration, and privacy was emphasized, including instructing participants to not write their names on surveys and informing them that a federal certificate of confidentiality protected their responses. Participants no longer at their original school were surveyed at an alternate location. In Wave 2, participants were 56% female, with a mean age of 16.09 years (SD = 0.79), and they self-reported as African American (31%), white (29%), Hispanic (28%), and other (12%). Because students were recruited primarily when they were high school freshmen, a majority of them in the current study were in the 10th grade (73%).

Measures

Where applicable, frequency, mean, and SD for each variable at each wave are shown in Table 1. Three items assessed lifetime sexting (at Wave 2), including, “Have you ever sent naked pictures of yourself to another through text or e-mail?,” “Have you ever asked someone to send naked pictures of themselves to you?,” and “Have you ever been asked to send a naked picture of yourself through text or e-mail?” These items were included in the model as dummy-coded variables (1 = Yes, 0 = No). Because of the novelty of this topic and as in other studies on sexting,¹² questions were developed based on a review of relevant literature^{15,16} and in consultation with adolescent health experts. Because of potential legal and psychosocial issues, this study limited the definition of “sexting” to naked pictures rather than seminude picture or explicit messages.

Sexual and Risky Sex Behavior (Wave 3)

Participants were asked whether they “have had sex (intercourse).” Those

TABLE 1 Frequency, Mean, and SD for all variables

	Yes (%)	No (%)
Ever had sex (Wave 2)	506 (52.7)	455 (47.3)
Ever had sex (Wave 3)	568 (63.7)	324 (36.3)
Sent a sext (Wave 2)	259 (27.6)	678 (72.4)
Asked for a sext (Wave 2)	295 (31.4)	643 (68.6)
Been asked for a sext (Wave 2)	540 (60.0)	408 (40.0)
Condom use (Wave 2)	355 (46.6)	407 (53.4)
Condom use (Wave 3)	298 (59.5)	203 (40.5)
	Frequency (%); Mean; SD	
# Sexual partners past year (Wave 2)	M = 1.9	SD = 1.48
1	224 (48.6)	
2	110 (23.9)	
3	60 (13)	
4	22 (4.8)	
5	22 (4.8)	
≥6	23 (4.9)	
# Sexual partners past year (Wave 3)	M = 2.11	SD = 1.52
1	185 (45.8)	
2	91 (22.5)	
3	58 (14.3)	
4	31 (7.7)	
5	12 (3.0)	
≥6	27 (6.7)	
Alcohol or drug use before sex (Wave 2)	M = 0.54	SD = 0.78
Never	292 (62.8)	
Rarely	104 (23.4)	
Sometimes	61 (13.1)	
Always	8 (1.7)	
Alcohol or drug use before sex (Wave 3)	0.78	0.91
Never	201 (51.3)	
Rarely	91 (23.3)	
Sometimes	95 (23.2)	
Always	13 (3.2)	

who reported affirmatively (1 = had sex, 0 = never) were asked 3 additional questions: whether they use condoms during sexual intercourse (1 = nonuser, 0 = user), number of sexual partners in the past year (1 = 1 person, 6 = 6 or more people), and frequency of alcohol or drug use before sex (0 = never, 3 = always). Similar measures have been shown to be reliable indicators of adolescent sexual behavior.^{17,18} Notably, sexual behavior was limited to intercourse and did not include other sexual activity such as oral sex. A distinction was not made between vaginal and anal intercourse or between heterosexual and homosexual intercourse.

Covariates

Gender (0 = female, 1 = male), grade (1 = 9th, 2 = 10th, 3 = 11th, 4 = ≥12th; no

substantive differences emerged when analyses were conducted with age, as opposed to grade, as a covariate), ethnicity (3 dummy-coded variables: 1 = Hispanic, 0 = all other ethnicities; 1 = white, 0 = all other ethnicities; 1 = black, 0 = all other ethnicities), sexual behavior (1 = had sex, 0 = never), and dating behavior (1 = begun dating, 0 = never) at Wave 2 were included in the mediator models to control for the relationship between exogenous and endogenous variables.

