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Predictors of mobile sexting among teens: Toward a new explanatory framework

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Abstract

This study posits a framework for conceptualizing the practice of adolescent sexting in order to help explain this behavior and inform decisions about whether and how to address it. Select theoretical propositions about the role of mobile communication in the “social emancipation” of youth were explicated and tested using a national survey of teens in the US. Drawing from this perspective, we hypothesized that sexting would be associated with levels of peer and family mobile connectivity, although in opposite ways, as well as parental control over the technology. As hypothesized, involvement in sexting was positively predicted by connectedness to peers through mobile communication and negatively predicted by connectedness to family. Although sexting was less likely with mobile connectedness to family, heavy-handed parental control over the technology was not a predictor. The discussion offers theoretical and practical implications of these and other findings, along with directions for future research.

Keywords

Adolescence, adolescents, cell phone, mobile communication, mobile phone, sexting, social emancipation, teens, text messaging

Sexting, or the digital exchange of sexually explicit images, has garnered a great deal of concern among parents, teachers, school administrators, and the criminal justice system (e.g., Arcabascio, 2010; Gillespie, 2008; Mattey Diliberto & Mattey, 2009). The media

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have brought visibility to adolescent sexting with stories depicting young teens cuffed and charged after a sext they distributed went viral. These accounts also commonly feature a teenager who has suffered severe consequences from sexting, socially as well as legally (e.g., Hoffman, 2011; Simmon, 2009).

In the US, it is illegal for anyone to produce, possess, or distribute nude or sexual images of individuals under 18. At the federal and, in many cases, state levels, sexting among adolescents under 18 is conceptualized, *de jure*, as child pornography. Hasinoff (2013) and boyd (2011) argue this legal framework is problematic because it fails to differentiate between consensual and nonconsensual sexting, meaning those who take and share these images of themselves may be prosecuted along with individuals who distribute them without consent. The argument is that when adolescents choose, on their own volition, to produce and share these types of images of themselves, they should not be treated as sex offenders—a categorical label that can follow them for life. Many of these laws were written in an era that preceded picture phones with mobile messaging as an everyday social resource for young people. Thus, they were developed to battle the child pornography industry, not teens under 18 who choose to engage in this behavior.

Both Hasinoff (2013) and boyd (2011) point out that as policy on sexting evolves, lawmakers will necessarily be informed by the standpoint from which this behavior is conceptualized. To help move beyond the standpoint of child pornography, Hasinoff (2013) advances a new standpoint for conceptualizing adolescent sexting as a consensual act, while also recognizing the distinct set of issues surrounding nonconsensual, or abusive, distribution of these images. From her perspective, consensual sexting is conceptualized not as a crime, but rather as a form of *media production* that helps with sexual expression. By distinguishing between consensual and nonconsensual sexting, Hasinoff highlights the latter as particularly problematic and offers suggestions for addressing it through education and awareness campaigns. This perspective paves the way for thinking about sexting in a new way.

Thinking about sexting in “old ways” and in the context of other forms of adolescent socialization also helps pave the way for thinking about it as something other than pornography. As boyd (2011) explains, teens have always taken nude or seminude photos of themselves to explore and express sexuality. She characterizes this behavior as not only natural, but rational. In a sense, mobile-mediated sexting can be viewed as an extension of this traditional form of sexual exploration and expression. Sexting may also be seen as an extension of other forms of mobile-mediated sexual expression that have long been recognized by scholars in this area. For example, Prøitz (2005) writes about teen “love-projects” involving sexually laden discourse in text messages meant to affirm mutual attraction. Similarly, Hjorth (2007) reports on young peoples’ use of the mobile phone for maintaining intimate relationships, and her interviews of female mobile users from various cultures show that girls oftentimes highlight the emotional and intimate relational experiences as the important aspect of their mobile phone practices (Hjorth, 2006). From this perspective, nude or sexual images exchanged through camera phones may reflect the pursuit of intimacy in the shared moment (Lasén & Casado, 2012). On an even broader level, there is also the perspective that young people’s use of mobile technologies, particularly text messaging and the camera phone, is an important part of the socialization process (e.g., Ito et al., 2010). This may explain why sexting is associated with

popularity for some teens (Vanden Abeele, Campbell, Eggermont, & Roe, in press). Thus, adolescent sexting may be regarded by the popular press and the justice system as an emergent new social problem, but it should also be recognized as an aspect of youth culture that is connected to traditional forms of sexual expression/exploration and teen socialization more broadly. We are not suggesting here that sexting is a new positive norm among all teens, but that it is a social practice embraced by a certain subset.

With this study we advance an alternative, if not complementary, theoretical framework for conceptualizing adolescent sexting through mobile messaging. A fundamental assumption, as well as rationale, for this study is that the ways in which adolescent sexting is conceptualized plays an important role in how it is addressed. Thus, advancing and testing new standpoints for thinking about adolescent sexting broadens the foundation from which policy decisions are made. Toward that end, this study examines adolescent sexting through the lens of Ling's (2004) theoretical propositions about mobile communication, adolescence, and social emancipation.

Different frameworks for understanding adolescent sexting call for different hypotheses. For example, viewing adolescent sexting as a form of child pornography might lead investigators to predict this behavior reflects exploitation and the malicious gratification of others. These may be viable hypotheses for those who distribute these images without consent, but less viable for understanding the behavior outside of those cases. Other frameworks such as sexual expression (Hasinoff, 2013) and emancipation offer ways of thinking about adolescent sexting that fall outside of the dark side of child pornography. Attempts to explain this behavior as sexual expression might lead to hypotheses about romantic involvement and the motivation of shared intimacy. We do not view emancipation as being in contrast with that perspective, but rather as orthogonal and complementary in the sense that it offers a distinctive vantage point with emphasis on transition toward greater peer connectedness and social autonomy (Ling, 2004, 2005), which we will explain in the next section.

