



# Longitudinal Correlates of Peer Sexual Communication Quality in Late Adolescence

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## Abstract

Comfort discussing sex with friends may develop over time and may be associated with individual and peer characteristics. The current paper uses longitudinal data to examine the developmental trajectory and between- and within-person correlates of peer sexual communication quality. Participants were 434 college students (52.1% female, 38.7% European American/White, 32.5% African American/Black, 28.8% Latino American/Hispanic;  $M = 18.0$  [ $SD = 0.4$ ] years old fall of first year) who completed surveys at four semesters. Peer sexual communication quality improved across the college years, and tended to be higher during semesters when late adolescents held less conservative attitudes about sex and communicated about sex more frequently. Additionally, peer sexual communication quality was better among women and late adolescents who were sexually active at more semesters. We discuss implications for peer-led sexual health intervention programs and for theories of normative sexuality development.

**Keywords** Peers · Sexual communication · Sexual attitudes · Sexuality development · Adolescence

The development of high-quality peer sexual communication, or communication with peers about sex that individuals perceive to be comfortable, open, and not embarrassing (Lefkowitz, Boone, & Shearer, 2004), may be a part of normative sexuality development (Harper, Gannon, Watson, Catania, & Dolcini, 2004; Morgan & Korobov, 2012; Tolman & McClelland, 2011). In addition, the development of high-quality peer communication is important for late adolescents' sexual well-being (Mastro & Zimmer-Gembeck, 2015). During late adolescence, patterns of peer sexual communication are likely to change, because changes in sexual attitudes and behaviors are common during this period (Herbenick et al., 2010; Lefkowitz, 2005; Schwartz,

Zamboanga, Luyckx, Meca, & Ritchie, 2013). The goal of the current paper is to explore the development of peer sexual communication quality during late adolescence. Specifically, we use longitudinal data to examine (1) the developmental trajectory of peer sexual communication quality and (2) how between- and within-person individual and peer characteristics are associated with changes in peer sexual communication quality.

## Peer Sexual Communication

Peer sexual communication may be an important part of late adolescents' sexuality development. The development of "sexual selfhood," or one's identity as a sexual being, is a major developmental task of adolescence (Tolman & McClelland, 2011). Youth may look to peers for help in developing sexual selfhood, by consulting peers on topics such as navigating new dating and sexual experiences, determining the course of sexual relationships, and making decisions about their own relationship and sexual health values (Harper et al., 2004; Morgan & Korobov, 2012). Although parents may also influence youth's sexuality development, youth tend to feel more comfortable discussing these sexual topics with peers than with parents (DiIorio, Dudley, Lehr, & Soet, 2000). In

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the current paper, we define peers as adolescents' friends, although dating and sexual partners may also be considered peers. Specifically, we examine sexual communication with one's closest friend. We examine sexual communication among closest friends because closest friends often advise each other on sexual relationships and influence the course of these relationships (Byron, 2017; Harper et al., 2004). In addition, previous research has also examined communication among closest friends (e.g., Widman, Choukas-Bradley, Helms, Golin, & Prinstein, 2014).

Peer communication may encourage the adoption of peers' values (Real & Rimal, 2007). Late adolescents describe peers as a source of sexual values for important topics such as consent, pleasure for self and partner, and when to have sexual intercourse (Harper et al., 2004; Morgan & Zurbriggen, 2012). In fact, in late adolescence, peer sexual communication may be more strongly associated with sexual attitudes and behavior than parental sexual communication is (Lefkowitz & Espinosa-Hernández, 2007; Trinh, Ward, Day, Thomas, & Levin, 2014). As a result, peers' sexual attitudes and behaviors are associated with late adolescents' sexual attitudes and behaviors (Potard, Courtois, & Rusch, 2008; Sieving, Eisenberg, Pettingell, & Skay, 2006; Trinh et al., 2014).

On average, high-quality communication with peers and partners is associated with attitudes, behaviors, and outcomes that reduce risk and promote positive sexual experience. For example, high-quality communication is associated with attitudes and behaviors that reduce sexual risk such as condom use self-efficacy, contraceptive use, and delayed first intercourse. High-quality communication is associated with positive sexual outcomes such as desirable attitudes and behaviors including contraceptive use, delayed first intercourse, condom use self-efficacy, sexual satisfaction, and positive emotional responses to sex (Davis et al., 2006; DiIorio et al., 2000; Guzmán et al., 2003; Lefkowitz et al., 2004; Mastro & Zimmer-Gembeck, 2015; Widman, Welsh, McNulty, & Little, 2006). In addition, quality and frequency of sexual communication with *friends* are associated with quality and frequency of sexual communication with *dating partners* (Powell & Segrin, 2004; Widman et al., 2014) which in turn are associated with more consistent contraceptive use (Noar, Carlyle, & Cole, 2006; Widman et al., 2006). Thus, although we do not assess sexual health outcomes in the current study, high-quality sexual communication, which we assess in the current study, is associated with sexual health.

Given the role of peer communication in shaping sexual health and values, peer-led approaches to sexual health promotion for late adolescents are increasingly popular (Cupples, Zukoski, & Dierwechter, 2010; Frantz, 2015). Peer-led programs are valuable prevention tools because they are inexpensive, and peer educators enable programs to remain relevant in a rapidly changing youth culture (Cupples et al., 2010). However, the effectiveness of peer-led programs is mixed

(Kim & Free, 2008). Thus, there is much room for improvement in these programs. Open, comfortable group discussion may be an important characteristic of these programs (Moore, Smith, & Folsom, 2012). Basic research on peer sexual communication quality could help program developers facilitate peer sexual communication that is open and comfortable during discussion-based, peer-led sexual health programs.

