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Factors Associated with Event Level Anal Sex and Condom Use during Anal Sex among Adolescent Women

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Abstract

Purpose: To examine the distribution of and factors associated with event-level heterosexual anal sex and of event-level condom use during anal sex among adolescent women

Methods: Adolescent women (N=387; 14 to 17 years at enrollment) were recruited from primary care clinics for a longitudinal cohort study of STIs and sexual behavior. Data were taken from daily sexual diaries; generalized estimating equation logistic regression assessed the likelihood of anal sex or condom use during anal sex on a given day.

Results: Heterosexual anal intercourse is a small but non-random event-level component in adolescent women's sexual behavior. About 30% of anal sex events were condom-protected. Mood, partner and situational factors predicted anal sex, but not condom use during anal sex; within-day and recent behavior factors were the strongest influences on both outcomes.

Conclusions: Our findings suggest the importance of providers' screening adolescent women patients during office visits about anal sex and about condom use during anal sex, as well as asking questions about the context of these behaviors to appropriately tailor risk reduction counseling.

Keywords

anal sex; condoms; adolescent women; diary data

Among women and adolescents, heterosexual anal sex is factor in the acquisition of several sexually transmitted infections (STIs), including human immunodeficiency virus (HIV).[1-3] While anal sex may be a less common sexual behavior than oral-genital or vaginal sex,[6,7] it isan episodic component in many women's sexual relationships[6-10] and has been more frequently reported in recent years.[5,11,12] One third of third of adult women,[13,14] 20% of college aged women[7,16,17] and between 10% and 25% of adolescent women[16-18] report lifetime anal sex. Fewer adult women note anal sex in the past year or in the past three months[13] and about half of college aged women report anal sex in the past month.[19]

Global factors associated with anal sex include age,[6,16,19] a history of STIs and/or risky sex,[20,21] minority status,[11,22] a higher number past sexual partners,[19] participation in sex work,[1,23] illegal drug use,[4] and inner-city residence.[16,17,22] Other situational variables, such as partnership type,[12,18,24] same-day sexual activities[22] and recent experience with anal sex[22]

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also increase the likelihood of anal sex. Although less is known about the association of mood and emotion with anal sex, studies have shown that enhanced states of positive and negative mood, as well as increased partner support, are associated with event-level *vaginal* sex in different populations.[13,19,25] Feeling in love is associated with retrospective reports of anal sex in adolescent men, but not adolescent women.[14]

Consistent condom use can reduce the transmission of STIs, including HIV, during anal sex;[26] however, almost all research suggests that condom use for heterosexual anal sex is low,[8,19,21] and is less frequent than condom use for vaginal sex.[4,7,16,17] Condom use during anal sex decreases in long-term relationships,[7,23,24] with main partners over casual partners,[12,18] and with repeat partners.[12] Reasons for non-use include perceiving one's partner was “safe,” because the sexual event was unplanned, and because of absence of pregnancy risk.[18,23,24] The association of mood and condom use during anal sex is also unknown, but past work demonstrates that condom use during *vaginal* sex is less likely with depressed mood[27] or with use of sex to enhance mood.[21] Condom use during *anal* sex is more likely if condoms are also used for vaginal sex.[7,12,23]

To date, the use of retrospective data limits much of what we know about anal sex or condom use during anal sex among adolescent women. The less frequent occurrence of either behavior can mean that existing studies over- or under-estimate actual behavior prevalence;[28] such inaccuracies may have important implications for STI/HIV prevention efforts. In contrast, prospective collection methods, such as diaries, permit the capture of a sufficient number of observations required to both examine variability in an infrequent behavior, as well as to accurately describe factors associated with the sexual event itself.[29] Diaries yield more reliable estimates of behavior than retrospective or single event studies[28,29] and are associated with low levels of dropout, high levels of completion and relatively low levels of item-level missing data, even for reports of different sexual behaviors.[28-32] Therefore, using daily sexual diaries, the purpose of this article was to 1) describe the event-level prevalence of heterosexual anal sex and condom during anal sex among adolescent women; and 2) identify factors associated with event-level heterosexual anal sex and with condom use for anal sex.