Statistical Analysis

Path analysis using Mplus 7.0¹⁹ (Muthén & Muthén, Los Angeles, CA) was conducted for primary analyses in the current study. To deal with missingness across waves, we used the full information maximum likelihood method.²⁰ Because the mediator

(eg, sending a sext at Wave 2) and dependent variable (eg, had sex at Wave 3) were binary variables, we used weighted least squares with mean- and variance-adjusted parameter estimates. This method performs well when data are not normally distributed and provides unbiased parameter estimates.^{21–23} Because the model examined all possible associations, a fully saturated model was used. By definition, a fully saturated model will always offer a perfect fit to the data; therefore, model fit indices are not reported. To examine the potential mediation effect of sending a sext, we used the indirect command with bootstrap option. This method gives a bias-corrected significance test of the mediation effect.^{24,25} To estimate a significant mediated path, we applied 5000 bootstrap samples and 95% bias-corrected confidence intervals (CIs).

RESULTS

Consistent with our hypothesis, sending a sext at Wave 2 mediated the relationship between asking or being asked for a sext and having sex over the next year (Fig 1). Specifically, being asked (odds ratio [OR] = 5.35, bias-corrected CI, 3.39 to 8.44) and asking for a sext (OR = 4.55; 95% CI, 3.37 to 6.15) were positively associated with sending a sext. For youth who asked for a sext, the odds of sending a sext were 9.91 times as large as the odds for youth who have never asked for a sext. Similarly, for youth who had been asked for a sext, the odds of them sending a sext were 5.35 times as large as the odds for their counterparts. Sending a sext at Wave 2 was positively associated with having sex at Wave 3, OR = 1.32; 95% CI, 1.07 to 1.63. Specifically, the odds of being sexually active at Wave 3 were 1.32 times larger for youth who sent a sext at Wave 2 relative to youth who did not send a sext. Conversely, being asked (OR = 0.91; 95% CI, 0.57 to 1.47) and asking for a sext (OR = 0.88; 95% CI, 0.49 to 1.30) were not significantly associated with sexual intercourse at Wave 3.

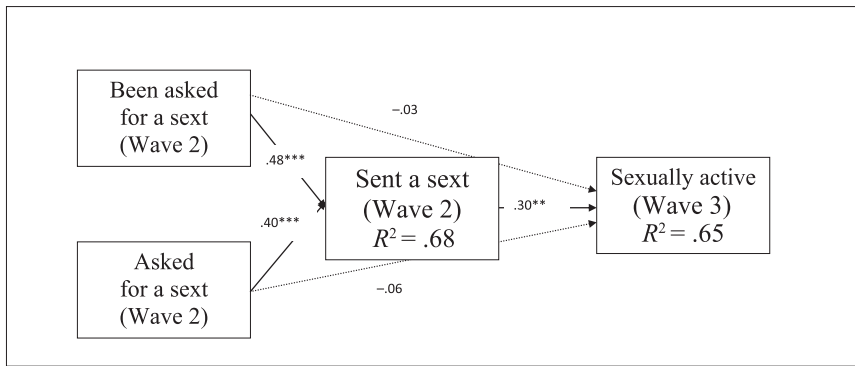


FIGURE 1

Temporal relationship between sexting and sexual behaviors. *Note.* Path coefficients and correlations are completely standardized. Although not shown here, dating and sexual activity at Wave 2, grade, gender, and ethnicity were included as covariates in the model. All significant ($p < .05$) paths are highlighted by boldface and marked by asterisks. * $p < .05$. ** $p < .01$. *** $p < .001$.

