Increasing Condom Use Without Reducing HIV Risk

Results of a Controlled Community Trial in Uganda

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Background: Although consistent condom use is effective in reducing individual risk for HIV infection, the public health impact of condom promotion in a generalized epidemic is less clear. We assess the change in condom uptake and number of sex partners after a condom promotion trial in Kampala, Uganda.

Methods: Two similar poor urban communities near Kampala were randomized. One received a condom promotion program that taught condom technical use skills in workshops for men aged 18 to 30 years (n = 297) and encouraged condom use. Men in the control community (n = 201) received a brief informational presentation about AIDS. Participants received coupons redeemable for free condoms from distributors in both communities and completed questionnaires at baseline and 6 months later.

Results: Six-month follow-up was completed for 213 men (71.7%) in the intervention group and for 165 (82.1%) men in the control group. Men in the intervention group redeemed significantly more condom coupons than men in the control group (on average, 110 vs. 13 each; $P = 0.002$). Men in the intervention group increased their number of sex partners by 0.31 compared with a decrease of 0.17 partners in the control group ($P = 0.004$). Other measures did not support a net reduction in sexual risk in the intervention community compared with the control community and, in fact, showed trends in the opposite direction.

Conclusions: In this study, gains in condom use seem to have been offset by increases in the number of sex partners. Prevention interventions in generalized epidemics need to promote all aspects of sexual risk reduction to slow HIV transmission.

Key Words: HIV, AIDS, condoms, prevention, sexual behavior, Uganda, Africa

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Early in the HIV/AIDS pandemic, Uganda was one of the hardest hit countries in the world.[1–4] Now, it is held to be one of the rare HIV prevention success stories. Although HIV infection continued to increase in many countries in sub-Saharan Africa,[5] Uganda experienced a decrease in HIV prevalence in the early 1990s.[1–4] Among pregnant women in Kampala, HIV prevalence decreased from approximately 30% in 1992 to 10% by 2001.[1–4]

Although infection rates have declined, the HIV/AIDS problem in Uganda remains serious. Current HIV prevalence, around 5% nationally,[1–5] is still unacceptably high, new infections are still occurring, and many HIV-infected people are becoming ill because of AIDS.[6] Recent data suggest that the rate of decline in HIV prevalence has slowed.[1,3] Thus, there are no grounds for complacency, and the need for effective prevention strategies remains great.

Condom use has been held to be one of the most important preventive measures against sexually transmitted HIV infection.[7,8] Longitudinal studies have demonstrated that consistent use of condoms for heterosexual intercourse is effective (although not 100% effective) in preventing the transmission of HIV.[8–10] Condom promotion as a community-level public health measure may reduce sexually transmitted infections (STIs) and HIV transmission, even if use is less than 100%.[11–14] Because STIs are known cofactors in HIV transmission,[15–17] the overall effect of condom promotion on preventing HIV transmission may be substantial in populations in which the prevalence of STIs and HIV is high.

Despite widespread awareness of condoms among Ugandans, limited access, belief in certain condom myths, inadequate knowledge of proper use, and lack of faith in the effectiveness of condoms have all been reported to hinder their use.[18–22] In our own studies in Kampala, we found that low technical use skills, not knowing where to obtain a condom, and embarrassment about obtaining a condom were significantly associated with lower condom use.[23,24] Condom promotion in Uganda has traditionally been "passive," with little provision of explicit instructions on proper use. Although condom education and free distribution have been shown to increase condom use in some areas of sub-Saharan Africa,[11,25–28] it is not yet clear how condoms can best be promoted and distributed in Uganda, where improved availability alone has increased use only modestly.[2] Furthermore, few controlled studies have examined the impact of condom promotion interventions on overall sexual risk, including number of sex partners, as opposed to simply measuring condom use.

We conducted a community-level trial in 2 periurban areas of Kampala, Uganda. One community received a condom promotion intervention with intensive workshops addressing 3 barriers to condom use: lack of technical condom use skills, lack of access to condoms, and embarrassment about obtaining condoms. A comparison community received passively increased condom availability with a brief AIDS informational presentation but was not provided with the condom skills workshops.