Methods

Study Design and Data

Data were collected as part of a larger longitudinal cohort study of sexual relationships, sexual behaviors and STIs among young women in middle- to late-adolescence.[25,30] As part of the larger study (initiated in 1999), young women completed alternating 84-day diary collection time frames over a period of up to 8 years. All collection time frames were followed by a rest period in which no diary information was collected, and each collection period was bracketed with a clinic visit for collection of interview and physical examination data related to the larger project. At enrollment and at each bracketed interview, participants identified up to five partners, including friends, dating partners, boyfriends and sexual partners. Sexual experience was not a criterion for naming partners as a means of analyzing various types and stages of relationships. At the time of analyses, the study was ongoing, and not all subjects had completed the same number of follow up diary collection periods. This research was approved by the institutional review board of Indiana University/Purdue University at Indianapolis – Clarian. Informed consent was obtained from each participant and permission obtained from a parent or legal guardian.

The diary instrument was a single bar coded, scannable sheet; questions assessed the content of partner interactions (e.g., oral-genital, vaginal, receptive anal sex, as well as condom use for vaginal and receptive anal sex events) and subject information specific to that day (e.g., menstrual bleeding, mood or substance use). Partner specific items were differentiated by

partner initials; participants filled out one sheet per partner (up to five per collection time frame) identified. Diaries were collected weekly by trained field research staff and participants were compensated $2.00 for each diary entry completed, with a $20.00 bonus for completion rates of 80% or higher.[25,30]

Behavior changes in response to diary completion are possible,29 but most research finds little or only very short-lived diary reactivity effects.[32] We find little evidence of behavior adjustment in the present data: prior analyses has suggested that completion does not decline over time and that sexual behavior levels have remained at similar levels since the study's inception (data not shown; available from first author).

Participants

Participants were 387 adolescent women receiving health care as part of the patient population in one of three primary care adolescent health clinics in Indianapolis, IN. These clinics serve primarily lower- and middle-income families residing in areas with high rates of unintended pregnancy and STIs. The average maternal education was 12th grade. Most participants (90%) were African American. Participants were eligible if they were 14 to 17 years of age, spoke English, and were not pregnant at enrollment; however, adolescents who became pregnant during the course of the study were permitted to continue. Sexual experience was not a criterion for entry.

Measures

Outcome variables—Two outcome variables were taken from daily diaries: *anal sex* (no/yes) and *condom use during anal sex* [when anal sex occurred] (no/yes).

Predictor variables—Six classes of predictor variables (demographic, situational, relational, intrapersonal and within-day behavioral and recent behavioral) known through our prior work[25,30] to influence vaginal sex, and to be associated with anal sex on a specific day, and with condom use, if anal sex occurred.

Age, the demographic measure, was constructed by subtracting diary date from date of birth. An exact day-level age measure was produced that does not confound, for example, 16.01 years of age with 16.99 years of age. Race was not included in the analysis because of the relative racial homogeneity of the sample.

Situational variables included *alcohol use* (no/yes) and *marijuana use* (no/yes), as well as the presence of *vaginal bleeding* (no/yes).

Intrapersonal factors included four measures: two additive indices, *positive mood* (3-items; α=0.86) and *negative mood* (3-items; α =0.83), as well as two single items, *feeling in love* and *sexual interest.* Relational variables, also additive indices, assessed perceived partner-specific sentiments: *partner support* (4-items; α = .95) and *partner negativity* (5-items; α = .83). For the mood, feeling in love and sexual interest items, participants were asked to rate the proportion of the day (not at all, some, about half or all) they felt the following: *happy, friendly and cheerful* (positive mood); *unhappy, angry and irritable* (negative mood); *in love* (feeling in love) and *interested in sex* (sexual interest). For the partner specific items, participants were asked to note (no/yes) which events occurred with a specific partner: talked about my feelings, made me feel loved, made me feel special, made me feel cared for (partner support); made me feel bad, made me feel mad, made me depressed, made me feel disrespected, made me feel stupid (partner negativity).

