



Sexual Minority Status and Violence Among HIV Infected and At-Risk Women

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IMPORTANCE: Sexual minority women with and at-risk for human immunodeficiency virus (HIV) may face increased risks of violence.

OBJECTIVE: To understand the relationship between sexual minority status and violence; and how high-risk sex and substance use mediate that relationship among women with and at-risk for HIV.

DESIGN & PARTICIPANTS: Longitudinal study of 1,235 HIV infected and 508 uninfected women of the Women's Interagency HIV Study (WIHS) cohort, from New York City, NY, Chicago, IL, Washington D.C., and San Francisco, CA, 1994–2012.

MAIN MEASURES: Primary exposures are sexual identity (heterosexual, bisexual, lesbian/gay) and sexual behavior (male, female, or male & female partners). Primary outcomes are sexual abuse, intimate partner violence (IPV) and physical violence; high-risk sex and substance use were examined as mediators.

KEY RESULTS: Bisexual women were at increased odds for sexual abuse [aOR 1.56 (1.00, 2.44)], IPV [aOR 1.50 (1.08, 2.09)], and physical violence [aOR 1.77 (1.33, 2.37)] compared to heterosexual women. In a separate analysis, women who reported sex with men and women (WSMW) had increased odds for sexual abuse [aOR 1.65 (0.99, 2.77)], IPV [aOR 1.50 (1.09, 2.06)] and physical violence [aOR 2.24 (1.69, 2.98)] compared to women having sex only with men (WSM). Using indirect effects, multiple sex partners, cocaine and marijuana were significant mediators for most forms of abuse. Transactional sex was only a mediator for bisexual women. Women who reported sex only with women (WSW) had lower odds of sexual abuse [aOR 0.23 (0.06, 0.89)] and physical violence [aOR 0.42 (0.21, 0.85)] compared to WSM.

CONCLUSIONS: Women who identify as bisexual or report both male and female sex partners are most vulnerable to violence; multiple recent sex partners, transactional sex and some types of substance use mediate this relationship. Acknowledging sexual identity and behavior, while addressing substance use and high-risk sex in clinical and psychosocial settings, may help reduce violence exposure among women with and at-risk for HIV.

KEY WORDS: gay and lesbian health; IPV; sexual assault; HIV/AIDS; women's health.

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INTRODUCTION

Violence is a significant health problem for many women, including sexual minorities; it is associated with increased risk for human immunodeficiency virus (HIV), stress, and poorer physical and mental health outcomes.^{1–3} A study by the National Institute of Justice and the Centers for Disease Control and Prevention (CDC) found that 10 % of women had experienced rape and 31 % had experienced physical assault; over 60 % of these acts were perpetrated by intimate partners.⁴ Violence does not occur in isolation. The term syndemic, introduced by Singer, describes a synergy between disease(s) and environmental factors, such as poverty, that result in excess morbidity.^{5,6} The SAVA (substance abuse, violence, and AIDS/HIV) syndemic identified such a set of mutually reinforcing health issues among women.^{1,4,5,7–12} In this paper, we examine how sexual minority status, substance use and high-risk sex impact women's risk for violence, specifically sexual abuse, emotional intimate partner violence (IPV) and physical violence.

Sexual orientation is often described in three dimensions: attraction, behavior and identity.^{13–15} These dimensions are not perfectly congruent and separating same-sex from bisexual identity and behaviors can highlight differences that often cancel out when the groups are combined.¹³ For this analysis, we examined behavior and identity. We use the term sexual minority women to include lesbians, bisexuals, women who have sex with women (WSW) and women who have sex with men and women (WSMW), regardless of their sexual orientation.