METHODS

Overall Study Design

The study was a quasiexperimental controlled trial. Two communities were randomized by the toss of a coin to receive increased condom accessibility (control) or increased condom accessibility plus condom use skill educational workshops (intervention). Participants were young men residing in the 2 communities recruited by members of local youth councils. Subjects completed baseline and 6-month follow-up questionnaires on condom use and sexual behavior. After the baseline interview, subjects were given coupons redeemable for free condoms from volunteer distributors within the 2 communities. Intervention subjects additionally attended condom use skills workshops. Pilot studies and field tests were conducted to develop questionnaires, coupon redemption procedures, and the content of the condom skills workshops.

Setting and Study Subjects

The target population was all men aged 18 to 30 years living in 2 well-separated but demographically similar periurban communities near Kampala, Uganda. The areas were of low socioeconomic class, where carpentry, metalworking, automobile repair, alcohol brewing and selling, and market vending were the chief sources of income. An earlier study in these areas determined that STIs and HIV were issues that the community wanted to be addressed. Focus group discussions with opinion leaders living in the study areas suggested that the communities had favorable attitudes toward condom use for disease prevention. Lack of education about proper use of condoms and embarrassment about obtaining condoms were identified as major barriers to their use. Furthermore, a substantial number of STI clinic clients at Mulago Hospital came from these areas. We therefore hypothesized that a community-level condom promotion and skills development intervention in these communities could have a positive impact on preventing HIV and STIs.

The study attempted to reach all eligible men in both communities at baseline and at follow-up; however, a small but unknown number of men were absent from the community because of work, school, or travel outside the area on the days of the surveys. We estimate that at least 90% of eligible men in each community were approached for participation. Study subjects were men, because we were examining male condom use only and men are considered to be the usual initiators of condom use in Uganda. Members of the districts' youth and local councils and community mobilizers recruited subjects. These persons knew all members of their respective communities and could encourage men to participate in the study, attend the workshops, and complete the study interviews. Participation in the study consisted of completing 2 survey questionnaires in face-to-face structured interviews at baseline and 6 months, redeeming condom coupons, and, for intervention subjects, participating in the condom use skills workshops.

The members of the local youth councils and the local council chairpersons selected a total of 10 resident condom distributors in each community. The selection criteria included popularity, age, and accessibility. Condom distributors were trained on how to record condom redemption, including the date, number of condoms redeemed, and confidential participant study numbers.

All participants provided individual informed consent. Ethical review boards in Uganda and the United States approved the study.

Intervention Activities

Young men in the intervention community were invited to attend 1 of 8 sessions of 3 hours each conducted over a 3-month period. The sessions consisted of a review of the broad study objectives (ie, comparison of health education approaches to prevent HIV), a general presentation on the AIDS epidemic in Uganda, detailed demonstrations of how to use condoms facilitated by 2 nurses, practicing the steps of proper condom use with coaching using a penis model, addressing barriers to condom use, brainstorming solutions to negotiating condom use with resistant partners, and role playing on creative means to negotiate for safer sex. The sessions also introduced the community condom distributors and provided their physical addresses, distributed coupon books for redeeming free condoms, and gave explanations on how to use them. Each participant was initially given 1 coupon book containing 12 leaflets. Each leaflet was redeemable for 3 condoms, and a maximum of 9 condoms could be redeemed at a time. Additional coupon books could be obtained from the condom distributors within the 2 communities. At the end of each session, investigators addressed individual questions about HIV and STI prevention.

Control Activities

A general meeting was organized in the control community to address participants. The investigators reviewed the broad study objectives (ie, comparison of health education approaches to prevent HIV) and gave a general presentation on the AIDS epidemic in Uganda. One of the investigators (M.K.) answered questions asked by the participants; most concerned general information about HIV/AIDS. The meeting introduced the community condom distributors, provided their physical addresses, and instructed members on how to use the coupon books to redeem free condoms. The condom coupon redemption program in the control community used the same procedures as in the intervention community. To ensure that all control participants understood where and how to redeem condom coupons, the research team additionally approached all control participants in their homes.

Measures

Participants completed a preintervention questionnaire and a 6-month postintervention questionnaire. The instruments

covered demographic characteristics, self-reported numbers and types of sex partners, and condom use with different types of partners. Sexual risk behavior data were collected individually for each partner for up to 5 partners, measuring episodes of sex with and without condom use. Partner types included permanent partners (usually wives), steady girlfriends, casual partners, exchange (cash for sex) partners, and 1-night stands. The time frame for questions was the preceding 6 months.

