CONDOMS

Men with broken condoms: who and why?

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Objectives: To identify (1) the prevalence of condom breakage, and demographic and sexuality-related differences among young men who have sex with women reporting and not reporting this event; (2) condom-specific behaviours associated with breakage.
Methods: Young men (n = 278) attending a clinic for treatment of sexually transmitted infections (STIs) responded to an anonymous questionnaire aided by a CD recording of the questions. The samples were screened to include only men who had used a condom during penile–vaginal sex at least three times in the past 3 months. Condom-specific behaviours (including breakage) were assessed using these last three acts of condom use as the recall period. Correlates achieving bivariate significance were subjected to multivariate analysis.
Results: Nearly one third (31.3%) of the men reported recent breakage. The breakage rate was 15%. Three correlates significantly distinguished between men who did and did not report breakage. Men who had past STIs were more likely to report breakage (adjusted odds ratio (AOR) 2.08), as were men who also reported condom slippage (AOR 2.72). Less self-efficacy for correct condom use was also significantly associated with breakage (AOR 1.07). Further, three condom-specific behaviours were significantly associated with breakage: allowing condoms to contact sharp objects (AOR 2.6), experiencing problems with the "fit or feel" of condoms (AOR 2.3) and not squeezing air from the receptacle tip (AOR 2.0).
Conclusions: Breakage may be common and may occur in a larger context of difficulties with condoms. STI clinics could potentially benefit some men by providing instructions on the correct use of condoms.

The male latex condom is the single best method of preventing the acquisition and transmission of sexually transmitted infections (STIs) for people who choose to have sex.[1][2] Given that the effectiveness of this method relies on application and use skills, behavioural investigations pertaining to failure of condom user are warranted.[3][4] Indeed, breakage and other forms of condom failure have been linked with inflated risk of STI transmission.[5–7] As breakage is one of the most common reasons for condom failure, several studies have tried to identify correlates of this event.[8–14] Previously identified correlates of breakage include contacting the condom with a sharp object before or during sex,[5][10] having multiple sex partners during the recall period,[11] condom slippage,[11] never being taught how to use condoms,[10] motivation of the partner to use condoms,[10] use of oil-based lubricants[14] and discomfort with the "fit and feel" of condoms.[14]

Although previous investigations have been informative, one limitation has been that they have often used a lengthy recall period. Another approach is to focus on the last time a condom was used as the recall period.[4] However, single-event recall could severely limit the ability of a study to detect true relationships due to the probable low proportion of participants who would have experienced breakage the last time a condom was used. Our study considered these problems by using the last three times a male condom was used for sex with a female partner as the recall period.

Our study also focused exclusively on male clients attending an STI clinic. As substantial STI burden stems from reinfection,[3][15][16] studies on condom breakage among STI clinic populations may inform the design of clinic-based prevention efforts. Given the increased prevalence of STIs among young people,[17–19] young male clients who have sex with female partners may be a particularly important group to study. Accordingly, the objectives of our study were: (1) to assess the recent prevalence of condom breakage among young male clients of an STI clinic; (2) to identify demographic and sexuality-related differences between male clients at an STI clinic who recently did and did not experience condom breakage; (3) to identify specific condom use behaviours associated with condom breakage.

METHODS
Participants and procedure
Data were collected at a large, urban, mid-western public STI clinic from October 2004 to September 2005. Men attending the clinic were recruited in the waiting area and screened for eligibility in a private room. The inclusion criteria were: (1) age 18–35 years, (2) English speaking and (3) reporting that a male condom had been used at least three times in the past 3 months for sex (defined as "sexual intercourse, or penis in the vagina") with a woman. In all, 516 men were screened and 351 met the inclusion criteria. Of these, 314 (89.5%) agreed to participate. After providing written informed consent, volunteers completed a brief self-administered questionnaire lasting 15–20 min. To avoid problems with literacy, the questions were recorded on a CD that men could choose to play by using a portable headset to assist them in completing the questionnaire. Each question constituted a single track; thus, men could easily replay a question just as they would replay a track of music. Responses were anonymous. Men who completed the questionnaire were paid US$10. The institutional review board at Indiana University approved the study protocol.

Measures
Breakage was assessed by a single item: "For the last three times you used a condom, did it break during sex?" Men indicating "yes" were then asked to indicate if this had occurred once, twice or all three times.