High-risk sex, specifically multiple recent sex partners and transactional sex, and substance use are related to violence in complex ways. Transactional sex is associated with increased physical and sexual violence, from clients

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and intimate partners,^{9,16-21} as well as higher numbers of sex partners²²⁻²⁵ and increased substance use.^{22,24,26} Substance use may also contribute to poor decision-making and aggressive behaviors of both victims and perpetrators that increase violence, as well as participation in risky activities to obtain drugs.^{7,10} Substance use can also lead to and stem from transactional sex²¹ and is associated with multiple partners.²⁷

Participating in high-risk sexual and drug-related behavior and experiencing violence may be more common among sexual minority women. Studies have shown that women identifying as lesbian, bisexual or WSMW have increased odds of binge drinking and drug use.²²⁻²⁵ WSMW have been associated with high-risk sex; in two studies at sexually transmitted infection (STI) clinics, WSMW reported more transactional sex compared to heterosexual or WSW women.^{28,29} Among drug using women, those who had sex with women had increased transactional sex and numbers of sex partners.³⁰ In a community sample of low-income women, WSMW were six times more likely to engage in recent transactional sex and had four times the number of recent male partners compared to WSM.³¹ Finally, several studies have suggested that sexual minorities experience higher rates of violence, both as children and as adults³². In a meta-analysis of North American students, childhood sexual abuse was reported by 40 % of bisexual, 32 % of lesbian and 17 % of heterosexual women.³³ Compared to heterosexual women, bisexual women report higher rates of physical assault, injury by a partner, sexual assault, and lifetime victimization.³⁴

While the SAVA paradigm recognizes that women dealing with substance use and HIV also often experience violence, sexual minority status within this population may amplify this risk, with high-risk sex and substance use as mediators. We hypothesize that sexual minority women in this sample with and at-risk for HIV would have increased odds of sexual abuse, IPV and/or physical violence, and that number of sexual partners, transactional sex and substance use would mediate these relationships.

Subjects and Data Collection

Details of the Women Interagency HIV Study (WIHS) have been previously reported.^{35,36} Briefly, 4,137 women (3,067 HIV infected and 1,070 HIV uninfected) were enrolled at sites in Brooklyn NY, Bronx NY, Washington, DC, Chicago IL, Los Angeles CA and San Francisco CA, and participated in detailed interviews and physical exams every 6 months; the Los Angeles site did not ask about abuse. Initial enrollment was in 1994–95, and all sites enrolled additional cohorts in 2001–02 and 2010–12. HIV-infected women who did not acquire HIV perinatally and were biological females were eligible. HIV-uninfected women were eligible if they reported injection drug use, an STI, unprotected sex with ≥

3 men, having sex for drugs, money or shelter, or ≥5 male partners in the past year. For the later cohorts, additional criteria included crack, cocaine, heroin or methamphetamines use, sex with ≥6 men, and sex with a known HIV-infected man. In this study, inclusion criteria for the identity analysis were ≥ 2 follow-up visits, sexual identity reported at baseline (not including other), and ≥ 1 recent sex partner; 2,747 women were eligible and 2,089 had data on all variables of interest and were included. For the behavioral sample, the additional inclusion criterion was ≥ 3 years of follow-up; 2,702 women were eligible and 1,743 had data on all variables of interest and were included. Retention rates were 86 % in the identity sample and 88 % in the behavioral sample. This study was approved by the Institutional Review Board at each participating site and the WIHS Executive Committee. All participants provided written informed consent.

To assess the primary outcomes, violence questions were asked every 6 months through 1999 and yearly thereafter for non-California sites; San Francisco participants started reporting violence annually in 2005. Sexual abuse was assessed as “Since your last study visit, has anyone pressured or forced you to have sexual contact? By sexual contact I mean them touching your sexual parts, you touching their sexual parts or sexual intercourse.” Psychological/emotional IPV was indicated if the participant responded yes to any of the following “Since your last study visit, has a current or previous partner: threatened to hurt you or kill you; prevented you from leaving or entering your house; prevented you from seeing friends; prevented you from making phone calls; prevented you from getting or keeping a job; prevented you from continuing your education; prevented you from seeking medical attention?” Cronbach’s alpha for the IPV questions was 0.75. Physical violence was assessed as “Since your last study visit, have you experienced serious physical violence (physical harm by another person)? By that I mean were you ever hurt by a person using an object or were you ever slapped, hurt punched, kicked?”

