Relationship Inequality and HIV Risk in Malawi

Jenny Trinitapoli
Penn State University

Emily Smith Greenaway
Penn State University

The AIDS epidemic of Sub-Saharan Africa has generated much interest in identifying and understanding the risk factors for HIV transmission. In contrast to parts of the world with concentrated HIV epidemics, where high risk "vectors" (i.e., intravenous drug users and sex workers) are primarily responsible for the spread of the disease, the African epidemic is a generalized one. The majority of transmission takes place within stable relationships (i.e., marriages and cohabiting unions).

The fact that transmission occurs primarily within relationships has prompted a small, but growing body of research on relationships in the African context—specifically, the features of relationships that may heighten both actual and perceived risk. Distilled into a traditional stratification framework, the existing body of research emphasizes the role of inequality within relationships as a risk factor for HIV transmission along two key demographic dimensions—gender and age. There is considerable focus on how gender roles and obligations 'disempower' women in sexual relationships and act as a key underlying risk. There has also been an emphasis on inter-generational sex, specifically the role of "sugar daddies" (an exchange-based, sexual relationship between an older man and a young woman) in spreading HIV. But, in general, these studies have produced scant empirical evidence that gender and age inequalities are truly risk factors—either at the population or the individual level.

Relationships can be characterized by many other forms of inequality beyond gender and age. These seldom-considered inequalities within relationships are the subject of our analyses. In this paper, we will draw upon literature from social stratification, the sociology of religion, and psychological studies of physical attractiveness, to motivate the examination of how educational, class background, religious, and attractiveness inequalities *within relationships* are associated with perceived risk of HIV infection. We use new couple-level data from an ongoing study in rural Malawi to test for associations between these inequalities and the perceived level of risk along two time horizons (now and in the future) for each member of the couple, and for the couple as a unit.

Our motivation for focusing on perceptions of risk is three-fold. First, studies show that people's perceptions of risk are closely aligned both with the aggregate epidemiological patterns and with their own sero-status (Angelwicz and Kohler 2009; Trinitapoli and Yeatman 2011). In other words, people are good assessors of their own risk. Second, there is evidence that perceived level of risk is informed by relational factors, with women being most worried about being infected by their spouse, while men, who marry later, worry most about infection through non-marital partners (Smith and Watkins 2005). Third, perceived risk far exceeds actual HIV prevalence (which is relatively low among young adults), and allows us to take a graded, rather than binary, approach to HIV risk.

DATA & SAMPLE

Data for this study come from a longitudinal research project, Tsogolo la Thanzi (TLT). TLT is an ongoing study in Balaka, Malawi that focuses on young adults' transition to adulthood in the wake of the AIDS epidemic.

The first wave of data collection took place between May and August 2009. A simple random sampling technique was used to draw a representative population from the villages around Balaka, a growing town in the southern region of Malawi. A complete household listing was conducted within a 7-kilometer radius of the center of town. The catchment area includes rural and peri-urban communities around Balaka. The household listing provided a complete sampling frame of 15 to 23 year olds within the catchment area. From the household list, a random sample of 1500 women and 600 men were recruited to participate in the study.

Women's sexual and romantic partners were asked to enroll in the study using respondent-driven sampling techniques. At the end of the survey, young women are given tokens to give to their sexual and romantic partners, who enroll in the study and complete the full interview. A total of 443 such partners were recruited during the first wave of data collection between May and August 2009. These rich data allow us to analyze couple-level outcomes by using women's and men's reports.

Another unique feature of TLT is the centrally located research center where interviews occur. Respondents are interviewed in a private room where their responses cannot be overheard. The privacy of the TLT research center increases disclosure of sensitive information, such as sexual behavior or suspicion about partner's sexual behaviors, which respondents may be more reluctant to disclose when completing an interview in their own home where observers may overhear.

