A case-crossover analysis of predictors of condom use by female bar and hotel workers in Moshi, Tanzania

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Accepted 4 December 2008

Background Factors related to specific sexual encounters can influence condom use during these encounters. These situation-specific factors have not been adequately studied in resource-poor countries where HIV infection has in some areas reached epidemic levels. This study was undertaken to identify situation-specific factors associated with condom use among 465 female bar and hotel workers in Moshi, Tanzania.

Methods We conducted a case-crossover study in which women provided information about their most recent unprotected and protected sexual encounters. Conditional logistic regression was used to estimate paired odds ratios and 95% confidence intervals for the association between situation-specific factors and condom use.

Results A subject-based or mutual decision about condom use (compared with partner based), casual partner type, a first-time sexual encounter and receiving gifts in exchange for sex were independently associated with increased odds of condom use, while sex at home and sex with a partner more than 10 years older was associated with reduced odds of use. There was also effect modification between partner type and decision-making: subject-based or mutual decisions were more protective with casual than regular partners; also, when the partner made the decisions about condom use, the type of partner had no effect.

Conclusions Decision-making about condom use is a potentially modifiable predictor of unprotected sex, but its effect varies by partner type. Behavioural interventions are needed that encourage discussion about condom use and increase women’s self-efficacy, but other types of interventions as well as female-controlled HIV prevention methods are needed for women in regular partnerships.

Keywords Case-crossover, decision-making, partner type, condoms, HIV, Tanzania
Introduction

Inconsistent condom users differ from consistent users in their sexual behaviours.\textsuperscript{1,2} These differences can put inconsistent users at increased risk for sexually transmitted infections including HIV. There are also factors that vary between sexual events within the same individual (situation-specific factors), such as partner characteristics and interpersonal factors that can influence condom use in specific sexual situations.

To appropriately study situation-specific factors, it is important to control for potential confounders of the association between these factors and condom use. Perceptions, beliefs and other subject-level characteristics can strongly affect condom use, and these variables remain largely unchanging within individuals. To control for them, within-person or paired analyses are therefore required. A few studies, all conducted within US populations, have examined situation-specific factors using these methods. Seage et al.\textsuperscript{3} found that men who have sex with men were less likely to have unprotected anal sex with steady partners while drinking than while sober, while with non-steady partners alcohol use was associated with an increased risk of unprotected sex. Lansky et al.\textsuperscript{4} found that among women with both regular and casual partners, when women only used condoms with one partner type they were more likely to do so with casual than with main partners. Colfax et al.\textsuperscript{5} found that consumption of six or more drinks or use of amyl nitrites, amphetamines or cocaine were associated with unprotected sex among men who have sex with men. Among women at risk for HIV infection, partner age and type, partner use of alcohol and drugs and exchange of sex for money or drugs were associated with condom use.\textsuperscript{6,7} A study of women attending sexually transmitted disease clinics found that consistent condom use was higher with casual than with regular partners, and it decreased when partnerships changed from new to regular.\textsuperscript{7}

A more detailed understanding of the factors associated with specific sexual events may enable interventions to increase condom use among inconsistent users. Our goal in this study was to identify the situation-specific factors associated with use of male condoms in female bar and hotel workers in Moshi, Tanzania. Tanzania is experiencing a generalized HIV epidemic. Condom use remains low, and there has been little study of situation-specific factors associated with condom use in Tanzania or other resource-poor settings. Bar and hotel workers, who are at high risk for HIV infection due to their sexual relationships with both regular partners and bar customers, are an important group in which to identify these factors.\textsuperscript{6,9} One specific objective was to determine whether there was effect modification between partner type and the other situation-specific factors, since effect modification between partner type and subject’s alcohol use was identified in a previous study.\textsuperscript{3}