For the primary exposures, participants were asked their sexual identity (heterosexual/straight, bisexual, lesbian/gay, other) at baseline, and at each visit, how many males and females they had vaginal, oral or anal sex with since their last visit. The sexual behavior variable was created based on the gender of partners over the past 3 years (men, women or both men and women). This variable was updated at each visit; for example, sexual behavior at visit 6 is defined by partners at visits 1 through 6, and sexual behavior at visit 7 is defined by partners at visits 2 through 7. Therefore, sexual identity was constant for each participant, while sexual behavior could change over time. The behavioral sample is also smaller, as data before year 3 of follow-up was not used; we use the term ‘index visit’ as the first visit when the sexual behavior variable could be created.

Baseline covariates included childhood sexual abuse (reported age 17 or younger to any sexual abuse question), education (less than high school, high school/equivalent, more than high school), and race/ethnicity (White, African American, Hispanic, other). Covariates updated every 6 months included annual household income (< \$6,000, \$6–12,000, \$12–18,000, > \$18,000), health insurance, stable housing (living in one's own house/apartment), partnered status (married/living with partner), total number of sex partners (1, 2, \geq 3), transactional sex (sex for money, drugs or shelter), and substance use (cocaine/crack, heroin, marijuana or risky drinking). Risky drinking is defined as \geq 3 drinks per day or \geq 7 drinks per week.³⁷ At each visit, HIV status was assessed (determined by ELISA, confirmed with Western Blot), thereby allowing serostatus to change over time.

Statistical Analysis

We used Chi-Square tests to assess categorical variables and Kruskal-Wallis tests for non-normal continuous variables to compare sociodemographics, high-risk sex, substance use, and violence exposure by sexual identity and behavior; Fisher's exact Chi-Square tests were used for small cell sizes. Confounders were selected based on empirical literature. Cohort and year of visit were included to account for temporal trend, while study site was included to account for geographic differences.

The three outcomes were sexual abuse, IPV and physical violence since the last visit. Separate analyses were run using sexual identity and sexual behavior as the predictors of interest. Unadjusted and adjusted odds ratios were calculated using generalized estimating equations (GEEs) with an exchangeable correlation structure and logit link to account for within-subject correlation due to repeated measurements over time. The adjusted models controlled for: cohort, race/ethnicity, education, childhood sexual abuse, age at visit, year of visit, income, insurance, housing stability, partner status, and HIV status at each visit.

To test for mediation, number of recent sex partners, transactional sex, and substance use since last visit were included one at a time and then jointly (in the complete model). A change in the association (odds ratio) of the primary exposure (sexual identity or behavior) when the new variable is added suggests it is acting as a mediator. The indirect effect is used to quantify the mediation and is the portion of the total effect that is actually due to the mediator; it provides information about the significance, size, and direction of the mediation. Indirect effects were determined by bootstrapping the complete model for each outcome as well as models predicting each mediator.³⁸ Simple random sampling with replacement was used and models were each run 500 times³⁹; confidence intervals were bias-corrected.⁴⁰ All analyses were planned a priori;

therefore p values were not adjusted for multiple comparisons. All analyses were conducted in SAS 9.3 (Cary, NC).

RESULTS

Table 1 shows participant characteristics at baseline for the sexual identity sample and index visit for the sexual behavior sample. The sexual identity sample (n=2,089; 17,645 person visits) included 103 lesbians (821 visits), 173 bisexuals (1,384 visits) and 1,813 heterosexual women (15,440 visits). There were 1,743 women in the sexual behavior sample, contributing 12,731 visits. The interclass correlation (ICC) for sexual behavior was 0.55, indicating that 45 % of the variation in sexual behaviors was within participants. Sexual identity and sexual behavior were not always concordant. During follow-up, women who identified as heterosexual at baseline were classified as WSW or WSMW at 5 % of follow-up visits, while women who identified as lesbian at baseline were classified as either WSM or WSMW at 28 % of follow-up visits.

