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A longitudinal daily diary analysis of condom use during bleeding-associated vaginal sex among adolescent females

Devon J Hensel^{1,2}, Amanda E Tanner³, Ashley Sherrow², J Dennis Fortenberry¹

¹Section of Adolescent Medicine, Indiana University School of Medicine, Indianapolis, Indiana, USA

²Department of Sociology, Indiana University Purdue University-Indianapolis, Indianapolis, Indiana, USA

³Department of Public Health Education, University of North Carolina Greensboro, Greensboro, North Carolina, USA

Abstract

Objective—Sex during bleeding is a risk factor for sexually transmitted infection (STI) and other bloodborne viruses, including HIV. We examined daily predictors of adolescent women’s male condom use during bleeding-associated vaginal sex.

Methods—Adolescent females (N=387; 14–17 years) were recruited from primary care clinics for a longitudinal cohort study of STIs and sexual behaviour. Data were daily partner-specific sexual diaries; generalised estimating equation logistic regression assessed the likelihood of condom use during bleeding-associated vaginal sex.

Results—Less than 30% of bleeding-associated vaginal sex events were condom protected. Condom use during these events was less likely with younger age, higher partner support, higher partner negativity or past week bleeding-associated sex with a given partner; condom use was more likely with high individual mood and past week condom use during bleeding-associated vaginal sex with a given partner.

Conclusions—Low condom rates during bleeding-associated vaginal sex can increase STI and bloodborne virus risk. Providers should consider integrating partner-specific and behavioural factors when they deliver sexual health messages to young women.

Correspondence to Dr Devon J Hensel, Section of Adolescent Medicine, Indiana University School of Medicine, 410 West 10th Street, Room 1001, Indianapolis, IN 46202, USA; djhensel@iu.edu.

Contributors JDF designed and conducted the larger study from which the current data are drawn. All authors participated in the conception and design of the research questions. AS and DJH conducted and interpreted data analysis, and JDF provided additional contextual refinement around these analyses. DJH and AET drafted the manuscript. All authors critically revised and approved the final manuscript.

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INTRODUCTION

Adolescent women are disproportionately impacted by sexually transmitted infections (STIs) (see online supplementary reference 1). Cyclical variations in vaginal microflora and local immunity may particularly increase young women's STI susceptibility during vaginal sex that occurs jointly with menstruation.¹ Self-reported coitus during menstruation or with genital blood (online supplementary references 2–4) is linked to history of STI, and may be a risk factor for other bloodborne viruses, including HIV. Gonorrhoea, pelvic inflammatory disease and hepatitis all occur most frequently during menstruation (online supplementary references 5 and 6). Thus, male condom use is likely to be an important risk-reduction tool when young women do choose to have sex in the presence of vaginal bleeding. However, studies have yet to examine young women's condom use in this scenario.

Several factors could influence adolescent women's condom use during bleeding-associated vaginal sex. Condom use could *increase* with mess-related or hygiene-related concerns (online supplementary reference 7), or could *decrease* with any heightened sexual desire (online supplementary reference 8) or perceptions of reduced sexual risk (eg, unintended pregnancy). Our own work shows that demographic and emotional factors may also be important. We found that daily reports of bleeding-associated vaginal sex were more likely with decreasing age² as well as higher daily partner support, higher daily sexual interest and lower feelings of being in love.³ During anal sex, young women's condom use was more likely with older age and less likely with any higher level of emotion, including positive mood, negative mood, partner support, partner negativity, feeling in love or sexual interest.⁴

Our own work also demonstrates that recent behavioural factors could also impact condom use. The daily likelihood of oral–genital, vaginal and anal sex increase with reports of those same activities in the past week.^{5,6} Moreover, the daily odds of bleeding-associated sex become greater with both recent general reports of vaginal sex^{2,3} and in the context of vaginal bleeding.³ We have observed a similar increase in adolescent women's condom use during anal sex with condom usage in the prior week.⁴

Accordingly, using daily diaries collected from adolescent women, the objective of the current paper was to examine daily factors associated with adolescent women's condom use during bleeding-associated vaginal sex. Extending prior work,^{2–6} we hypothesised that different demographic, emotional and behavioural factors should predict whether or not condom use occurs.

