Levels of Protection across Concurrent Sexual Partnerships

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Abstract

A large body of research has found that sexual partner concurrency increases the transmission of sexually transmitted infections, including HIV. Researchers are now calling for further investigation into the types of concurrency that promote or impede onward transmission of STIs. In this paper, we use life history data collected from youth in urban Kisumu, Kenya, to examine levels of protection within concurrencies, defined by combinations of sexual intercourse and condom use. We find that approximately one-third of concurrency episode months were completely protected by consistent condom use and/or no sexual intercourse, and thus the large majority of months were not protected and therefore at some risk of STI transmission. Regression results show that mutual concurrency is more likely to display full protection for females and longer concurrencies, which are thought to increase transmission potential, are more likely to be protected among both females and males.

Introduction

A large body of research has found that sexual partner concurrency (having two or more sexual partnerships that overlap in time) increases the transmission of sexually transmitted infections (STIs), including HIV. Researchers are now calling for further investigation into the types of concurrency that promote or impede onward transmission of STIs (Mah & Halperin 2010). Polygynous unions have been identified as a "safer" form of concurrency because of a possible "coital dilution effect," where there is a lower frequency of intercourse across multiple simultaneous female partners (Reniers and Watkins 2010). Polygynous unions may account for a substantial share of all concurrent partnerships in some sub-Saharan countries, such as West Africa. In addition to coital dilution, consistent condom use within concurrencies could mitigate the transmission impact as well (Doherty et al. 2009). In this paper, we use life history data collected from youth in urban Kisumu, Kenya, to examine levels of protection within concurrencies, defined by combinations of sexual intercourse and condom use. STI rates are high within this population, and there is little polygyny. Instead, mutual concurrency, where both sexual partners have other sexual partners, which connects sexual networks together, is common (Xu et al. 2010). Therefore, investigation into the prevalence and characteristics of partnerships that display lower or higher levels of projection is needed to identify which types of concurrency should be targeted by policies and interventions.

Data and Methods

The data we use for the analyses come from the Urban Life among Youth in Kisumu Project. The study was designed to compare the quality of sexual behavior reporting using a new instrument, the Relationship History Calendar (RHC), with that of a standard sexual-partnership questionnaire, such as the one used in Demographic and Health Surveys. The sample included 1275 young people aged 18–24. Enumeration areas (EAs) mapped by the Government of Kenya's Central Bureau of Statistics for Kisumu town were used as primary sampling units. Of the urban EAs, 45 were randomly chosen for the survey. A team of ten interviewers contacted every other household in each enumeration area, and one eligible respondent was selected randomly from each household. Respondents were randomly assigned to be interviewed with the RHC or with the standard instrument. The overall response rate was 94.9 percent, with no significant differences by sex or instrument type (for further details of the study design, see Luke et al. 2011).

The RHC is a fold-out grid in which monthly information on each topic is recorded in a time-line format over a 9.5-year retrospective period (January 1998 to June/July 2007). Like other life-history calendars, the RHC gathered information on changes in residence, employment, and schooling. In addition, respondents provided detailed information for each month of each of their romantic (non-sexual) and sexual partnerships, including partner characteristics, relationship dimensions (such as type and duration), and sexual activities (including frequency of intercourse and level of condom use). Life history calendars were designed to minimize recall error with the use of memory aids and flexible interview style that allows for cross-checking of event dating (Axinn et al. 1999; Belli and Callegaro 2009). These procedures are likely to make recall of the exact timing (by month and year) of the frequency of sexual intercourse and condom

use within relationships relatively accurate. The RHC method was specifically designed to reduce social desirability bias, which is particularly relevant when gathering information on sensitive sexual behaviors. The method incorporated qualitative techniques, such as rapport-building, and the structure of the questioning also minimized the potential embarrassment of questions on sexual behavior by embedding them within the more innocuous context of relationships as well as in conjunction with schooling, work, and migration histories. The results of the methodological experiment suggest that, compared with the standard instrument, the RHC decreased social-desirability bias and improved the reporting of a variety of measures of sexual behavior (Luke et al. 2011). For the present study, concurrency estimates were calculated using data from RHC respondents only (N=608).