Within-day behavioral factors included *fellatio* (no/yes), cunnilingus (no/yes), *vaginal (no/yes) condom-protected vaginal sex* [when vaginal sex occurred] (no/yes). Recent behavioral factors

evaluated the carry-over of past week sexual and condom use behavior and involved the creation of four time-lagged variables: *recent vaginal sex* (vaginal sex in the past 7 days; no/yes), *recent anal sex* (anal sex in the past 7 days; no/yes), *recent condom-protected vaginal sex* (condom use during vaginal sex in the past 7 days; no/yes) and *recent condom-protected anal sex* (condom use in the past 7 days; no/yes). In essence, recent behavior variables allowed us to examine the effect of behavior patterns of the prior week on the present day's behavior.[25]

Data Analysis

Descriptive analyses were performed using chi-square tests. Inferential analyses utilized logistic regression with GEE generalized estimating equation adjustment for the correlation in repeated within-subjects observations and for different numbers of observations across individuals.[33] For each outcome variable, we estimated a bivariate model with each predictor in turn. From these models, all significant variables ($p<.05$) were estimated simultaneously in a final multivariate model (Table 1). All models were estimated in SUDAAN, Version 9.01.[34]

Results

Event-level distribution of anal sex and condom-protected anal sex

Participants contributed 132,707 diary days, reporting 14,538 coital vaginal sex events (10.9% of all diary days) and 547 anal sex events (0.4% of all diary days). About 30% (165/547) of anal sex events were associated with recent anal sex ($\times^2(df)=131.4(1)$, $p<.001$); 65% of anal sex events (358/547) were associated with recent vaginal sex ($\times^2(df)=494.2(1)$, $p<.001$). Only 15% (83/547) of anal sex events occurred as the only sexual event on a given day; most occurred in conjunction with coital, oral-genital and genital touching behaviors. Of these combined events, about 10% occurred with vaginal sex only (55/547) or 10% with vaginal sex with one other oral genital behavior (53/547). The majority (65%: 356/547) involved vaginal sex with two or more oral genital and/or genital touching behaviors.

About a third of both anal sex (165/547) and vaginal sex events (4211/14,358) events were condom-protected. Of the days on which condom-protected anal sex was reported, over half (90/165; $\times^2(df)=136.956(1)$, $p<.001$) occurred jointly with days on which condom-protected vaginal sex was also reported. About 40% (66/165; $\times^2(df)=18.672(1)$, $p<.001$) of condom-protected anal sex events were associated with recent condom-protected anal sex and about 78% (128/165; $\times^2(df)=48.962(1)$, $p<.001$) were associated with recent condom-protected vaginal sex.

Multivariate Predictors of Anal Sex

Significant multivariate predictors of event-level anal sex (Table 1) included older age (Odds ratio (OR) = 1.08; 95% Confidence Interval (CI) = 1.04,1.13); vaginal bleeding (OR = 1.49; 95% CI = 1.02 , 2.13); lower partner support (OR = 0.91; 95% CI = 0.85, 0.97); higher partner negativity (OR = 1.11; 955 CI = 1.02, 1.21); lower positive mood (OR – 0.96; 95% CI = 0.93, 0.99); higher negative mood (OR = 1.05; 95% CI: 1.01, 1.09); higher sexual interest (OR = 1.22; 95% CI = 1.09, 1.21); recent anal sex (OR = 22.76; 95% CI = 17.84, 29.02); no recent vaginal sex (OR = 0.69; 95% CI: 0.53, 0.89); within-day fellatio (OR – 2.95; 95% CI = 2.10, 4.13); within-day cunnilingus (OR = 1.54; 95% CI = 1.10, 2.16) and within-day vaginal sex (OR) = 18.52; 95% CI = 13.16, 26.06) (Table 1). Within-day feeling in love and within-day alcohol use were each independently associated with anal sex in bivariate, but not multivariate, models.

Multivariate Predictors of Condom Use during Anal Sex

Significant multivariate predictors of condom use during anal sex included less feeling `in love' (OR = 0.67; 95% CI = 0.50, 0.88); recent condom-protected anal sex (OR = 2.77; 95% CI = 1.17, 6.56) and within-day condom-protected vaginal sex (OR = 5.80; 95% CI = 3.56, 9.46) (Table 1). In bivariate analyses, condom use during anal sex was significantly associated with older age, less partner support, less partner negativity, less positive mood, less negative mood, less feeling `in love', more sexual interest, recent condom-protected vaginal sex, decreased likelihood of within-day fellatio, and decreased likelihood of within-day cunnilingus. Vaginal bleeding, within-day alcohol use, and within-day marijuana use were not associated with condom use during anal sex in bivariate models.