Methods

Study population

Women included in this analysis were taking part in one of two prospective studies of female bar and hotel workers in Moshi, Tanzania. The Moshi Sexually Transmitted Diseases Prevention Pilot Study (MSPP) is a recently completed study designed primarily to determine the incidence of HIV and predictors of seroconversion. The Moshi Women’s Health Project (MWHP) is a study designed to prepare for implementation of Phase I/II safety and effectiveness studies of candidate vaginal microbicides. Eight hundred women, including 221 who had also enrolled in the MSPP, were enrolled into the MWHP. The 1050 women in the MSPP and the 579 women who enrolled only in the MWHP were available for consideration in this analysis. The study protocols were approved by the Ethics Committee of Kilimanjaro Christian Medical Centre and the Institutional Review Board of Harvard School of Public Health.

Recruitment

Recruitment for both studies focused on seven of the 15 wards in the central part of Moshi, where most hotels and bars are located. The owners of all registered establishments were visited and given brief information about the studies. Most bar owners are aware of the severity of the HIV situation in Moshi and agreed to participate.

Screening methods

Outreach workers visited participating bars and hotels. Women received study information and were invited to learn more by visiting the study clinic, where detailed information about study aims and procedures was provided. Female bar and hotel workers 14 years of age or older, who were willing to provide written consent, were eligible to enroll in the studies. MSPP enrollment took place over a 12-month period, from December 2002 to November 2003. MWHP enrollment began in December 2004; baseline data collected as of 20 December 2005 were used for this analysis.

Study design

This case-crossover study used data from baseline interviews. Women who reported inconsistent use of male condoms within the past 5 years were asked to recall the most recent sexual event in which a condom was used (protected event) and the most recent event without a condom (unprotected event), and were asked detailed questions about both events. Information was collected on several factors...
potentially associated with condom use, including partner type [regular (husband/cohabiting partner, fiancé, regular partner); casual (casual acquaintance, bar/hotel customer, other)], partner age, age difference between subject and partner, alcohol or drug use by subject or partner, location of sexual encounter (subject/partner's home; hotel/other), receipt of money or gifts before sex, whether it was the first sexual event with the partner, whether the woman knew the partner's HIV status, whether coercion was involved, and who decided whether or not a condom would be used (subject/mutual; partner). (A post hoc decision was made to combine subject and mutual decisions into one category because the three-category variable resulted in sparse cell sizes and unstable estimates.) Women who reported both a protected and an unprotected sexual event were included in this analysis. All information was obtained during interviews with trained female nurses, conducted in private rooms at the study clinic.

**Data analysis**

The case-crossover study design compares—for the same individual—periods in which the outcome occurs (case event) to periods in which the outcome does not occur (control event). The protected (case) sexual event is matched to the unprotected (control) sexual event. Because each woman is compared to herself, confounding is eliminated for factors that can differ between women but are unvarying within women (stable factors). Included are easily measured factors such as ethnicity, education and age (within relatively short time intervals), but also variables that are often unmeasured or difficult to ascertain, such as risk-taking profile and other subject-level personality characteristics.

While the case-crossover method controls for confounding by stable factors, there can still be confounding by factors that vary by sexual event for the same individual. We used conditional logistic regression to estimate paired odds ratios and their confidence intervals, adjusted for confounding by these other situation-specific factors. Stable factors do not need to be included in this model. Model-building proceeded by first including all situation-specific factors that were univariate predictors of condom use (P ≤ 0.10). Variables with a P > 0.10 were removed one at a time and assessed as confounders. Factors that were not univariate predictors were then entered into the model. Variables with a P ≤ 0.10 were retained in the model as multivariate predictors. Variables that changed odds ratios by ≥15% were kept in the model as confounders. We examined potential effect modification between partner type and other situation-specific factors by including interaction terms and assessing their importance using likelihood ratio tests. As an exploratory analysis we also examined all other pair-wise interactions between independent predictors of condom use.

