

HIV Risk Behaviours and their Relationship to Intimate Partner Violence (IPV) Among Men Who Have Multiple Female Sexual Partners in Cape Town, South Africa

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Abstract HIV/AIDS and intimate partner violence (IPV) are growing public health concerns in South Africa. Knowledge about adult men's perpetration of IPV and links between HIV risk behaviours and IPV is limited. Respondent driven sampling was used to recruit men who have multiple concurrent female sexual partners. Forty-one percent of the 428 recruited men had perpetrated IPV. Inconsistent condom use was associated with physical IPV; experiencing a symptom of a sexually transmitted infection and engaging in transactional sex were associated with physical and sexual IPV; problem alcohol use was associated with physical, and any IPV, but not sexual IPV; having five or more partners was associated with sexual IPV; perceptions of partners' infidelity were associated

with physical and any IPV. HIV risk reduction interventions among men, especially those with multiple female sex partners, should incorporate strategies to change the underlying construction of masculinity that combines the anti-social and risky behaviours of IPV perpetration, inconsistent condom use, transactional sex and heavy alcohol consumption.

Keywords Concurrent sexual partnerships · HIV prevention · High risk heterosexual men · Intimate partner violence · Respondent driven sampling · South Africa

Introduction

The recent South African national household survey conducted in 2008 identified black African men in South Africa aged 25–49 years as a most-at-risk population (MARP) [1]. MARPs engage in behaviours that put them at higher risk for HIV and usually have a higher than average HIV prevalence compared to people in the general population [2]. The South African national household survey found that black African men in this age category have the second highest HIV prevalence in the country (23.7%), surpassed only by the rate found among women aged 20–34 years (32.7%) [1].

In addition to the high prevalence of HIV in South Africa, intimate partner violence (IPV) is a growing public health concern that has serious implications for victims' mental and physical wellbeing [3, 4]. Physical and/or sexual violence perpetrated against women by their intimate male partners is a common experience worldwide [5]. In South Africa, much of the research on IPV has examined women's experiences as victims [6–9]. Lifetime reports of

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physical or sexual violence reported by women in South Africa range from 43.3% among young rural women [8], to 55.5% among women attending antenatal clinics [6]. In the latter study, 30.1% of pregnant women had been assaulted in the past year and those who had experienced more than one episode of physical/sexual IPV were 54% more likely to have HIV than those who had not experienced a similar level of IPV [6].

Knowledge about adult men's perpetration of IPV and links between HIV risk behaviours and IPV among males in South Africa is limited. Research with a random sample of men aged 18–49 years in South Africa found that 42.4% had perpetrated physical or sexual IPV in their lifetime [10], and those perpetrating more than one episode of physical or sexual IPV were 48% more likely to have HIV than those who had not perpetrated IPV [11]. Similarly among working class men in Cape Town, 15.3% of men had perpetrated sexual violence [12] and 42.3% had perpetrated physical violence in the 10 years prior to the survey [13], and 8.8% had perpetrated physical violence in the 12 months prior to the survey [13].

The perpetration of IPV by men is believed to be a consequence of, and to sustain, inequitable gender power distribution that stems from ideologies of male superiority [14]. Within violent relationships women's ability to use or suggest using condoms, and determine the timing and circumstances of sex is reduced [8]. Further, in sexual relationships characterised by the exchange of cash or other material goods, the 'paying partner' (most often men) gains sexual leverage and the right to guard and use his 'investment' in the manner he chooses, including unprotected sex and the use of violence [15–18]. Additionally, men who perpetrate physical and/or sexual violence against their intimate female partners have been found to engage in higher rates of behaviours that increase their HIV risk [17]. These behaviours include having multiple sexual partners [11–13, 19, 20], inconsistent condom use [20], problem alcohol consumption [11–13, 19, 21], and engaging in transactional sex (TS) [11, 19, 20]. Research in South Africa among sexually transmitted infection (STI) clinic clients indicates that men who had a history of sexually assaulting women were more likely to have a history of genital ulcers [20], and women who had experienced sexual assault were more likely to have a STI [9], which in turn significantly increases the risk of HIV infection and transmission [3, 22].