Analytic Sample

We exclude some couples from our final analytic sample. First, because we are interested in the dynamics of perceived risk of HIV among intimate sexual partnerships, we exclude the 9 couples that the female respondent classifies as an infrequent sexual partnership (5 couples), nonsexual partnership (3 couples), or a one night stand (1 couple). Second, of these 434 couples, we exclude 26 couples (less than six percent of the sample) with missing data on explanatory variables. Listwise deletion is an acceptable strategy for handling such a small percentage of cases (Von Hippel 2007).

MEASURES

Dependent variables

We make use of an interactive technique to elicit respondents' probabilistic expectations about risk of infection. In this method, an interviewer places 10 beans on a table and asks the respondent to shift onto a plate the number of beans that represents the likelihood of a particular eventuality. The interviewer introduces the method with straightforward questions about the likelihood of a common occurrence (e.g., going to the market) given a specified time frame and moves slowly to questions about more sensitive issues. Here, we examine respondents' answers to the prompt: "Pick the number of beans that reflects how likely it is that: a) you are infected with HIV right now, b) you will become infected with HIV during the next 12 months." We give respondents who indicated 10 beans when assessing their current status a value of 10 for the likelihood measure for the one-year time horizon. We categorize individuals' perceived risk now and in one-year as: (1) no perceived

risk (0 beans), (2) low perceived risk (1-4 beans), and (3) high perceived risk (5-10 beans). We assess perceived HIV risk along these two time horizons and from three perspectives: hers, his, and theirs. We utilize her and his perceived risk to measure 'their' risk, and adopt the highest value of her or his perceived risk as the couple's perception.

Key Independent Variables

We examine six distinct dimensions of inequality among couples. First, we create an indicator of age disparity. We consider couples age disparate if the male is three or more years older than their female partner[1].

Second, we create two measures of educational inequality. The first measures school enrollment status. This indicates whether the man only is currently enrolled, the woman only is currently enrolled, both are in school, or both are out-of-school (reference group). The second measure focuses on the level of education completed at the time of the interview. We calculate individual's level of school completed (0-12), and then create a three categorical outcome of whether he has completed more formal education, she has, or whether they have the same level of education (reference group).

Third, to evaluate socioeconomic inequality, we create an indicator based on the women's perception of whose family is "better off" financially[2]. This variable distinguishes couples with women who perceive that his family is wealthier, her family is wealthier, or their families' have equal wealth (reference group).

[1] The analytic sample does not include any age disparate couples with a more senior female partner.
[2] Additional analyses confirm that using the male's perception of whose family is "better off" financially produces similar results.

Fourth, we create two measures to evaluate religious inequalities. We use individual's reports of the name of their congregation to create a binary indicator of whether the couple attends the same congregation or attends different congregations (reference group). Respondents are also asked how frequently they attend religious services. We categorize respondents into those who attend: never, once per month, 2-3 times per month, once per week, more than once per week. Based on these response categories, we create an indicator of whether he is more religious, she is more religious, or if they are equally religious.

Beyond demographic inequalities, we also look at two more relational dimensions of inequality. The fifth dimension captures differences in the partners' sexual histories. Using information from the number of previous sexual partners that individual reports, we create an indicator of inequality in sexual experience: he has had more, she has had more, they have had an equal number. The sixth dimension focuses on physical attractiveness. TLT interviewers interview respondents of their own gender. At the end of each interview, interviewers are asked to complete follow-up questions about the respondent. Interviewers categorize the respondent's relative attractiveness in response to the following prompt: "Personally, how would you rank the respondent's physical attractiveness relative to other persons of about the same age and sex?" Interviewers select if the respondent is much more attractive than average, more attractive, average, below average, or much less attractive than average[3]. We use this information to create a three category indicator for whether the man is more attractive, the woman is more attractive, or if the partners are ranked as the same level of attractiveness (reference group).

[3] The interviewer's assessment is independent from fellow interviewer's assessment of the respondent's partner.