Data Analysis

To assess the impact of the intervention on sexual risk, we compared condom acquisition as measured by coupon redemption and changes in the number of sexual partners, types of sexual partners, and condom use by partner types before versus after the intervention between subjects in the intervention and control communities. Questionnaire data were linked to coupon redemption counts using participants' unique study numbers. The number of condoms redeemed was calculated for each participant and compared between intervention and control participants using the Wilcoxon rank sum test. The proportions of participants redeeming any condom coupons were compared using the χ^2 test.

Participants' change in number of sex partners was calculated by subtracting the number of partners reported in the 6 months preceding the baseline interview from the number reported for the 6 months preceding the follow-up interview (ie, before vs. after intervention). The median change in number of sex partners was compared between intervention and control subjects using the Wilcoxon rank sum test. Comparisons were made for change in all sex partners, casual sex partners, all unprotected sex partners, and unprotected casual sex partners. Except for the coupon redemption comparison, analyses were restricted to subjects who completed baseline as well as follow-up questionnaires. In accordance with the intent-to-treat principle, all subjects in the intervention community were included in the analysis regardless of whether they attended the workshops or not. Other comparisons of proportions were performed using the χ^2 test. Although the Wilcoxon rank sum test was used to compare continuous variables because of their nonnormal distributions, means are presented for simplicity. Qualitative feedback on the program was solicited from survey participants, recruiter interviewers, condom distributors, and local councils.

We also performed a set of multivariate analyses to determine the extent to which any differences in baseline characteristics between the 2 communities might have affected comparisons. The first was a multiple logistic regression in which baseline behavior and community (intervention or control) were the predictors and unprotected sex at follow-up was the outcome. This was compared with a similar multiple logistic model that also included level of education, age, and marital status as predictors.

RESULTS

A total of 498 subjects were recruited and interviewed at baseline, including 297 in the intervention community and 201 in the control community. Of men approached, 15 (4.8%) in the intervention community and 16 (7.4%) in the control community declined to participate. In the intervention community, 213 (71.7%) completed the follow-up interview compared with 165 (82.1%) in the control community ($P = 0.22$).

Table 1 shows the demographic characteristics of subjects who completed the baseline and follow-up interviews. There was a slightly higher proportion of men aged 25 to 30 years among the intervention subjects compared with control subjects (31.0% vs. 23.0%, respectively; $P = 0.055$). Intervention subjects were more likely to be married compared with control subjects (24.4% vs. 14.5%, respectively; $P = 0.030$), partly a reflection of their older age. Control subjects were more likely to have completed secondary education compared with intervention subjects (81.0% vs. 67.6%, respectively; $P = 0.025$). Not surprisingly, the proportion of men in both communities who reported never having had sex at baseline fell with increasing age: 11.2% for age of 18 to 19 years, 4.6% for age of 20 to 24 years, and 0.5% for age of 25 to 30 years ($P < 0.001$).

A total of 207 men in the intervention community attended at least 1 workshop. Of the 213 men who completed the follow-up survey, 165 (77.5%) reported attending a workshop. Although the intention was for men to attend 1 workshop, men attended more than 1 workshop in some cases.

Condom distributors experienced variable success in both communities. In the intervention community, the 3 most popular condom distributors (accounting for 78.8% of condoms) were part-time students, 2 of whom were football players on a community team. They were also available to provide condoms late at night. The 3 least popular condom distributors redeemed no condom coupons at all. Two were unavailable because of work schedules. The other, the only female distributor in the intervention community, was reportedly rejected because of concerns about keeping information confidential and for lecturing subjects on immoral behavior.

