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Factors associated with HIV sero-status in young rural South African women: connections between intimate partner violence and HIV

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Background This paper aims to describe factors associated with HIV sero-status in young, rural South African women and the relationship between intimate partner violence (IPV) and HIV.

Methods A total of 1295 sexually active female volunteers, aged 15–26, from 70 villages were recruited to participate in a cluster randomized controlled trial of an HIV behavioural intervention. The main measures were HIV sero-status, and IPV and sexual practices measured using a questionnaire administered during baseline interviews.

Results About 12.4% of women had HIV and 26.6% had experienced more than one episode of physical or sexual IPV. After adjusting for age, HIV infection was associated with having three or more past year partners [odds ratio (OR) 2.39; 95% confidence interval (95% CI) 1.48–3.85], sex in past 3 months (OR 3.33; 95% CI 1.87–5.94), a partner three or more years older (OR 1.69; 95% CI 1.16–2.48), and a more educated partner (OR 1.91; 95% CI 1.30–2.78). IPV was associated with HIV in two-way analyses (OR 1.56; 95% CI 1.08–2.23), but the effect was non-significant after adjusting for HIV risk behaviours. The experience of IPV was strongly associated with past year partner numbers, time of last sex, and partner's education; it was also marginally associated with partner age difference. Adverse experiences in childhood, including sexual abuse, increased the likelihood of having more past year partners (OR 1.43; 95% CI 1.21–1.69).

Conclusions IPV was strongly associated with most of the identified HIV risk factors. Our findings provide further evidence of links between IPV and HIV among women and the importance of joint prevention.

Keywords Intimate partner violence, HIV, risk factors, women

Gender-based violence and gender inequity are important influences on women's risk of HIV.[1–4] Research from the United States has shown that women who experience intimate partner violence (IPV) have more HIV risk behaviours.[5–13] Dunkle *et al.*[14] showed IPV and gender inequity to be risk factors for prevalent HIV infection among pregnant South African women. Their results complemented the findings of two previous studies that showed associations between HIV and IPV among women in Rwanda[15] and Tanzania[16]; as well as evidence from the United States that women with HIV have more experiences of violence than those without.[17]

Conceptually, there are several possible pathways that could explain these findings. One of these is biologically a more direct pathway, in that women can be exposed to HIV in the course of rape by infected men, and any genital trauma occurring during rape increases the likelihood of HIV transmission.[18] Men who rape are likewise potentially exposed to HIV through rape and

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may then spread it to other women partners. Research from North America has shown that women who have experienced child sexual abuse and IPV are more likely to engage in risky sex.[5–8,10–13,19–24] Recent research in South Africa has yielded similar findings.[25,26]

The experience of violence, furthermore, reinforces gendered power inequalities that impact on women's HIV risk. Dunkle *et al*.[14] demonstrated that women who had less power in their sexual relationship (measured on the Sexual Relationship Power Scale, adapted from Pulerwitz *et al*.[27]) were at elevated risk of having HIV. Pettifor *et al*.[28] found that South African women with less power had a lower likelihood of condom use. These findings confirm the conclusions of other authors[2,3,29–32] who have argued that condom negotiation and refusal of unwanted sex are critically influenced by relationship power.

Studies from different continents have often shown that men who rape, or are physically violent to partners, have more sexual partners[33–36] as well as more frequent intercourse.[32,36] They may be more likely to be infected with HIV and other STDs (particularly HSV-2) and to spread these to their partners. There is some evidence for this as men who have STDs are more likely to have rape-supporting attitudes.[37] These findings point to an interface between risk of HIV infection and risk of sexual and physical violence, which needs to be explored and elucidated through further research.

A study undertaken to evaluate an HIV prevention behavioural intervention, *Stepping Stones*, in the rural Eastern Cape Province of South Africa[38] provided an opportunity to explore the associations between HIV, IPV, and other HIV risk factors, in a non-clinical setting, with young, rural African women. Drawing from the baseline data, we aim to investigate the influence of IPV on HIV sero-positivity; to explore which risky sexual practices are associated with HIV sero-positivity; and to describe associations between IPV and these HIV risk factors.

Methods

Between 2002 and 2003, we recruited 1416 women into a randomized controlled trial to evaluate the HIV prevention behavioural intervention *Stepping Stones*.[39] A detailed description of the trial methods are presented elsewhere.[38] The participants were volunteers from 70 study villages in the rural Eastern Cape province of South Africa, near the town of Mthatha. Most were recruited from schools. Between 15 and 25 women per village completed the baseline questionnaire and gave blood for HIV testing. This analysis concerns 1295 women who were sexually active.