Statistical controls

In addition to measuring discordance, we control for couple-level correlates of perceived risk. We control for whether the couple is married/cohabiting versus dating, the length of the relationship (months), perceived likelihood that the other partner has additional sexual partners, and a summed measure of the woman and man's incomes. Because of the non-normative distribution, we use take the square root of the couple's income.

ANALTYIC STRATEGY

We use a series of ordinal logistic regression models to assess how inequality within relationships influences perceived risk for among women, men, and couples. We estimate all models in Stata 11 using the *ologit* command for ordinal outcomes.

We begin by providing descriptive statistics of the sample to highlight the variation in the perceived risk of HIV infection among women, men, and couples in Malawi. We then turn to descriptive statistics that illustrate the prevalence of inequality in young adults' romantic relationships. Finally, we present two series of three ordinal logistic regression models. The first series predicts hers, his, and their current perceived risk of infection. The second series of models predicts hers, his, and their perceived risk of infection in one-year from the time of the survey.

RESULTS

Table 1 provides a distribution of perceived risk of infection now and in one-year for women, men, and couples. Beginning with women, the majority of the sample (58 percent) reports that there is no chance that they are currently infected (0 beans). Several women (34 percent) report relatively low perceived risk of infection (1-4 beans) and close to 8 percent of women have high risk perceptions (5-10 beans). As we shift to the later time horizon, we see women's perceived risk of infection also shift upwards. When forecasting to one year, half of women report low perceived risk of infection while close to 20 percent of women have higher perceptions of risk.

Compared to women, in general, men perceive lower risk of infection. The majority of men (69 percent) report no likelihood of infection at the time of the interview. While men's perceived risk increases across the time horizons, relative to women, men continue to have lower perceived risk, with over half of the men reporting no risk of infection in one year.

It is worth noting again that we calculate couples perceived risk by taking the highest value of the woman's or man's perceived risk. As shown, almost half of couples (42 percent) report no likelihood of infection at the time of the survey. When forecasting to one year, this reduces to only 20 percent. In one year, 49 percent of couples are defined by low perceived risk (1-4 beans) and 31 percent are categorized as having high perceived risk (5-10 beans). Taken together, these descriptive results illustrate that there is meaningful variation in perceived risk of infection that merit explanation.

Table 2 further provides characteristics of the sample of couples. The majority of couples (76 percent) are defined by inequality in age (defined here as the man being three or more years older.) In terms of education, the vast majority of couples are both out of

school (86 percent) or both in school (8 percent). In terms of educational attainment, in most couples men are more educated (65 percent), but in a sizeable percent of couples, women have more education than their partner (21 percent). In terms of religion, while over half of the couples attend the same congregation (56 percent), most couples report inequality in in terms of religiosity. In most couples, men report having had more sexual partners (59 percent), but a sizeable percent of couples report an equal number of partners (30 percent). In terms of attractiveness, exactly half of the sample is equally ranked. In couples with attractiveness inequality, in 26 percent of couples men are more attractive and in 24 percent of couples women are more attractive. The majority of the sample is married or cohabiting (84 percent) and have been together for an average of 47 months.

Turning to our multivariate findings, Table 2 shows the associations between different dimensions of relationship inequality and current perceived risk of infection (expressed as odd ratios). Interestingly, the two measures of inequality that are significantly associated with perceived risk are the relational dimensions: number of sexual partners and physical attractiveness. Beginning with her perceived risk, the results show that women in relationships with a more attractive partner have greater perceived risk than women who are equally attractive as their partner (1.569 $p<.1$). In terms of predicting his perceived risk, the results show that men with relatively more sexual partners have greater perceived risk than men with the same number of sexual partners as their partner (1.631 $p<05$). Similar to women, men in relationships with a more attractive partner have significantly greater perceived risk than men who are equally attractive as their partner (2.905 $p<.001$).