To examine the associations between sexting (asking, being asked, sending) and risky sexual behaviors (unprotected sex, number of sexual partners in the past year, and alcohol or drug use before sex) over time, we tested the same mediation model with only adolescents who reported having sexual intercourse at Wave 2 ($N = 506$). Previous risky sexual behaviors were included in this model as covariates. Five students who had never started dating but reported a history of sex at Wave 2 were excluded from these analyses (notably, analyses were rerun with these 5 adolescents included, and all results were the same). Consistent with the mediation model described earlier, asking (OR = 4.85; 95% CI, 3.30 to 7.09) and being asked for a sext (OR = 4.62; 95% CI, 2.41 to 8.81) were positively associated with sending a sext for these sexually active youth (Fig 2). However, sending a sext at Wave 2 was not associated with risky sexual behaviors at Wave 3, including unprotected sex (OR = 1.01; 95% CI, 0.83 to 1.22), number of sexual partner in the past year ($b = 0.17$; CI = -0.00 to 0.35), and alcohol or drug use before sex ($b = 0.10$; 95% CI, -0.02 to 0.22). Thus, although we observed positive associations between sexting variables (asked, been asked, sent), sending a sext was not positively related with risky sexual behaviors over time. In other words,

sending a sext did not mediate the relationship between being asked or asking for a sext and risky sexual behaviors. Counter to expectations, asking for a sext was negatively associated with alcohol or drug use before sex, $b = -0.30$; 95% CI, -0.57 to -0.04 . Notably, we tested a reverse model of the one presented, while controlling for sending, asking, and being asked for a sext at Wave 2, and found that sexual behavior or risky sexual behavior at Wave 2 did not significantly predict sexting at Wave 3.

DISCUSSION

In this temporal examination of the relationship between teen sexting and

sexual behaviors, we found that sending naked pictures of oneself was associated with being sexually active 1 year later; counter to previous cross-sectional research, sexting was not temporally associated with risky sexual behaviors; and active sexting mediated the relationship between passive sexting and sexual intercourse.

Sexting and Sexual Behavior

Our finding that sexting was associated with sexual behavior over time is consistent with mounting cross-sectional evidence linking sexting to a range of sexual behaviors.^{1,5–7,11–13} For example, Rice and colleagues³ found that adolescents who sexted had >7 times the odds of having ever engaged in sexual intercourse, relative to their non-sexting counterparts. Furthermore, a recent systematic literature review revealed that all extant studies measuring sexting and sexual activity ($n = 8$) found an association between the 2 behaviors.¹ Current data demonstrating a temporal relationship between sexting and sexual behavior extends these findings by offering a first step in addressing the “chicken or egg” question. Notably, although the odds of having sex were significantly higher among adolescents who reported earlier sexting, the increase was not overwhelming,

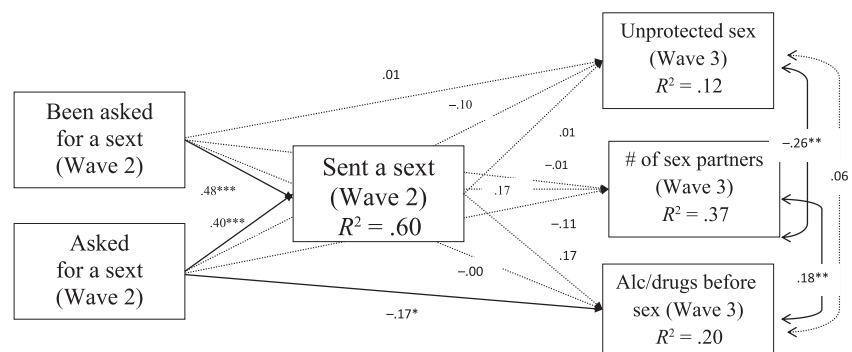


FIGURE 2

Temporal relationship between sexting and risky sexual behaviors. *Note.* Path coefficients and correlations are completely standardized. Although not shown here, previous risky sexual behaviors (eg, Wave 2 unprotected sex, number of sexual partners, alcohol or drug use before sex), grade, gender, and ethnicity were included as covariates in the model. All significant ($p < .05$) paths are highlighted by boldface and marked by asterisks. * $p < .05$. ** $p < .01$. *** $p < .001$.