The identity sample was predominantly African American (66 %) and low-income, with 55 % earning less than \$12,000 per year. At baseline, 72 % were HIV infected and 18 women seroconverted during follow-up. The mean years of follow-up was 7.7 (SD 5.6). The behavioral sample was similar in make-up. Sexual minority women were more likely to report childhood sexual abuse, recent sexual abuse, and IPV, and less likely to report having a partner or living in their own home. Bisexuals and WSMW were also more likely to report transactional sex, \geq 2 recent sex partners, and substance use. Among the potential mediators, the highest correlations were between number of sex partners and transactional sex (0.41, $p<0.001$), cocaine/crack use and heroin use (0.41, $p<0.001$), and transactional sex and cocaine/crack use (0.37, $p<0.001$).

During follow-up, all types of violence were more common among bisexual women and at visits where women reported WSMW (Table 2). In the adjusted models, bisexuals had 56 % ($p=0.05$) higher odds of sexual abuse, 50 % ($p=0.01$) higher odds of IPV, and 77 % ($p<0.001$) higher odds of physical violence compared to heterosexual women (Table 3). The increased odds for sexual abuse and IPV were completely mediated by high-risk sex and substance use. In the complete model, accounting for all potential mediators, the odds of physical violence remained significantly higher for bisexual women (aOR 1.36, $p=0.03$). The indirect effects of recent sex partners, transactional sex, cocaine/crack use and marijuana use were significant for all outcomes for bisexuals (Table 4); heroin use and risky drinking were not associated with any outcomes. We were unable to detect an association between any type of violence and lesbian compared to heterosexual identity ($p=0.34$ for sexual abuse, $p=0.13$ for IPV, $p=0.72$ for physical violence).

Table 1. Sample Characteristics at Baseline for Sexual Identity and at Index Visit for Sexual Behavior

	Lesbian (n=103)	Bisexual (n=173)	Heterosexual (n=1,813)	p value	WSW (n=87)	WSMW (n=135)	WSM (n=1,521)	p value
Total number of visits	821 (4.7 %)	1384 (7.8 %)	15,440 (87.5 %)	—	595 (4.7 %)	940 (7.4 %)	11,196 (87.9 %)	—
HIV infected	61.2 %	68.8 %	72.8 %	0.02	56.3 %	60.7 %	72.6 %	<0.001
Age, mean (SD)	37.4 (7.3)	38.6 (8.8)	36.5 (8.7)	0.01	39.6 (7.4)	35.7 (7.5)	38.0 (8.2)	<0.001
Cohort 1 (1994–1995)	68.9 %	60.7 %	62.7 %	0.33	72.4 %	54.1 %	66.5 %	0.006
Cohort 2 (2001–2002)	28.2 %	30.1 %	29.2 %		27.6 %	45.9 %	33.5 %	
Cohort 3 (2010–2012)	2.9 %	9.3 %	8.2 %		0.0 %	0.0 %	0.0 %	
Race								
White	12.6 %	12.1 %	11.4 %	0.47	11.5 %	11.1 %	11.6 %	0.34
African American	62.1 %	61.9 %	66.4 %		59.8 %	71.1 %	64.7 %	
Hispanic	22.3 %	20.2 %	19.3 %		25.3 %	13.3 %	20.8 %	
Other	2.9 %	5.8 %	2.9 %		3.5 %	4.4 %	2.8 %	
Income								
Under \$6 K	27.2 %	28.3 %	26.0 %	0.35	29.9 %	27.4 %	22.3 %	0.07
\$6–\$12 K	36.9 %	31.8 %	28.2 %		25.3 %	34.1 %	29.7 %	
\$12–18 K	9.7 %	12.1 %	13.7 %		14.9 %	16.3 %	14.1 %	
Over \$18 K	26.2 %	27.8 %	32.1 %		29.9 %	22.2 %	34.3 %	
Education								
Less than HS	43.7 %	38.7 %	35.0 %	0.10	40.2 %	34.8 %	35.2 %	0.15
HS	22.3 %	25.4 %	31.9 %		19.5 %	29.6 %	32.2 %	
More than HS	34.0 %	35.8 %	33.1 %		40.2 %	35.6 %	32.6 %	
Insured	78.6 %	75.7 %	81.7 %	0.13	85.1 %	69.6 %	82.8 %	<0.001
Stable Housing	63.1 %	72.8 %	74.2 %	0.04	74.7 %	68.9 %	80.9 %	0.002
Partnered	28.2 %	29.5 %	37.5 %	0.02	29.9 %	23.7 %	34.4 %	0.03
Childhood sexual abuse	36.9 %	46.2 %	23.3 %	<0.001	40.2 %	39.3 %	23.9 %	<0.001
Total number of sex partners								
1	80.6 %	52.6 %	76.6 %	<0.001	85.1 %	46.7 %	81.7 %	<0.001
2	10.7 %	22.5 %	14.5 %		11.5 %	28.9 %	12.3 %	
3 or more	8.7 %	24.9 %	9.0 %		3.5 %	24.4 %	6.1 %	
Transactional sex	1.9 %	9.8 %	4.0 %	<0.001	1.2 %	11.1 %	3.2 %	<0.0001
Cocaine/crack Use	19.4 %	24.9 %	13.8 %	<0.001	12.6 %	23.7 %	11.3 %	<0.001
Heroin Use	8.7 %	12.7 %	5.6 %	<0.001	3.5 %	9.6 %	4.9 %	0.042
Marijuana use	24.3 %	33.5 %	22.6 %	0.005	24.1 %	34.1 %	20.5 %	0.001
Risky drinking	19.4 %	21.4 %	15.2 %	0.06	14.9 %	26.7 %	14.7 %	0.001
Recent Experience of Violence								
Sexual Abuse	9.7 %	14.5 %	7.0 %	0.001	6.9 %	14.1 %	3.6 %	<0.001
IPV	13.6 %	15.0 %	8.0 %	0.001	8.1 %	10.4 %	5.8 %	0.08
Physical Violence	2.9 %	5.8 %	3.3 %	0.21	2.3 %	4.4 %	2.3 %	0.24*
Sexual Identity								
Lesbian	—	—	—	—	74.7 %	11.9 %	0.3 %	<0.001
Bisexual	—	—	—		23.0 %	41.5 %	4.6 %	
Heterosexual	—	—	—		2.3 %	46.7 %	95.1 %	