Data collection

We used a structured questionnaire, administered in Xhosa by young female interviewers. Following the World Health Organization's rapid testing protocol,[40] a venous blood sample was tested for HIV using two rapid tests. Determine (Abbott Diagnostics, Johannesburg, South Africa) was used as a screening test, with confirmation of positive samples using Uni-goldTM (Trinity Biotech, Dublin, Ireland). An ELISA was performed to clarify any indeterminate results. Participants in the study could access their HIV results. A total of 60 women (4.4%) had been tested for HIV before the study and 40 had taken their results. Of the latter, 16 had tested HIV positive.

The questionnaire asked about social and demographic factors (age, education, current schooling, and earnings), and perceptions of the community. Socioeconomic status was measured on a scale that captured household goods ownership (TV, radio, and car), frequency of hunger, frequency of having meat, and perceived difficulty accessing a modest sum for a medical emergency (R100 or £9). Adverse childhood experiences were measured on a modified version of the short form of the Childhood Trauma Questionnaire.[41] It covered emotional neglect, emotional abuse, physical neglect/hardship, physical abuse, and sexual abuse (Cronbach's alpha 0.73). We used scales to measure knowledge of sexual and reproductive health and HIV. We measured perceived susceptibility to peer pressure to have sex on a 4-item scale (Cronbach's alpha 0.80). We measured the extent to which the current or most recent boyfriend controlled the woman using a modified (10-item) form of the Sexual Relationship Power Scale[14,27] (Cronbach's alpha 0.73). We also measured attitudes towards gender relations in women (Cronbach's alpha 0.62).

We collected detailed information on the current or most recent main partner, including partner's social and demographic characteristics (including age, education, earnings, and alcohol consumption). We asked about time of last sex and whether condoms had been used. We also asked about consistency of condom use in the past year, numbers of main and casual male partners, and history of transactional sex, which was defined as sex primarily motivated by material gain (provision of food, cosmetics, clothes, transportation, items for children or family, school fees, somewhere to sleep, or cash).[14] We measured alcohol use using the AUDIT scale.[42] We measured communication with a 6-item scale developed on communication skills and openness (Cronbach's alpha 0.69). Further information on measures can be found in the study's methods paper.[38]

We also measured physical and sexual IPV using questions from the World Health Organization's instrument,[43] and rape by a man who was not an intimate partner.[38] IPV questions contained specific, objective descriptions of men's behaviour and asked about frequency. Six items covered physical violence: pushed, shoved, slapped, hit with fist, kicked, beaten up, strangled, burnt, hurt/threatened with a weapon, threw something that could hurt her. Four items asked about being physically forced to have sex, having sex when frightened of the consequences, being forced to do oral or anal sex. Further information on the questionnaire, the scales and their psychometric properties is presented in Jewkes *et al*.[38] Written informed consent was given. Ethical approval for the study was given by the University of Pretoria. The World Health Organization's guidelines on research on violence against women[44] were followed.

Derived variables

We constructed a four level variable to classify women into those with no previous experience of IPV; those with experience of just physical violence; just sexual; and both

physical and sexual. Then, following Dunkle *et al.*,[14] we constructed a summary measure (broad IPV) that classified women who reported no IPV or only one type (physical or sexual) once into one group. Those who reported both physical and sexual IPV, or one type more than once, were place in a separate category. When we looked at the relationship between experience of IPV using these two measures and women's sexual practices and HIV sero-status, we decided to use the two level variable, and restrict the 'violence experience' group to those with 'broad IPV' because it resulted in a more parsimonious model.

Statistical analysis

All procedures used in data analysis took into account the study design, viewing the baseline study as a stratified, two-stage survey with participants clustered within villages. First descriptive analyses were carried out, all potential explanatory variables were summarized by HIV status. For continuous variables the summary took the form of means with 95% confidence intervals (95% CIs), while for binary variables the summary took the form of percentages with 95% CIs. Estimation was carried out using standard linearization methods for data from multistage surveys. Similar descriptive analyses were carried out on a sub-set of behavioural variables and adverse experiences in childhood, with the summaries given by whether or not the woman had experienced 'broad' IPV.

