Condom acceptance is higher among travelers in Uganda

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Objective: To examine the role played by mobile residents in the spread of HIV through rural Uganda.

Design: Travel history and sexual network data were collected from a random sample of 1627 residents aged 15–49 years in Rakai District, Uganda during 1994.

Methods: Travelers and non-travelers are compared with respect to socio-demographic attributes, risk exposure, knowledge, attitudes and use of condoms using descriptive statistics and multivariate logistic regression. A demographic profile of travelers' partners is developed using information from a local network survey module.

Results: The population is highly mobile, with over 70% reporting travel to a potentially higher risk destination in the past year. Travelers are somewhat more likely to have higher levels of sexual risk behavior, but the risk appears to be offset by significantly greater knowledge, acceptance, and use of condoms. In multivariate analysis, the sexual risk differential for travelers is explained by occupational exposure and higher socio-economic status. The differential in condom acceptance, by contrast, appears to be associated with travel itself. Condom use with non-spousal partners is three times higher among travelers than non-travelers ($P < 0.001$), and travel remains a significant predictor after controlling for age, education, residence, occupation and multiple partners. Travelers are more likely to use condoms with both their local and non-local partners. Partners of male travelers are likely to be younger and better educated than those of male non-travelers.

Conclusions: The mobile population in this rural region appears willing to adopt risk reduction measures appropriate to their exposure. This suggests that targeting condom promotion programs to travelers and their partners is likely to be effective in reducing the spatial diffusion of HIV, and may be an efficient method for spreading behavioral change into rural areas.

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Introduction

A growing literature on HIV risk factors in sub-Saharan Africa has documented the relationship between mobility and HIV spread [1,2]. Mobility is variously defined in terms of short and/or long distance travel [3–10], seasonal and/or permanent migration [3,7,11], or high risk occupations requiring travel such as mobile traders and truck drivers [12–15]. HIV risk can be determined by directly comparing seroprevalence among mobile and non-mobile populations, or by relating mobility to high risk behaviors. Almost all studies present support-

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ing evidence that higher mobility is associated with increased HIV risk, with few exceptions [8,13]. Reasons for this higher risk might include exposure of travelers to higher risk groups in urban areas, marital instability caused by long separations from family, and more opportunities for sexual contact. While some earlier studies examine the frequency of consistent condom use among travelers, none examine the relative frequency of condom use between those who do and do not travel. In this study it was found that the mobile members of a rural population in Uganda are more likely to have positive attitudes towards condoms and to have used condoms with non-spousal partners during the last year than less mobile members of the same population. These results suggest that while mobile persons can be at higher risk, they may also be more likely to take risk reduction measures.

Subjects and methods

The Rakai Project Sexual Network Study is a cross-sectional survey focusing on sexual behavior, and networks and HIV in the Rakai District of rural southwest Uganda. The survey is part of the Rakai Project, a larger longitudinal cohort study of health, sexual behavior, and fertility. The respondents were a household based random sample of 1627 adults aged 15–49 years interviewed between September 1993 and September 1994. The sample was based on 108 villages randomly selected from three strata in the project sampling frame: main road trading centers, intermediate trading villages off the main roads, and agrarian rural villages off main and secondary roads (see [5,6] for further description of the strata definitions). Within each village, all households were enumerated and up to 18 were randomly selected. The number of households sampled in each village was kept low to minimize respondent concerns about confidentiality. One eligible adult in each household was chosen using a Kish table [16]. The overall survey response rate was 92%. Of the retrospective information collected, the behavior analyzed here, with respect to both travel and sex, is restricted to the 12-month period preceding the interview date.