Findings from the South African national survey referred to above also found significant increases in the percentages of black African men aged 25–49 years reporting multiple sexual partnerships that includes the likelihood of concurrent partnerships over time (from 7.0% in 2002, when the first national household survey was conducted to 17.4% in 2008) [1, 23]. Concurrent sexual partnerships,

where two or more partnerships occur in the same period of time, or where one partnership begins before another ends [24], are a widely accepted contributor to the HIV epidemic and are normative in sub-Saharan Africa [24–28]. There are sub-groups of men who practice unprotected sex with large numbers of, often younger, concurrent partners. They are perceived to be at particularly high risk of being infected with, and transmitting HIV [26, 27].

Black African men aged 25–49 years who have multiple female sexual partners are a sub-group of high risk heterosexual men (HRH) who compose a highly efficient network of HIV transmission; however, there is no reliable documented information describing their HIV related risk behaviours. One of the challenges to acquiring reliable data about this population is the difficulty accessing them in a representative sample. In household surveys male respondents are likely to under- or not report having multiple partners should they complete the survey in the presence of other family members. Furthermore, household surveys, unless very large, may not capture a sufficient number of HRH men from which to draw conclusions about them. Snowball sampling and time location sampling (TLS) have been successful in capturing difficult to access populations [29], but they either do not provide representative samples or are not appropriate for sampling HRH men. The former is biased by the choice of initial recruiters and the latter by the danger of missing some venues where HRH men may be found [29]. Another sampling method that has been successful in capturing difficult to access populations is Respondent Driven Sampling (RDS) [30]. This method combines a modified form of snowball sampling with a mathematical model that weights the sample in such a way as to counteract bias introduced by the non-random way in which participants recruit each other [30]. A recent review of 123 studies conducted internationally concluded that RDS was an effective strategy to sample high-risk, hard to reach and socially networked populations for HIV biological and behavioural surveillance [31].

The foregoing demonstrates that HIV risk behaviours are interwoven with multiple sexual partnering as well as IPV. This paper therefore describes the prevalence of physical and sexual IPV, and the association between HIV risk behaviours and IPV among HRH men recruited through RDS in a peri-urban setting on the outskirts of Cape Town. We hypothesised that past year perpetration of three IPV outcomes—physical, sexual, and physical or sexual IPV—would be higher among men who have multiple female sexual partners compared to that reported by other populations from the general population. We also hypothesised that past year perpetration of IPV would be associated with a range of HIV risk behaviours such as inconsistent condom use, having a STI, engaging in transactional sex, excessive alcohol consumption, having

large numbers of female sexual partners, and unfaithfulness among the female partners of HRH.

Method

Survey Design

From June to September 2008 we used RDS [32, 33] to recruit men into an HIV biological and behavioural surveillance survey. RDS starts with a pre-determined number of initial contacts or “seeds” who are eligible for the study. After the seeds are interviewed, they become recruiters and are given a set number of coupons to use for inviting eligible male peers from their social network to participate in the survey. Once each seed’s recruits have participated in the survey, they in turn are given a set number of coupons with which to invite peers from their social networks to participate. Seeds and recruits are provided an incentive to participate and for each recruit who enrolls in and who completes the survey. This recruitment process continues through a number of recruitment waves until the required sample size is reached.

Eligibility and Survey Setting

Eligible men were those who reported having two or more female sexual partners in the 3 months prior to the study. Eligible men were living in a peri-urban community 50 km north-east of Cape Town, South Africa; were 25–55 years of age; had sex with two or more female partners in the 3 months prior to the study, one of whom was five or more years younger than the participant. The age restriction for female partners was based on research that describes the significant HIV risk for young women who have older male sexual partners resulting in mixing populations with different HIV prevalence levels [16, 18, 34]. Per capita monthly income in this study setting is R600 (approximately US\$60) per month [35]. Almost 31% of dwellings are described as “informal dwelling” and 30% of people are unemployed [36].

Procedure

We implemented RDS using standard RDS recruitment and analytical methods [37]. Recruitment began with eight non-randomly selected seeds recruited by field staff. Seeds and all subsequent recruits completed a behavioural assessment questionnaire, provided a blood sample for HIV testing, received a cellular telephone voucher valued at R60 (\pm US\$7.50) for participating in the survey, and three recruitment coupons with which to recruit eligible peers into the study. Recruitment coupons provided an

explanation of the study, directions to the study site, contact details for enquiries and a unique recruitment number which was used to link recruiters to their recruits. Eligible recruits received information about the study and provided written informed consent before being interviewed. Dried blood spots were collected and sent to a referral laboratory for analysis. Participants were offered free voluntary counselling and testing and those who accepted were able to obtain their HIV test results on site. Seeds and recruits received an additional telephone voucher valued at R20 (\pm US\$2.50) for each person they recruited who successfully completed the survey.