To assess the possibility of time trends in exposures or in the outcome, we conducted sensitivity analyses in which we restricted our model to include only events which both took place within the past year, then to events that were no more than 6 months apart, and finally, separate models for MSPP and MWHP participants, since the latter group enrolled up to 2 years after the former.

**Results**

Of the 1050 women enrolled in the MSPP, 380 (36%) reported both a protected and unprotected sexual event and of the 579 women enrolled in the MWHP, 224 (39%) reported both types of events. Thus a total of 604 women had both a protected and an unprotected event. One hundred thirty-nine women (23%) reported an intention to become pregnant at their last unprotected event. For these 139 women, our assumption is that pregnancy intention was the primary reason a condom was not used and that other situation-specific factors were not relevant. These women were therefore excluded, yielding a sample size of 465 for this analysis.

Table 1 summarizes demographic, behaviour and work-related characteristics of the study population. The average age at time of interview was 26.2 years (range 16–54 years). Fifty-five percent of women were from the Chaga ethnic group, 44% were Catholic and the majority had completed at least 7 years of primary school education. Fifty-two percent reported three or more sexual partners in the past 5 years.

Table 2 presents the unadjusted main effects of all situation-specific factors, as well as the distribution of each factor by pairing of sexual event type (protected-unprotected pairings). Several factors were univariate predictors of condom use. Casual partner type, a first-time event with the partner, having received gifts or money prior to sex, the woman's alcohol use prior to sex and a mutual or subject-based condom use decision were all associated with an increased odds of protected sex. Coercion, a partner more than 10 years older, and location of the encounter in the woman's or partner's home (rather than in a hotel or other location) were associated with a reduced odds of protected sex. The subject's drug use, the partner's alcohol or drug use, the partner's age, and knowledge of the partner's HIV status were not associated with condom use.

Table 3 presents unadjusted and adjusted odds ratios for independent predictors of condom use. After multivariate adjustment, partner type and decision-making were associated with condom use and there was effect modification between these two factors (P-value, likelihood ratio test = 0.02). Therefore stratum-specific likelihood ratio tests are presented for these two factors.

When condom use was decided mutually or by the woman in both sexual events, the event involving a
casual partner had twice the odds of resulting in condom use compared with the event involving a regular partner (OR = 2.10, 95% CI 1.19–3.70). When the partner made the decision in both events, however, there was no effect of partner type (OR = 0.65, 95% CI 0.24–1.77). When both events involved a regular partner, the event in which the subject or both parties decided whether to use a condom had a higher odds of being protected than the event in which the partner made the decision (OR = 8.27, 95% CI 4.47–15.3). When both events involved a casual partner, the effect of subject/mutual versus partner decision-making was substantially stronger (OR = 26.6, 95% CI 10.8–65.2).

Independent of partner type and decision-making, the location of the sexual event, receipt of gifts in exchange for sex, and a first-time event with a partner were also independent predictors. When the event took place in the subject’s or partner’s home, it had half the odds of being protected as when sex took place in another location such as a hotel or guesthouse. If the event was the first time with a partner, or if the woman received gifts in exchange for sex, then the event had twice the odds of being protected. An event in which the partner was more than 10 years older than the woman had a lower odds of being protected than when the age difference