Before setting up the specific hypotheses, we wish to frame them more generally by stating they are meant to help construct a pattern of associations consistent with Ling's propositions about emancipation, particularly assertions about shifting social identity and autonomy. Just as our hypotheses are meant to reflect that pattern, so too are they constrained by the items in the dataset made publicly available by Pew (Lenhart, Ling, Campbell, & Purcell, 2010). Thus, we are unable to generate hypotheses to fully test emancipation as an explanation for adolescent sexting, but we are able to test some key relationships between sexting and core propositions that may further thinking and inquiry in this area.

Sexting as an expression of social emancipation

Adolescence is a life stage that entails social transition and physical maturation (e.g., Erikson, 1950; Havighurst, 1972). Through a process Ling (2004, 2005) characterizes as social emancipation, teens experience new freedoms and develop skills they will rely on later in life. These skills include accruing and managing personal finances, dealing with social institutions, developing a sense of style and integrity, navigating personal relationships, and dealing with issues of sex and sexuality. Teens are also testing the boundaries

of what is acceptable. Adolescence is a phase of life where they can, perhaps more than at later phases, make mistakes that are not fully counted against them. Mobile communication has become a primary resource for teens to expand and test boundaries, evidenced by positive associations between mobile phone use and behaviors such as drinking, trouble at school, and sexual activity (Ling, 2005). Considering those trends and the spontaneity and immediate access afforded by the camera phone, it is not surprising that sexting has emerged as a social practice.

At the core of the emancipation process is expanding social horizons beyond the domestic sphere as adolescents develop a sense of identity through their interactions and affiliations with others outside of the home (Ling, 2004). As children become teenagers they commonly experience greater breadth and depth in their friendships, and their peers become increasingly important to them as they develop a sense of self and make sense of the physical and social transformations of adolescence. Although they are still tied to the domestic sphere, the relative role of family in social life and social identity becomes somewhat attenuated with the increasing importance of peer culture. Or, perhaps it is more accurate to say that the influences of family and other social institutions are increasingly “moderated and understood through the lens of peers” (Ling, 2004, p. 96).

Mobile communication plays an integral role in the emancipation process by providing teens with the autonomy and flexibility to connect with their peers and carry out their social lives as they see fit. This helps explain why teens were pioneers in fully embracing mobile telephony as a resource for social interaction. In fact, Ling (2004) argues that mobile telephony has emerged as the most integral resource that teens use to exercise their autonomy and align themselves with peer culture because of its communicative function, as opposed to other artifacts of peer culture, such as clothing. As Ling puts it, “ownership of a mobile telephone means that teens are in control of their own channel of communication. It provides them with an independent link to others, and thus it represents a particularly central form of access” (Ling, 2004, p. 86).

Although he does not explicitly apply this lens to the case of sexting, Ling (2004, 2005) points to sexuality as one arena in which mobile communication is a resource for social emancipation. Ling (2004) explains, “teens are in the process of exploring sexuality and developing social interaction skills. In these ways, the mobile telephone plays into ... the emancipation of the teen” (p. 86). In other words, teens use mobile technology to harness new freedoms under the radar of supervision while navigating the (often-times thorny) sexual landscape of peer culture (Bond, 2011).

By applying emancipation as a framework for understanding teen sexting, we do not mean to cast this behavior in either a positive or negative light. Arguments for one or the other, or even both, could be made through the lens of emancipation. Instead, we advance emancipation as an alternative conceptual standpoint for understanding this behavior in the context of the mediation of adolescent social life. As we turn to next, this standpoint rests on core propositions about the role of mobile communication in this context, which can be translated into testable hypotheses. The first two hypotheses were unexamined in the Pew reports that came out of this dataset (Lenhart, 2009; Lenhart et al., 2010). As we explain in what follows, the latter two were partially examined for those reports, however extensions are made here through more robust multivariate analysis and inclusion of moderating effects of select demographics throughout.

The first proposition that will be examined is the notion that mobile communication plays an integral role in shifting the balance between peer and domestic social alignments. As Ling (2004) puts it, “one of the main tasks of adolescents is to progressively learn how to function outside of the sphere of the family ... Children go from being a fixture in their parents’ home to being emancipated” (pp. 93–94). Mobile communication plays into this dynamic in the sense that young people use it in ways that more strongly align them with peer culture while also gaining freedom from the sphere of family control. Thus, one can expect that sexting, from the perspective of social emancipation, would be associated with use of the technology for this shift in social involvement. More specifically, one would expect sexting to be positively associated with use of mobile technology for alignment with peers (H1), and negatively associated with its use for alignment with family (H2).

Another core proposition of emancipation is that mobile communication helps teens express and maximize autonomy associated with new freedoms and responsibilities (Ling, 2004, 2005). Mobile communication becomes a central resource for negotiating autonomy in many emergent aspects of their lives outside of the home, such as socializing with friends, dating, and driving. Mobile communication itself is a form of autonomy. Texting especially allows teens to carry out their social affairs under the radar of their parents, teachers, and others around them (Lenhart et al., 2010). Thus, from the emancipation perspective, sexting should be positively associated with the degree of autonomy or control that an adolescent has over the technology.