Travel history

Respondents were asked about frequency, duration, and purpose of travel (work, social, or other reason) within the last 12 months. Destinations were distinguished in terms of geographic distance and population concentration: rural areas within their parish; rural areas outside the parish but within Rakai district; trading centers in Rakai (Lyantonde and Kyotera); the cities/towns of Masaka, Mbarara and Kampala (outside Rakai); other parts of Uganda; and other countries. While travel could be broadly defined given the survey questions, we are primarily interested here in travel to one of the higher risk destinations. Within Rakai district this means the trading centers, where HIV seroprevalence is higher [5,6]. All travel outside the district is also potentially higher risk. We code someone as a 'traveler' who reports at least one potentially higher risk destination during the last 12 months. Persons who already live in one of the trading centers are not counted as travelers unless they have traveled to another of the higher risk destinations. Among travelers, the median number of trips was 10 for men, and one for women. We do not have information on the duration of stay.

Respondent attributes

Standard demographic information was collected for all respondents. The variables used in the analysis here include sex, age, education, occupation, economic status, and residential location as defined by the sampling strata (rural village, intermediate center, trading center). Education is collapsed into five categories: 0, 1–4 years, 5–7 years, some secondary education, and beyond secondary education. The majority of both men and women reported a primary school education. The 28 original occupation codes are collapsed into six categories. The first category combines occupations previously associated with higher risk behavior and HIV prevalence (truckers, bar workers, mobile market traders, beer brewers, police or military, and the 'unemployed'). The most common high risk occupation was that of market trader (79% of this group). While it may have been preferable to investigate each high risk occupation separately, the small numbers in the other occupations (range, 2–28) makes it necessary to pool them. The remaining occupational categories are farmers, shop attendants and laborers, professional and clerical workers, students, and 'others'. The study area is characterized predominantly by subsistence farming. Only 20% of the respondents report occupations from which they derive any cash income (30% of men, 15% of women). We therefore measure economic status by an index constructed from measures of possessions (radio, bicycle, motorcycle and car or truck), land, and housing quality (wall and roof materials, electricity). The index forms a scale that ranges from 1 to 7, with about 10% of the population in each category. The sample distribution for most of these variables can be seen in Table 1.

Sexual behavior and networks

The survey collected two types of sexual behavior data. The first consisted of summary information on the number and type of sexual partners in the lifetime, last 12 months and last 6 months. For sexually active respondents (those ever reporting sexual relations, $n = 1428$) a local network module [17] was used to obtain detailed information on the most recent three sexual relationships. The module covered partner attri-

Table 1. Demographic breakdown of respondents, with percent reporting travel to a potentially higher risk destination during the last 12 months. The percentages are based on the number of observations in the first two columns. High-risk occupations include truckers, mobile traders, barworkers and the unemployed.

		n		Travel (%)	
Demographic attribute		Men	Women	Men	Women
Residence	Trading center	120	190	95.8	86.3
	Intermediate	124	157	86.3	59.9
	Rural	381	456	82.9	50.0
Age (years)	15–19	79	135	83.5	65.9
	20–24	148	186	92.6	62.9
	25–29	122	153	91.8	64.0
	30–34	106	108	85.9	57.4
	35–39	76	82	80.3	61.0
	40–49	94	136	75.5	50.7
Education (years)	0	62	190	67.7	40.0
	1–4	185	216	78.9	57.4
	5–7	245	295	90.0	69.8
	Secondary	86	77	95.5	72.7
	Tertiary	46	23	100.0	95.7
Occupation	High risk	228	159	94.3	79.6
	Farmers	188	378	73.9	47.3
	Shop/labor	59	144	91.5	64.1
	Professional	34	32	94.1	84.4
	Student	27	10	92.6	60.0
	Other	89	80	82.2	70.0
Total		625	803	86.0	60.5

butes (e.g., age, occupation, education, village of residence), relationship characteristics (e.g., type, length), and pair-specific behavior (e.g., sexual practices, condom use). These data are used to construct measures of sexual risk behavior, the demographic profile of the partners, and the age and education mixing patterns of respondents and their partners.