## Developmental Trajectory of Peer Sexual Communication

Late adolescents experience changes and development in a range of areas, including sexual attitudes and behaviors (Herbenick et al., 2010; Lefkowitz, 2005; Schwartz et al., 2013). In addition, cross-sectional and longitudinal research indicates improvement in general communication ability during the college years (Humphris & Kaney, 2001; Saavedra & Saavedra, 2011). Thus, peer sexual communication is likely to change during this developmental period as well. Researchers have called for studies that capture the development of sexual communication using longitudinal data (Widman et al., 2014). Knowledge of the development of sexual communication may inform theories of late adolescents' sexuality development and communication. For example, normative frameworks of sexuality development propose that the development of sexual selfhood, or identity as a sexual being, is a major developmental task of adolescence (Tolman & McClelland, 2011). If peer sexual communication quality improves over time, it may indicate that becoming more comfortable with sexual communication is part of the development of sexual selfhood. Therefore, aim 1 of the current paper is to examine changes in peer sexual communication quality in late adolescence, specifically, sexual communication with one's closest friend. Based on research showing that sexual attitudes become more permissive in late adolescence (Lefkowitz, 2005), and that peers become an increasing source of sexual values (Morgan & Zurbriggen, 2012), we hypothesize that peer sexual communication quality will increase over time (hypothesis 1).

## Correlates of Peer Sexual Communication Quality

According to the Health Disclosure Decision-Making model, communication is a dyadic process in which the person receiving a message is an active participant, and thus, the decision to communicate may be affected by both individual factors such as gender and peer factors such as peer attitudes (Greene, 2009). In the current paper, to examine both types of factors that may affect communication, we examine both individual (gender, sexual activity, and sexual attitudes) and peer (romantic relationship status, frequency of peer sexual

communication, perceived peer approval of sex) characteristics that may be associated with peer sexual communication quality. This research will identify the types of individuals who are comfortable discussing sex with peers and under what conditions. Peers may have more influence on late adolescents who are more comfortable with peer sexual communication than on late adolescents who are less comfortable.

Previous research on the correlates of peer sexual communication has examined between-person variation (DiIorio et al., 2000; Lefkowitz et al., 2004; Widman et al., 2014). In this paper, we use multilevel modeling to examine within-person correlates of sexual communication quality. Multilevel modeling enables researchers to separate between- and within-person effects. Examining within-person variation allows for stronger inference about the individual and peer characteristics associated with peer sexual communication quality by decreasing the opportunity for unmeasured, confounding variables to influence results (Curran & Bauer, 2011; Singer & Willett, 2003). Whereas between-person effects represent differences between individuals, within-person effects represent individuals' deviation from their own average or usual behaviors/attitudes. For example, peer communication quality may vary between people who have more or less conservative sexual attitudes generally across time (a between-person effect), and it may vary within people when their sexual attitudes are more or less conservative than their own average (a within-person effect). Thus, we build on previous research by including both between- and within-person correlates, where possible. By examining individual and peer correlates at the within-person level, we contribute information on how high-quality sexual communication develops. In summary, aim 2 is to examine the between- and within-person correlates of sexual communication quality with one's closest friend, including individual and peer characteristics.

### Individual Characteristics

**Gender** Peer sexual communication is more frequent and more comfortable for women than for men (DiIorio, Kelley, & Hockenberry-Eaton, 1999; Rittenour & Booth-Butterfield, 2006; Trinh & Ward, 2015; Widman et al., 2014). Therefore, we hypothesize that women will report higher-quality peer sexual communication than men (hypothesis 2).

**Sexual Activity** Sexually active late adolescents have better-quality sexual communication and receive more sexual information from peers than abstinent late adolescents (Lefkowitz et al., 2004; Widman et al., 2014). Most past research in this area uses cross-sectional data on lifetime sexual activity, not recent sexual activity. However, recent sexual activity may also have implications for peer sexual communication quality. When individuals have engaged in

sexual activity recently, they have readily accessible and personal content for conversations about sex, making it easier to have such conversations. Consistent with past research examining between-person differences in lifetime sexual activity, we hypothesize that late adolescents who are sexually active during more college semesters will have higher-quality sexual communication (hypothesis 3a). We also hypothesize that during semesters when late adolescents are sexually active, they will have higher-quality peer sexual communication than usual (hypothesis 3b).

**Sexual Attitudes** Cross-sectional research on late adolescents has found that more permissive sexual attitudes are associated with higher-quality peer sexual communication (Lefkowitz et al., 2004). However, because exploration of attitudes is common in late adolescence (Schwartz et al., 2013), and sexual attitudes tend to change during this period (Lefkowitz, 2005; Morgan & Zurbriggen, 2012), the examination of variability within individuals is particularly relevant to the study of late adolescents (Howard, 2015). We hypothesize that late adolescents with less conservative sexual attitudes overall will have higher-quality peer sexual communication (hypothesis 4a). We also hypothesize that during semesters when late adolescents have less conservative sexual attitudes, they will have higher-quality peer sexual communication than usual (hypothesis 4b).