suggesting the importance of additional factors in determining adolescent sexual activity. That sexting may precede sexual intercourse in some cases is consistent with the notion that sexting may serve as a prelude or gateway behavior to actual sexual behaviors, or as a way to indicate one's readiness to take intimacy to the next level.^{5,16,26} Indeed, a recent online study found that 38% of college-aged participants reported that exchanging sexts makes "hooking up with others more likely."²⁶ Furthermore, Drouin and colleagues²⁷ reported that, even across various forms of relationship statuses (committed, casual, cheating), a frequently identified motive for sexting was to initiate sex. Similarly, in a sample of at-risk middle school students, Houack and colleagues¹² found that teen sexters had more intentions to engage in sex in the next 6 months than nonsexters.

Sexting and Risky Sexual Behavior

We did not find a relationship between sexting and risky sexual behavior over time. Findings from cross-sectional research on this association are mixed. Although some studies have found a link between sexting and unsafe sex, alcohol or drug use before sex, and history of multiple sexual partners,^{5,6,11,13} others have revealed marginal³ or no associations.⁷ Even when a link is identified, the relationship between sexting and risky sex is more nuanced than the link between sexting and sex. For example, a previous study found that sexting was related to a host of risky sexual behaviors, but only among adolescent girls.⁵ Furthermore, although Ferguson¹³ did find an association between sexting and having sex without a birth control method, he did not find sexting to be associated with any other risky sexual behaviors.

Passive Sexting Versus Active Sexting

In support of our hypothesis, sending a sext mediated the relationship between asking and being asked for a sext and engagement in sexual intercourse 1 year later. In other words, sending a nude picture (active sexting), as opposed to asking or being asked for a nude picture (passive sexting), was the salient component in the link between sexting and sexual behavior over time. Being a passive recipient of or asking for a sext is not likely to require the same level of comfort with one's sexuality as does sending a nude photo. Moreover, sending a nude photo may communicate to the recipient a level of openness to sexual activity, promote a belief that sex is expected,² and increase sexual advances, all of which may increase the chance of subsequent sexual behavior.

Limitations and Future Directions

Several limitations should be considered in interpreting these results. First, questions on sexting were developed for this study, based primarily on limited available literature at the time, and were not vetted by teens, potentially limiting the validity of our findings. A good next step in this line of research may be the development and testing of a sexting-related self-report instrument. Second, because of increased legal and psychosocial concerns associated with sending naked images, we limited our measure of sexting accordingly. However, future research would benefit by including a more comprehensive measure of sexting that contains explicit messages and seminude content. Third, that our model did not find sexting predictive of risky sexual behaviors may be a result of insufficient power and thus should be explored in future research. Fourth, although the current sample represents a diverse

cross-section of students from several high schools or districts, it is possible that regional differences influenced results. Fifth, sexual behavior was limited to sexual intercourse and did not include other sexual activity such as oral sex, which may be differentially associated with sexting. Finally, because of the rapidly evolving nature of social media, future research should inquire about new approaches to sexting, including Snapchat, where images disappear after a predetermined number of seconds. It is possible that adolescents are even more likely to sext if they believe the image is temporary. Despite these limitations and ideas for future research, this is the first study to examine the link between sexting and sexual activity over time and among the first to consider the importance of passive versus active sexting.

CONCLUSIONS

The link between teen sexting and actual sexual behavior is becoming well established, with this study extending our knowledge by demonstrating a temporal association between the 2 behaviors. Although additional research is needed, current data indicate that sexting may precede sexual intercourse in some instances and cement the notion that sexting behavior is a viable indicator of adolescent sexual activity. That we did not find a link between sexting and risky sexual behavior over time may suggest that sexting is a new "normal" part of adolescent sexual development and not strictly limited to at-risk adolescents. Furthermore, our findings indicate that sending a naked picture can explain the relationship between any form of sexting and actual sexual behavior. That is, asking and being asked for a naked picture are related to sexual activity through their relationship with sending a sext.

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