Our measures of sexual risk behavior include having multiple partners, concurrent partners, and non-spousal partners in the last year. These categories are not mutually exclusive. Concurrent partners are two or more partners with whom a respondent reports sexual partnerships that overlap in time. Such partnerships are a source of risk at both the individual and the population level [18]. The questionnaire is designed so that the respondent does not directly report having a sexual relationship with partner 1 while also having a sexual relationship with partner 2. Instead, the local network module contains a series of questions for each partner, including the dates of first and last sex (days/months/years ago). We can then construct the partnership intervals, and check for overlap. Because this analysis is restricted to the last 12 months, some part of the overlap was required to occur in this period. Respondents were asked to describe the nature of their relationship with each sex partner. The categories ranged from spouse, to 'consensual' (a long term lover), to boy- or girlfriend and stranger. The primary split in condom use was between spousal and non-spousal partners (this is discussed in the next section), so we adopt that split here. About 63% of the respondents were currently married, and 12% of these reported a non-spousal partner in the last year. Among the non-married respondents, 51% reported a non-spousal partner in the last year. Among the non-spousal partners, consensual partners and boy- or girlfriends were most common (over 80% of these partners), with 'friends' making up most of the remainder. As respondents did not use the term 'casual' or 'non-regular' partner to describe these partnerships, we also do not, and instead use the term 'non-spousal' partner here. About 35% of the men, and 20% of the women reported non-spousal partners in the last year. The majority of respondents report that they know or believe that their non-spousal partner has had other sex partners during their relationship.

One of the questions in the local network module is whether the respondent knows or believes that this partner has had other sexual partners during their relationship. We construct a dummy variable from these questions that takes the value 1 if the respondent knows or believes that any of their eligible non-spousal partners has other partners, 0 otherwise. We use this variable as a control variable in some of the multivariate analyses.

When the demographic profile of the partners and the mixing patterns between respondents and partners is analyzed the sample consists of all eligible partners reported in the local network module. The unit of analysis is therefore the partnership, not the respondent: a single respondent can contribute multiple partners to

the partner sample (the total number of eligible partnerships is 470). We do not restrict the focus to partners who reside outside the respondent's village of residence. Our interest here is in the behavior of travelers, not simply in their behavior when they travel. As we show, travelers' behaviors are consistently different from those of non-travelers, whether at home or on the road.

Attitudes, knowledge and practices regarding condom use

A simple additive knowledge index was created from three questions: whether respondents had heard of condoms, whether they knew that condoms could be used for preventing sexually transmitted diseases and AIDS, and whether they thought a condom could break off and 'get lost' inside a woman. A simple additive index for attitudes was also created from three questions: condoms cause mistrust with wives and serious girlfriends, condoms are only suitable for casual or commercial partners, and men will leave a woman who suggests using condoms. Respondents were asked whether they were comfortable with condom use in general. Sexually active respondents were asked about condom use with each of the partners identified in the local network module. Condom use is relatively low in this population: 12% report ever using a condom with any of their most recent three partners from the last year. This rises to 28% if only non-spousal partners are considered, but only 10% report consistent condom use with every non-spousal partner. Condom use with spouses is negligible. Our measure of condom use in the analysis is any condom use with a non-spousal partner in the last year.

Chi-square tests and odds ratios are used to compare travelers and non-travelers by sex with respect to risk exposure, knowledge, attitudes and use of condoms. Multivariate logistic regression analysis is used to isolate the effects of travel on behavioral risk and condom acceptance and use, controlling for age, education, sex, and other factors.

When comparing the demographic profile of travelers' and non-travelers' partners, χ^2 tests and gamma statistics are used for trend, but results should be interpreted with care. Because respondents can contribute more than one observation to the partnership sample there may be some correlation among observations. As our sample in this analysis is restricted to non-spousal partners, only 5% of respondents contribute more than one partner in the last year, and the maximum number of partnerships contributed by a respondent is three, so the level of dependence introduced is probably small. A conservative approach would be to use only one partnership per respondent. We have run all analyses reported here both ways, using all eligible partnerships, and using the most recent non-spousal partner reported by the respondent. Both analyses produce the same substantive findings and the same pattern of statistically significant results. We report here the findings from the full set of eligible partnerships.