Discussion

These data extend current understanding of receptive anal sex among adolescent women. Anal sex was a relatively infrequent event for the young women in this study; yet, any anal sex that does occur may have important health implications in terms of sexually transmitted infections. The association of anal sex with other event-level factors contradicts the idea that it is solely driven by impulse or opportunity[35] and may further suggest that some young women purposively choose anal sex to fulfill different functions on a given day. For example, avoidance of vaginal sex during menses is widely practiced by both adolescent and adult women, such that anal sex occurs often in lieu of vaginal sex.[36] Higher negative emotions and decreased positive emotions, both intrapersonal and relational, may be consistent with other research showing that women are less interested in anal sex compared to male partners, but engage in it out of partner request[24] or partner decision making power.[1,4] It is equally plausible, however, these effects indicate an evaluation of anal sex as a mediocre sexual experience on that day, or that negative emotion preceded anal sex and was involved in a decision to have anal sex in the first place. In contrast to other work,[14] feeling in love did not significantly influence the likelihood of anal sex, however, findings of an association of sexual interest, fellatio, cunnilingus anal sex may suggest that anal sex is, to some degree, orchestrated by young women themselves within a larger repertoire of partnered sexual behaviors.

These data also illustrate that condom use during anal sex is less affected by within-day mood or partner factors, appearing more to be a function of recent behavioral factors (using a condom during anal sex in the week prior to a specific day) and the co-occurrence of other within-day protection behavior (condom use during vaginal sex). These findings reinforce the idea increasing condom use during anal sex may require anchoring efforts within the context of larger condom promotion efforts for vaginal sex.

The prevalence of anal sex in our data is generally consistent with reports in other studies. Less than one percent of diary days contained anal sex; when reported, anal sex most often occurred in conjunction with vaginal sex or other sexual behaviors. Prior research shows that less than 10% of young women retrospectively report either lifetime or recent experience with anal sex.[5,10,12,14,18] About a third of both anal sex and vaginal sex events were condom protected; however, condom use during anal sex increased with within-day vaginal sex condom use.[23] Although no comparable event-level studies are available, these findings contrast with retrospective based data suggesting condom use rates for vaginal sex exceed rates for anal sex.[4,17] Also in opposition to past research, we found no association of event-level condom-protected anal sex with within-day condom protected vaginal sex, recent condom protected vaginal sex[4,12] or with alcohol or drugs.[12]

These results provide important information for HIV/STI prevention efforts. Many young women are unaware of the risks associated with unprotected anal sex,[38] perceiving it to be a safe[14] and contraceptively effective[18] alternative to vaginal sex. Some health care professionals

are reticent to screen adolescents for anal sex as part of routine health care,[1,6,38] often leaving questions about anal sex practices or condom use out of clinical sexual histories[39] or to assume that it is a an irregular or one-time activity.[35] Providers should be vigilant about regularly asking patients if anal sex occurs, and in what context it occurs, as this information may allow for a much more nuanced discussion of risk and prevention.[39] For example, a young woman's affirmative response to “Have you ever had anal sex?” and “Did you use a condom?” in the absence of relationship specific information may lead a practitioner to incorrectly assume either that the frequency of anal sex, or condom use during anal sex, are similar in all her partnerships. As shown in our data, asking direct follow up questions related to emotional content, sexual behavior patterns, as well as about the method and frequency of protection related to anal and vaginal sex, may provide a more efficient and accurate assessment of exposure to STIs.[40]

Our data should be considered in the context of its limitations. First, the sample is primarily selected from urban, low- to middle-income areas marked by high rates of sexually transmitted infections. From this perspective, while generalizations to other adolescent populations should be made with caution, these data they do offer insight on day-to-day sexual decision making in an at-risk population which may provide information useful for research with school-based samples. Second, the diaries do not establish the time order of specific events, leaving us unable to disentangle within-day causal order of one event relative to another. For example, because alcohol and marijuana use are not assessed specifically in the context of sexual activity, consumption of either substance may reflect factors other than those (e.g., relationship or general lifestyle choices) directly associated with condom use. Finally, although the data were collected at a partner-specific level, the models presented here do not incorporate information about the couples' histories prior to a given day. Elaboration of the models presented here would be of interest, although several conceptual and statistical issues remain to be resolved. Future research may seek to implement perception of partner risk based on relationship status, as well as to assess the role of concurrent partners. Such information may have important implications for public health promotion and prevention strategies.