To investigate potential risk factors associated with being HIV positive at baseline, we used the following procedure: experience of IPV, as the primary variable of interest, was included in all models; as was age. Thereafter, variables were considered in groups (socio-demographic, knowledge and attitudes, substance use, current/most recent relationship, and sexual activity and practices) and backward elimination applied separately to each group using ordinary logistic regression in order to identify a maximal subset of potential explanatory variables using a liberal nominal *P*-value for exclusion (of 0.15). This approach is suggested by Vittinghoff *et al.*[45] To account for clustering generalized linear mixed models were then fitted to the maximal set of explanatory factors. In generalized linear mixed models we introduce random effects (here corresponding to random village effects) and suppose that the conditional distribution of the responses given the random effects satisfies a generalized linear model.[46,47] To obtain the likelihood function for the observed data, the random effects have to be integrated out, and for situations such as ours where there is only one extra random effect, this can be done using Gauss-Hermite quadrature.[46,48] There are also approximate procedures such as penalized quasi-likelihood (PQL),[49] although these are known to produce estimates that may be biased downwards. Thus, in most cases Gauss-Hermite quadrature is preferred, but the quadrature approximation may be inaccurate, especially if there are large group sizes or large correlations within groups. Thus checks were carried out by varying the number of quadrature points and fitting approximate general linear mixed models (GLMMs) using PQL before accepting the final models. Analyses were carried out using Stata release 8.0, with PQL checks carried out in Genstat version 6.

Results

In total, 1416 women were enrolled in the study. Analysis is restricted to 1295 women who had had sex. These women ranged in age from 15 to 26 years (mean age 18.7 years). About 12.4% (160) (95% CI 10.4–14.3) of sexually active women tested HIV+.

Overall 26.6% of women (344) had experienced more than one episode of physical or sexual IPV; of these 344 women, 164 (47.7%) had experienced only physical IPV, 31 (9.0%) had experienced only sexual IPV, and 149 (43.3%) had experienced both. The unadjusted odds ratio (OR) for HIV positivity for women who had experienced 'broad' IPV compared with limited or no IPV was 1·56 (95% CI 1.08–2.23, $P = 0.016$). In all, 5.9% (76) of the women had been raped by a man who was not a partner. This yielded an unadjusted OR for HIV positivity for women raped by a non-partner of 1.41 (95% CI 0.73–2.73, $P = 0.30$), compared with those not experiencing such rape.

Demographic, social, and relationships characteristics of the women are given by HIV status in Table 1. These characteristics may be considered as potential risk factors for HIV and constitute the maximal set used for model building. Women with HIV were older than those without but were of similar socioeconomic status, just as likely to be studying, came from similar communities, had similar club and church activities, and similar experiences of orphanhood. Women with HIV were much more likely to have ever been pregnant, although the association is explained by their greater age. A similar proportion of those with and without HIV had previously been tested for HIV and knew their result prior to the study.

The women differed little in their knowledge of reproductive health and HIV, or in their attitudes towards HIV, condoms, gender, or peer pressure to have sex. Only a small proportion of women had ever used drugs, or drank alcohol to levels that could be problematic for them, and this differed little by HIV status.

There were differences between women with and without HIV in their current main partner's age and educational levels; women with HIV had older and more educated partners, and partners who were more likely to earn money. However women with HIV reported similar experiences of control by their partner, communication strategies, and levels of conflict in the relationship to those without HIV.

Women with HIV were more likely to have had sex more recently and to have had more partners in the past year. Women with and without HIV did not differ in coercion at first sex, experiences of rape by a non-partner, dry sex practices, condom use, or in whether they had ever had transactional sex with a casual partner.

Table 2 shows that broad IPV is associated with a greater likelihood of having had a casual partner and of having had transactional sex with a main and casual partner. Experience of IPV was also associated with the risk factors for HIV identified in the model in Table 3 below and with adverse experiences in childhood.

Table 3 shows the results from fitting a GLMM to investigate factors associated with HIV sero-positivity. Adjusting for age, women were more likely to be HIV positive if they had had three or more consensual sexual partners in the past year, had a boyfriend who had completed high school (or had further

Table 1 Associations between HIV sero-status and social, demographic, and behavioural characteristics of women