Results

Characteristics of travelers

There is substantial geographic mobility in this rural population, with more travel closer to home, and more men traveling to all types of destinations. The prevalence of travel to all kinds of destinations is shown in Fig. 1. Restricting the destination to areas of potentially higher HIV risk (see methods section), 70% of all residents (85% of men and 59% of women) report such travel during the past year. The remainder of the paper will focus on this kind of travel. Table 1 presents the rates of travel broken down by socio-demographic attributes. Residents of trading centers are most likely to travel, and residents of rural villages are least likely. Travel is highest among those aged 20–29 years for both men and women, and decreases with age thereafter. Travel increases with education, and is almost universal at the highest levels. Men are more likely to travel than women, overall, and in every demographic group. Travel also varies by occupation: farmers are the least likely to travel, while professionals are among the most likely to travel for both sexes. For men, as expected, the high-risk occupations also have very high rates of travel, whereas for women, people in these groups travel slightly less than professionals.

Travel and HIV risk

There is some evidence in this survey that travelers may be at higher risk for contracting or transmitting HIV, both in terms of risk behaviors and HIV seroprevalence. The associations are consistent but often not significant, as the number of observations in

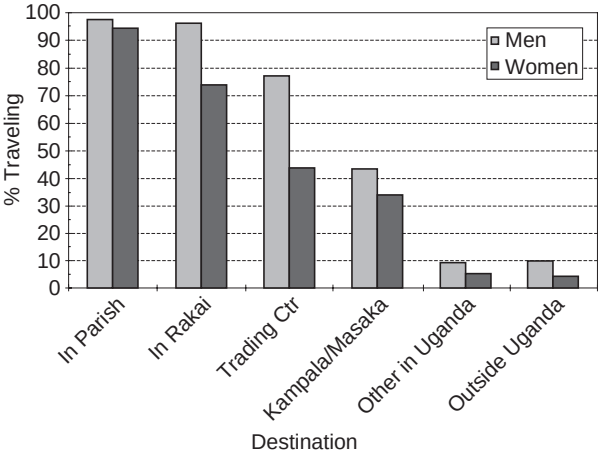

Fig. 1. Prevalence of travel to various destinations, by sex. The destinations are not mutually exclusive.

some of the cells becomes quite small. Table 2 lists the measures of behavioral HIV risk broken down by sex and travel status. Male travelers are somewhat more likely to report behavioral risk factors, such as having multiple partners [odds ratio (OR), 1.5; $P = 0.14$], concurrent partners (OR, 1.4; $P = 0.24$), and non-spousal partners (OR, 1.3; $P = 0.28$). Female travelers, by contrast, report levels of behavioral risk that are similar to those of non-travelers. In multivariate analysis, controlling for age, education and residence location eliminates the travel effect for men, with higher risk occupations and higher economic status significantly associated with greater behavioral risk. This suggests that the characteristics of these men, rather than the process of travel itself, leads to greater behavioral risk taking. These findings are consistent with the preponderance of evidence in related studies that travel is associated with higher behavioral risk, but they also suggest that the effect is small at best, with travel likely to be acting as a proxy for other factors.

Condom knowledge, attitudes and practice

While travelers report slightly higher levels of risk behavior, they also have greater knowledge and more positive attitudes towards condoms, and higher condom use with their non-spousal partners. As shown in Table 3, this is true for both men and women. Scores on the knowledge index are significantly higher (γ, 0.49 for men; γ, 0.30 for women; $P < 0.001$ for both), as are scores on the attitude index (γ, 0.57 for men; γ, 0.29 for women; $P < 0.001$ for both). Male travelers are three times more likely to report being comfortable with condoms (OR, 4.1; $P < 0.001$), and using condoms with non-spousal partners (OR, 3.7; $P < 0.02$), while female travelers almost twice as likely to report being comfortable (OR, 2.1; $P < 0.001$) and 2.5 times more likely to report condom use (OR, 3.2; $P < 0.01$).