The Pew survey provides two opportunities to test this proposition with items about whether a teen pays for their own mobile communication and the extent to which their parents supervise and restrict usage. Cross-tabulations from that study already suggest that the issue of “who pays” plays a role in whether a teen engages in this type of behavior. Fully 17% of those who paid reported sending a sext, as opposed to just 3% who relied on family or others to pay for their service (Lenhart, 2009). In fact, most teens (in the US at least) rely on their parents to pay for some if not all of their service. That said, some do pay for it entirely on their own, and those who do are substantially more likely to be involved in sexting, according to the initial study findings (Lenhart, 2009; Lenhart et al., 2010). Through the lens of emancipation, paying for one’s mobile expenses can be viewed as an indicator of autonomy, giving teens a heightened sense of control over how they use it, if not actual control. Considering this link between sexting and “who pays” is already established through descriptive statistics and cross-tabulation in the Pew reports, we anticipate that it will also be supported through more rigorous multiple regression analysis with other key variables accounted for in the model (H3). While this component of the study may overlap with the findings in the Pew reports, an extension is made with examination of how age and sex interact with “who pays,” as well as all other predictors, which we discuss below in the presentation of RQ1.

Following the same line of reasoning as H3, one can anticipate that parental supervision over a teen’s mobile phone use will be negatively associated with mobile-based sexting (H4). Beyond the emancipation perspective, support for this last hypothesis can be found in the literatures on parental monitoring of teens (generally) and parental restriction of children’s media use. For example, Li, Feigelman, and Stanton (2000; Li, Stanton, & Feigelman, 2000) found that children and teens who reported that their

parents regularly monitored their whereabouts and social activity were significantly less likely to engage in risky activities, including sexual behaviors, substance abuse, drug trafficking, school truancy, and violence. On the media front, parental restriction of television viewing has been found to mitigate certain negative effects of TV watching on youth (Buijzen, 2009; Harrison & Lietchty, 2012).

We feel it important to acknowledge that, like H3, H4 is not entirely new in the sense that it has been partially addressed in the Pew report. In that analysis, two indicators of parental supervision were negatively linked to teen sexting—(a) parents checking contents of their teen's mobile phone and (b) parents restricting when teens can text. These trends were examined through two separate cross-tabulations involving unitary items, providing an opportunity for more robust and rigorous analysis. As with the rest of this study, one analytical enhancement is the use of multiple regression, with other key variables accounted for. There is also an opportunity for follow-up and enhancement by creating a multi-item index for the construct of parental restriction, as opposed to the separate tests of select unitary items conducted for the Pew report. In fact, there are six items in the Pew survey available for constructing a reliable measure for parental restriction of teen mobile phone use (see Methods section). Thus, although H4 is already somewhat addressed, it is only done so through individual examples of parental restriction rather than a robust measure that more fully captures the construct and how it operates in the context of other predictors.

The previous hypotheses examine the main associations between a host of predictors and involvement in teen sexting. As we explain in the Methods section, age, sex, and other key demographic variables are controlled for in these tests through multivariate analysis. For a more nuanced account of how the predictors function, we also appropriated age and sex as interaction terms. The age and sex of a teen can play meaningful roles in how and how often they use their mobile phone, and especially their engagement with mobile messaging (e.g., Lenhart et al., 2010; Ling, 2004). Also, age and sex likely alter the dynamics of sexting behavior. Evidence indicates that females can sometimes feel pressured into this behavior, whereas males may engage in it to heighten their status (Lippman & Campbell, 2012). Therefore, it is conceivable that age and sex interact with other independent variables to predict mobile-based sexting. To examine this, we advance the following research question (RQ1): To what extent do age and sex moderate mobile-mediated peer connectivity (H1), mobile-mediated family connectivity (H2), paying for one's own service (H3), and parental restriction (H4) to predict involvement in mobile-based sexting among teens?

Methods

Data

This study analyzed survey data collected for the “Teens and Mobile Phones” study by the Pew Internet and American Life project (Lenhart et al., 2010). Results are derived from a telephone-based survey of 800 teens and one of their parents/guardian, conducted in the US by the Princeton Survey Research Associates International. Conducted between June and September of 2009, the sample design utilized random digit landline and mobile phone dialing provided by Survey Sampling International (SSI) and according to

Princeton Survey Research Associates International (PSRAI) specifications. The response rate was 13.7% for landline phones and 11.2% for mobile phone contacts. The final analyses for this study were limited to mobile text messaging users ($N = 552$) for consistency of items that ask about both mobile-phone and texting-related behaviors. Thus, nonmobile users and those who did not text were filtered out of the analyses.

Those who took part in the study ranged in age from 12 to 17 years ($M = 14.88$, $SD = 1.65$); 47.6% were female, and 77.5% were White. Annual household income ranged from less than \$10,000 (coded as 1) to \$150,000 or more (coded as 9) ($M = 5.92$, median = 6, $SD = 2.28$), and parental education ranged from none or Grade 1 to 8 (coded as 1) to postgraduate (coded as 7) ($M = 4.93$, $SD = 1.59$).

Measures

Mobile-based sexting. The Pew study involved two dimensions of mobile-based sexting, sending and receiving, which conceivably present their own distinctive dynamics and circumstances. Thus, sending and receiving sexts were run as separate dichotomous criterion variables in the analysis. These items were asked as part of a battery of questions following the prompt: "Have you ever experienced or done any of the following?" Following this prompt, sending and receiving a sext were assessed with two unitary items (one for each respectively). The wording for sending was: "Sent a sexually suggestive nude or nearly nude photo or video of yourself to someone else using your cell phone." Wording for receiving was: "Received a sexually suggestive nude or nearly nude photo or video of someone else you know on your cell phone." 4.5% ($n = 25$) reported having sent a mobile-based sext, and 15.6% ($n = 86$) said that they had received one.