Sample Size

The required sample size for the study was estimated to be 430. In the absence of HIV prevalence data for HRH in the study setting, the sample size was based on an estimated HIV prevalence of 25% among pregnant women in a geographic area in close proximity to the study setting [38], with a precision of \pm 5% and a design effect of 1.5. Ethics approval for the study was granted by the Research Ethics Committee of the Faculty of Health Sciences, University of Cape Town.

Measures

Several demographic variables used to describe the study population are shown in Table 2. Levels of socio-economic status (SES) were categorized as: ‘Low,’ reported by participants as, “We don’t have enough money for food,” or “We have enough money for food but not for other basic items such as clothes;” ‘Medium,’ reported by participants as, “We have enough money for food and clothing but are short of many other things,” or “We have the most important things but few luxury goods;” and ‘high,’ reported by participants as, “We have money for luxury goods and extra things.” All other variables used in the analysis are described in Table 1.

Interviews asked questions about three types of female sexual partners: main (steady sexual partner or wife, also known as ‘fasti’ or ‘5–60’), regular (clandestine partners outside of the main relationship, known as ‘khwapeni’), and one-time partners (with whom men had sex with just once and never again). For this paper, “any partner” refers to any of these three types of partners.

Data Analysis

The number of recruitment waves required to reach equilibrium was generated by RDSAT 6.0. Equilibrium is the point at which the sample distribution changes within no more than 2% of the corresponding equilibrium

Table 1 Definitions and coding of variables used in the analysis of intimate partner violence (IPV) and sexual risk

Variables	Survey questions and responses	Coded for analysis
Physical IPV: any physical IPV with any sexual partner in the past 12 months	In the last 12 months, did you	
	(1) slap your [main partner, casual partner, or sexual partner you had sex with just once and never again] or throw something at her?	0 No to all of these IPV behaviours for all partners
	(2) hit your [main partner, casual partner, or sexual partner you had sex with just once and never again] with a fist or something else?	1 Yes to one or more of these IPV behaviours for any partner
	(3) threaten to use or actually use a gun, knife or other weapon against your [main partner, casual partner, or sexual partner you had sex with just once and never again]?	
	Response options: yes/no.	
Sexual IPV: any sexual IPV with any sexual partner in the past 12 months	(1) In the last 12 months, did you force your [main partner, casual partner, or sexual partner you had sex with just once and never again] to have sex with you when she did not want to?	0 No to both of these IPV behaviours for all partners
	(2) Do you think your [main partner, casual partner, or sexual partner you had sex with just once and never again] had sex with you when she did not want to because she was afraid of what you might do?	1 Yes to one or more of these IPV behaviours for any partner
Any IPV: any physical or sexual IPV with any partner in the past 12 months		0 No IPV
		1 Yes to any one or more of the physical or sexual items above
Problem alcohol use	CAGE ^a questionnaire items:	
	(1) Have you ever felt you should CUT DOWN on your drinking?	0 CAGE score < 3
	(2) Have people ANNOYED you by criticizing your drinking?	1 CAGE score 3 or 4
	(3) Have you ever felt bad or GUILTY about your drinking?	
	(4) Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (EYE-OPENER)?	
	Response options: yes/no. Total score range: 0–4.	
Transactional sex (TS) with any most recent sexual partner	Thinking about your most recent [main partner, casual partner, or sexual partner you had sex with just once and never again], do you think she may have become involved with you because she expected you to provide her with, or because you provided her with the following.	0 No to all these items for all partners
	Response options: yes/no to food, clothes, transport, school fees, cash, cosmetics, pre-paid telephone vouchers, items for her children or family, drinks/a good time	1 Yes to one or more of these items for any partner
Number of sexual partners in past 3 months	How many [main partner, casual partner, or sexual partner you had sex with just once and never again] have you had sex with in the last 3 months?	0 2–5
		1 >5
Perception of faithfulness of any most recent sexual partner	Do you think your [main partner, casual partner, or sexual partner you had sex with just once and never again] has other sexual partners?	0 No for all partners
	Response options: yes/no.	1 Yes for one or more partners
Concurrent sexual partners	Think about the last 3 months, have you been in a sexual relationship with a woman whilst still having a sexual relationship with another?	0 No
	Response options: yes/no.	1 Yes
Condom use with any sexual partner in the past 3 months	How often have you used condoms with your [main partner, casual partner, or sexual partner you had sex with just once and never again] in the last 3 months? Would you say never, sometimes, often or always?	0 Always
		1 Inconsistent (often, sometimes or never)
Symptoms of a sexually transmitted infection (STI) in past 3 months	In the last 3 months have you had any of the following: pain when urinating, discharge (drop) from your penis; sores on your private parts?	0 No symptoms
	Response options: yes/no.	1 One or more symptoms
HIV status	Serum was eluted from samples and tested with a 4th generation HIV ELISA (Vironostika Uniform II plus 0). Initially reactive samples were re-tested with a 3rd generation (antibody only) HIV ELISA (SD Bioline). Samples that were reactive in both assays were reported as positive. Discordant samples were tested by western blot (HIV1/2 Biorad).	0 Uninfected
		1 Infected