Detailed data from the RHC on the frequency of sexual intercourse each month for each partnership provided the opportunity to define concurrency precisely by month. We compared the months of first and last sexual intercourse within each relationship for the same individual and defined *concurrency* as having two or more sexual partnerships that overlapped in time. The period of consecutive months when two or more sexual partnerships overlapped was treated as a *concurrency episode*. For the analysis, we use the sample of months that make up all concurrency episodes. In total, N=142 concurrency episodes included N=766 concurrency episode months.

We created a trichotomous measure of the *level of projection within concurrency episode months*. We utilize information from the RHC on sexual intercourse in the month (yes/no) and condom use level in the month (always, most of the time, sometime, very rarely, and never). The three levels included "completely protected," where all partnerships in the month had no sexual intercourse and/or always used a condom; "not protected," where all partnerships had sexual intercourse in the month but no condom use; and "somewhat protected," which included all the remaining combinations of sexual intercourse and condom use.

We first present descriptive statistics on concurrencies in the sample. We next perform a multinomial logit regression using concurrency episode months as the unit of analysis. The level of protection within the concurrency month serves as the dependent variable, and the results are clustered at the level of concurrency episode. Independent variables include the duration of the concurrency episode in months up until that month; at least one concurrent partner lived in a different city/village from the respondent (yes/no); if the respondent knows or suspects at least one of the partners to have other sexual partners during that month (mutual concurrency) (yes/no); and relationship type, which included four dichotomous variables for whether at least one partner was a spouse/finance, serious partner, dating partner, or casual partner. Controls include respondent characteristics in the month: currently in school or not, currently employed or not, educational attainment (primary or less vs. secondary school or more), and household wealth quintile. We complete the regression analysis separately for males and females.

Preliminary Results

Tables 1 and 2 present information on concurrency indicators for various time periods and samples. Individuals are the unit of analysis. Estimates of point prevalence, calculated for a

specific month before the survey, are shown in Table 1. In the sixth month before the survey, 3.5 percent of females and 4.0 percent of males had more than one ongoing sexual partner. Point prevalence is higher when the sample is restricted to sexually active respondents owing to the smaller denominator of each measure. With respect to cumulative prevalence, during the year before the survey, 5.6 percent of females and 12.7 percent of males had at least one concurrency episode, and 13.6 percent of females and 22.4 percent of males experienced concurrent relationships in the previous 9.5 years. If we restrict the sample to those who were sexually active, the estimates again increase.

In the bottom panel of Table 1, we see that, of those who experienced concurrent relationships in the previous 9.5 years, over 80 percent of both males and females had only one episode. Of the remainder, all but one of the females and approximately ten percent of males had two, and another ten percent of males had three or four. In the year before the survey, approximately 85 percent of both sexes had one episode and the remainder had two. No one experienced more than two concurrency episodes in the previous year.

Table 2 uses concurrency episode months as the unit of analysis. We see that approximately 90 percent of young women's episodes and approximately 80 percent of young men's episodes involved two ongoing sexual partnerships simultaneously. The percentage of episodes involving three partners is lower for females than for males, and one episode among young males involved four partners. The duration of concurrency episodes is highly variable: 34.0 percent of females' and 55.8 percent of males' episodes in the previous 9.5 years lasted one month, while 19.1 percent of females' and 12.6 percent of males' episodes lasted over one year. On average, young men's episodes (5.2 months) were shorter than young women's (7.0 months).

Table 3 presents the matrix of the combinations of levels of protection within concurrency episode months. The results are restricted to concurrencies that involved only two partners. Table 4 summarizes the results for concurrency episode months with only two partners and those with all partners included. We see that approximately one-third of concurrency episode months were completely protected, with a higher percentage among young females (40 percent) than among young males (26 percent). Around 14 percent of months are not protected at all, which is lower for females (10 percent) than males (15 percent). Thus, the large majority of months are at some risk of STI transmission. Figures at the bottom of Table 3 are for concurrency episodes, which show that about 30 percent of all concurrencies included fully protected months across the entire concurrency.

Our final analysis examines the correlates of levels of projection within concurrency episode months. Table 5 presents descriptive statistics for the independent variables by level of concurrency, and Tables 6 and 7 show the multinomial regression results for females and males, respectively. Looking across both regression tables we find that mutual concurrency increases the likelihood of full protection compared to somewhat protected for females, and having at least one marital partner decreases it. For males, having a serious partner decreases the likelihood of full protection. For both males and females, shorter episodes are associated with no protection compared to somewhat protected, and fidelity between partners increases the likelihood of no protection for females. Correlates of some protection for females include geographic separation of partners and having a dating partner.