Controls. This study accounts for variance attributable to two sets of control variables. On the one hand, we control for the sociodemographics reported before. Considering various other aspects of mobile communication are partially explained by demographics such as sex and age (Lenhart et al., 2010), it is important to identify and account for such sociodemographic characteristics. In addition we control for variables that reflect basic usage of mobile technology, which may also play a role in whether, how, and how much one is involved in sexting. In this study, frequency of text messaging was assessed using the following open-ended item: "On an average day, about how many text messages do you send and receive on your cell phone?" ($M = 109.81$, $SD = 139.92$). We also accounted for mobile Internet use with a dichotomous measure involving the question, "Do you ever use the Internet from your cell phone?" 30.1%, ($n = 166$) reported "yes."

Mobile phone use for peer engagement. The extent to which participants used the mobile phone as a peer resource was assessed using four items, two for texting (friends and boy/girlfriend) and two for calling (friends and boy/girlfriend). For the two texting items participants were asked, "How often do you send or receive text messages with [insert "friends" or "boy/girlfriend"] on your cell phone?" with response options ranging from (5) "several times a day" to (1) "never" (friends: $M = 4.46$, $SD = 1.03$; boy/girlfriend: $M = 3.34$, $SD = 1.77$). For the two voice calling items participants were asked, "How often do you talk to [insert "friends" or "boy/girlfriend"] on your cell phone?" with response options ranging from (5) "several times a day" to (1) "never" (friends: $M = 3.80$, $SD =$

1.11; boy/girlfriend: $M = 3.16$, $SD = 1.68$). These four items were combined to form an additive index ($M = 13.91$, $SD = 4.80$, Cronbach's $\alpha = .76$).

Mobile phone use for family engagement. Similar to the aforementioned peer items, the extent to which participants used the mobile phone as a family resource was assessed using four items, two for texting (parents/guardian and other family member) and two for calling (parents/guardian and other family member). For the two texting items participants were asked, "How often do you send or receive text messages with [insert "parents or guardian" or "brothers, sisters, or other family members"] on your cell phone?" with response options ranging from (5) "several times a day" to (1) "never" (parents/guardian: $M = 3.13$, $SD = 1.44$; other family: $M = 2.76$, $SD = 1.40$). For the two voice calling items participants were asked, "How often do you talk to [insert "parents or guardian" or "brothers, sisters, or other family members"] on your cell phone?" with response options ranging from (5) "several times a day" to (1) "never" (parents/guardian: $M = 3.90$, $SD = 1.03$; other family: $M = 3.10$, $SD = 1.32$). These four items were combined to form an additive index ($M = 12.65$, $SD = 3.83$, Cronbach's $\alpha = .70$).

Payment of mobile service. To determine who paid for the participants' mobile phone service, participants were asked, "Do you, yourself, pay all of the bills for your cell phone ... do you pay only part of the costs ... or do you pay none of the costs?" with response options of "pay all of the costs" (10.3%, $n = 57$), "pay part of the costs" (19.4%, $n = 107$), and "pay none of the costs" (69.9%, $n = 386$). In the analysis, this item was treated as a continuous variable ranging from 1 (pay all) to 3 (pay none).

Parental supervision of the mobile phone. For each teen participant, a parent was first contacted to gain permission/access and to participate in a separate survey for purposes of the larger one. Parents/guardians were asked a battery of six items to assess the extent to which they exerted control over their teen's mobile phone through restriction and monitoring. The parent was first provided with the following prompt, followed by the subsequent list of six items: "Here is a list of ways some parents supervise their child's cell phone activities. For each, please tell me if this is something do, or not. Do you [INSERT FROM LIST]?" "Limit the times of day when your child can use the phone" (yes: 51.7%, $n = 273$); "Use the phone to monitor your child's location" (yes: 48.1%, $n = 254$); "Limit the number of minutes your child may talk on the phone" (yes: 43.6%, $n = 228$); "Limit the number of text or other messages your child may send or receive" (yes: 24.2%, $n = 128$); "Ever take away your child's phone as punishment" (yes: 62.8%, $n = 331$); "Look at the contents of your child's cell phone" (yes: 63.7%, $n = 337$). The order of these items was randomized during data collection to mitigate ordinal effects. "Yes" responses were coded as 1, and "no" coded as 0. The items were then combined to form an additive index ($M = 2.80$, $SD = 1.66$, Cronbach's $\alpha = .80$).

Analysis

A series of hierarchical logistic regressions were run to test the hypotheses. We first entered demographic variables, followed by mobile use variables, variables of peer

involvement and family contact, and then variables for autonomy over the technology. In addition to tests for the hypotheses, we also examined some interactive relationships of interest, particularly age and sex because they have played an important role in mobile communication behavior in other contexts (see e.g., Lenhart et al. 2010; Ling, 2004). To reduce problems with multicollinearity, the variables were standardized prior to the formation of the interaction terms (Campbell & Kwak, 2011; Cronbach, 1987). Interactions were plotted (in Figure 1) using logistic probabilities to identify more nuanced nonlinear interactive patterns.¹ Probability metrics were calculated with log odds in separate logistic regression equations for interaction terms. For all data points represented in the figure, the combinations of high (1) or low (0) were assigned at each point of the x-axis variable.