In the control community, the 2 most popular distributors were a young man who owned a hair salon and a student

TABLE 1. Demographic Characteristics of Persons Completing Follow-up, Young Men in Periurban Kampala, Uganda, 2001–2002

Variable	Intervention Community n (%)	Control Community n (%)	*P*
Total	213	165	—
Age (y)			0.055
18–19	57 (26.8)	37 (22.4)	
20–24	90 (42.2)	90 (54.6)	
25–30	66 (31.0)	38 (23.0)	
Marital status			0.030
Never married	159 (74.6)	135 (81.8)	
Married/cohabiting	52 (24.4)	24 (14.5)	
Separated/divorced	2 (0.93)	6 (3.6)	
Education			0.025
Never been to school	4 (1.9)	2 (1.2)	
Primary	65 (30.5)	29 (17.6)	
Secondary	110 (51.6)	107 (64.8)	
Tertiary	34 (16.0)	27 (16.4)	

(accounting for 49.3% of condoms distributed). The salon was a meeting point for many youths attending a neighboring school. The 2 were preferred by virtue of being friendly and accessible at late hours. Three distributors redeemed no condom coupons: the only female distributor in the control community stepped down because of objections by her husband, another voiced the circulating suspicion that the condoms contained the AIDS virus, and the third left the community. The remaining 5 distributors met with equal but low success.

Men in the intervention community redeemed substantially more condom coupons than men in the control community: 23,442 coupons (a mean of 110 per man) versus 2119 coupons (13 per man) ($P = 0.002$). The proportion of men who redeemed any condom coupons at all in the intervention community was not significantly higher than in the control community (49.8% vs. 41.2%, respectively; $P = 0.098$), however.

Figure 1A shows abstinence, consistent condom use, and inconsistent condom use for all sex partner types at baseline and follow-up in the control and intervention communities. The proportion of men reporting sexual activity with consistent condom use increased to approximately the same level in both communities (to 60.6% in the control community and to 59.6% in the intervention community; $P = 0.57$). Abstinence (ie, no sex partners in the last 6 months) decreased in both communities, however, and to a somewhat lower level in the intervention community than in the control community (to 8.5% vs. 17.0%, respectively; $P = 0.068$). The net result was that the proportion reporting any unprotected sex remained unchanged in the intervention community at 31.9%, whereas it decreased to 22.4% in the control community ($P = 0.72$). Overall, there was no statistical evidence of a benefit of the intervention on change in sexual risk behavior as measured by any unprotected sex.

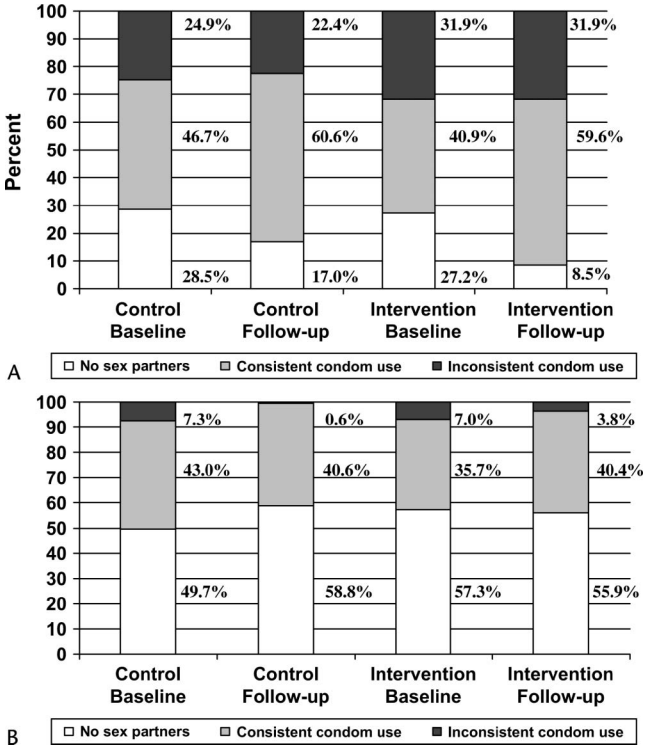

FIGURE 1. A, Condom use with all sex partners, young men in periurban Kampala, Uganda, 2001–2002. B, Condom use with casual sex partners, young men in peri-urban Kampala, Uganda, 2001–2002.