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Abbreviations: AOR, adjusted odds ratio; , STI, sexually transmitted infection

For the second purpose of our study, we used several single-item measures to assess correlates of condom breakage. These included men's self-reported history of STIs (chlamydia, gonorrhoea, syphilis or trichomoniasis; yes to any *v* no), whether they had ever been taught how to use condoms (yes *v* no); the number of female partners they had had sex with over the past 3 months; and whether they had experienced another form of condom failure, slippage during sex, at least one of the past three times they used a condom. Two items were also used to assess men's motivation to use condoms correctly: "I am highly motivated to use condoms correctly" and "My sex partner(s) is (are) highly motivated to use condoms correctly". Responses to this item were provided using a scale ranging from 1 (strongly agree) to 5 (strongly disagree). Finally, an 8-item index was used to assess their self-efficacy for the correct use of condoms.[20] These items asked men how "easy or difficult" it would be for them (and their sex partners) to perform various behaviours related to the acquisition, application and use of condoms. Responses were provided using a scale ranging from 1 (very easy) to 5 (very difficult). The index produced a satisfactory Cronbach's α of 0.70, suggesting adequate reliability of the measure.

To investigate the third purpose of the study, we assessed four specific condom use behaviours that could be reasonably expected to result in breakage. The behaviours assessed were use of an oil-based lubricant ("For the past three times you used a condom, did you also use an oil-based lubricant such as vaseline or baby oil with the condom?"), contacting the condom with a sharp object before or during sex ("For the past three times you used a condom, did you let it contact sharp jewellery, fingernails or teeth before or during sex?"), experiencing problems with the fit and feel of condoms ("For the past 3 times you used a condom, did you or your partner have any problem with the way it fit or felt?") and failure to squeeze the air out from the receptacle tip after the condom was applied ("For the past three times you used a condom, did you squeeze the air out after putting it on?").

Data analysis

For associations with potential correlates, the measure of breakage was dichotomised as one or more versus none. The specific condom use behaviours were dichotomised in an identical fashion.

The bivariate associations between the dichotomous correlates and breakage were assessed by prevalence ratios, their 95% confidence intervals (CIs) and respective p values. t Tests were used to assess the bivariate relationship between breakage and correlates, assessed using a continuous measure. Correlates achieving significance (p<0.05) were entered into a forward stepwise logistic regression model. Two models were created. The first corresponded to the second purpose of the study (answering the question about "who" experiences recent breakage). The second corresponded to the third purpose of the study (answering the question of "why" breakage may have occurred). Multivariate significance was defined by 95% CI and p ⩽ 0.05.

RESULTS

Characteristics of the sample

Of the 314 men enrolled in the study, 15 provided responses to the questionnaire, which indicated that despite screening, they were ineligible because they had not had sex at least three times in the past 3 months. Further, 21 men provided answers indicating that they had not used a condom with a female partner at least three times in the past 3 months. Thus, the analytical sample comprised 278 men (88.5% of those who

initially provided answers to the screening questions indicating they were eligible).

The average age of the men was 23.7 (standard deviation (SD) 4.13) years. About two thirds (67.6%) were identified as Black or African-American, nearly one quarter (23.7%) were identified as white and the remainder were identified as other minority groups. The average number of times men reported having penile–vaginal sex during the recall period (3 months) was 20.6 (SD 21.5). The average number of times men reported using condoms for these episodes was 12.4 (SD 14.8). On average, men reported using condoms for 3290 occasions of penile–vaginal sex during the 3-month recall period. Table 1 shows further descriptive data.

Prevalence of breakage

As the framework for assessing specific condom use events was the past three times men used condoms for penile–vaginal sex, the denominator for calculating a breakage rate equals n multiplied by 3 (ie, 278×3 = 834). Men reported breakage during 125 of these occasions. The breakage rate was therefore 15.0%. In all, 87 (31.3%) men reported breakage during at least one of the three occasions of penile–vaginal sex.

Bivariate associations

Table 1 also shows the observed bivariate associations regarding the dichotomous correlates. The first section of the table shows demographic and sexuality-related differences between men who did (31.3%) and did not (68.7%) experience breakage at least once during the past three times a condom was used (second purpose of our study). The second section of the table reports differences in specific condom use behaviours (third purpose of our study). Eight correlates achieved bivariate significance.

Five correlates were assessed using a continuous measure. The mean number of female partners that men reported having sex with in the past 3 months was 3.37 among those reporting recent breakage compared with 2.69 among those not reporting breakage (t = 2.30, df = 271; p = 0.02). Also, the level of self-efficacy for correct condom use was significantly lower among men reporting recent breakage. Self-efficacy scores ranged from the highest possible (a score of 7) to the lowest possible (a score of 35). The mean was 17.7 among those reporting recent breakage compared with 15.6 among those not reporting breakage (t = 3.30, df = 276; p = 0.001). No significant results were observed for men's age (p = 0.37), their level of motivation to use condoms correctly (p = 0.63), and their perception of their sex partners' motivation for correct condom use (p = 0.85).