Before moving on to the results, a few comments regarding assumptions are in order. As with ordinary least squares (OLS) multivariate models, a common problem with logistic models is high correlations among predictor variables. The matrix in Table 1 shows that correlations among predictors are not prohibitively high and no greater than the recommended threshold of .70 (Tabachnik & Fidell, 2001). Also, large sample sizes are required for logistic regression to provide sufficient data in both categories of the dependent variable. As a general guideline, Hosmer and Lemeshow (2000) recommend a sample size greater than 400 when the logistic regression model employs multiple predictors. Accordingly, our sample size ($n = 552$) meets this guideline for detecting subtle deviations from the logistic model, although the “sending” variable is notably small ($n = 25$). While this may invoke Type II error (false-negative), there is less concern about the possibility of a more serious Type I error in hypothesis testing. Furthermore, we ran Hosmer and Lemeshow’s test for goodness of fit and results indicate this is satisfactory ($\chi^2 = 8.43$, 8 degrees of freedom, $p = 0.39$ for sending sexts; $\chi^2 = 8.71$, 8 degrees of freedom, $p = 0.37$ for receiving sexts).

Results

All statistics supporting the findings for the hypotheses are depicted in Table 2. After a block of demographic and basic mobile usage controls, the remaining variables are organized into two blocks of predictors—mobile use as a peer and family resource (H1–2), and autonomy over the technology (H3–4). Findings will be reported on in the same order as these blocks of predictors with interaction effects for age and sex (RQ1) incorporated into each.

Before turning to the findings for the hypothesis we will report on the significant predictors from the controls. The only demographic variable that was consistently associated with teen sexting was age. As Table 2 indicates, older teens in the study were more likely to send as well as receive sexts than younger teens. Socioeconomic status (i.e., parent education and household income) and sex were not directly related to involvement in sexting, although, as we explain later, sex did function as a moderating variable in one case. Other than age, the only other demographic that directly predicted sexting was race—teens who were White were less likely to have received a sext than those who reported another race. Also, being a heavier texter predicted receiving sexts but not sending them. These associations did not vary significantly across age or sex when they were included as interaction terms (RQ1).

Table 1. Correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11
1. Teen age	1										
2. Sex (high: female)	.10*	1									
3. Parent education	.06	-.07	1								
4. Household income	.00	-.03	.49**	1							
5. Race	.04	-.00	.06	.25**	1						
6. Frequency of texting	.19**	.20**	-.06	-.05	-.03	1					
7. Mobile Internet use	.07	.05	-.06	-.17**	-.22**	.18**	1				
8. Peer mobile contact	.26**	.09*	-.07	-.09*	-.05	.51**	.19**	1			
9. Family mobile contact	.10*	.11**	.00	.03	-.07	.26**	.07	.27**	1		
10. Teen self-pay for mobile	.10*	-.02	-.16**	-.21**	-.11*	-.00	.06	.10*	-.02	1	
11. Parental supervision	-.08	.06	.06	.03	-.06	.12**	-.02	.03	.03	-.11**	1

*p < .05; **p < .01.

Table 2. Predictors of mobile-based sexting among teens ($N = 552$).

	Receiving a sext		Sending a sext	
	<i>B</i>	<i>SE odd ratio</i>	<i>B</i>	<i>SE odd ratio</i>
Sociodemographics				
Teen age	.57***	.16 1.767	.68**	.28 1.986
Sex (high: female)	-.18	.13 0.828	.02	.23 1.024
Parental education	-.19	.15 0.823	-.20	.25 0.811
Household income	.06	.16 1.065	-.35	.26 0.700
Race (White = 1)	-.32**	.13 0.720	-.18	.22 0.832
Frequency of texting	.47**	.16 1.615	-.13	.25 0.902
Mobile Internet use	.14	.13 1.158	.34#	.21 1.411
R ² (%)		.08		.04
Peer/family resource				
Peer mobile contact	1.21***	.29 3.378	1.24*	.52 3.455
Family mobile contact	-.57**	.22 0.561	-.65#	.36 0.519
Inc. R ² (%)		.04		.01
Autonomy over mobile				
Teen self-pay for mobile	.21#	.12 1.243	.32#	.19 1.381
Parental supervision	.05	.14 1.059	.21	.24 1.234
Inc. R ² (%)		.01		.01
Total R ² (%)		.13		.06

Note. Entries are regression coefficients (log odds) after controlling for the prior blocks.
 # $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

The next block of predictors in Table 2 examined the relationships between sexting and use of the mobile phone as a peer resource (H1) and as a family resource (H2). As expected, frequent use of the mobile phone to connect with peers was a positive predictor of both sending and receiving sexts. Thus, H1 was fully supported. In fact, coefficients for peer connectivity stand out as the strongest among all of the predictors included in this study. That said, it should be noted that effect sizes were modest, with all variables combined accounting for 13% of variance in receiving sexts and 6% for sending them (see Table 2). Associations for mobile-based peer connectivity did not vary significantly across age or sex (RQ1).

H2 predicted that use of the technology to connect with family members would be negatively associated with teen sexting. Table 2 shows this hypothesis was supported for receiving sexts, but not quite for sending them. Although mobile-mediated contact with family members did not reach significance at $\alpha < .05$ for sending these types of images, it did approach significance ($\alpha < .10$) as a negative predictor. Tests for the research question revealed one significant interaction effect. That is, being connected to family through mobile communication interacted with sex to predict receiving a sext ($\beta = -.51$, $\alpha < .05$), such that this association was most pronounced among girls. Nonlinear plots were used to depict this interaction in Figure 1, which indicates that girls who did not use the mobile phone as a family resource were notably more likely to have received a sext than girls who frequently did (see top panel of the figure).