Figure 1B shows similar comparisons for casual partners only (defined as casual, exchange, or 1-night stands). Consistent condom use with casual partners increased in the intervention community yet decreased in the control community; however, postintervention levels were nearly the same (40.4% vs. 40.6%, respectively; $P = 0.43$). Moreover, abstaining from any casual partners increased in the control community but decreased in the intervention community (to 58.8% vs. 55.9%, respectively; $P = 0.33$). The net result was that somewhat more men in the intervention community reported unprotected sex with casual partners at follow-up compared with men in the control community, although this difference was not statistically significant (3.8% vs. 0.6%, respectively; $P = 0.071$). Again, there was no statistical evidence of a benefit of the intervention on change in sexual risk behavior as measured by any unprotected sex with casual partners.

Figure 2A shows that men in the intervention community increased their overall number of partners in the past 6 months by 0.31 on average (from 2.13 to 2.44), whereas men in the control community decreased their overall number of partners by 0.17 on average (from 2.20 to 2.03) ($P = 0.004$). Although both communities reported reductions in the number of casual partners, the reduction was greater in the control community (from 1.07 to 0.85, for a change of -0.22) compared with the intervention community (from 1.0 to 0.9, for a change of -0.1) ($P < 0.001$). Figure 2B compares the changes in number of unprotected sex partners. Although not statistically significant, men in the control community had a somewhat greater reduction in their overall number of unprotected sex partners compared with men in the intervention community (by 0.13 vs. 0.02 partners on average; $P = 0.089$). Also not statistically significant, men in the control community reduced their number of unprotected casual sex partners by 0.06 on average compared with an increase of 0.01 on average among men in the intervention community ($P = 0.13$).

Multivariate analyses that adjusted for potential confounding effects of differences in baseline characteristics between the 2 communities did not substantially change results. For example, the odds ratio at follow-up for any unprotected sex in the intervention community (vs. the control community) was 1.50 ($P = 0.12$) when adjusting only for baseline behavior. After also adjusting for age, level of education, and marital status by including these variables as predictors in the multiple logistic model, this odds ratio became 1.48 ($P = 0.17$). Finally, removal of intervention subjects who did not actually attend a workshop from the analysis (ie, "as treated" rather than "intent to treat") did not change the primary findings of greater increases in condom uptake and total number of sex partners among intervention subjects.

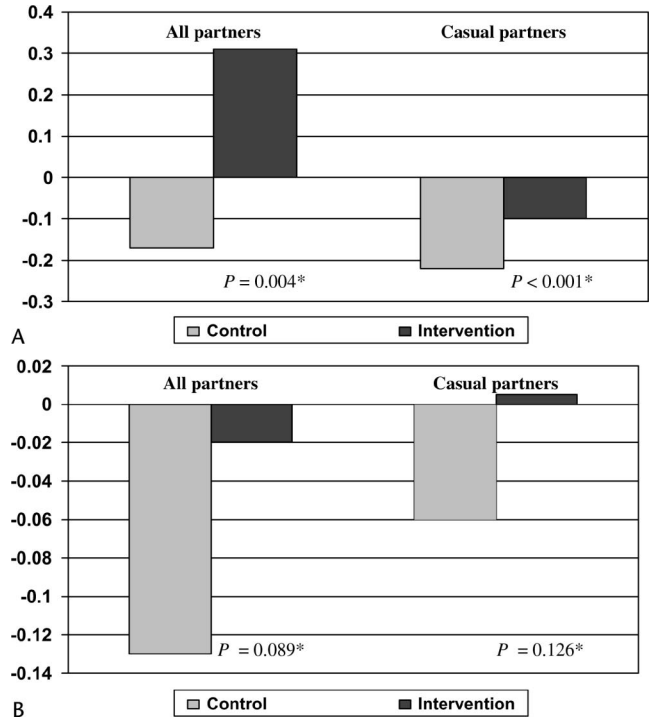

FIGURE 2. A, Mean change in number of sex partners in the last six months, young men in peri-urban Kampala, Uganda, 2001–2002. B, Mean change in number of unprotected sex partners in the last six months, young men in peri-urban Kampala, Uganda, 2001–2002. *Mean changes are presented to illustrate differences; however, statistical analyses were non-parametric (Wilcoxon rank sum test) due to the non-normal distribution. The median change in all partners in each group was 0 with an interquartile range of 2. For casual partners, the median change in each group was 0 with an interquartile range of 1.