Table 1 Characteristics of female bar and hotel workers in Moshi, Tanzania (N = 465)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
</tr>
<tr>
<td>16–24</td>
<td>211 (45.6)</td>
</tr>
<tr>
<td>25–34</td>
<td>199 (43.0)</td>
</tr>
<tr>
<td>35–44</td>
<td>46 (9.9)</td>
</tr>
<tr>
<td>45–54</td>
<td>9 (1.5)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Chaga</td>
<td>257 (55.3)</td>
</tr>
<tr>
<td>Pare</td>
<td>84 (18.0)</td>
</tr>
<tr>
<td>Other</td>
<td>124 (26.7)</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
</tr>
<tr>
<td>Moslem</td>
<td>109 (23.4)</td>
</tr>
<tr>
<td>Catholic</td>
<td>205 (44.1)</td>
</tr>
<tr>
<td>Other</td>
<td>151 (32.5)</td>
</tr>
<tr>
<td><strong>Years of education</strong></td>
<td></td>
</tr>
<tr>
<td>0–6</td>
<td>49 (10.5)</td>
</tr>
<tr>
<td>7–8</td>
<td>295 (63.5)</td>
</tr>
<tr>
<td>≥9</td>
<td>121 (26.0)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Married/Cohabiting</td>
<td>120 (25.8)</td>
</tr>
<tr>
<td>Divorced/Widowed</td>
<td>113 (24.3)</td>
</tr>
<tr>
<td>Single</td>
<td>232 (49.9)</td>
</tr>
<tr>
<td><strong>Number of live births</strong></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>148 (31.8)</td>
</tr>
<tr>
<td>1</td>
<td>165 (35.5)</td>
</tr>
<tr>
<td>≥2</td>
<td>152 (32.7)</td>
</tr>
<tr>
<td><strong>Frequency of alcohol use</strong></td>
<td></td>
</tr>
<tr>
<td>Never user</td>
<td>87 (18.7)</td>
</tr>
<tr>
<td>0–1 days/week</td>
<td>176 (37.8)</td>
</tr>
<tr>
<td>2 days/week</td>
<td>107 (23.0)</td>
</tr>
<tr>
<td>3–5 days/week</td>
<td>58 (12.5)</td>
</tr>
<tr>
<td>6–7 days/week</td>
<td>37 (8.0)</td>
</tr>
<tr>
<td><strong>Number of partners in past 5 years</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>69 (14.8)</td>
</tr>
<tr>
<td>2</td>
<td>152 (32.7)</td>
</tr>
<tr>
<td>3</td>
<td>117 (25.2)</td>
</tr>
<tr>
<td>4+</td>
<td>127 (27.3)</td>
</tr>
<tr>
<td><strong>Age at Sexual initiation</strong></td>
<td></td>
</tr>
<tr>
<td>≤15</td>
<td>108 (23.2)</td>
</tr>
<tr>
<td>16–17</td>
<td>131 (28.2)</td>
</tr>
<tr>
<td>18–20</td>
<td>165 (35.5)</td>
</tr>
<tr>
<td>≥21</td>
<td>48 (10.3)</td>
</tr>
<tr>
<td>Missing</td>
<td>13 (2.8)</td>
</tr>
</tbody>
</table>

Table 1 Continued

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ever received gift in exchange for sex</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>222 (47.7)</td>
</tr>
<tr>
<td>Yes</td>
<td>243 (52.3)</td>
</tr>
<tr>
<td><strong>Duration of stay in Moshi (months)</strong></td>
<td></td>
</tr>
<tr>
<td>≤17</td>
<td>105 (22.6)</td>
</tr>
<tr>
<td>&gt;17–48</td>
<td>111 (23.9)</td>
</tr>
<tr>
<td>&gt;48–120</td>
<td>100 (21.5)</td>
</tr>
<tr>
<td>&gt;120–240</td>
<td>77 (16.5)</td>
</tr>
<tr>
<td>&gt;240</td>
<td>72 (15.5)</td>
</tr>
<tr>
<td><strong>Total duration of bar work</strong></td>
<td></td>
</tr>
<tr>
<td>≤1 month</td>
<td>34 (7.3)</td>
</tr>
<tr>
<td>&gt;1–6 months</td>
<td>98 (21.1)</td>
</tr>
<tr>
<td>&gt;6–12 months</td>
<td>76 (16.4)</td>
</tr>
<tr>
<td>&gt;1–2 years</td>
<td>89 (19.1)</td>
</tr>
<tr>
<td>&gt;2–3 years</td>
<td>64 (13.8)</td>
</tr>
<tr>
<td>&gt;3–5 years</td>
<td>42 (9.0)</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>62 (13.3)</td>
</tr>
<tr>
<td><strong>Expect to stay in Moshi</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>38 (8.2)</td>
</tr>
<tr>
<td>Yes</td>
<td>316 (67.9)</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>111 (23.9)</td>
</tr>
</tbody>
</table>
Table 2 Numbers of women reporting different levels of potential risk factors for protected and unprotected events, and crude ORs for protected vs unprotected sex (N = 465)