The results for couple's current perceived risk mirror those for women and men. Couples with men who report relatively more sexual partners have significantly greater perceived risk than couples with the same number of sexual partners ($p<.05$). Inequality in physical attractiveness also increases couple's perceived risk of infection. While couples with men who are ranked as more attractive have greater perceived risk (1.605 $p<.01$), couples with women who are ranked as more attractive are particularly susceptible to greater perceived risk (1.975 $p<.001$),

Shifting time horizons, the results for perceived risk in one year are fairly consistent with the results for current perceptions of risk. But, unlike current perceived risk, education immerges as an important dimension of inequality (note that results are marginally significant). Men who are more educated than their partner have greater odds of perceived risk than men in relationships with equally educated women ($p<.1$). Relationships in which the woman is more educated translates into greater perceived risk for her, him, and them (1.868, 1.768, & 1.935 $p<.1$, respectively).

While there is no evidence that the number of sexual partners influences perceived risk in one year, the results for physical attractiveness remain consistent with the results for current perceptions of risk. Women and men in relationships with a more attractive partner have greater perceived risk that they will become infected within the year (1.529 $p<.1$; 3.079 $p<.001$). But, as shown, men with more attractive partners have considerably higher perceived risk, while attractiveness inequality is less meaningful for women's perceived risk. Finally, couples with a more attractive man and those with more attractive woman have significantly higher perceived risk compared to couples with equally attractive partners (1.565 $p<.05$; 2.098 $p<.01$). Similar to the findings for men's

perceptions, couples with a more attractive woman are particularly more likely to experience greater perceived risk.

Taken together, these results illustrate that there is meaningful variation in perceived risk of current HIV infection and future risks of infection for women and men, and in turn couples, in Malawi. The results further show that there is considerable inequality present in Malawian couples that – extending far beyond gender and age – spans multiple dimensions including education, class background, religion, sexual histories, and attractiveness. While there is evidence that inequality in education and prior sexual history are meaningful dimensions of dissimilarity that shape perceptions of risk, inequality in physical attractiveness is a consistent feature of relationships that heightens women's and men's perceived risk of infection.

DISCUSSION

To the extent that researchers have examined the role of relationship inequality in HIV risk, they have focused almost exclusively on structural dimensions of inequality—particularly on equalities in gender and age. Our finding that attractiveness discordance (an often overlooked dimension of relationship inequality) strongly predicts perceived level of risk for women *and* for men, suggests that other, relationship-specific factors play an important role in how couples understand their level of risk.

Power imbalances within relationships can take a number of different forms, many of which are relevant for relationship quality and factor into people's assessments of their level of risk for infection with HIV. By examining relationship inequalities along a variety of

dimensions, we contribute both to the literature on HIV in the African setting and to more general questions about relationship quality and stability.

Table 1. Distribution of Perceived Risk Now & in One-Year

	Her	Him	Them
Now			
No Risk (0 beans)	58.33	68.38	42.40
Low Risk (1-4 beans)	35.29	24.26	45.34
High Risk (5-10 beans)	6.37	7.35	12.25
One-year			
No Risk (0 beans)	30.15	52.94	20.10
Low Risk (1-4 beans)	50.25	31.37	49.02
High Risk (5-10 beans)	19.61	15.69	30.88

N=408 Couples; Data Source: Tsogolo La Thanzi Wave 1

Table 2. Descriptive Statistics for
Analytic Sample of 408 Malawian Romantic Couples

	%/Mean (S.D.)
Key Independent Variables	
Age Discordance	
Male is older	75.62
Same Age	24.38
Education	
Current Enrollment	
Male in school	1.96
Feale in school	4.17
Both in school	86.27
Neither in school	7.60
Attainment	
Male more educated	64.71
Female more educated	20.83
Equally educated	14.46
Class background	
Male's family wealthier	42.39
Female's family wealthier	23.28
Families equally wealthy	35.05
Religion	
Congregation	
Attend Same Congregation	56.13
Attend Different Congregations	43.87
Religiosity	
Male more religious	38.73
Female more religious	35.54
Equally religious	25.74
Sexual Experience	
Male more partners	59.07
Female more partners	11.27
Equal # of partners	29.66
Physical Attractiveness	
Male is more Attractive	25.98
Female is more Attractive	24.02
Equally Attractive	50.00
Controls	
Married/Cohabiting	83.58
Relationship Duration (in months) (1-163)	47.12 (34.10)
Combined Income (sqrt) (0-549)	89.34 (55.55)