	HIV+ (*n* = 160)		**HIV− (*n* = 1135)**	
	% (or mean)	95% CI	% (or mean)	95% CI
Social and demographic factors				
Age	19.7	19.4–20.0	18.5	18.4–18.7
Adverse childhood experiences score	0.080	−0.061 to 0.221	0.033	−0.048 to 0.114
Socioeconomic status score	0.034	−0.189 to 0.258	−0.036	−0.150 to 0.079
Easy/very easy to find R100 in a medical emergency	33.1%	25.5–40.8	36.9%	33.5–40.3
Often or sometimes go hungry	29.4%	22.4–36.4	35.4%	32.2–38.7
Currently studying	95.5%	89.4–97.8	98.1%	96.8–99.3
Active in church	71.7%	65.2–78.2	70.6%	67.3–73.8
Earned money in the past year	24.4%	17.8–30.9	18.2%	15.3–21.0
Involved in a club/society	38.1%	31.0–45.2	45.5%	41.2–49.6
Community cohesiveness score	−0.028	−0.201 to 0.145	0.0056	−0.062 to 0.073
Ever been pregnant	34.2%	26.0–42.4	20.1%	17.2–22.9
HIV status known prior to the test	9.4%	4.1–14.6	7.3%	5.4–9.2
Parental death: none	66.9%		65.9%	
Father	21.9%		24.3%	
Mother	6.9%		6.6%	
Both	4.4%		3.3%	
Knowledge and attitudes				
Reproductive knowledge score	22.8	22.2–23.4	22.9	22.6–23.1
HIV knowledge score	24.6	23.9–25.4	24.2	23.8–24.5
Attitudes towards gender relations	−0.056	−0.273 to 0.162	−0.004	−0.096 to 0.089
Attitudes towards condoms	0.108	−0.030 to 0.246	−0.044	−0.127 to 0.040
Resistance to peer pressure to have sex	−0.010	−0.159 to 0.139	−0.028	−0.100 to 0.042
Substance use				
Problem drinking	3.8%	0.8–6.7	3.5%	2.3–4.7
Drug use (ever)	5.0%	1.8–8.2	6.3%	4.6–8.1
Current/most recent relationship				
Age difference from partner (years)	4.1	3.50–4.75	3.1	2.92–3.25
Partner 3+ years older	62.4%	53.3–71.5	44.6%	41.1–48.0
Partner educated to Matric or beyond	53.8%	44.9–62.6	31.5%	28.1–35.0
Partner has earnings	45.2%	37.3–53.1	34.9%	31.5–38.3
Partner drinks: never	60.5%		57.8%	
Sometimes	19.7%		25.4%	
Regularly	19.7%		16.8%	
Experiences of being controlled in relationship scale	−0.156	−0.330 to 0.019	−0.021	−0.107 to 0.065
Communication scale	−0.119	−0.288 to 0.050	−0.001	−0.082 to 0.080
Consistent condom use with main partner	28.4%	20.9–35.9	22.0%	18.8–25.2
Relationship conflict scale	0.289	0.017–0.562	0.041	−0.073 to 0.154
Sexual activity and practices				
Forced or tricked first sex	15.6%	9.8–21.5	15.3%	13.0–17.7
Duration of sexual activity (years)	3.90	3.51–4.30	2.92	2.77–3.06
Correct condom use on last sex	45.6%	38.9–52.2	37.2%	33.7–40.8
Number of days since last sex	52.5	34.5–70.6	110.1	96.1–124.2
Last sex <3 months ago	89.9%	84.9–94.8	71.6%	68.2–74.9
Transactional sex with a casual partner	12.7%	7.3–18.0	8.2%	6.6–9.9
Number of partners in past year	1.78	1.60–1.97	1.38	1.33–1.43
3+ partners in the last year	22.2%	15.5–28.8	8.7%	7.3–10.1
Dry sex practices	6.2%	2.5–10.0	4.1%	2.9–5.2
>1 episode of physical or sexual IPV	34.4%	26.5–42.2	25.5%	22.6–28.3
Raped by a non-partner	4.4%	0.8–8.0	4.6%	3.4–5.9

Table 2 Association between experience of more than one episode of physical or sexual intimate partner violence and sexual relationship characteristics and dynamics

	IPV+ (n = 951)		IPV− (n = 344)	
	%	95% CI	%	95% CI
Had a casual partner	34.6	29.3–39.8	17.4	14.8–19.9
Transactional sex with a casual partner	15.7	11.2–20.3	6.2	4.6–7.8
Transactional sex with a main partner	28.3	22.7–33.9	19.9	17.0–22.8
Condom used correctly on last sex with main partner	37.0	32.0–42.0	38.7	35.1–42.4
Partner aged 3+ years older	53.0	47.1,58.8	44.6	40.8–48.4
Partner educated to matric or higher	38.7	33.5–43.8	32.7	29.09–36.4
Sex within the last 3 months	81.9	77.9–86.0	70.9	67.1–74.6
3+ partners in last year	19.2	15.2–23.3	7.1	5.5–8.7
Adverse events in childhood (mean)	0.52	0.39–0.65	−0.17	−0.24 to −0.10