^a CAGE: a quick screening tool used to identify problem drinking from four questions [39]. It has been shown to demonstrate reliability and validity across a variety of populations [40]

distribution, even though more individuals enter into the sample. Assuming that all theoretical assumptions are met, equilibrium is an indication that the sample composition is independent of the seeds and therefore independent of the biases introduced by their non-random selection.

We first calculated estimates of population proportions for all socio-demographics and IPV outcomes and HIV risk behaviours using RDS Analysis Tool 6.0 (RDSAT) (www.respondentdrivensampling.org). Then we tested a range of potential confounders for inclusion in multivariate logistic regression models. These confounders included socio-demographic variables and HIV risk behaviours. Variables that altered the point estimate of the association between HIV risk behaviours and IPV outcomes by 10% or more were deemed significant confounders [41] and thus included in the models. We also included those HIV risk variables that were theoretically associated with the IPV outcomes in the models. Outcome variable weights were generated and imported into STATA 10.0 from RDSAT for the multivariate models. Rather than using a sampling frame, RDS uses participants' reported social network sizes to set up selection proportional to degree (network size). This provides the selection probability whereby everyone in someone's social network has an equal probability of selection. To account for biases associated with some participants having larger social network sizes and, therefore, more opportunities to recruit, weighting is set up as the inverse of participants' reported social network sizes (those with larger network sizes are given less weight and vice versa) [30]. Participants' network size was measured by asking about the number of men they knew and who knew them, that were 25 years or older; and had sex with at least one women in the last 3 months who was five or more years younger than they.

Results

Four hundred and twenty-eight of the required 430 men were recruited into the study. The sample produced up to 15 waves of recruitment, and equilibrium was reached within 2–4 waves of recruitment on the demographic, and the four IPV variables reported in Table 2.

Table 2 shows that men had a median age of 28 years. On the whole, men in the sample were relatively well-educated, and enjoyed relatively good socio-economic standing most likely as a function of the high numbers who were employed. Very few men were married and the majority reported having concurrent sexual partners, and that they thought at least one of these partners had other sexual partners. Almost three quarters of men (72.4%) agreed that a man may have “good reason to hit his girlfriend”, while 61% of men agreed that a “wife should be

expected to be punished by her husband”. Physical IPV was more commonly reported than sexual IPV (36.2 vs. 18.9%), 41.5% reported perpetrating any IPV in the past 12 months with more than a quarter (27.6%) reporting multiple episodes of any IPV in the same time period.