N=408 Couples; Data Source: Tsogolo La Thanzi Wave 1

Table 3. Odds Ratios for Logistic Regression Results of Hers, His, & Their Perceived Risk Now among 408 Malawian Couples

	Hers	His	Theirs
Age Discordance			
Male is older	0.971	1.399	1.248
Same Age (ref)	--	--	--
Education			
Current Enrollment			
Male in school	0.622	0.247	0.900
Female in school	0.782	2.087	2.240
Both in school	0.758	0.799	0.546
Neither in school (ref)	--	--	--
Attainment			
Male more educated	1.502	1.044	1.622
Female more educated	1.519	0.928	2.089
Equally educated (ref)	--	--	--
Class background			
Male's family wealthier	0.976	1.305	0.971
Female's family wealthier	0.852	1.279	0.823
Families equally wealthy	--	--	--
Religion			
Attend Same Congregation	0.988	0.956	0.765
Attend Different Congregations (ref)	--	--	--
Female More Religious	0.869	0.966	0.942
Male More Religious	1.267	0.814	1.138
Sexual Experience			
Male more partners	1.429	1.631*	1.885*
Female more partners	1.378	1.459	0.957
Equal # of partners (ref)	--	--	--
Physical Attractiveness			
Male is more Attractive	1.569*	0.784	1.605*
Female is more Attractive	0.975	2.905***	1.975***
Equally Attractive (ref)	--	--	--
Controls			
Married/Cohabiting	0.967	1.996	1.497
Relationship Duration (in months)	1.004	0.993	1.004
Combined Income (sqrt)	1.000	1.000	0.999
Male worried (other partners)	0.805	0.750	0.709†
Female worried (other partners)	0.649	0.837	0.771

N=408 Couples; Data Source: Tsogolo La Thanzi Wave 1

Table 4. Odds Ratios for Logistic Regression Results of Hers, His, & Their Perceived Risk in One-Year among 408 Malawian Couples

	Hers	His	Theirs
Age Discordance			
Male is older	1.138	1.439	1.248
Same Age (ref)	--	--	--
Education			
Current Enrollment			
Male in school	1.195	0.441	0.900
Female in school	2.887†	0.712	2.240
Both in school	0.824	0.508	0.546
Neither in school (ref)	--	--	--
Attainment			
Male more educated	1.629	1.669†	1.622
Female more educated	1.8688†	1.786†	1.935†
Equally educated (ref)	--	--	--
Class background			
Male's family wealthier	0.955	1.439	0.971
Female's family wealthier	0.724	1.393	0.823
Families equally wealthy	--	--	--
Religion			
Attend Same Congregation	0.930	0.952	0.765
Attend Different Congregations (ref)	--	--	--
Female More Religious	0.885	1.129	0.942
Male More Religious	1.357	1.036	1.138
Sexual Experience			
Male more partners	1.047	1.311	1.240
Female more partners	1.153	0.997	0.957
Equal # of partners (ref)	--	--	--
Physical Attractiveness			
Male is more Attractive	1.529†	1.252†	1.565*
Female is more Attractive	0.917	3.079***	2.098**
Equally Attractive (ref)	--	--	--
Controls			
Married/Cohabiting	1.794	1.316	1.497
Relationship Duration (in months)	1.005	0.993†	1.004
Combined Income (sqrt)	0.998	1.000	0.999
Male worried (other partners)	1.047	0.758	0.902
Female worried (other partners)	0.663	1.143	0.824

N=408 Couples; Data Source: Tsogolo La Thanzi Wave 1