<table>
<thead>
<tr>
<th>Unprotected events</th>
<th>Protected events</th>
<th>Crude OR (95% CI) (from conditional logistic model)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision maker</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject/Mutual</td>
<td>234</td>
<td>17</td>
</tr>
<tr>
<td>Partner</td>
<td>197</td>
<td>17</td>
</tr>
<tr>
<td><strong>Partner type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>229</td>
<td>116</td>
</tr>
<tr>
<td>Casual</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td><strong>First time</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>278</td>
<td>123</td>
</tr>
<tr>
<td>Yes</td>
<td>43</td>
<td>20</td>
</tr>
<tr>
<td><strong>Gifts received</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>222</td>
<td>95</td>
</tr>
<tr>
<td>Yes</td>
<td>32</td>
<td>116</td>
</tr>
<tr>
<td><strong>Location of sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel/Other</td>
<td>86</td>
<td>40</td>
</tr>
<tr>
<td>Home</td>
<td>101</td>
<td>238</td>
</tr>
<tr>
<td><strong>Subject alcohol use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>282</td>
<td>62</td>
</tr>
<tr>
<td>Yes</td>
<td>44</td>
<td>77</td>
</tr>
<tr>
<td><strong>Subject drug use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>462</td>
<td>2</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Partner alcohol use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>194</td>
<td>67</td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
<td>118</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td><strong>Partner drug use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>395</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td><strong>Coercion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>432</td>
<td>8</td>
</tr>
<tr>
<td>Yes</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td><strong>Know partner is HIV-negative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>291</td>
<td>41</td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>85</td>
</tr>
<tr>
<td><strong>Age difference between partner (P) and subject (S)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P Older by ≤10 Years</td>
<td>284</td>
<td>14</td>
</tr>
<tr>
<td>P Older by &gt;10 Years</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>18</td>
<td>0</td>
</tr>
</tbody>
</table>

Table cells refer to numbers of women with the specified pairs of unprotected and protected events.
was smaller. The woman’s alcohol use and coercion were no longer associated with condom use after adjusting for other factors.

In all sensitivity analyses assessing time trends, odds ratios for all variables remained very similar with those in the main analyses (data not shown).

**Discussion**

In settings such as Moshi where the general population has a high prevalence of HIV, women are likely to be at substantially increased risk of HIV infection even when they are sexually active with only one or two partners, and therefore lack of condom use with these partners is a potentially high-risk behaviour. Women in the MWHP and MSPP reported few sexual partners, but they also reported low rates of condom use. Fifty-two percent reported no condom use, and only 11% reported always using condoms. In this analysis of inconsistent condom users, 81% of women said they ‘sometimes’ used condoms and 19% said they ‘often’ used them. This low use is not explained by lack of condom availability in Moshi. Ninety-eight percent of women interviewed said it was easy to obtain condoms, and most (84%) women also understood condoms’ protective effect against HIV transmission. This within-person analysis provides evidence that inconsistent use is associated with factors that vary between sexual events, including who makes the decision about condom use, and the type of partner.

In agreement with earlier studies, we found that women had a lower odds of using a condom with a regular partner than with a casual partner, and that in sexual events involving a subject or mutual-based decision about condom use, the odds of condom use were increased compared with sexual events in which the partner made the decision. What our study adds to the literature is the finding of effect modification between decision-making and partner type. While decision-making was the strongest factor we identified both with regular and casual partners, the effect was substantially stronger with casual partners. This could either reflect a belief by both parties that condom use is less important with a regular partner, or it could indicate that a woman’s negotiation of condom use with a regular partner is less successful. Interventions therefore need to work not only to increase a woman’s decision-making skills, but to take into account the types of partners with which a woman is involved.