Table 3 A logistic regression model of factors associated with HIV sero-status in women who have ever had sex

	OR	95% CI	*P*-value
Age in years	1.42	1.28–1.58	<0.0001
3+ partners in last year	2.48	1.48–3.85	<0.0001
Last sex <3 months ago	3.37	1.89–6.01	<0.0001
Partner 3+ years older	1.69	1.16–2.48	0.007
Partner educated to matric or higher	1.91	1.30–2.78	0.001
>1 episode of physical or sexual IPV	1.16	0.78–1.73	0.45

education), had sex more frequently, or had a partner who was three or more years older than them. Adjusting for these factors, the association between IPV and HIV sero-status was no longer statistically significant. This suggests that the two-way association between IPV and HIV in this data can be fully explained by associations between IPV and HIV risk behaviours.

In Table 4 we present the results of fitting GLMMs to each of the factors associated with HIV. Experience of IPV was strongly associated with having had three or more consensual sexual partners in the past year, had a boyfriend who had completed high school (or had further education) and having had sex in the last 3 months. There is also some evidence that experience of IPV was associated with having a partner three or more years older.

Women with more adverse experiences in childhood, including sexual abuse, were more likely to have had three or more partners in the past year, as were women who were more susceptible to peer pressure to have sex and those who had been sexually active for longer.

Having a higher socioeconomic status, more egalitarian attitudes towards gender, and a lesser likelihood of being involved in a club or society, were associated with a greater likelihood of women having a more educated partner, after adjusting for her age.

Women who had more controlling sexual partners had a greater likelihood of having had sex more often than those who had ever had transactional sex with a casual partner and those who had poorer communication with their main partner.

Having ever been pregnant and having been sexually active for longer were both associated with a greater likelihood of having a partner who was three or more years older.

Discussion

In this analysis we sought to explore the relationship between HIV infection and IPV in young rural women in South Africa. We found HIV infection to be associated with several well-established risk factors, notably frequency of sex and number of sexual partners (e.g. Reiss and Leik[50]). Furthermore, we found that characteristics of women's current main partner (age and education) were also associated with a greater likelihood of women having HIV. We observed a two-way association between IPV and HIV infection, which did not persist in multiple regression models. We also found an association between IPV and almost all of the HIV-associated factors.

Most of the factors that were significantly associated with HIV infection have been reported in other research. Having a higher number of sexual partners is a well recognized HIV risk factor,[51–55] as is having more frequent sex,[50] although sexual frequency is usually not reported in studies from Sub-Saharan Africa. Many studies have found that young women's HIV risk is heightened by having a greater age difference between themselves and their partner.[51–53,55] We also found that women were more at risk if the partner was more educated. This latter finding may be explained if more educated men had more extensive sexual networks, perhaps due to mobility, or if they were of higher social status (either wealth or degree of respect) and used this to gain more sexual partners. Few studies of HIV in Sub-Saharan Africa report details of partner characteristics; we have not been able to establish whether this has been examined previously.

Our findings suggest that experience of IPV was associated with an increased likelihood of most of the main risk factors for HIV. Both sexual frequency and number of partners mediated the relationship between IPV and HIV to the extent that after adjusting for them no independent relationship is discernable. Having sex more frequently was a particularly important risk factor for HIV. We have shown that women who were in a relatively less powerful position than their partners, indicated by their reports of experiencing more controlling behaviours, and those in relationships where communication was generally poorer had sex more often. Disclosure of higher levels of adverse experiences in childhood, including child sexual abuse, was associated with a greater likelihood of having

Table 4 Multiple logistic regression models for factors associated with each risk factor for HIV