The association between HIV risk behaviours and IPV outcomes are shown in Table 3. Inconsistent condom use was significantly related to any IPV (OR 1.80; CI 1.06, 3.06; $P = 0.031$) but not to the other two categories of IPV. Having experienced at least one symptom of a STI and having engaged in transactional sex with one or more most recent partners were significantly related to physical IPV (OR 2.08; CI 1.30, 3.32; $P = 0.002$ and OR 2.22; CI 1.28, 3.85; $P = 0.005$, respectively), sexual IPV (OR 2.16; CI 1.22, 3.81; $P = 0.008$ and OR 2.67; CI 1.23, 5.80; $P = 0.013$, respectively), and any IPV (OR 1.98; CI 1.24, 3.14; $P = 0.004$ and OR 2.23 CI 1.32, 3.79; $P = 0.003$, respectively). Problem alcohol use was significantly related to physical IPV (OR 1.85; CI 1.20, 2.86; $P = 0.005$), and any IPV (OR 1.77; CI 1.16, 2.70; $P = 0.008$). Having five or more partners in the previous 3 months was significantly related to sexual IPV only (OR 1.73; CI 1.05, 2.86; $P = 0.031$). Perceptions that any most recent sexual partner had other sexual partners were related to physical IPV (OR 2.25; CI 1.19, 4.24; $P = 0.013$), and any IPV (OR 1.82; CI 1.01, 3.28; $P = 0.047$).

Discussion

This study of HRH men who have multiple concurrent partners found high levels of past year IPV perpetration against female sexual partners. Physical IPV appeared to be normative with the majority of men agreeing that a man may have “good reason” to hit his girlfriend and/or punish his wife. While men who have multiple female sexual partners are at increased risk for HIV as a product of having many partners, our results show that those men who engaged in a range of behaviours that increase the risk for HIV transmission to female partners had also been violent.

Very few Southern African studies measured IPV perpetration in the past 12 months, and those that did, were almost exclusively conducted among women victims. We found that 36% of men in our study had perpetrated physical IPV in the past 12 months. This is much higher than that reported by women attending antenatal clinics where it was 25.5% [6], women in three provinces in South Africa (9.5%) [42], and women in Rakai, Uganda where it was 26.9% [43]. IPV perpetration was also much higher than that reported by working class men in Cape Town (8.8%) [13]. Sexual IPV in the past year was reported by 19% of men in our study and was considerably higher than that reported by women attending antenatal clinics where it

Table 2 Population estimates for socio-demographic, intimate partner violence (IPV) outcomes in the past year and HIV risk behaviours among high risk heterosexual men who have multiple female sexual partners

Variables	N/n in sample	% (95% confidence interval)
Demographics		
Age (median: 28 years)		
25–29 years	303/428	68.4 (62.2, 74.3)
30+ years	125/428	31.6 (25.7, 37.8)
Education		
<Grade 8	39/425	8.1 (5.5, 11.2)
Grade 8–11	220/425	55.0 (49.4, 60.7)
Grade 12	166/425	36.9 (31.4, 42.1)
Unemployed	121/414	27.4 (21.2, 31.7)
Cohabiting/married	132/428	33.5 (28.2, 39.6)
Socio-economic status		
Low	98/428	22.9 (17.9, 27.9)
Middle	299/428	69.9 (64.9, 75.2)
High	31/428	7.2 (4.2, 10.3)
HIV Infected	55/403	15.8 (11.1, 20.0)
Intimate partner violence: any partner, past 12 months		
Physical IPV only	160/427	36.2 (30.6, 41.7)
Sexual IPV only	82/428	18.9 (14.5, 23.2)
Physical or sexual IPV	179/428	41.5 (35.7, 47.4)
Physical or sexual IPV > once	123/428	27.6 (23.2, 32.9)
HIV risk behaviours		
Inconsistent condom use: any partner, past 3 months	334/427	76.5 (71.5, 81.3)
Any STI symptom, past 3 months	144/426	33.2 (27.7, 39.1)
Problem alcohol use	233/423	55.0 (49.3, 60.2)
>5 partner numbers in past 3 months	180/428	39.4 (33.3, 45.1)
5+ years older than any last partner	374/427	88.3 (84.8, 91.8)
Any last partner has other sexual partners	333/398	84.3 (78.8, 88.7)
Engages in concurrent partnerships	403/427	94.1 (90.4, 96.9)
Transactional sex with any last partner	340/427	76.8 (71.6, 82.2)

was 9.7% [6], and women in Rakai, Uganda (13.4%) [43]. The rate of past year physical or sexual IPV perpetration found in our study (41.5%) was higher than that reported by women attending antenatal clinics (30.1%) [6]. These findings suggest that men in our study setting who have multiple sexual partners perpetrate past year IPV at much higher rates compared to those reported elsewhere in southern Africa. While recognising that women in the studies cited above may have under-reported being victims of IPV, our hypothesis that HRH men in our study would report higher rates of past-year IPV was largely confirmed.