A recent review of condom use interventions in sub-Saharan Africa and Asia found that interventions to increase condom use with marital or steady partners can be effective. However, the same

<table>
<thead>
<tr>
<th>Situation-specific factor</th>
<th>Unadjusted ORa (95% CI)</th>
<th>Adjusted ORb (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision-maker about condom use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular partner type in both events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject/mutual vs partner decision</td>
<td>7.91 (4.42–14.1)</td>
<td>8.27 (4.47–15.3)</td>
</tr>
<tr>
<td>Casual partner type in both events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject/mutual vs partner decision</td>
<td>25.9 (10.7–62.5)</td>
<td>26.6 (10.8–65.2)</td>
</tr>
<tr>
<td><strong>Partner type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject/mutual decision in both events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual vs regular type</td>
<td>4.14 (2.50–6.87)</td>
<td>2.10 (1.19–3.70)</td>
</tr>
<tr>
<td>Partner decision in both events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual vs. regular type</td>
<td>1.27 (0.50–3.21)</td>
<td>0.65 (0.24–1.77)</td>
</tr>
<tr>
<td>Location of sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home vs hotel/other</td>
<td>0.40 (0.27–0.57)</td>
<td>0.47 (0.28–0.78)</td>
</tr>
<tr>
<td>Received gifts in exchange for sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes vs No</td>
<td>2.97 (1.99–4.43)</td>
<td>2.02 (1.18–3.48)</td>
</tr>
<tr>
<td>First time with partner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes vs No</td>
<td>2.86 (2.02–4.05)</td>
<td>2.05 (1.25–3.37)</td>
</tr>
<tr>
<td>Age difference between partner (P) and subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P older by &gt;10 years vs P older by ≤10 years</td>
<td>0.51 (0.27–0.96)</td>
<td>0.35 (0.14–0.84)</td>
</tr>
<tr>
<td>Don’t Know vs P older by ≤10 years</td>
<td>2.45 (1.42–4.24)</td>
<td>1.29 (0.62–2.68)</td>
</tr>
</tbody>
</table>

aModelling OR for protected vs unprotected sex.

bAll variables listed are included in multivariate model.
review found that pre-intervention levels of condom use with regular partners are often quite low, and despite an increase, use often remains relatively low post-intervention (24–33%). Therefore even these interventions may not increase condom use enough to result in sufficient protection against HIV infection.

Our previous study found that higher condom self-efficacy (one’s confidence in the ability to use condoms under different situations, and to request that a condom be used) was associated with an increased odds of consistent vs inconsistent use. A conclusion from this earlier study was that interventions that increase condom self-efficacy can help occasional condom users become more consistent users, by incorporating methods such as skills-based sessions run by peer educators and sessions that emphasize role-playing. But even with these interventions it will likely be more difficult to increase self-efficacy with a regular partner than with a casual partner. In addition to the effect of partner type, in this case-crossover analysis we found that first-time sexual events, sex away from home, and the exchange of gifts increased the odds of condom use. These types of events likely define a relationship that is less intimate, one with fewer a priori expectations, and one in which it is easier for a woman to successfully negotiate condom use.

While we did not directly measure women’s perception of their power in sexual relationships, we did find lower odds of condom use with an older partner than with a partner closer in age. This finding suggests is a power differential in sexual relationships involving older men and younger women. Women’s limited sexual power in relationships has been associated with inconsistent condom use in a South African study. Reduced power in a relationship, including social or economic dependence, as well as fear of one’s partner, can influence a woman’s willingness to attempt to negotiate condom use with a regular or long-term partner. Therefore even well-designed interventions may not meaningfully increase consistent condom use unless the larger social context of women’s unequal economic and social power is addressed.