METHODS

Participants and study design

Data were drawn from a longitudinal study (1999–2009) of sexual relationships and STI in adolescent women. Participants (N=385) were recruited from primary care adolescent clinics in Indianapolis, Indiana; these clinics serve lower and middle income, multiethnic communities typically associated with early onset of sexual activity and high levels of teen pregnancy and STIs. Eligibility included being 14–17 years of age, English speaking and not pregnant; however, adolescents who became pregnant were allowed to continue in the

study. Neither sexual experience nor sexual orientation was a criterion for entry. Additional methodological and data collection details are available in the online supplementary material.

As part of this study, participants contributed prospective partner-specific daily diaries assessing individual and partner affect, coital and non-coital behaviours, as well as condom and contraceptive use. They could identify up to five ‘partners’ in each diary, including friends, dating partners, boyfriends and sexual partners. This broadened definition allowed for a more nuanced understanding of how relationship dynamics influence the occurrence of specific sexual events without making assumptions about how relatively static labels (eg, ‘main’ or ‘casual’) impact day-to-day behaviour.

The Institutional Review Board of Indiana University Purdue University-Indianapolis approved this study (#1011004294). Each participant provided informed consent, and parents/legal guardians provided research permission. This study uses all diary data available.

Measures

Outcome variable: the main outcome variable was *condom use during bleeding-associated vaginal sex* (no/yes).

Predictor variables: we included variables shown from previous diary studies to impact adolescent women’s sexual activity.^{2–6} Additional measure details are provided in the online supplementary material. We included *age* (day-level years), *positive mood* and *negative mood* (each three, 5-point positive or negative mood items; $\alpha=0.86$ and $\alpha=0.83$; eg, ‘I felt happy’ or ‘I felt unhappy’), *partner support* and *partner negativity* (each four, no/yes positive or negative relationship items; $\alpha=0.95$ and $\alpha=0.83$; eg, (partner made me feel) ‘...special’ or ‘...bad’), *sexual interest* and *feeling in love* (both single, 5-point). Time-lagged variables assessed the potential carry-over effects of past week behaviours enacted with a given partner: *recent bleeding-associated vaginal sex* (occurred in the past week with specific partner: no/yes) and *recent condom use during bleeding-associated sex* (occurred in week with specific partner: no/yes).

Control variables: all models also controlled for daily hormonal oral contraceptive use (no/yes) and race/ethnicity (African–American/non-African–American).

Statistical procedure

Descriptive statistics, including χ^2 tests, evaluated bivariate relationships. Multivariate generalised estimate equation logistic regression assessed the influence of the predictor variables on condom use during bleeding-associated vaginal sex (SPSS V.22.0).

RESULTS

Sample characteristics

Participants (N=385) had an average age of 16.67 (SD=2.18), and were primarily (89%) African–American. Average material education was 12th grade. At enrolment, the majority

(87%–90%) had enrolment experience with hand holding, kissing and breast touching; fewer had experience with oral–genital (33%–56%), vaginal sex (34%) or anal sex (12%). All participants contributed a total of 218 579 partner-specific daily diary entries.

Descriptive statistics

Vaginal sex occurred on 6.8% of all partner-specific diary entries (14 541/213 579; $p < 0.001$). Very few of these events (3.2%: 466/14 451) happened when vaginal bleeding was also reported ($p < 0.001$). Condom use occurred on about one-fourth (25.9%: 121/466) of bleeding-associated vaginal sex events compared with about one-third of vaginal sex events (28.2%: 3629/12 825) *not associated* with bleeding; Fisher's exact tests showed no significant difference in these percentages. Predictor variable descriptive statistics are provided in table 1.

Multivariate statistics

Male condom use was *less likely* with younger age (OR=0.77), higher perceived partner support (OR=0.66) and higher perceived partner negativity (OR=0.61). Condom use was *more likely* if young women reported higher positive mood (OR=1.14).

In addition, male condom use was *less likely* if a young woman had engaged in bleeding-associated vaginal sex with that partner in the past week (OR=0.28), but was *more likely* if she had used a condom during bleeding-associated vaginal sex with that partner in the past week (OR=22.71).