Multivariate associations

Table 2 shows the results of the logistic regression model considering sexuality-related differences between men who did and did not experience breakage. The model was significant (χ^2 with 3 df = 24.3, p<0.001), and produced a Nagelkerke R^2 value of 0.12. Three of the four correlates entered retained significance. Men who reported a history of STI were about twice as likely to report breakage as those reporting they had never had an STI. Men who had recently (past three times a condom was used) reported problems with condom slippage were about 2.7 times as likely to report breakage. Finally, for each unit of increase in the self-efficacy index (an increase means less self-efficacy to use condoms correctly), the odds of recently experiencing breakage increased by 1.07.

Table 3 shows the results of the logistic regression model considering differences in specific behaviours of condom use between men who did and did not experience breakage. The model was significant (χ^2 with 4 df = 27.8, p<0.001), and

Table 1 Bivariate associations between dichotomous correlates and condom breakage

	% break*	Prevalence ratio	95% CI	p Value
Correlates pertaining to ''Who''				
Racial or ethnic minority				
No (n = 66)	33.3	0.92	0.62 to 1.37	0.68
Yes (n = 212)	30.7			
Self-reported history of STI diagnosis				
No (n = 230)	27.8	1.76	1.23 to 2.52	0.004
Yes (n = 47)	48.9			
Taught how to use condoms				
Yes (n = 238)	32.8	0.69	0.38 to 1.25	0.19
No (n = 40)	22.5			
Recent experience with condom slippage				
No (n = 238)	26.9	2.14	1.52 to 3.00	0.001
Yes (n = 40)	57.5			
Correlates pertaining to ''Why''				
Used oil-based lubricant				
No (n = 260)	29.6	1.88	1.19 to 2.95	0.02
Yes (n = 18)	55.6			
Condom contacted sharp object				
No (n = 250)	28.4	2.01	1.38 to 2.93	0.002
Yes (n = 28)	57.1			
Problems with ''fit and feel'' of condom				
No (n = 195)	25.1	1.82	1.30 to 2.55	0.001
Yes (n = 83)	45.8			
Squeezed air from receptacle tip?				
Yes (n = 158)	24.7	1.61	1.14 to 2.30	0.006
No (n = 120)	40.0			

*Defined as experiencing breakage at least once during the past three times a condom was used.

produced a Nagelkerke R^2 value of 0.13. Three of the four correlates entered retained significance. Men who reported that condoms had contacted a sharp object were about 2.6 times as likely to report breakage than men saying that condoms did not contact sharp objects. Also, men reporting problems with the fit or feel of condoms were about 2.3 times as likely to report breakage than men not having this difficulty. Finally, men reporting that they had not squeezed air from the receptacle tip were about twice as likely to report breakage.

DISCUSSION
In this study of young men attending an STI clinic, all reporting condom use during sex with a female partner at least three times in the past 3 months, nearly one in every three men reported that a condom had broken at least once during the past three times condoms were used. The breakage rate of 15%, and our identified correlates of condom breakage, suggests that this form of condom failure is substantial and may be amenable

Table 2 Multivariate differences in sexuality-related correlates (''Who'') between men who did and did not experience breakage

Correlate	AOR*	95% CI	p Value
Self-reported history of STI diagnosis	2.08	1.06 to 4.09	0.034
Recent experience with condom slippage	2.72	1.34 to 5.61	0.006
Self-efficacy to use condoms correctly	1.07	1.02 to 1.13	0.008

*Adjusted odds ratio—adjusted for the influence of all other variables in the model.

to corrective action from clinic directors and clinic staff. Indeed, clinics may be an ideal setting for behavioural intervention for two reasons. Firstly, the experience of attending an STI clinic may create a sense of vulnerability to infection that can serve as a teachable moment. Secondly, as young men may seldom if ever present themselves for medical care, the opportunity to provide prevention education after clinical diagnosis and treatment is potentially invaluable.

When a condom breaks, the effectiveness of the condom may be considerably attenuated for the woman and possibly less so for the man. Given that almost one of six men in this study reported condom breakage, and these men generally reported having multiple partners, it can be easily imagined that the population burden of STIs may disproportionately fall on women as a result of condom breakage. The interventions targeted at men may therefore also benefit their female partners.