*Fishers exact test

For the behavioral analysis, WSMW had 65 % (p=0.05) higher odds of sexual abuse, 50 % (p=0.01) higher odds of

IPV, and 124 % (p<0.001) higher odds of physical violence compared to WSM in the adjusted models (Table 3). The

Table 2. Type of Violence Reported Over All Visits, by Sexual Identity Or Sexual Behavior

	Lesbian (n=821)	Bisexual (n=1,384)	Heterosexual (n=15,440)	p value	WSW (n=595)	WSMW (n=940)	WSM (n=11,196)	p value
Any Violence	10.8 %	14.1 %	8.1 %	<0.001	4.4 %	13.9 %	6.3 %	<0.001
Sexual Abuse	1.2 %	4.0 %	1.9 %	<0.001	0.3 %	3.8 %	1.5 %	<0.001
IPV	7.9 %	9.0 %	5.2 %	<0.001	3.9 %	8.6 %	4.0 %	<0.001
Threatened by partner	4.9 %	6.3 %	3.6 %	<0.001	2.7 %	6.2 %	2.8 %	<0.001
Partner prevented leaving house	2.9 %	3.5 %	2.0 %	0.003	1.2 %	4.0 %	1.4 %	<0.001
Partner prevented seeing friends	3.7 %	2.9 %	2.0 %	<0.001	1.5 %	3.7 %	1.4 %	<0.001
Partner prevented making phone calls	2.6 %	2.2 %	1.6 %	0.03	1.9 %	2.7 %	1.1 %	<0.001
Partner prevented getting/keeping job	1.0 %	1.0 %	0.6 %	0.07	0.7 %	1.6 %	0.3 %	<0.001*
Partner prevented continuing education	0.5 %	0.4 %	0.5 %	0.85	0.3 %	0.5 %	0.3 %	0.28*
Partner prevented seeking medical attention	0.1 %	0.6 %	0.4 %	0.27	0.5 %	0.9 %	0.3 %	0.01*
Physical Violence	5.4 %	9.2 %	4.3 %	<0.001	1.7 %	10.9 %	3.4 %	<0.001