This association between travel and higher rates of condom acceptance remains after controlling for education, residence and age, though the size of the travel

Table 2. Risk factor prevalence among travelers and non-travelers. The percentages are based on the number of observations reported in the last row.

	Men (%)			Women (%)		
Risk factor	No travel	Travel	OR	No travel	Travel	OR
Multiple partners	24.1	32.7	1.5	6.0	6.2	1.0
Concurrent partners	20.7	27.1	1.4	3.8	3.7	1.0
Non-spousal partners	29.9	36.1	1.3	17.7	20.8	1.2
Number of observations	87	538		317	486	

OR, Odds ratio.

Table 3. Condom knowledge, attitudes and use by travel and sex. The percentages are based on the number of observations reported in the last row.

	Rates of condom knowledge, attitudes and use (%)			
	Men		Women	
	No travel	Travel	No travel	Travel
Knowledge index				
0 (low)	6.9	1.7[a]	12.9	6.6[a]
1	54.0	34.4	52.7	43.8
2	35.6	44.8	27.8	34.6
3 (high)	3.4	19.1	6.6	15.0
Attitude index				
0 (negative)	82.8	56.1[a]	73.5	59.7[a]
1	13.8	22.5	18.3	24.9
2	0.0	8.9	6.9	11.1
3 (positive)	3.4	12.5	1.3	4.3
Comfortable with condoms	12.6	37.3**	16.7	30.1**
Use condoms with non-spousal partners	11.5	33.0*	12.5	31.7*
Number of observations	87	538	317	486

[a] $P < 0.001$ for trend; * $P < 0.05$; ** $P < 0.001$.

effect is slightly reduced. The multivariate logistic regression results are presented in Table 4. The sex of the respondent did not have an independent effect on either comfort with or use of condoms, but separate analyses for men and women suggested some interaction effects were relevant, and they are included here. Travel makes both sexes significantly more comfortable with condoms though the effect is stronger for men than for women. With the interaction effect in the equation, the main effect captures the impact of travel on women's comfort with condoms, while the interaction effect captures the additional increment for men who travel. For condom use, there is no interaction with sex: both sexes are almost twice as likely to use condoms with their non-spousal partners if they are travelers. The persistence of a significant effect for travel, even after controlling for other attributes, suggests that there is something about the process of travel itself that increases condom acceptance, above and beyond the characteristics of the travelers.

The respondent characteristics generally operate as one might expect. Both comfort with and use of condoms decreases with age. While we cannot distinguish between an age and a cohort effect here, there is some reason to believe that the young cohort is more accepting of condoms than previous cohorts have been. If so, the strong significant coefficients on age suggest a positive trend for the future. Education is also linked to reporting more comfort with condoms. While it is not significant for condom use with non-spousal partners, it is close, and the trend in the coefficients is also positive. Occupation, and particularly a professional occupation is a better predictor of condom use. This suggests that education is linked to attitudes, whereas occupation – perhaps a better indicator of what one has to lose by contracting HIV – is linked to use; however this point should not be pressed too hard. The high correlation between education and professional occupation suggests that these two variables might best be understood as tapping a single dimension, such as socio-economic status, that is strongly associated with both condom acceptance and use.

The control variables for behavioral risk are also significant, though not uniformly. If a respondent reports multiple partners in the last year, their odds of both condom acceptance and use rise by nearly 50%. If they report that they know or believe that their partner has other partners, this increases their comfort with condom use, but interestingly, does not increase their use of condoms. We examined this lack of relationship in detail, using both the sample of respondents and the sample of partnerships. It is not simply a matter of statistical significance, there is simply no increase in condom use with a non-spousal partner, even if the respondent reports that they know this partner has other partners, and this is true for both sexes, and for both travelers and non-travelers. There is, instead, a small propensity for respondents with multiple partners to use condoms when they believe that their partner does not have other partners, suggesting a desire to protect their partner, but this is not statistically significant.