The findings suggest that age and ethnic minority status are not related to the risk of breakage. However, breakage was markedly more common among men reporting a history of STI. This observation suggests that adequate education about correct condom use was not provided during previous visits to the clinic. Further, the findings suggest that men who recently experienced breakage also had recent problems with another form of condom failure—condom slippage. This finding underscores that clinic-based behavioural intervention to promote the correct use of condoms may be highly beneficial for men and also their female partners.

Our study also sheds light on the question of why condoms break. The use of oil-based lubricants failed to retain a marked association with breakage when three other factors were included in the model. The strongest of these was allowing the condom to contact a sharp object either before or during

Table 3 Multivariate differences in condom-specific behaviours of condom use (''Why'') between men who did and did not experience breakage

Correlate	AOR*	95% CI	p Value
Used oil-based lubricant	2.73	0.98 to 7.67	0.056
Condom contacted sharp object	2.64	1.13 to 6.15	0.03
Problem with fit or feel of condom	2.27	1.29 to 4.00	0.004
Did not squeeze air from receptacle tip	2.05	1.19 to 3.50	0.009

*Adjusted odds ratio—adjusted for the influence of all other variables in the model.

sex. Clearly, this error in condom use can be overcome through education to instruct men that condoms should not contact teeth, jewellery and fingernails, and that scissors and other sharp objects should not be used to open condom packages. It is noteworthy that this same correlate was associated with breakage in a previous study conducted among college students.[10]

The finding that men reporting problems with the fit and feel of condoms were considerably more likely to experience breakage is also important. In a recent qualitative study on young men attending an STI clinic, it was observed that men often experienced discomfort from condoms fitting too tightly. Another form of discomfort was the use of condoms that had become dry during sex.[21] Similar findings were obtained from a recent quantitative study.[14] Given that tight-fitting condoms and poorly lubricated (dried-out) condoms are prone to excess friction, our finding is not unexpected. In this regard, any effects of condom education could be enhanced by providing men with an array of condom sizes and a supply of pocket-size tubes of water-based lubricants that can be added to condoms intermittently during prolonged penile–vaginal sex.

Finally, we found that men reporting that they had not squeezed air from the receptacle tip were more likely to report breakage. Unfortunately, this error in condom use may require more than simple education before improvement occurs. Squeezing air from the tip (ideally performed at the same time the condom is being unrolled) is a skill that may best be learnt through repetitive practice sessions using a penile model. Given the teachable moment and the probable credibility of the clinic staff, guided instructions followed by practice (complete with feedback) could prove to be a valuable investment in averting future condom breakage and, by extension, subsequent acquisition or transmission of STIs.

Limitations

As is true for most research on sexuality, findings are limited by the validity of the retrospective self-report. In particular, the ability of men to accurately recall specific events of condom use is critical to the validity of the study findings; thus the last three times a condom was used over a 3-month recall period may minimise the recall error. On the other hand, these data do not enable us to specifically relate the correlates to breakage on any of the three occasions. An alternative approach would be to use event-specific datafor example, daily diaries. The use of a convenience sample (in this case, one comprised primarily of African-American men) means that our findings may not be generalisable to other populations of young men attending STI clinics in the US. Also noteworthy is that our study did not assess penile circumference in relation to the size of condoms used, and we did not assess the experience with condom use before the 3-month recall period. Each of these measures may

Key messages

- Condom breakage may be a relatively common occurrence among young male patients in clinic to treat sexually transmitted infections (STIs). Men with a history of STI acquisition, men who also experience condom slippage and those who have relatively less self-efficacy for the correct use of condoms may be especially prone to condom breakage.

- Findings suggest that three factors may lead to condom breakage. Although one of these factors is somewhat intuitive (ie, allowing condoms to contact sharp objects) the other two provide substantial insight into the event of breakage. Problems with fit and feel may be an important indicator of condoms that fit too tightly or lack adequate lubrication–in each instance the viability of the condom may be unduly challenged. Failure to expel air from the receptacle tip may also create conditions that cause undue force on the condom at the time of ejaculation.

- Discrete differences between men who did and did not report the experience of condom breakage, combined with the identification of well-defined errors in use, provide valuable insight into how clinic-based interventions may be designed to reduce condom breakage.

be an important correlate of condom breakage.[21 22] Finally, the failure of two correlates (having >3 partners and use of oil-based lubricants) to retain multivariate significance is likely to be an artefact of the low statistical power afforded by the relatively modest sample size.

Conclusions

Findings suggest that condom breakage may be a relatively common event among young male clients attending STI clinics who have had sex with female partners. Breakage may occur in a larger context of errors and problems experienced during condom use. Thus, an important implication of our findings is that STI clinics could potentially benefit these men by providing instructions on the correct use of condoms.

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