DISCUSSION

Our community-level intervention sought to reduce the risk for HIV transmission for young men in periurban communities of Kampala through a program of condom technical skills education, condom promotion, and enhanced access to condoms. These aims were based on prior research that specifically identified these factors as associated with decreased condom use in our target population.[23,24] To judge the ability of the intervention to reduce HIV transmission, we examined 2 questions: was the uptake of condoms higher or lower among men in the intervention community compared with men in the control community, and did men in the intervention community report more or less overall sexual risk behavior than men in the control community? The former question was measured by redemption of condom coupons as an objective validation of self-reported information. The latter question was addressed by comparing self-reported condom use and number of sex partners.

The study data provide evidence that the uptake of condoms was indeed much higher among men in the intervention community. Significantly more coupons were redeemed for condoms in the intervention community than in the control community during the period after program activities. Of note, however, the proportion of men redeeming any coupon was not substantially different between communities.

Although men in the intervention community obtained more condoms, they did not report significantly higher levels of consistent condom use at 6 months of follow-up. Moreover, they reported increases in their overall number of sexual partners. Having more sex partners may increase the probability of exposure to HIV or of exposing an uninfected partner to HIV if condoms are not consistently used throughout the partnership. For equal numbers of unprotected sexual contacts per partner, HIV and STI transmission risk is likely to be higher in sexual networks in which the frequency of partner change is higher.[29]

A central question in scenarios where partner change is high is whether condoms are used consistently with all partners. Whether condoms obtained were actually used in our study is not easy to verify and must rely on self-report. Consistent condom use with all partners increased in both communities; however, inconsistent condom use continued. In the intervention community, the proportion of men reporting any unprotected sex did not change at all compared with a slight decrease in the control community. Similarly, inconsistent condom use with casual partners persisted to a greater degree in the intervention community than in the control community. This is especially disappointing, given the large number of condoms supplied to men in the intervention community.

When examining condom use partner by partner, men in the control community reported a greater reduction in the number of partners with whom they had any unprotected sex compared with men in the intervention community. Men in the intervention arm actually reported an increase in the number of casual partners with whom they had unprotected sex compared with a reduction in unprotected casual sex partners in the control community. Although these trends are worrisome, we should emphasize that the differences between the 2 communities did not achieve statistical significance (2-tailed P = 0.089 and 0.13, respectively, for the last 2 comparisons.)

This study has many limitations. It compares only 2 communities that were not identical at baseline. Although we examined changes in behavioral variables (eg, number of partners) rather than absolute values and did not find that a multivariate analysis adjusting for baseline differences in potential confounding variables altered the findings, we cannot rule out the possibility that the different behavioral trends in these 2 communities were caused by factors other than our interventions. Other limitations include incomplete follow-up, which was somewhat different in the 2 communities (although the difference was not statistically significant) and the fact that not all men in the 2 communities participated in the study.

This study would have been stronger (and orders of magnitude more expensive) had it included multiple communities in each condition and/or biologic outcomes to compare the effects of different interventions on infection rates directly. We had more modest goals: to see if the intervention could increase condom uptake (which it did) and to include a control community to provide stronger inference than would have been possible from a simple before versus after comparison in a single community. The study was underpowered to measure

changes in some of the behavioral variables that we examined; consequently, many of the trends that we observed did not reach statistical significance, with the notable exceptions of changes in condom uptake and numbers of sexual partners. Our results should thus be interpreted with caution. Nevertheless, we believe that they raise important questions deserving consideration and further research. If nothing else, they provide an example to demonstrate that increased condom distribution does not always result in decreased sexual risk behavior.

In aggregate, our data do not support a net reduction in HIV risk through a program focused on condom promotion in this setting. The increase in condom uptake that the intervention produced seems not to have been sufficient to counteract the increase in numbers of sex partners. Although this was not the result we intended or expected, it is consistent with the history of AIDS prevention efforts in Uganda. Uganda's success in AIDS control seems to have resulted from reductions in numbers of partners, with condoms playing a relatively minor role.[1,4,30] Future HIV prevention research needs to develop and evaluate interventions that are able to achieve partner reduction and increased condom use. Given the substantial resources currently being devoted to condom promotion in Africa, it is essential to carefully examine what approaches best reduce overall levels of sexual risk.

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