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These results have implication for STI transmission. Mutual concurrency (where at least one partner has another sexual partner) produces wider, more connected sexual networks, but our results show that, for females, it also appears to be more likely to display full protection. Longer concurrencies are thought to increase transmission potential, but they also appear to be more protected among both females and males. Finally, we find that the types of relationships affect the level of protection within concurrency. If one partner is stable (a spouse or serious partner), the concurrency is less likely to be fully or somewhat protected.

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Table 1. Individual concurrency measures of urban Kenyan youth (ages 18-24 in 2007)

	Point prevalence 6 months before interview (%)		Cumulative prevalence in last 1 year (%)		Cumulative prevalence in last 9.5 years (%)	
	Female	Male	Female	Male	Female	Male
Of all respondents	3.5	4.0	5.6	12.7	13.6	22.4
N	286	322	286	322	286	322
Of sexually active respondents	6.2	9.4	7.8	19.6	16.1	25.7
N	162	138	205	209	242	280
Of those who had concurrency episodes						
No. of episodes						
1	--	--	87.5	85.4	82.1	80.6
2	--	--	12.5	14.6	15.4	9.7
3	--	--	0.0	0.0	2.6	6.9
4	--	--	0.0	0.0	0.0	2.8
N			16	41	39	72

Table 2. Characteristics of concurrency episodes in 9.5 years before interview for urban Kenyan youth (ages 18-24 in 2007)

	Female %	Male %
Number of concurrent sexual partners[1]		
2	93.6	82.1
3	6.4	16.8
4	0.0	1.1
Duration of episodes (months)		
1	34.0	55.8
2-3	25.5	12.6
4-6	12.8	10.5
7-12	8.5	8.4
>12	19.1	12.6
N	47	95

[1] Maximum number of simultaneous partners during episode

Table 3. Levels of protection in concurrency episode months involving 2 partners

Sex/condom use with Partner 1 (%)	Sex/condom use with Partner 2 (%)						Total %	N
	No sex	Always	Most of the time	Some-times	Very rarely	Never		
No sex	6.0	14.8	0.7	1.8	0.4	10.4	34.1	261
Always	--	11.9	0.1	5.9	1.4	18.9	38.2	293
Most of the time	--	--	1.2	0.0	0.0	0.1	1.3	10
Sometimes	--	--	--	3.9	1.6	5.6	11.1	85
Very rarely	--	--	--	--	0.1	1.6	1.7	13
Never	--	--	--	--	--	13.6	13.6	104
Total %	6.0	26.6	2.0	11.6	3.5	50.3	100.0	766
N	46	204	15	89	27	385		

Completely protected =   all partnerships had no sex and/or always used condom in month
Somewhat protected =   remaining combinations of sex and inconsistent condom use
Not protected =   all partnerships had sex but no condom use in month

Table 4. Levels of protection within concurrency

	Episode months that involve				Episode months with all Ps			
	Two Ps only		All		Females		Males	
	%	N	%	N	%	N	%	N
Concurrency episode months								
Completely protected	32.6	250	31.6	261	40.1	131	26.1	130
Somewhat protected	53.8	412	55.3	456	49.8	163	58.8	293
Not protected	13.6	104	13.1	108	10.1	33	15.1	75
	100.0	766	100.0	825	100.0	327	100.0	498
Concurrency episodes								
Completely protected throughout entire episode	30.2	42	31.0	44	--	--	--	--
Not protected	69.8	97	69.0	98	--	--	--	--
	100.0	139	100.0	142	--	--	--	--

Table 5. Individual and concurrency episode characteristics by levels of protection