### Peer Characteristics

**Romantic Relationship Status** Late adolescents in romantic relationships tend to engage in sexual behavior more frequently than other late adolescents (Patrick & Maggs, 2009), making open, comfortable communication about sex more relevant. Additionally, late adolescents in romantic relationships may have more practice with sexual communication because they have more frequent sexual communication with sexual partners, compared to late adolescents in casual relationships (Jonason, Li, & Richardson, 2011; Paul & Hayes, 2002). We hypothesize that, overall, late adolescents who spend more college semesters in romantic relationships will have higher-quality peer sexual communication (hypothesis 5a). We also hypothesize that during semesters when late adolescents are in romantic relationships, they will have higher-quality peer sexual communication than usual (hypothesis 5b).

**Frequency of Peer Sexual Communication** More frequent peer sexual communication is associated with higher-quality peer sexual communication (Lefkowitz et al., 2004). We hypothesize that, consistent with past cross-sectional research, late adolescents who have more frequent peer sexual communication overall will have better-quality communication (hypothesis 6a). We also hypothesize that during semesters when late adolescents have more frequent sexual communication, they

will have higher-quality peer sexual communication than usual (hypothesis 6b).

**Perceived Peer Approval of Sex** According to the Health Disclosure Decision-Making model, when individuals perceive lower stigma and higher approval of a topic, they are more willing to communicate about that topic (Greene, 2009). Adolescents who perceive that their peers approve of sex may find it easier to communicate about sexual topics. Therefore, we hypothesize that late adolescents who perceive more peer approval of sex will have higher-quality peer sexual communication than late adolescents who perceive lower peer approval of sex (hypothesis 7).

In summary, in the current paper, we examine changes in peer sexual communication in late adolescence (aim 1) and between- and within-person individual and peer correlates of peer sexual communication quality (aim 2). The results of this research will inform theory regarding the developmental trajectory of peer communication and provide implications for peer-led health promotion.

## Method

### Participants

Participants were traditionally aged first-year students (17–19), recruited via the university registrar in the fall of their first year to be part of a study on sexuality and gender at a large, northeastern university (Lefkowitz, Shearer, Gillen, & Espinosa-Hernández, 2014). To create a diverse sample, all African American and Latino American first-year students were invited to take part in the study, as were 9% of European American first-year students (by random sample). The response rate was 52%, yielding a Semester 1 sample of 434 students. Over-sampling of ethnic/racial minority students resulted in a diverse sample: 38.7% European American/White, 32.5% African American/Black, and 28.8% Latino American/Hispanic. The sample was 52.1% female and, on average, 18.0 (SD = 0.4) years old at semester 1. They were 97.2% heterosexual, 0.2% gay/lesbian, 1.9% bisexual, and 0.7% other (e.g., “confused”) at semester 1. We were unable to determine if any transgender or gender non-binary students participated in the current study.

We invited participants to respond in three subsequent semesters with varying time spans between semesters (semester 2: spring first year, semester 3: fall second year, semester 4: fall fourth year). Retention was 95.2% at semester 2, 89.9% at semester 3, and 78.1% at semester 4. We performed four chi-squares and four *t* tests to determine if participants who responded in semester 4 (last semester of data collection) differed from participants who did not respond in semester 4 on semester 1 data. Four of the eight tests were significant.

Compared to non-respondents, participants in semester 4 tended to have lower perceived peer approval of sex ( $t(431) = 3.08, p < .01$ ); were more likely to be female ( $\chi^2(1, n = 434) = 16.48, p < .001$ ), European American/White ( $\chi^2(1, n = 434) = 12.40, p < .01$ ), and sexually active ( $\chi^2(1, n = 433) = 6.11, p < .05$ ); and were less likely to be African American/Black ( $\chi^2(1, n = 434) = 5.13, p < .05$ ), at semester 1. Groups did not differ on semester 1 Latino American/Hispanic identity, peer sexual communication quality, romantic relationship status, sexual attitudes, or sexual communication frequency.

Participants signed consent forms before completing the questionnaire at semester 1. Participants completed paper questionnaires at each of the four semesters. They were compensated \$25 at semester 1, \$30 at semester 2, and \$35 at semesters 3 and 4.

### Measures

**Peer Sexual Communication Quality with Closest Friend** Each semester, participants identified one same-gender friend as their closest friend at the university. The instructions for female participants were as follows: “The questions below ask about your closest female friend at {the university}. Please think of the one female at {the university} whom you consider to be your closest friend. If you have more than one female close friend at {the university}, please just pick ONE of these friends.” For male participants, we replaced the term “female” with “male.” Participants responded to 13 items on a 4-point scale from *strongly disagree* (1) to *strongly agree* (4) about their level of comfort, embarrassment, and openness regarding sexual communication with their closest friend (Lefkowitz et al., 2004; adapted from Feldman & Rosenthal, 2000). Eight of the items had the stem “If my close friend discussed sex and sex-related issues with me, I would...” Example items include “feel uncomfortable” and “try to change the topic.” Five of the items had the stem, “Regarding talking about sex and sex-related issues, I...” Example items include “communicate openly with my close friend” and “have an unspoken agreement with my close friend that we do not discuss these issues.” Higher scores on this measure represent higher-quality peer sexual communication. Reliability was adequate in the current sample ( $\alpha s = .89-.92$  across semesters).

**Gender** At semester 1, participants reported their gender, coded as *female* (0) or *male* (1).

**Sexual Activity** Each semester, participants reported whether or not they had ever had penetrative (vaginal or anal) sex and, if yes, how many different penetrative sexual partners in the last 3 months. We coded participants who had never had penetrative sex or had zero partners in the last 3 months as *not sexually active* (0). We coded



participants who had one or more partners in the last 3 months as *sexually active* (1).