	Model 1			Model 2			Model 3			Model 4		
	3+ partners			Partner educated to matric or higher			Sex in last 3 months			Partner 3+ years older		
	OR	95% CI	*P*-value	OR	95% CI	*P*-value	OR	95% CI	*P*-value	OR	95% CI	*P*-value
Age in years[a]	0.91	0.80–1.04	0.18	1.26	1.17–1.36	<0.001	0.98	0.91–1.07	0.70	0.84	0.77–0.92	<0.001
>1 episode of physical or sexual IPV	2.09	1.41–3.10	<0.001	1.45	1.10–1.91	0.008	1.76	1.26–2.47	0.001	1.27	0.98–1.65	0.072
Adverse childhood experiences[a]	1.43	1.21–1.69	<0.001									
Resistance to peer pressure to have sex[a]	0.72	0.61–0.86	<0.001									
Duration of sexual activity (years)	1.31	1.18–1.45	<0.001							1.22	1.13–1.31	<0.001
Socioeconomic status[a]				1.18	1.08–1.30	<0.001						
Attitude to gender relations[a]				1.44	1.27–1.64	<0.001						
Involvement in clubs or societies				0.79	0.62–1.02	0.067						
Relationship control[a]							0.84	0.73–0.97	0.017			
Transactional sex with a casual partner							1.98	1.09–3.59	0.025			
Communication[a]							0.88	0.77–1.01	0.065			
Ever been pregnant										1.90	1.39–2.61	<0.001

[a] Continuous variables.

three or more sexual partners, thus suggesting that there may be an important, if indirect, association between child sexual abuse and risk of HIV infection in this population. This confirms the findings of Dunkle *et al.*,[14] who also showed an indirect association among South African women, and those of many authors from the United States who have shown associations between child sexual abuse and HIV risk behaviours.[5,7,19,24]

We do not know whether IPV was a cause or consequence of sexual risk taking. Both are possible. However, we have shown that sex is more frequent in violent relationships, and it seems much more likely that violence would influence sexual frequency, rather than sexual frequency influencing violence. We have also shown that women with a previous experience of violence are more likely to have a more educated or older current partner. To the extent that women experience violence as a consequence of risky behaviour (such as sex with multiple partners), our findings may help explain the results of several studies from the United States that matched participants on behavioural HIV risk factors and failed to show an association between HIV and IPV.[56–58] If experience of violence and infection with HIV sometimes share underlying risk factors, such matching would mask associations that are visible in this and other unmatched African studies.[14–16] Furthermore, emerging evidence suggests that men who perpetrate violence engage in higher levels of risky sex and may, therefore, be more likely to have HIV.[36,59]

Understanding why we did not find a significant association between IPV and HIV in multiple logistic regression can considerably advance our understanding of connections between gender-based violence and HIV risk and raises important issues related to interpreting HIV risk factors. The differences in the ages and life experiences between our sample of young students, who mainly lived with their families, and that of an urban antenatal clinic population of aged 16–44 years, half of whom were cohabiting,[14] are manifest. In our study population, three of the four risk factors for HIV are ones that have a very direct link to biological risk in young women; namely having more sex, more numerous partners, and an older partner (who on average would have the HIV risk of their older age-cohort). We would suggest that in the older and more sexually established population of the antenatal clinic, partner age is no longer a risk factor as it is only important in young women,[53] and that coital frequency is less variable because partnerships are more stable. With less variation in salient biologically related risk factors, different mechanisms of risk become more visible, including the direct contribution of IPV to HIV risk.

Limitations of this research included the volunteer nature of the recruitment that allows for the possibility of bias being introduced. There may have been some misclassification arising as a result of under-reporting of IPV or any of the sensitive sexual behaviour variables. We sought to reduce this to a minimum by working with a small number of highly trained interviewers, who were closely matched to the participants' age and social backgrounds.[38]

In conclusion, our findings showed IPV to be associated with a range of risky sexual practices and independently associated with three of the four HIV risk factors found in our analysis. We have shown the relationship between IPV and HIV to be mediated by sexual frequency and partner numbers in these young women. Our findings provide further evidence of links between HIV and gender-based violence, and support an argument that these links may be at times be indirect, and at others direct, but that there is an underlying, enduring, and strong association between experience of IPV and HIV risk practices. This suggests that undertaking efforts to promote gender equity and reduce levels of IPV are of critical importance for HIV prevention.

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KEY MESSAGES

- HIV infection was associated with established risk factors such as partner numbers and frequency of sex; in addition, some partner characteristics, notably his age and level of education, were important.
- IPV was significantly associated with HIV sero-positivity before adjustment for other variables.
- IPV was associated with almost all the HIV-associated factors, suggesting that IPV and HIV share underlying risk factors.
- Our findings provide further evidence of links between HIV and gender-based violence, and support an argument that these may at times be indirect, and at others direct, but that there is an underlying, enduring, and strong association between experience of partner violence and HIV risk practices.

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