* Fishers exact test

Table 3. Adjusted Odds Ratios of Violence by Type and Sexual Behavior Or Sexual Identity, with Mediators

	Unadjusted Model OR (95 % CI)	Adjusted Model* aOR (95 % CI)	Adjusted Model & Recent Sex Partners aOR (95 % CI)	Adjusted Model & Transactional Sex aOR (95 % CI)	Adjusted Model & Substance use† aOR (95 % CI)	Complete Model‡ aOR (95 % CI)
Sexual Identity Models, Heterosexual as reference group (n=2,089)						
Sexual Abuse						
Lesbian/Gay	0.76 (0.33, 1.75)	0.67 (0.29, 1.53)	0.70 (0.30, 1.59)	0.65 (0.29, 1.45)	0.63 (0.28, 1.41)	0.65 (0.29, 1.47)
Bisexual	2.14 (1.39, 3.29) ¶	1.56 (1.00, 2.44) §	1.14 (0.71, 1.81)	1.24 (0.77, 2.00)	1.37 (0.87, 2.15)	1.06 (0.66, 1.70)
IPV						
Lesbian/Gay	1.57 (1.06, 2.32)	1.36 (0.91, 2.03)	1.39 (0.92, 2.11)	1.38 (0.92, 2.07)	1.39 (0.95, 2.04) §	1.45 (0.98, 2.15) §
Bisexual	1.82 (1.34, 2.47) ¶	1.50 (1.08, 2.09)	1.25 (0.90, 1.72)	1.36 (0.97, 1.90) §	1.35 (0.97, 1.88) §	1.18 (0.85, 1.63)
Physical Violence						
Lesbian/Gay	1.24 (0.84, 1.84)	1.08 (0.72, 1.61)	1.07 (0.71, 1.62)	1.08 (0.71, 1.64)	1.08 (0.73, 1.61)	1.11 (0.74, 1.66)
Bisexual	2.16 (1.62, 2.89) ¶	1.77 (1.33, 2.37) ¶	1.48 (1.12, 1.97)	1.54 (1.16, 2.05)	1.53 (1.16, 2.04)	1.36 (1.02, 1.80)
Sexual Behavior Models, WSM as reference group (n=1,743)						
Sexual Abuse						
WSW	0.31 (0.09, 1.06) §	0.23 (0.06, 0.89)	0.26 (0.06, 1.02) §	0.24 (0.06, 0.93)	0.25(0.06, 0.97)	0.26 (0.07, 1.06) §
WSMW	2.06 (1.25, 3.41)	1.65 (0.99, 2.77) §	1.04 (0.61, 1.76)	1.41 (0.80, 2.46)	1.47 (0.87, 2.50)	1.06 (0.61, 1.84)
IPV						
WSW	0.96 (0.58, 1.58)	0.86 (0.53, 1.40)	0.92 (0.57, 1.51)	0.88 (0.54, 1.44)	0.94 (0.58, 1.52)	1.00 (0.61, 1.63)
WSMW	1.78 (1.31, 2.43)	1.50 (1.09, 2.06)	1.11 (0.80, 1.53)	1.37 (0.99, 1.90) §	1.32 (0.95, 1.83) §	1.08 (0.77, 1.50)
Physical Violence						
WSW	0.46 (0.22, 0.93)	0.42 (0.21, 0.85)	0.44 (0.21, 0.90)	0.44 (0.21, 0.90)	0.47 (0.23, 0.95)	0.49 (0.24, 1.00) §
WSMW	2.67 (2.00, 3.55)	2.24 (1.69, 2.98)	1.65 (1.21, 2.25)	2.05 (1.53, 2.75)	1.91 (1.42, 2.58)	1.60 (1.17, 2.19)

*age, visit year, cohort, race, education at baseline, income, stable housing, insurance, partner, HIV status, childhood sexual abuse
 † cocaine/crack use, heroin use, marijuana use, risky drinking
 ‡ Adjusted Model plus recent sex partners, transactional sex and substance use, as previously defined
 § p < 0.1; || p < 0.05; ¶ p < 0.001

association with physical violence remained significant even in the complete model (aOR 1.60, p=0.003), while the associations with sexual abuse and IPV were completely mediated. The indirect effect of number of recent sexual partner was significant for all outcomes for WSMW (Table 4). The indirect effect of cocaine/crack use was significant for IPV and physical violence, while marijuana use was significant for sexual abuse and physical violence.