**Conservative Sexual Attitudes** Each semester, participants responded to 12 items adapted from Hudson, Murphy, and Nurius' (1983) measure of general conservative attitudes toward sex. Example items included "I think sex should be reserved for marriage" and "I think there is too much sexual freedom given to adults these days." Participants rated items on a 5-point scale from *strongly disagree* (1) to *strongly agree* (5), with higher scores denoting more conservative sexual attitudes. Reliability was adequate in the current sample ( $\alpha = .87-.89$ ).

**Romantic Relationship Status** Each semester, participants answered a question about their romantic relationship status. We coded participants who responded "I am not dating anyone right now" or "I am casually dating someone" as *not in a relationship* (0). We coded participants who responded "I am in a relationship, but it is not very serious," "I am in a serious and committed relationship," or "I am engaged, living with, and/or married to my partner" as *in a relationship* (1). We selected the categories based on previous research that suggests that the act of making a relationship "official" has implications for couple members' perceptions of their relationship (England, Shafer, & Fogarty, 2008; Mod, 2010).

**Frequency of Peer Sexual Communication** Each semester, participants responded to 21 items regarding sexual communication about various sexual topics (Lefkowitz et al., 2004). All items referred to the past 3 months and had the stem, "How much have you talked to your friend about..." Example items include "pregnancy," "masturbation," and "sexual orientation." Participants responded on a 4-point scale from *never* (0) to *often* (3). Reliability was adequate in the current sample ( $\alpha = .91-.93$ ).

**Perceived Peer Approval of Sex** At semester 1, participants responded to eight items that assessed their perceptions of peers' approval of sex (adapted from Treboux & Busch-Rossnagel, 1995) on a 4-point scale from *would strongly disapprove* (1) to *would strongly approve* (4). Example items include "Making out with someone you have just met" and "Having sexual intercourse with someone with whom you have a serious relationship." Reliability was adequate in the current sample ( $\alpha = .87$ ).

## Analysis Plan

Multilevel modeling is an appropriate data analysis strategy for longitudinal data with repeated measurement occasions. Strengths of multilevel modeling include (1) observation of the effects of time on peer sexual communication quality; (2)

estimates that account for nested data, or residual error correlation within individuals; and (3) separation of between-person and within-person effects to determine the level at which particular constructs covary with the outcome of interest (Curran & Bauer, 2011; Singer & Willett, 2003). We conducted the current analyses using the MIXED procedure in SAS Version 9.4 using maximum likelihood estimation. Maximum likelihood estimation uses all available data to produce estimates of fixed and random effects. Thus, all 434 participants contributed data to the estimates in the current analyses, despite attrition. Maximum likelihood estimation assumes data are missing at random (Singer & Willett, 2003).

We centered the variable time at semester 1. Thus, the intercept for the linear variable time represented the approximate beginning of students' time at university. We coded the following measurement semesters to indicate the approximate months after semester 1 and unequal time spans between semesters (semester 2 = 4; semester 3 = 10; semester 4 = 34). We created two different variables for each of the time-varying covariates: sexually active, conservative sexual attitudes, romantic relationship status, and peer sexual communication frequency. We indicate these variables by BP (between-person; time-invariant variables) or WP (within-person; time-varying variables) in the model (Table 1).

We modeled the BP variables at level 2. With the exception of gender, we entered individuals' overall mean for both the continuous and dichotomous BP variables (sexual activity, conservative sexual attitudes, romantic relationship status,

**Table 1** Equations for multilevel models of peer sexual communication quality

Model 1 (aim 1)	Level 1: Peer sexual communication $quality_{ij} = \pi_{0i} + \pi_{1i}(\text{Time\_cent}_{ij}) + \varepsilon_{ij}$ Level 2: $\pi_{0i} = \gamma_{00} + \zeta_{0i}$ $\pi_{1i} = \gamma_{10}$
Model 2 (aim 2)	Level 1: Peer sexual communication $quality_{ij} = \pi_{0i} + \pi_{1i}(\text{Time\_cent}_{ij}) + \pi_{2i}$ $(\text{WP sexually active}_i) + \pi_{3i}(\text{WP conservative}$ $\text{sexual attitudes}_i) + \pi_{4i}(\text{WP romantic relationship}$ $\text{status}_i) + \pi_{5i}(\text{WP peer sexual communication}$ $\text{frequency}_i) + \varepsilon_{ij}$ Level 2: $\pi_{0i} = \gamma_{00} + \gamma_{01}(\text{gender}_i) + \gamma_{02}(\text{BP sexually active}_i)$ $+ \gamma_{03}(\text{BP conservative sexual attitudes}_i) + \gamma_{04}$ $(\text{BP romantic relationship status}_i) + \gamma_{05}$ $(\text{BP peer sexual communication frequency}_i)$ $+ \gamma_{06}(\text{BP perceived peer approval of sex}_i) + \zeta_{0i}$ $\pi_{1i} = \gamma_{10}$ $\pi_{2i} = \gamma_{20}$ $\pi_{3i} = \gamma_{30}$ $\pi_{4i} = \gamma_{40}$ $\pi_{5i} = \gamma_{50}$

BP between-person, WP within-person

peer sexual communication frequency, and perceived peer approval of sex) as the BP score. For example, each participant's BP score for sexual attitudes was the average of four assessments. BP scores for dichotomous variables were proportions across multiple time points. For example, average sexual activity across time was the proportion of all assessments when each participant had penetrative sex (e.g., .50 if a participant reported sexual behavior two out of four assessments).