Rather than focusing exclusively on increasing condom use for these women, interventions with a different focus, including interventions to reduce concurrent partnerships for both the woman and her regular partner, are warranted. Also, HIV prevention methods that do not require the participation and consent of the male partner should be encouraged. In a study of women with both regular and casual sexual partners, Macaluso et al. found that while consistent use of male condoms decreased as the length of partnerships increased, there was evidence that women used female condoms more often with their regular partners than with their new or casual partners. Female condoms and other female-controlled barrier methods might therefore be considered acceptable by women for use with their regular partners, particularly when male condoms become less desirable within a longer-term relationship. Innovative methods of HIV prevention also need to be developed for women such as the large proportion (23%) initially eligible for our study who reported a pregnancy intention. This is particularly crucial in settings such as Tanzania where pregnancy and child-rearing are of central importance, and where fears of HIV infection will not necessarily prevent a woman or a couple from trying to conceive. Candidates might include vaginal microbicides that do not contain a spermicidal agent, such as viral fusion/entry inhibitors.

Our results should be interpreted with the following points in mind. The validity of the case-crossover design depends on the similarity of the time periods being compared in terms of unmeasured risk factors. These periods should also be free of time trends in exposures and outcomes. In our analysis the time interval between the two events exceeded a year for 156 of 465 women (33%). In addition, 94 of the protected events (20%) and 86 of the unprotected events (19%) took place more than 1 year prior to the interview. This might increase the possibility of unmeasured risk factors such as marriage, childbirth or pregnancy having occurred between the two events. These factors could have affected subsequent partner characteristics as well as condom use and thereby confounded our results. However, since results of our sensitivity analyses were similar to results from the main analyses, substantial confounding due to temporal changes in unmeasured risk factors within women, or to limited recall of remote events, is not likely. There also do not appear to have been changes in the frequency of condom use in Moshi over the time period in which the two studies enrolled, since similar proportions of women from each study reported being inconsistent condom users. Also women from the two studies did not differ on demographic, psychosocial or sexual behaviour characteristics, except for differences in length of time in bar work and different expectations of continuing to stay in Moshi. In conclusion, we found that condom use is influenced both by condom use decision-making and by partner type. Furthermore, the effect of decision-making is substantially stronger among casual partners than among regular partners. Interventions should be considered that improve the ability of women to request condom use with both their regular and casual partners, but there are particular difficulties for women in regular partnerships. These women would benefit from interventions to reduce concurrent partnerships, and also by the development of HIV preventive agents that do not require the participation or knowledge of the male partner.

**Funding**

Rockefeller Foundation (2002 HE 036); National Institute of Allergy and Infectious Disease
(T32 AI07358-17); National Institute on Alcohol Abuse and Alcoholism (R21 AA013874-03); Harvard School of Public Health; Kilimanjaro Christian Medical Center.

Acknowledgements
We would like to thank the women who participated in this study; research and administrative staff for their efforts in the implementation of the study; and the Kilimanjaro Christian Medical Centre, the Harvard School of Public Health and the Moshi Municipal Council for providing institutional support. We are also grateful to Mary Solomon, Coleta Mbuya, Esther Mchome, Grace Mhango, Basidi Bamba, Ireen Kiwelu, John Shao and Christopher Mtamakaya for their dedication and support. We would also like to thank Dr Murray Mittleman for his valuable comments and suggestions.

Conflict of interest: None declared.

KEY MESSAGES
- Condom use in specific sexual events is influenced both by partner type and by whether the decision regarding condom use involves the woman or is made alone by her partner.
- There is significant effect modification between condom use decision-making and partner type, such that subject-based or mutual condom decisions are more protective with casual than with regular partners.
- Interventions to improve the ability of women to request condom use are essential for the goal of HIV prevention, but women with regular partners would also benefit from interventions to reduce concurrent partnerships and from the development of HIV preventive agents that do not require the participation or knowledge of the male partner.

References