Among our sample of HRH men, inconsistent condom use was related to any IPV but not to physical or sexual IPV separately. This is contrary to other studies and may be as a result of the decreased variability in our independent variables when separating physical and sexual violence. Other studies found an association between inconsistent condom use among men and having ever raped a woman [10], and lifetime physical and sexual IPV [43], and a

lifetime history of sexual assault among female victims [9] were found. Our findings thus suggest that inconsistent condom use may not be specific to either physically or sexually violent relationships, but rather equally likely in both. Taken together these findings confirm that inconsistent condom use is a feature of violent relationships; whether physical or sexual.

Having reported at least one symptom of a STI in the last 3 months and having engaged in TS with a most recent sexual partner among our study participants were significantly related to all three IPV outcomes. These findings are supported by other studies. For example, men who had been sexually assaultive were more likely to have a history of genital ulcers [20], and women who had a history of sexual assault were more likely to have been diagnosed with a STI and to have had genital ulcers [9]. Additionally, a number of other studies found associations between having engaged in TS and physical and/or sexual IPV [7, 9, 11, 18–20]. The significant association between a STI

Table 3 Logistic regression models showing associations between HIV risk behaviours and intimate partner violence (IPV) outcomes in the past year and among high risk heterosexual men who have multiple female sexual partners

	<i>N</i>	Condom use ^a	Sexually transmitted infection ^b	Transactional sex ^c	Problem alcohol use ^d	>5 partners ^e	Partner has others partners ^f
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
IPV in the past 12 months							
None		Ref	Ref	Ref	Ref	Ref	Ref
Physical IPV	160	1.56 (0.91, 2.67)	2.08 (1.30, 3.32)	2.22 (1.28, 3.85)	1.85 (1.20, 2.86)	1.19 (0.80, 1.78)	2.25 (1.19, 4.24)
		<i>P</i> = 0.110	<i>P</i> = 0.002	<i>P</i> = 0.005	<i>P</i> = 0.005	<i>P</i> = 0.005	<i>P</i> = 0.390
Sexual IPV	82	1.60 (0.78, 3.29)	2.16 (1.22, 3.81)	2.67 (1.23, 5.80)	1.25 (0.74, 2.11)	1.73 (1.05, 2.86)	1.21 (0.58, 2.52)
		<i>P</i> = 0.199	<i>P</i> = 0.008	<i>P</i> = 0.013	<i>P</i> = 0.013	<i>P</i> = 0.399	<i>P</i> = 0.031
Any IPV	179	1.80 (1.06, 3.06)	1.98 (1.24, 3.14)	2.23 (1.32, 3.79)	1.77 (1.16, 2.70)	1.14 (0.77, 1.69)	1.82 (1.01, 3.28)
		<i>P</i> = 0.031	<i>P</i> = 0.004	<i>P</i> = 0.003	<i>P</i> = 0.003	<i>P</i> = 0.008	<i>P</i> = 0.501

^a This model adjusted for STI symptoms, problem alcohol use and employment

^b This model adjusted for condom use, problem alcohol use and employment, partner has other partners

^c This model adjusted for problem alcohol use

^d This model has no confounders

^e This model adjusted for problem alcohol use

^f This model adjusted for employment

symptom and physical IPV found in our sample of HRH men has not been reported elsewhere and suggests that the risk for STI transmission may extend to relationships characterised by physical violence and should be investigated further in future studies. Our findings confirm that sexual relationships characterised by exchange pose a significant risk for IPV for women that is most likely a function of the greater power conveyed to the paying (male) partner in such relationships [15].

Problem alcohol use among this study's participants was significantly related to physical IPV, and any IPV. Likewise, other studies found that alcohol use was significantly associated with physical IPV among working class men, any IPV towards women attending antenatal clinics and Ugandan women [7, 13, 43]. Other studies found that alcohol use was significantly associated with sexual IPV [9, 11, 21], and having raped a non-partner [19]. Contrarily, we did not find a relationship between alcohol use and sexual IPV. It is likely that the different measures of alcohol consumption used by these studies account for this contradiction. Whereas other studies measured whether alcohol was consumed currently and in the past [13], or in conjunction with sex [21, 43] or ever in one's lifetime [9], we used a specific measure to assess problem levels of alcohol use. It is also possible that, as was found among sexually assaultive males [20], alcohol use may not be a feature of sexual violence by men. The association between alcohol use and sexual violence by males needs to be explored in more depth by future studies.