Non-spousal partners of travelers

The mobility and greater acceptance of condoms among travelers makes them a strategic group for social

Table 4. Multivariate logistic regression results for the impact of travel on condom acceptance and use.

		Multivariate odds ratio	
Variable (reference level)	Contrast level	Comfort with condoms	Condom use with non-spousal partners
Travel (no)	Yes	1.57**	1.99*
Travel*sex	Yes, male	1.30*	NS
Residence (trading center)	Intermediate	0.98	0.28***
	Rural	0.72**	0.45***
Age (years) (15–19)	20–29	0.97	1.40
	30–39	0.55***	0.70
	40–49	0.33***	0.47
Education (years) (none)	1–4	1.47	NS
	5–7	2.28***	
	8+	3.53***	
Occupation (high-risk)	Farmers	NS	0.80
	Shop/labor		0.75
	Professional		9.90***
	Student		2.14
	Other		0.79
Multiple partners (no)	Yes	1.44**	1.57*
Partner has other partners (no)	Yes	1.94***	NS
Number of observations		1410	376
Model χ^2 (d.f.)		184 (12)	55 (12)

* $P < 0.1$; ** $P < 0.05$; *** $P < 0.01$. NS, Non-significant; d.f., degrees of freedom.

marketing programs. As travelers will be using the condoms with a (typically non-spousal) partner, their partners may also be well served by a social marketing initiative. It would therefore be useful to know more about these partners. The local network module of this survey makes it possible to get a reasonably detailed picture of these partners, and their demographic attributes are presented in Table 5. Partners of male travelers differ in several ways from those of non-travelers. They are typically younger (γ, -0.44; $P < 0.01$) and more educated (γ, 0.72; $P < 0.01$). Substantially more of them are students, while fewer of them work in agriculture or housework (the number of partnerships becomes too small in some categories to report statistical significance levels). The partnerships are more often short term, and less often of long duration (χ^2, 22.0; $P < 0.01$). The partners of female travelers also tend to be younger (γ, -0.21; $P < 0.15$) and to have more education (γ, -0.22; $P < 0.05$). More of them are traders, and fewer work in agriculture.

The distinctive profile for the partners of travelers could be due to the attributes of the travelers themselves (younger and more educated). It could also be due to different mixing patterns: the rules of partner selection may differ between travelers and non-travelers. Examination of the age, education and occupation mixing matrices (not shown here) indicates that partner selection patterns are in general quite similar for travelers and non-travelers. There is some tendency for greater age asymmetry in traveler's partnerships – a greater likelihood of older men with younger women, especially among men over 40 years old – and a slightly higher probability of pairings between men with higher risk occupations and women who are either farmer/house-workers or students. In general, however, the partnerships are similar, and in particular, there is no evidence that traveler's partnerships are more likely to be assortative with respect to high-risk occupations. These data do not suggest that travelers are part of a distinctively high-risk core network, but rather that they are integrated into the general sexual network.

In partnerships involving travelers, then, the women typically are young and relatively well educated. The men have a broader range of age and education. While the greater age asymmetry in partnerships might be

Table 5. Attributes of the non-spousal partners by travel and sex of respondent. A total of 470 non-spousal partners were reported by 1428 sexually active respondents in the last 12 months. The percentages in the table are based on the number reported in the bottom row, and sum to 100 in each of the attribute panels. High-risk occupations include truckers, mobile traders, barworkers and the unemployed.