Negative mood, feeling in love and sexual interest were not associated with condom use.

DISCUSSION

Male condom use is important for reducing the elevated risk of STI and other bloodborne viruses, including HIV, which can occur during bleeding-associated vaginal sex.¹ However, in this diary study of adolescent women, less than one-third of daily reports of such events were condom protected. These levels are similar to the prevalence of condom use during vaginal sex events not associated with bleeding, suggesting that adolescent women may not be aware of any increased sexual risk on days when they report menstrual or other vaginal bleeding.

In partial support of existing diary-based studies,^{2–6} we found that higher levels of both positive and negative partner-specific emotions were associated with lower condom use during episodes of vaginal bleeding. Partner support may reflect a stage in relationships where condom use decreases in conjunction with higher trust and intimacy and lower worry about risk.^{w9} However, negative partner perceptions, either around the evaluation of the sexual event, or deferral to unwanted partner requests for any sexual activity during vaginal bleeding, could also lead to lower condom use. Our data also illustrate that condom use during bleeding-associated sex was most strongly influenced by recent behaviour factors. The *decrease* of condom use with past week bleeding-associated sex could reflect lower general within-relationship discomfort or disgust with menstrual sex.^{w8} On the other hand,

the *increase* of condom use with past week condom use during bleeding-associated sex underscores the importance of behaviour repetition on one's current behaviour repertoire.

Collectively, these findings are relevant to clinical practice. In addition to educating young women about the potential STI risks associated with bleeding-associated sex, healthcare professionals may seek to address the motivations associated with this activity as part of ongoing discussions about condom use. Rather than suggesting that couples be abstinent during menstruation, asking about the emotional content of an adolescent's relationship, as well as recent sexual activities, may allow a more nuanced discussion of how to reduce STI risk when bleeding-associated sex occurs.

Some limitations should be considered. A more racially/ethnically and geographically balanced sample of young women will be needed to extend these findings to wider community-based samples of adolescent women. Additionally, the measure of vaginal bleeding cannot strictly be interpreted as menses, as different hormonal contraceptive methods can be associated with varying degrees of bleeding. Moreover, while reports of sexual activity are partner specific, our analyses do not include historical information about a given relationship prior to a given day. Thus, specific relational characteristics (eg, length, quality, characterisation) associated with protective behaviours should be examined in future work.

CONCLUSION

Study limitations notwithstanding, understanding the daily correlates of unprotected vaginal sex, particularly during episodes of vaginal bleeding, is essential to promote sexual health for young women. Our data provide day-level estimates of how frequently young women use condoms during bleeding-associated sex, and illustrates specific factors predicting this use that could be targeted as part of STI education and intervention efforts.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Event level OR for factors associated with adolescent women's condom use during bleeding-associated vaginal sex

Factor	Descriptive statistics (N, % or mean, SD)			OR (95% CI)	p Value
	No condom use (N=341)	Condom use (N=121)			
Age	18.88 (2.13)	13.30 (1.91)		0.81 (0.68 to 0.96)	0.001
Positive mood	9.52 (3.27)	10.08 (3.95)		1.14 (1.01 to 1.31)	0.025
Negative mood	5.92 (2.76)	5.80 (2.57)		0.97 (0.84 to 1.12)	0.994
Sexual interest	3.12 (1.25)	3.28 (1.22)		0.94 (0.70 to 1.27)	0.682
Feeling in love	3.61 (1.50)	3.39 (1.60)		0.89 (0.68 to 1.19)	0.465
Partner support	3.23 (1.50)	2.83 (1.48)		0.66 (0.45 to 0.95)	0.009
Partner negativity	0.59 (1.13)	0.35 (0.86)		0.61 (0.37 to 0.97)	0.011
Recent bleeding-associated vaginal sex (past week: yes)	162 (47.50)	41 (33.88)		0.28 (0.13 to 0.62)	0.003
Recent condom use during bleeding-associated vaginal sex (past week: yes)	15 (4.39)	31 (25.62)		22.72 (7.73 to 47.58)	0.000

All results control for daily oral hormonal contraceptive use and race/ethnicity.