The association between greater numbers of partners in the past 3 months and sexual IPV has been found by a number of other southern African studies that found a significant relationship between numbers of partners and IPV among male perpetrators [11–13, 19, 20], and women who had experienced IPV [7, 9, 43]. Contrary to other study findings, we did not find an association between numbers of partners and physical IPV in our sample of men. This is likely a function of the different ways in which multiple partnerships were quantified: five or more partners in the past 3 months in our study compared to having casual sex among young rural men [11], more than one current sexual partner among working class urban men [13], and more than three sexual partners in the past year among rural women [8]. While it is inexplicable as to why the different quantification of partner numbers did not also produce contradictory findings with respect to sexual IPV, future studies should strive for a more consistent quantification of partner numbers.

We also found an association between whether the men in our study thought any one of their most recent female partners also had other sexual partners and physical and any IPV. This perceived behaviour has not been explored directly in any studies known to the authors and should be

examined in future research as it is a high-risk bridging behaviour that has important implications for the spread of HIV to the general population.

These findings suggest that HRH men in our study setting who have multiple sexual partners and who engage in a range of high-risk behaviours are more likely to perpetrate IPV compared to that reported elsewhere in southern Africa. Our hypothesis that a range of HIV risk behaviours among HRH men in our study would be associated with IPV perpetration was thus confirmed. Observing that these behaviours cluster together in a predictable manner across study settings, Jewkes et al. [8] and Dunkle et al. [11] argue that the associations can be explained by IPV and risky sex having a common origin in a dominant idea of masculinity [8, 11, 19]. This model of masculinity, which emphasizes power and control over women [18], and sexual 'success' with women, not only legitimises the pursuit of multiple female sexual partners (facilitated by the practice of TS [44]) as a means to enhance men's esteem among peers, but also control over sexual encounters and decisions around safe sex practices. Heavy drinking and non-condom use both stem from the same set of ideas, as this model of masculinity that values courage and toughness, which become equated with a lack of concern about health and risks. When one adds the disinhibitive effect and impaired judgement associated with alcohol consumption, we have a context in which risky sexual behaviours are highly prevalent and risk for HIV is greatly enhanced.

This study has a number of limitations. First, the RDS methodology provides representative estimates of people with a particular set of characteristics based upon specific eligibility criteria, and it is, therefore, difficult to estimate what proportion of the total population this group of men represent. Second, the weights are dependent on the degree to which men would have knowledge of their peers' sexual behaviours. Although the validity of this assumption is unknown, qualitative interviews with some of the men found that they socialised in close-knit friendship groups [45]. In these circumstances it is likely that the sexual behaviour of their friends may well have been known. Third, it is impossible to get a measure of reporting bias. Given that our interviewers were all male, men may have felt compelled to over-report behaviours deemed to reflect successful masculinity. Equally, as behaviours that are otherwise socially condemned and illegal, or simply because men forgot, there may have been under-reporting. However, all interviewers were carefully selected and provided training to elicit honest and accurate recall, and to conduct interviews in a non-judgemental manner. Fourth, the provision of incentives may have encouraged men who did not fit the eligibility criteria to misrepresent themselves in order to gain entry into the study. However, we had a staff member who specifically screened each participant for

eligibility using a set of screening questions and we suspect that very few men, if any, who did not fit eligibility were able to enrol. Finally, the age restriction on the younger age of female partners may have resulted in some men being excluded from the study. As the restriction was limited to only one of the female partners and men reported on average five partners (range 2–35) in the previous 3 months, it is unlikely that a significant number of men would have been excluded for this reason.

These study findings demonstrate that men who have multiple female sexual partners are at high risk for HIV infection and transmission. In epidemics characterised by heterosexual transmission of the virus, these men comprise an important bridge for transmitting HIV and should be a focus of future sentinel surveillance. This study also supports the argument that HIV risk reduction interventions for men, particularly those who have multiple female sexual partners, should incorporate strategies to change the underlying construction of masculinity that links the anti-social and risky behaviours of IPV perpetration, inconsistent condom use, multiple concurrent partnering, TS and heavy alcohol consumption. There are evaluated interventions with men, such as Stepping Stones, which have been shown to be effective in addressing all these issues and such interventions should be promoted [46].

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