	Partners of men who report (%)		Partners of women who report (%)	
Partner attribute	No travel	Travel	No travel	Travel
Age (years)				
15–19	31.0	44.6[a]	9.1	9.3
20–29	20.7	43.4	40.0	54.6
30–39	41.4	10.4	29.1	22.2
40–49	6.9	1.6	21.8	13.9
Education				
None	51.5	11.1[a]	6.6	1.8[b]
Primary 4 years	24.2	21.0	23.0	8.9
Primary 7 years	24.2	44.9	39.3	37.5
Higher	0.0	23.0	31.1	51.8
Occupation				
Salaried	–	3.6	3.2	8.8
Blue collar	–	–	19.4	21.1
Trader	–	8.1	24.2	35.1
Vendor	9.1	3.6	3.2	4.4
Agriculture	45.5	25.9	38.7	19.3
Student	6.1	21.9	–	–
Housework	33.3	25.9	–	–
Hotel/bar/restaurant	6.1	3.6	–	0.9
Other/unemployed	–	7.3	8.1	7.9
Length of partnership				
< 1 Month	6.1	16.0[c]	11.9	6.3
1–6 Months	33.3	14.4	10.2	18.0
6–12 Months	12.1	25.3	20.3	24.3
1–4 Years	30.3	40.5	42.4	36.9
5+ Years	18.2	3.9	15.3	14.4
Total non-spousal partners (n)	33	261	62	114

[a] $P < 0.01$ for trend; [b] $P < 0.05$ for trend; [c] $P < 0.01$, χ^2.

expected to lower the likelihood of condom use, the asymmetry in favor of women's education may be one reason that we instead observe higher rates of condom use.

Using the partnership sample we can also examine whether the observed increase in condom use among travelers occurs primarily in the context of non-local partnerships, or whether travelers simply use condoms more often with all non-spousal partners. Non-spousal partners tend to live outside the respondent's community, both for travelers and for non-travelers: over three-quarters of all non-spousal partners live outside the respondent's village, and about 40% live outside the respondent's county (note that the partner can travel, so non-mobile respondents can have non-local partners). Using the county level measure, the residence of the non-spousal partner has no impact on condom use for travelers: travelers use condoms with 35% of local non-spousal partners, and 31% of non-local non-spousal partners. There is a slight impact of partner residence for non-travelers: they use condoms with only 7% of local non-spousal partners, but this rises to 18% of their non-local non-spousal partners. The patterns for the village level measure are similar. This finding again suggests that it is something about the process of travel itself that influences condom use: travelers do not distinguish between local and non-local partners, and are more likely to use condoms with both. Non-travelers are more likely to use condoms when their partners are travelers. This suggests that travelers may be having a positive impact on condom use when they form partnerships on the road.

Finally, it is often assumed that the partnerships formed by travelers while on the road are more likely to be with high risk partners (e.g., commercial sex workers). The data from this rural district do not support this assumption. For travelers, non-local non-spousal partners were not more likely to be in one of the high risk occupations (OR, 1.1 for the village level measure and 0.91 for the county level measure). Interestingly, however, for non-travelers their non-local non-spousal partners were somewhat more likely to have a high risk occupation (OR, 2.4 for the village level measure and 1.1 for the county level measure, neither is significant). For this rural population, then, contact with more risky partners comes not from traveling oneself, but from having sex with someone who has traveled into one's village.

Discussion

The findings here suggest that travel has no independent effect on HIV-related risk behavior, though travelers are more likely to be at risk by virtue of their age, occupation and economic status. Travel does, however, have a significant, independent and positive impact on knowledge about and attitudes towards condoms, and on the use of condoms in non-spousal partnerships. This effect remains significant even after controlling for education, age, residence, occupation, economic status, and sexual activity, and occurs in the context of both local and non-local partners. Non-travelers, too, report that they are more likely to use condoms when their partners are travelers. This suggests that something about the experience of travel itself leads to a greater acceptance of this risk reduction method. The most likely explanation is that traveling exposes the respondents to new behaviors and weakens traditional social constraints, and thereby helps to lessen the obstacles to condom use. There may also be some influence from exposure to the condom social marketing initiatives, which have targeted the markets and trading centers for several years now. Travelers appear to have learned the importance of safer sex. They represent an opportunity for diffusing behavioral change, not simply spreading the virus. If we ignore this, and see travelers only as disease spreaders, we are missing an opportunity for intervention.