We modeled the WP variables at level 1. We centered WP, continuous variables (conservative sexual attitudes and peer sexual communication frequency) at each individual's mean. The centered, WP variables represented the deviation from an individual's overall mean at a particular semester. For example, each participant's WP score for sexual attitudes was the difference between the participant's mean sexual attitudes across time and his/her sexual attitudes at a particular assessment. We did not center WP, dichotomous predictors (sexual activity and romantic relationship status). For example, each participant's WP score for sexual behavior at a particular assessment is "1" if s/he had penetrative sex. We only measured perceived peer approval of sex at semester 1, and thus treated it only as a BP variable in the current analyses. No continuous variables were skewed beyond a statistic of 2 (George & Mallery, 2010). All analyses controlled for race/ethnicity with European American/White as the reference group.

## Results

In addition to the full models that tested our aims, we ran six single-predictor models. Each single-predictor model included a single individual or peer characteristic without the presence of other characteristics. All individual and peer characteristics were significantly associated with peer sexual communication in the single-predictor models (Table 2). However, our interpretations are based on the full models.

**Aim 1** See Table 3 for descriptive statistics of variables by semester. Aim 1 was to examine changes in peer sexual communication quality in late adolescences (model 1). As predicted, the linear trend ( $\gamma_{10}$ ) was significant (see Table 4), indicating that peer communication quality increased over time (hypothesis 1) by, on average, 0.12 on a 4-point scale.

**Aim 2** Aim 2 was to examine individual and peer between- and within-person correlates of peer sexual communication quality (model 2; see Table 4).

**Individual Characteristics** Consistent with our hypothesis, gender was significant; women had higher-quality peer sexual communication than men (hypothesis 2). In support of our hypothesis, the BP term for sexual activity was significant. Overall, participants who were sexually active during more

semesters had higher-quality peer sexual communication. However, this association was not present at the WP level, thus not supporting our hypothesis. That is, although being sexually active across more semesters was a significant correlate of quality of peer sexual communication (hypothesis 3a), sexual activity at a particular semester was not a significant correlate of quality of peer sexual communication in the same semester (hypothesis 3b). The BP and WP terms for conservative sexual attitudes were significant, as predicted. Overall, participants who were less conservative about sex had higher-quality peer sexual communication (hypothesis 4a). In addition, during semesters when participants were less conservative about sex, they had higher-quality peer sexual communication, compared to semesters when they were more conservative about sex (hypothesis 4b).

**Peer Characteristics** Inconsistent with our hypotheses, the BP and WP terms for romantic relationship status were not significant (hypotheses 5a and 5b). As predicted, the BP and WP terms for peer sexual communication frequency were significant. Overall, participants who more frequently talked to their peer about sex had higher-quality peer sexual communication (hypothesis 6a). In addition, during semesters when participants more frequently talked to their peer about sex, they had higher-quality peer sexual communication, compared to semesters when they less frequently talked to their peer about sex (hypothesis 6b). The BP term for perceived peer approval of sex was not significant, contrary to our hypothesis (hypothesis 7).

## Discussion

Responding to the need for longitudinal research on peer sexual communication (Widman et al., 2014), the current paper examined the developmental trajectory and correlates of peer sexual communication quality, specifically, communication with one's closest friend. Peer sexual communication quality tended to improve slightly over time, and late adolescents had better-quality peer sexual communication when they held less conservative attitudes about sex and communicated more frequently about sex. In addition, women and individuals who were sexually active during more semesters tended to have better peer sexual communication quality.

### Peer Sexual Communication Quality Trajectory Increased with Time

In support of our hypotheses, peer sexual communication quality improved over time. There are two possible interpretations of this finding. First, past research has demonstrated that late adolescents become better communicators during their college years (Humphris & Kaney, 2001; Saavedra &

**Table 2** Single-predictor models predicting sexual communication quality with closest friend

Individual characteristics		Peer characteristics	
Gender		Romantic relationship status	
Fixed effects		Fixed effects	
Intercept	3.352***	Intercept	3.189***
Gender <sup>a</sup>	−0.211***	Romantic Relationship status <sup>b</sup>	0.146**
Random effects		Random effects	
Level-1 effect	0.080***	Level-1 effect	0.080***
Level-2 effects		Level-2 effects	
Intercept	0.119***	Intercept	0.127***
Sexually active		Peer sexual communication frequency	
Fixed effects		Fixed effects	
Intercept	3.061***	Intercept	2.562***
Sexually active (last 3 months) <sup>b</sup>	0.327***	Peer sexual communication frequency <sup>b</sup>	0.440***
Random effects		Random effects	
Level-1 effect	0.079***	Level-1 effect	0.080***
Level-2 effects		Level-2 effects	
Intercept	0.111***	Intercept	0.085***
Conservative sexual attitudes		Perceived peer approval of sex	
Fixed effects		Fixed effects	
Intercept	3.778***	Intercept	3.055***
Conservative Sexual Attitudes <sup>b</sup>	−0.202***	Perceived peer approval of sex <sup>a</sup>	0.067*
Random effects		Random effects	
Level-1 effect	0.080***	Level-1 effect	0.080***
Level-2 effects		Level-2 effects	
Intercept	0.112***	Intercept	0.128***