	Female			Male		
	Fully protected (%)	Somewhat protected (%)	Not protected (%)	Fully protected (%)	Somewhat protected (%)	Not protected (%)
Individual characteristics						
Currently in school	40.5	13.5	15.2	44.6	65.9	54.7
Currently employed	20.6	22.7	21.2	27.7	20.5	26.7
Educational attainment						
None or primary school	42.8	61.4	60.6	26.9	35.5	56.0
Secondary school or beyond	57.3	38.7	39.4	73.1	64.5	44.0
Household wealth quintile						
Poorest	3.1	23.3	0.0	15.4	31.7	57.3
Poor	72.5	38.0	15.2	16.9	8.9	21.3
Middle	0.8	6.8	60.6	20.8	25.3	17.3
Rich	19.9	28.2	18.2	23.1	15.4	0.0
Richest	3.8	3.7	6.1	23.9	18.8	4.0
Episode characteristics						
Duration of episode						
6 months or less	42.0	42.3	97.0	62.3	42.7	62.7
More than 6 months	58.0	57.7	3.0	37.7	57.3	37.3
At least one partner lives in a different village/city	51.9	31.9	12.1	43.1	41.0	20.0
Partners' other partners						
All partners have other partners	51.9	11.7	6.1	20.0	23.2	6.7
At least one has/one did not	41.2	74.9	24.2	41.5	46.1	45.3
No partner has other partners	6.9	13.5	69.7	38.5	30.7	48.0
At least one P is spouse/fiancé/e	8.4	47.2	51.5	33.9	24.2	9.3
At least one P is serious	64.9	38.7	57.6	26.9	58.7	44.0
At least one P is dating	42.0	68.1	30.3	36.2	28.3	50.7
At least one P is casual	31.3	21.5	9.1	73.1	68.3	58.7
N concurrency episode months	131	163	33	130	293	75

Table 6. Multinomial logit models of corrrelates of levels of protection within concurrency episode months for females

	Female sample (N = 327)			
	Compared to Somewhat Protected			
	Completely Protected		Not Protected	
	Coef.	RSE.	Coef.	RSE.
Individual characteristics				
Age (years)	-0.064	0.187	**-0.768**	**0.284** **
Currently in school	0.391	0.640	-2.020	1.395
Currently employed	0.237	0.896	-0.082	1.230
Secondary school or beyond (ref: none/primary)	0.831	0.739	-0.728	1.096
Household wealth	0.364	0.388	**1.209**	**0.589** *
Episode characteristics				
Duration of episode to date (months)	0.045	0.030	**-0.467**	**0.140** **
At least one partner lives in a different village/city	0.096	0.762	**-2.442**	**1.214** *
Partners' other partners (ref: one has/one not)				
All partners have other partners	**2.247**	**0.758** **	1.633	1.481
No partner has other partners	-0.678	0.841	**3.172**	**1.433** *
At least one partner is spouse/fiancé/e	**-2.993**	**1.183** *	1.551	1.271
At least one partner is serious	-0.875	1.149	1.321	1.180
At least one partner is dating	-0.653	0.712	**-3.356**	**1.093** **
At least one partner is casual	0.355	0.899	-1.867	1.979
Constant	-0.124	2.477	10.883	4.571 *

RSEs clusterd at episode level

Table 7. Multinomial logit models of corrrelates of levels of protection within concurrency episode months for males

	Male sample (N = 498)			
	Compared to Somewhat Protected			
	Completely Protected		Not Protected	
	Coef.	RSE.	Coef.	RSE.
Individual characteristics				
Age (years)	-0.008	0.156	**-0.368**	**0.176** *
Currently in school	**-1.087**	**0.518** *	-0.664	0.935
Currently employed	0.044	0.687	0.104	0.934
Secondary school or beyond (ref: none/primary)	0.263	0.898	0.449	0.676
Household wealth	0.204	0.249	**-0.992**	**0.339** **
Episode characteristics				
Duration of episode to date (months)	-0.005	0.015	**-0.061**	**0.022** **
At least one partner lives in a different village/city	0.093	0.420	-0.485	0.624
Partners' other partners (ref: one has/one not)				
All partners have other partners	0.523	0.627	-1.485	1.215
No partner has other partners	0.406	0.559	0.803	0.626
At least one partner is spouse/fiancé/e	-0.619	0.695	-0.131	0.935
At least one partner is serious	**-1.750**	**0.614** **	-0.788	0.606
At least one partner is dating	0.217	0.542	0.554	0.673
At least one partner is casual	-0.200	0.622	-1.128	0.763
Constant	-0.128	3.212	9.067	3.578 *

RSEs clusterd at episode level