We hope these findings encourage more researchers to look at the relationship between condom acceptance and mobility, as mobility plays a key role in the spread of HIV (for a general review see [19]). Because HIV seroprevalence is generally highest in urban areas and along trade routes throughout East Africa, researchers often focus on mobile rural persons as a bridge in the spread of the virus from urban to rural populations. Our findings suggest that these same people are also a potential bridge in the diffusion of more positive attitudes and practices regarding condoms. For public health systems with limited resources it can be difficult to reach people in rural areas. If prevention programs focus these limited resources on central locations that rural travelers pass through, the travelers can bring their knowledge back to the communities that are more difficult to reach. The Ugandans have a traditional saying for this: '*okutambula kulaba, okudda kumanya*' roughly: 'traveling is seeing, coming back home is telling what you have seen'.

Condom promotion campaigns should exploit the opportunities that this presents, targeting social marketing programs toward both travelers and their partners. Our findings suggest that local and mobile markets would be good places to reach the mobile population, as many travelers and their partners are traders. Travelers are also likely to stop at restaurants, bars, and hotels, so these may be efficient locations for condom promotion and distribution programs. The findings also suggest that travelers' partners can be reached effectively. For example, 49% of male travelers report that their non-spousal partners are students and young girls

who work at home. This suggests that school-based programs would reach a group of young women who may be at higher risk but whose partners are also more likely to accept a request to use condoms. Among female travelers, 44% report that their partners are traders and other blue-collar workers. These partners might best be served by a program targeting markets, hotels and restaurants. The relatively higher education of women partners in traveler's partnerships may be one of the reasons for the higher rates of condom use. This suggests that women's educational parity plays an important role in the dynamics of negotiating safer sex.

The finding that respondents increase condom use when they have multiple partners, but not when they know that their partner has multiple partners, is also interesting. This pattern did not vary by sex – both men and women showed the same behavior – so it is not simply a function of women being unable to negotiate condom use when their partner puts them at risk. The finding suggests that respondents are linking their risk to their own behavior, rather than their partner's behavior. This might not be surprising in a more naïve population, but it is somewhat surprising in the Rakai context, where the epidemic is now 20 years old, virtually every family has been touched by AIDS, and knowledge of the routes of transmission is almost universal. Prevention messages in this community need to reemphasize the importance of chains of transmission, and not simply individual behavior, for the risk of exposure to HIV and other sexually transmitted diseases.

Finally, the finding that travelers are not more likely to have partners from higher risk occupations when they are on the road, but instead that non-travelers are more likely to have higher risk partners when these partners come from outside the village, challenges some common assumptions. The latter finding is not statistically significant, so one should be careful not to overemphasize it, but the lack of significance in the former finding is noteworthy. It suggests that HIV is introduced into these villages by people from outside, rather than brought back to the village by locals who travel. In part this pattern is probably a function of the study site – a very rural area that in some ways serves as an endpoint for the spatial spread of HIV. One would therefore not want to generalize to travelers from all areas. But the patterns do suggest that more careful research is needed to understand the dynamics of HIV spread through spatial networks.

By necessity, we have used simple, relatively crude measures of mobility, condom acceptance, and condom use. It would clearly be useful to separate short and long term travel, travel for work purposes, including seasonal migration, and permanent change of residence. Our study was not designed to provide this level of detail on mobility, but the mobility data that were collected here were substantially enhanced by the partner information from the local network module. The local network approach to survey design can provide detailed spatial and demographic information on both travelers and their partners. Such data can be used to reconstruct the spatial network of sexual partnerships [20], and to examine systematically the sexual networks of mobile persons. More systematic study of mobility, and its consequences for both risk enhancement and risk reduction, would make it possible to design intervention programs that disable the network for the spatial spread of HIV.

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