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ <sup>a</sup> Represents between-person variables measured at semester 1<sup>b</sup> Represents between-person variables measured at all semesters

Saavedra, 2011). Thus, improved peer sexual communication quality may reflect this overall improvement in late adolescents' ability to communicate. Second, improvement in late adolescents' sexual communication may reflect the

development of sexual selfhood, which, according to normative frameworks of sexuality development, is a major developmental task of adolescence and late adolescence (Tolman & McClelland, 2011). For example, more competence about safe

**Table 3** Descriptive statistics

	Semester 1 ( <i>N</i> = 434)	Semester 2 ( <i>N</i> = 413)	Semester 3 ( <i>N</i> = 390)	Semester 4 ( <i>N</i> = 338)
	M (SD)	M (SD)	M (SD)	M (SD)
Peer sexual communication quality <sup>a</sup>	3.22 (0.45)	3.28 (0.47)	3.31 (0.45)	3.34 (0.47)
Conservative sexual attitudes <sup>b</sup>	2.67 (0.72)	2.64 (0.74)	2.60 (0.73)	2.50 (0.71)
Sexual communication frequency <sup>c</sup>	1.42 (0.54)	1.61 (0.57)	1.65 (0.58)	1.63 (0.61)
Perceived peer approval of sex <sup>d</sup>	2.95 (0.62)	–	–	–
	%	%	%	%
Gender (female)	52.07	–	–	–
Sexually active in the past 3 months	50.58	52.45	57.48	79.31
In a romantic relationship	42.89	46.13	41.32	40.18

<sup>a</sup> Measured on a 4-point scale from 1 (*strongly disagree*) to 4 (*strongly agree*)<sup>b</sup> Measured on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*)<sup>c</sup> Measured on a 4-point scale from 0 (*never*) to 3 (*often*)<sup>d</sup> Measured on a 4-point scale from 1 (*strongly disapprove*) to 4 (*strongly approve*)

**Table 4** Full models predicting sexual communication quality with closest friend

	Model 1 (aim 1)	Model 2 (aim 2)
Fixed effects		
Means (between-person effects)		
Intercept ( $\gamma_{00}$ )	3.230***	3.103***
African American/Black	0.034	0.030
Latino American/Hispanic	0.067	0.020
Gender <sup>a</sup> ( $\gamma_{01}$ )		-0.131***
Sexually active (last 3 months) <sup>b</sup> ( $\gamma_{02}$ )		0.172**
Conservative sexual attitudes <sup>b</sup> ( $\gamma_{03}$ )		-0.160***
Romantic relationship status <sup>b</sup> ( $\gamma_{04}$ )		0.002
Peer sexual communication frequency <sup>b</sup> ( $\gamma_{05}$ )		0.352***
Perceived peer approval of sex <sup>a</sup> ( $\gamma_{06}$ )		-0.001
Slopes (within-person effects)		
Time ( $\gamma_{10}$ )	0.003***	0.002**
Sexually active (last 3 months) <sup>c</sup> ( $\gamma_{20}$ )		-0.002
Conservative sexual attitudes <sup>c</sup> ( $\gamma_{30}$ )		-0.116***
Romantic relationship status <sup>c</sup> ( $\gamma_{40}$ )		-0.042
Peer sexual communication frequency <sup>c</sup> ( $\gamma_{50}$ )		0.229***
Random effects		
Level-1 effect ( $\varepsilon_{ij}$ )	0.080***	0.066***
Level-2 effects		
Intercept ( $\zeta_{0i}$ )	0.130***	0.069***

\*\* $p < .01$ ; \*\*\* $p < .001$

<sup>a</sup> Represents between-person variables measured at semester 1

<sup>b</sup> Represents between-person variables measured at all semesters

<sup>c</sup> Represents within-person variables

sex and less negative emotional responses to sex are associated with better peer sexual communication quality (Mastro & Zimmer-Gembeck, 2015). At the same time, communication with peers may be one way that late adolescents create sexual identity (Harper et al., 2004; Morgan & Korobov, 2012; Morgan & Zurbriggen, 2012). It is important to recognize, however, that the magnitude of change in peer sexual communication was small. Because the timeframe we examined was short relative to the lifespan, future research should examine longer timeframes. Future research could explore the relative importance of childhood, adolescence, and young adulthood for normative development of sexual communication quality and positive sexual identity.

### Individual and Peer Characteristics Matter for Peer Sexual Communication Quality

We found that several individual and peer characteristics were associated with sexual communication quality among late adolescents. These findings are consistent with the Health Disclosure Decision-Making model, which describes communication as a dyadic process affected by both parties (Greene, 2009). That is, theoretically, late adolescents' development of

quality sexual communication is a process affected by both individual characteristics and by characteristics of the peer relationship. For instance, we found that gender, an individual characteristic, and communication frequency, a characteristic of the peer relationship, were associated with communication quality. The view of development as a process affected by both individual characteristics and characteristics of the environment is consistent with developmental theories such as social cognitive theory and developmental systems framework (Bandura, 1989; Gariépy, 1996).