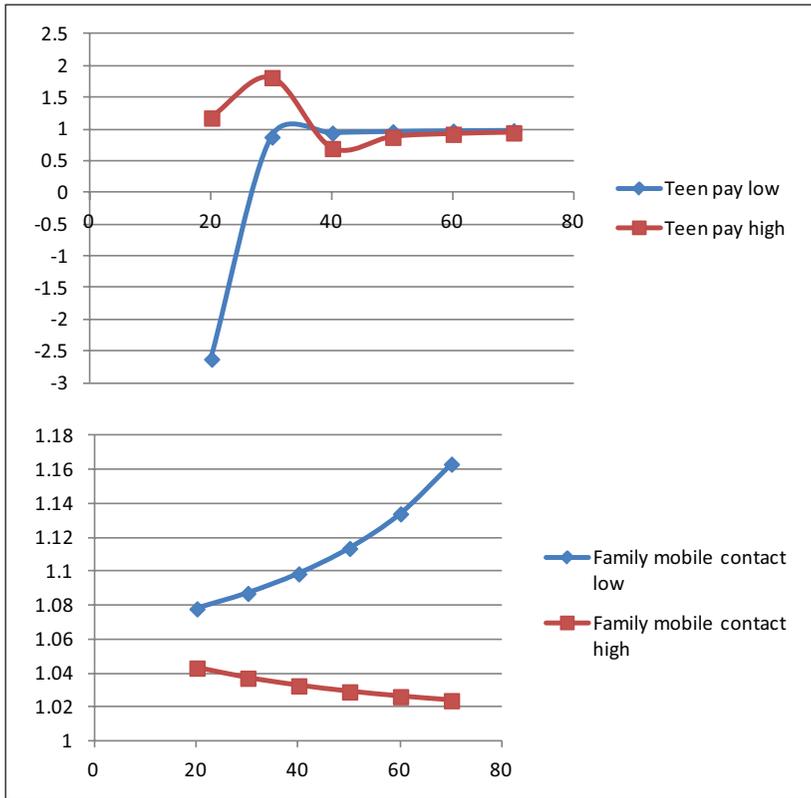


Figure 1. Interaction effects of age and sex in predicting the likelihood of sexting. Top panel: Interaction between age (x1) and teen pay for own service (x2) in predicting receiving a sext (y). Bottom panel: Interaction between sex (x1) and family mobile contact (x2) in predicting receiving a sext (y).

The last two hypotheses examined whether teen autonomy over the technology was linked to mobile-based sexting. The first of these (H3) involved payment for service, and the other (H4) addressed the extent to which parents actively tried to control their child’s mobile phone use, such as through monitoring and restriction. Findings were not significant at the $\alpha < .05$ level in the tests for these hypotheses, although they did reveal positive relationships between teen self-pay and both sending and receiving that approached significance at $\alpha < .10$. Therefore, H3 and H4 were largely unsupported. Although the main associations were not significant, there was one significant interaction effect (RQ1) in that age moderated paying for one’s own service to predict receiving a sext ($\beta = -.32, \alpha < .05$). The bottom panel of the figure shows it was primarily younger teens who were less likely to receive sexts when their parent or guardian paid for service. Likewise, young teens in the study who paid for their own service were more likely to have received a sext. No other significant interactions were found for this block of predictors.

Discussion

The aim of this study was to generate and test hypotheses supporting emancipation as a framework for considering adolescent sexting. This aim was justified by the need for conceptualizing this behavior as something other than child pornography, which entails a notably different set of motivations and contextual factors. We are not arguing that sexting is never child pornography, but rather that the broader sociocultural context surrounding this behavior calls for other perspectives that explain it as a social practice that is not necessarily criminal in intent. Among the items available in the publicly accessible Pew dataset (Lenhart et al., 2010), we were able to generate and test four hypotheses that can be grouped into two overarching propositions from emancipation, that is, that teen mobile phone use can be explained by heightened autonomy and peer—as opposed to family—connectedness. Speaking globally, the study supports propositions about peer and family connectedness, but not about autonomy over the technology, for reasons we suggest in what follows. The study also makes a contribution by offering more nuanced understanding of the roles of age and sex as moderating variables.

As hypothesized, mobile communication with peers was positively associated with both sending and receiving sexts, while its use with family members was negatively linked with both, although only marginally so for sending (i.e., $\alpha < .10$) so that finding should be interpreted with due caution. These patterns in the associations, with most being fully significant, provide guidance in reconceptualizing teen sexting as a social practice. As noted before, scholars have already argued that teen sexting should be conceptualized as a social practice rather than child pornography (boyd, 2011; Hasinoff, 2013). Our findings regarding the role of peers and family help sharpen the contours of that line of thinking by focusing attention on the relevant “social actors” (Ito & Okabe, 2005) associated with this practice. Consistent with the emancipation perspective, teen sexting seems not only to be an expression of sexuality (as per boyd’s and Hasinoff’s arguments), but also the development of social identity. In this case, the identity shift is reflected through opposing levels of connectedness to peers and family through mobile technology. As teens become more connected to their peers and less connected to family through the technology, the balance is tipped toward peer influence. Accordingly, teens are more likely to identify with the practices of peer culture, sexting being one of them (albeit more rare than other practices). Thus, these findings for peer and family dynamics have theoretical value in that they identify some key pieces of the puzzle that may help explain this behavior. We stress that they *may* help explain this behavior because the cross-sectional nature of the dataset hinders the extent to which causality can be asserted.

In addition to extending on Hasinoff’s and boyd’s perspectives on sexting as social practice rather than pornography, the study also extends on previous empirical research on the links between teen mobile phone use and sexual activity more broadly. Ling’s (2005) study of teens in Norway reveals positive associations between general “sexual activity” and frequency of mobile voice calling and texting. Our study calls attention to the fact that explanations for teen sexting must go beyond overall use of the mobile phone. Frequency of use certainly matters, however sexting is also highly dependent upon whom the technology is used with. This point is well illustrated through the negative associations between sexting and calling/texting family members. Our findings

show that adolescent sexting entails a more complex set of conditions involving differing roles among different sets of social actors. Accordingly, future research in this area should try to dig deeper into the context of mobile-mediated interactions with peers and family and the ways in which they support and suppress involvement in sexting.