Within the context of these limitations, our data provide an extended view of the role of anal sex and condom use during anal sex in adolescents' sexual relationships, and suggests some means by which these sexual relationships could be made safer in terms of HIV/STI risk. The stigma of heterosexual anal sex and our reluctance to speak of such things with young people notwithstanding, our data suggest the importance of a more balanced understanding.

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Table 1

Bivariate and multivariate logistic regression odds ratios (OR) with 95% confidence intervals (CI) for event-level factors associated with anal sex and condom use during anal sex among (N=387) adolescent women.

	Anal Sex		Condom Use During Anal Sex	
	Bivariate	Multivariate	Bivariate	Multivariate
Factors	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Demographic Factors	1.22 (1.18 – 1.26)*	1.08 (1.04 – 1.13)*	1.22 (1.12 – 1.34)*	1.11 (0.91 – 1.27)
Age	1.22 (1.18 – 1.26)*	1.08 (1.04 – 1.13)*	1.22 (1.12 – 1.34)*	1.11 (0.91 – 1.27)
Situational Factors				
Vaginal Bleeding (Yes)	1.67 (1.49 – 1.92)*	1.49 (1.04 – 2.13)*	0.68 (0.33 – 1.40)	-
Alcohol Use (Yes)	2.79 (2.04 – 3.88)*	1.22 (0.85 – 1.76)	0.80 (0.39 – 1.63)	-
Marijuana Use (Yes)	2.01 (1.59 – 2.56)*	0.97 (0.73 – 1.30)	0.56 (0.31 – 1.00)	-
Relational Factors				
Partner Support	0.25 (0.20 – 0.30)*	0.91 (0.85 – 0.97)*	0.78 (0.71 – 0.86)*	1.09 (0.89 – 1.34)
Partner Negativity	1.23 (1.16 – 1.30)*	1.11 (1.02 –1.21)*	0.73 (0.60 – 0.89)*	0.71 (0.48 – 1.04)
Intrapersonal Factors				
Positive Mood	0.94 (0.90 – 0.99)*	0.96 (0.93 – 0.99)*	0.91 (0.86 – 0.90)*	1.01 (0.89 – 1.15)
Negative Mood	1.06 (1.03 – 1.10)*	1.05 (1.01 – 1.09)*	0.90 (0.84 – 0.90*	1.09 (0.97 – 1.23)
Feeling In Love	1.28 (1.22 – 1.34)*	0.99 (0.91 – 1.09)	0.74 (0.66 – 0.84)*	0.67 (0.50 – 0.88)*
Sexual Interest	1.65 (1.56 – 1.75)*	1.18 (1.09 – 1.29)*	0.66 (0.54 – 0.76)*	1.27 (0.95 – 1.70)
Behavioral Factors: Recent				
Condom-Protected Anal Sex (Past 7 days: Yes)	-	-	2.36 (1.59 – 3.50)*	2.77 (1.17 – 6.56)*
Condom-Protected Vaginal sex (Past 7 days: Yes)	-	-	4.79 (3.12 – 7.36)*	0.75 (0.27 – 2.11)
Anal Sex (Past 7 days: Yes)	47.29 (39.28 – 56.35)*	22.76 (17.84 – 29.02)*	-	
Vaginal sex (Past 7 days: Yes)	0.58 (0.49 – 0.69)*	0.69 (0.53 – 0.89)*	-	
Behavioral Factors: Within-Day				
Condom Protected Vaginal sex (Yes)	-	-	5.52 (3.99 – 7.64)*	5.80 (3.56 – 9.46)*
Fellatio (Yes)	39.51 (33.25 – 46.95)*	2.95 (2.10 – 4.13)*	0.17 (0.11 – 0.27)*	0.63 (0.29 – 1.41)
Cunnilingus (Yes)	31.45 (26.44 – 37.25)*	1.54 (1.10 – 2.16)*	0.29 (0.19 – 0.95)*	0.71 (0.35 – 1.46)

	Anal Sex		Condom Use During Anal Sex	
	Bivariate	Multivariate	Bivariate	Multivariate
Factors	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Vaginal sex (Yes)	39.52 (32.51 – 48.03)*	18.52 (13.16 – 26.06)*	-	-

* p<.05; only factors significant in bivariate models were retained in multivariate models. No other variables were added to multivariate models.