As predicted, women reported better-quality peer sexual communication than men did. This finding is consistent with previous cross-sectional research finding that women report more frequent and comfortable peer sexual communication than men do (DiIorio et al., 1999; Lefkowitz et al., 2004; Rittenour & Booth-Butterfield, 2006; Widman et al., 2014). In addition, we found that individuals with less conservative attitudes tended to have better-quality peer sexual communication, consistent with past research on this topic (Lefkowitz et al., 2004). On the one hand, this finding suggests that less conservative attitudes may be health promoting because high-quality sexual communication is associated with positive sexual health outcomes (Davis et al., 2006; DiIorio et al., 2000;



Guzmán et al., 2003; Lefkowitz et al., 2004; Mastro & Zimmer-Gembeck, 2015; Widman et al., 2006). On the other hand, less conservative sexual attitudes in adolescence are associated with sexual risk behavior (Kirby & Lepore, 2007). Both interpersonal communication and risk reduction are important components of comprehensive sexuality education (Future of Sex Education Initiative, 2012). Prevention program developers should be aware of the possibility that high-quality communication may increase risk and should strive to create a curriculum that simultaneously increases communication quality and reduces sexual risk.

Sexual attitudes also were associated with peer sexual communication quality at the within-person level. Late adolescents had better-quality peer sexual communication during semesters when they held less conservative sexual attitudes, compared to semesters when they held more conservative sexual attitudes. This longitudinal research produces stronger inferences about the association between constructs than does cross-sectional research, because participants act as their own control (Curran & Bauer, 2011; Singer & Willett, 2003). Thus, within-person changes in conservative sexual attitudes may predict within-person changes in peer sexual communication quality. Late adolescents with more conservative sexual attitudes may need additional training to promote their sexual communication skills.

Overall, late adolescents who were sexually active during more semesters had better quality peer sexual communication. This finding is consistent with previous cross-sectional research indicating that sexually active youth have more frequent peer sexual communication (Widman et al., 2014). We postulate that this association did not vary within-person because late adolescents tend to view being sexually active as a trait (i.e., once one has had penetrative sex, one is sexually active; Carpenter, 2001), and not a state that may fluctuate (i.e., one is only sexually active if one has had recent penetrative sex). Thus, there may not be within-person differences according to *recent* sexual activity, only between-person differences according to tendency to be sexually active. Sexual competency and efficacy may contribute to both better quality peer sexual communication and the tendency to be sexually active. Better quality sexual communication is associated with better communication self-efficacy and competence to practice safe sex (Mastro & Zimmer-Gembeck, 2015). Future research should examine longitudinally the associations between sexual behavior, competency and efficacy, and communication.

In addition to individual characteristics, peer characteristics were also associated with sexual communication quality. As predicted, at the within-person level, when late adolescents had more frequent peer sexual communication, they also had better-quality peer sexual communication. This finding extends previous cross-sectional research (Lefkowitz et al., 2004) because the longitudinal analysis allows for stronger

inference about the association between peer sexual communication quality and frequency; it is not simply that a certain type of person is both more likely to talk about sex and to be more comfortable with such conversations. One possible explanation for this finding is that more frequent sexual communication increases comfort talking about sex. However, a second possibility is that when late adolescents anticipate better-quality communication (comfortable, open, and not embarrassing), they communicate more frequently. For instance, parents' discomfort in talking to children about sex is a barrier to communication (Elliott, 2010). Despite interpretation, these results suggest that communication quality and frequency change within an individual across the course of late adolescence, and may be amendable to intervention.

Whereas we found a significant association between individual sexual attitudes and peer sexual communication quality, we did not find a significant association between perceived peer approval of sex and peer sexual communication quality. These findings suggest that individuals' attitudes about sex may be more important than perceptions of peers' attitudes for comfort with sexual communication. Consistent with our results, previous research indicates that individuals' own attitudes about sex are associated with sexual behaviors and communication (Kotchick, Shaffer, Forehand, & Miller, 2001; Mastro & Zimmer-Gembeck, 2015). However, contrary to our results, previous research indicates that perceptions of peers' attitudes about sex are also associated with sexual behavior and communication (Holman & Sillars, 2012; Kotchick et al., 2001; Manago, Ward, & Aldana, 2014; Ragsdale et al., 2014). Lack of significant association between peers' attitudes and peer sexual communication quality may reflect our measurement of this construct. Perceived peer approval of sex referred to late adolescents' general peer groups, whereas our measure of sexual communication quality referred to the late adolescents' closest friend. Perceptions of closest friends' attitudes about sex may be more directly associated with sexual communication quality with a closest friend than are perceptions of peers' attitudes generally.

Contrary to our hypotheses, we did not find a significant association between romantic relationship status and peer sexual communication quality. Previous research demonstrates an association between frequency of sexual communication with a dating partner and frequency of sexual communication with a closest friend (Widman et al., 2014). However, we measured romantic relationship *status*, not sexual communication with a partner. It may be simply *having* a romantic partner does not guarantee sexual communication with that partner. It is also possible that romantic relationship status is not as important for peer sexual communication quality as peer-level variables, such as peer communication frequency. Finally, it may be that romantic relationship status is not a significant predictor after accounting for sexual behavior. Late adolescents in

romantic relationships are more likely to be sexually active than other late adolescents, and thus, sexual behavior may explain the effect of romantic relationship involvement (Meier & Allen, 2009).

### Practical and Policy Implications

Our findings provide implications for the implementation of peer-led health promotion programs, and information about which college students might benefit most from an intervention to develop communication skills. Peer-led health promotion programs that rely on peer communication may consider delivering a module that helps late adolescents develop communication skills to facilitate comfortable and open communication during the program (Harper et al., 2004; Mastro & Zimmer-Gembeck, 2015; Moore et al., 2012). According to our findings, slightly older late adolescents, who are more comfortable with sexual communication, may be more comfortable than their younger peers serving as peer facilitators of sexual health programs where sexual communication with peers is necessary.