In addition to those theoretical implications, the findings for H1–2 regarding peer and family mobile contact may be of use to parents and practitioners interested in curbing or preventing adolescent sexting. These findings suggest two potential routes for reducing the likelihood of sexting—one involving less peer interaction, the other for families to use the technology as a way of staying connected to their teens. Considering the fact that texting is the number one form of peer contact among teens—even greater than face-to-face interaction (Lenhart et al., 2010)—it may be unrealistic to expect today's young people to disengage with peers through this channel. Furthermore, the findings suggest that explicit restriction is not effective, as we discuss next with H4. A more realistic approach seems to be for family members to incorporate themselves into a teen's mobile communication practices in ways that cultivate an orientation toward the technology as a domestic resource—for communication, but not for control. According to the findings, this approach may be especially useful in helping to curb exposure to sexting, that is, receiving a sext. On a related note, research indicates that mobile communication between parents and teens can strengthen familial bonds, especially when used for social support (Weisskirch, 2011). Our findings, coupled with those, point to potential benefits of teens being connected with family through mobile communication. Again, we qualify the findings as pointing to *potential* benefits because of the cross-sectional nature of the data. That said, it is important to recognize that this potential benefit of mobile-mediated family contact does not play out equally across sexes. The significant interaction effect for sex (RQ1) shows that the likelihood of receiving sexts is lowest among teen girls connected to family through mobile communication. As we also address in the following discussion, this interaction effect warrants future research on the differing contexts surrounding adolescent sexting across boys and girls and the way they intersect with family connectedness.

While the evidence for emancipation was notably consistent for peer–family dynamics (H1–2), little support was found for the hypotheses regarding autonomy over the technology (H3–4). Although the directions of the associations were as expected, none of the findings were significant at $\alpha < .05$. Paying for one's own technology approached significance in predicting increased sending and receiving sexts, however only at $\alpha < .10$ and therefore cannot be interpreted with confidence as meaningful. Perhaps the most striking aspect of this finding is that it changes, or at least contextualizes, the story told in the initial Pew reports (Lenhart 2009; Lenhart et al., 2010). Those reports reveal that teens not responsible for their own mobile bills have only a 3% likelihood of sexting, whereas those who are responsible for payment have a 17% likelihood. It is interesting that this stark trend does not hold up very well through multivariate analysis with other factors accounted for. In particular, it appears that the variable of “who pays” may have been confounded with age in the Pew reports. Table 2 shows that in more robust multivariate analysis, age accounts for the brunt of the explainable variance, likely drawing from some of the variance initially attributed to payment. The interaction effects from RQ1 help further understand how age has a dynamic effect on the relationship between “who pays” and adolescent sexting.

Although main associations between self-payment and sexting were not significant (H3), one of the tests for the interactive effect of age was. That finding indicates that the very youngest participants in the study, that is, 12 year olds, were particularly *unlikely* to receive sexts when their mobile expenses were taken care of for them. Although not as pronounced, there is also a noticeable increase in the likelihood of receiving sexts among 13 year olds who did pay for their own service. Through this finding, the role of “who pays” in adolescent sexting is substantially clarified in ways that may be useful for parents who wish to shield their children from these images. If this finding reflects payment influencing sexting (which should be tested through methods geared for causality), then it appears that including children on a family plan may be helpful in preventing exposure to sexting for very young adolescents, with diminishing returns (or even no returns) for older teens.

The last hypothesis (H4), that parental supervision of teen mobile phone use would be negatively associated with involvement in sexting, was not supported. In other words, direct parental intervention, in the forms of monitoring and restriction, appears to be ineffective in either explaining or mitigating adolescent sexting. Parents who wish to shield their children from exposure to these images may be better off incorporating mobile communication as a means of connecting with their teen (especially if it is a girl) and paying for their service (especially if it is a very young adolescent) than imposing heavy-handed supervision of its use.

In addition to the tests for the hypotheses and research question, some notable findings emerged in the control block of variables. As noted, the strongest predictor in the control block was age, which significantly predicted both sending and receiving sexts, with older teens more likely to experience both. One of the points Ling (2004, 2005) stresses is that emancipation plays out differentially across ages within adolescence. Older teens are further into sexual maturation. Certain landmark experiences, such as driving, open up a whole new set of boundaries for teens at a particular age. Also, as students, children tend to be graded by age which helps tighten the distinctions between older and younger teens. Thus, greater sensitivity to the distinctive contexts surrounding age is an avenue for future research in this area.

Another control, frequency of text messaging, was associated with likelihood of receiving, but not sending, a sext. Considering frequency of texting was not associated with the act of sending, this set of findings indicates that heavy texting only increases *exposure* to these images. Again, the question of causality is not empirically addressed, however in this case it is more theoretically elegant to suggest that overall frequency of texting drives exposure rather than the reverse. It also points to an opportunity for follow-up investigation to better understand why and how frequent texting may lead to this increased exposure. As Chalfen (2009) argues, future research in this area should go beyond examining mere reception of sexts to account for whether sexts received are unintentional or explicitly requested. In the case of the former, it is plausible that intensive texting leads to contact with a broader array of characters, making it more likely that the user will encounter a member of the small subset of teens who distribute these types of messages, thereby increasing their chance of receiving a sext unintentionally. On the other hand, it may be that heavy texters are more likely to actively solicit these images from others because they have become accustomed to this channel as a safe venue for

intimate exchanges. This scenario is consistent with findings that many teens rely on texting for handling sensitive matters that would be too uncomfortable to address in the physical presence of others (Ishii, 2006). In this case, teens who are too shy to ask for nude images face-to-face may be relying on texting as a more comfortable channel for making an otherwise difficult request (Hasinoff, 2013). Thus, future research can help explain why texting is associated with exposure to sexts by accounting for whether these images are unintentionally received or the result of a text-based request. Furthermore, accounting for whether sexts sent are solicited or unsolicited may shed light on the extent to which this practice is a means of sexual expression (Hasinoff, 2013), or perhaps the result of social pressure (Lippman & Campbell, 2012; Vanden Abeele et al., in press).