We found that more conservative sexual attitudes were associated with lower-quality peer sexual communication. Late adolescents with more conservative sexual attitudes may need special attention to promote their sexual communication skills. Regardless of their sexual attitudes, late adolescents will need to develop the skills to communicate about sex. Even late adolescents with conservative sexual attitudes are likely to have some sexual experience in late adolescence because over 90% of individuals are sexually active by age 25 (Mosher, Chandra, & Jones, 2005), and thus will need to communicate with partners about having sex and negotiate condom/contraceptive use (Noar et al., 2006; Widman et al., 2006). Even the 10% of individuals who are not sexually active in late adolescence can benefit from having high-quality peer sexual communication. Late adolescence may be a formative period for developing comfort with sexual communication as part of the development of sexual selfhood (Tolman & McClelland, 2011). Peer sexual communication skills learned in late adolescence may transfer to conversations with future sexual partners (Powell & Segrin, 2004; Widman et al., 2014). Previous research has demonstrated that peer sexual communication is associated with sexual communication with partners (Powell & Segrin, 2004; Widman et al., 2014). Thus, the development of sexual communication ability is important for all late adolescents, including individuals with more conservative attitudes about sex. Facilitators should consider the sexual attitudes of the adolescents that they serve and adjust program sessions accordingly.

We found that late adolescents tend to have higher-quality sexual communication at times when they are talking about sex more frequently. Thus, peer facilitators may want to consider allowing time for frequent discussion about sexual

topics, for instance, having multiple-session interventions, to give late adolescents an opportunity to practice and become more comfortable with sexual communication. However, because we cannot determine the direction of this effect, a second possibility is that when late adolescents anticipate better-quality communication, they communicate more frequently. In practice, developers of peer-led health promotion may consider adding exercises to improve communication quality if a goal is more frequent sexual communication.

### Limitations and Future Directions

The current paper has several limitations that suggest areas for future research. First, in the current study, we assessed frequency of communication about various sexual topics, but did not consider the implications of different topics for communication quality. In the future, researchers could examine the extent to which the content of the communication moderates the association between communication quality and sexual attitudes and behaviors. It is possible that sexual communication about certain topics such as hook-ups, even if it is high quality, could encourage sexual risk behavior (Holman & Sillars, 2012). Second, although longitudinal analysis allowed us to make a stronger inference about the associations between covariates and peer sexual communication quality than cross-sectional analysis, we still cannot determine direction of causality. For example, conservative sexual attitudes may decrease comfort discussing sex with peers, or comfort discussing sex with peers may lead to less conservative sexual attitudes. Third, although we posit that the findings are applicable to peer-led sexual health programs, our measure of peer sexual communication addressed late adolescents' closest friends. Late adolescents in peer-led programs generally have group discussions with peers who are only acquaintances or strangers. Future work that compares peer sexual communication between close friends to communication with more distal peers will provide a more nuanced view of peer communication. Fourth, our sample consisted of traditionally aged college students. Future research should examine the longitudinal trajectory of correlates of peer sexual communication of non-college attending late adolescents, and individuals of various ages, including early adolescents; it is possible that peer sexual communication quality changes more rapidly in early adolescence than in late adolescence. Fifth, in the future, researchers should explore other individual and peer characteristics. For example, similarity between peers' sexual behaviors may be a factor in communication quality (e.g., Jaccard, Blanton, & Dodge, 2005). Similarly, we did not assess how participants' best friends changed over time, which may affect change in peer sexual communication quality. According to the Health Disclosure Decision-Making model, one's comfort with communication varies depending on the person with whom one is communicating (Greene, 2009). Thus, the

particular person participants identified as their best friend at a semester may be more important for sexual communication quality than other individual and peer characteristics such as sexual attitudes or sexual communication frequency. It is also possible that individual factors such as sexual attitudes affected participants' change of best friend, and thus their reports of sexual communication quality. For instance, it may be that students who became sexually active choose new friends who were also sexually active, which could have also changed the content of, and their comfort with, sexual communication. To better understand peer sexual communication, researchers should account for how peer networks change over time, including best friends, and how these changes are associated with changes in peer sexual communication quality. Finally, in the current study, we did not ask participants if they identified as transgender or gender non-binary. In the future, researchers should include options for transgender and gender non-binary in questions about gender. In addition, we asked participants to identify their closest same gender friend. However, this question may not have been inclusive for non-cisgender individuals. In the future, researchers may consider eliminating the gender reference from the closest friend question, to be more inclusive of transgender and gender non-binary students.

## Conclusion

The current study demonstrated the utility of longitudinal data for examining late adolescents' perceived peer sexual communication quality. Peer sexual communication quality improved across the beginning of late adolescence, and tended to be better among women and sexually active late adolescents. Late adolescents had better-quality peer sexual communication when they felt less conservative about sex and communicated more frequently about sex. These findings have implications for developers of peer-led sexual health programs, who may consider adding a communication module to such programs to facilitate more open and comfortable conversation during discussion-based programs. Gaining the ability to communicate comfortably about sex may be part of late adolescents' achievement of sexual selfhood, a key task of sexual development (Tolman & McClelland, 2011).

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Studies Involving Human Participants** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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