As scholars pursue research in this area, they should be mindful of some limitations associated with the survey used for this study. First, the response rates for both landline (13.7%) and mobile (11.2%) telephone surveys somewhat hinder generalizability. Although not ideal, these response rates are actually a little higher than the overall 9% average response rate the Pew Research Center (2012) reports for phone-based public opinion polling in 2012. This is a notable drop from 36% in 1997. Some of this drop has to do with mobiles replacing landlines and distinctive challenges associated with mobile-based surveys, such as caller ID being used as a filter and reaching people at times that are not conducive to lengthy conversations. That said, this drop in response rate is evident with landlines as well. Discussion and speculation of this problem is offered by a dedicated report of the Pew Research Center (2012). For a higher response rate, researchers may want to consider other means such as postal mail surveys. Because mail surveys are completed more privately, they may also mitigate bias due to social desirability, especially with research on sensitive matters such as this.

Researchers should also strive for multiwave panel data. A longitudinal approach will allow for the examination of changes over time and help bolster causal claims. In some cases, there are theoretical grounds to hypothesize the direction of causality with these cross-sectional data, if not assert it (e.g., age cannot be affected by sexting). In other cases, it is more difficult to tease out the direction of causality, warranting additional investigation. Follow-up investigation should also strive for more nuance in measurement, particularly with boy/girlfriend status – exclusive, casual dating, courtship, etcetera. More refinement is also needed in capturing the practice of sexting itself. As Chalfen (2009) explains, sexting can be more complex than the items for sending and receiving captured in this study. For example, it is possible for someone to take a picture with their camera phone and post it to a web site. Chalfen (2009) also argues that the statuses of sender and receiver should be expanded. In particular, this distinction becomes complicated when the recipient forwards a sext on to others, essentially becoming a so-called “middleman,” raising questions about the conditions that support and suppress this dynamic.

Furthermore, future research should also try to account for changes in the landscape of visual culture more broadly. It may be that sexting is partially explained by increased exposure to pornography and other stimulating materials that have become part of everyday media consumption for many individuals (e.g., Peter & Valkenburg, 2011). For example, it is conceivable that high-profile cases of “leaked” images of young celebrities baring skin may contribute to perceptions of adolescent sexting as a normative, even desirable, practice. Thus, the broader normative aspects of visual culture in the digital age may further our understanding of sexting.

Finally, future research should be sensitive to some notable challenges of capturing not only behavior, but also underlying mechanisms associated with adolescent sexting. Of course, social desirability is always a challenge when using self-report data that are sensitive in nature. Beyond that, there is the potential to disrupt the normal flow of mobile phone use through direct measurement, such as tracking or counting the exchange of mobile-mediated content. In consideration of this, researchers involved in the Pew project collected open-ended written responses from a small sample of teens in focus groups. This strategy helped provide some nuance (see Lenhart, 2009; Lenhart et al., 2010). For example, analysis of the questionnaires provided initial evidence that although boys and girls may not differ much in their frequency of sexting, they may be involved in this behavior for different reasons. Notably, Lippman and Campbell (2012) report that girls were more likely to emphasize expectations for them to sext (especially from boys), whereas the responses indicated that sexting was sometimes perceived as a way of gaining status for boys. Coupled with the interaction effect between sex and mobile-mediated family contact, these findings point to differences across boys and girls as a fruitful area for future qualitative research—not only to explain the likelihood of sexting, but the motivations underlying this behavior. Another notable gap in this study that could be filled through follow-up qualitative work is better understanding of the content involved in these exchanges. This study provides only a general idea about what these images entail, that is, nudity. Better understanding of what these images entail and how they vary may shed new light on this social practice and how it plays out differentially among teens, particularly across boys and girls.

Concluding remarks

Collectively, the findings from this study help shed new light on a number of variables that function in predicting adolescent sexting, providing support for conceptualizing it as social practice rather than pornography and also helping to pave the way for future research on sexting and developing emancipation into a framework for generating testable hypotheses. The primary area of support for emancipation is with regard to which types of personal ties, that is, peers and family, one is connected to through the technology. Mobile communication tightens the flows of interaction among personal ties, making those ties more salient and influential. Human beings are socially contagious, and the potential for (almost) anytime-anywhere connectivity through mobile communication has the capacity to heighten this contagion effect (Campbell & Ling, 2008; Campbell & Russo, 2003). From the emancipation perspective (Ling, 2008), mobile communication plays into the social alignments that teens negotiate as they develop a sense of self. The argument here is that members of these alignments help shape how individuals, especially teens, think about themselves and how they act, which explains why there are very different trends for the ways in which peer and family connectivity are associated with adolescent sexting.

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Note

1. For the graphic representation, the x-axis is laid out as continuous. However, we also plotted linear interactive graphs using log odds (i.e., unstandardized coefficients). The linear graphs displayed similar patterns of interactions, with the linear slopes evening out nuanced interactions across the four different points.

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