WSW had 77 % (p=0.03) lower odds of sexual abuse and 58 % (p=0.01) lower odds of physical violence compared to WSM in the adjusted models; the association with IPV was not significant (p=0.54). None of the indirect effects were significant for WSW and any type of violence.

In the complete models (for either behavior or identity), childhood sexual abuse remained highly significant (p < 0.001) and was one of the largest measures of association (aORs from 1.91 to 2.96) depending on the outcome. As a

Table 4. Beta Estimates of Indirect Effects (Bias Corrected 95 % CI) of Mediators in Complete Model

Outcome	Number of Recent Sex Partners	Transactional Sex	Cocaine/Crack Use	Heroin Use	Marijuana Use	Risky Drinking
Bisexual						
Sexual Abuse	0.60 (0.37, 0.87) *	0.37 (0.11, 0.85) *	0.15 (0.02, 0.40) *	-0.23 (-0.64, 0.008)	0.18 (0.08, 0.34) *	0.0001 (-0.02, 0.02)
Domestic Abuse	0.59 (0.44, 0.78) *	0.14 (0.01, 0.36) *	0.10 (0.02, 0.24) *	0.06 (-0.12, 0.25)	0.15 (0.06, 0.25) *	-0.006 (-0.05, 0.01)
Physical Violence	0.38 (0.25, 0.62) *	0.24 (0.04, 0.48) *	0.23 (0.10, 0.44) *	0.11 (-0.05, 0.34)	0.11 (0.05, 0.23) *	-0.01 (-0.07, 0.03)
WSMW						
Sexual Abuse	1.14 (0.78, 1.68) *	-0.006 (-0.45, 0.28)	0.01 (-0.13, 0.14)	-0.14 (-0.61, 0.08)	0.05 (0.007, 0.19) *	0.006 (-0.01, 0.09)
Domestic Abuse	0.89 (0.65, 1.28) *	0.002 (-0.18, 0.13)	0.09 (0.006, 0.26) *	0.07 (-0.08, 0.35)	0.09 (-0.007, 0.18)	-0.003 (-0.04, 0.01)
Physical Violence	0.65 (0.41, 0.97) *	0.003, (-0.28, 0.17)	0.15 (0.01, 0.38) *	0.15 (-0.02, 0.42)	0.05 (0.01, 0.15) *	-0.006 (-0.08, 0.006)

Models include age, visit year, cohort, race, education at baseline, income, stable housing, insurance, partner, HIV status, childhood sexual abuse, recent sex partners, transactional sex, cocaine/crack use, heroin use, marijuana use, risky drinking
 * p < 0.05

confounder in the adjusted models, HIV was only associated with IPV; interactions between HIV status and sexual behavior or identity were tested and were not statistically significant.

DISCUSSION

In this sample of women with or at-risk for HIV, women who identified as bisexual at baseline and those reporting sex with both men and women during follow-up had the highest odds of experiencing violence. These differences were often completely mediated, particularly by multiple recent sex partners. However, even after controlling for all mediators, bisexual women and WSMW had increased odds for physical violence. Transactional sex and cocaine use also emerged as important mediators for all types of violence. While WSW had lower odds of sexual abuse and physical violence, it is important to note that lesbian identity was not protective, and therefore all women should be screened.

In 2012, the US Prevention Task Force recommended IPV screening for all women of reproductive age;⁴¹ such screening is now covered by the Affordable Care Act.⁴² While there are no standards regarding sexual histories, the American College of Obstetricians and Gynecologists recommended in 2013 that assessments of adult women include “sexual orientation, number of partners...exchange sex for drugs or money.”⁴³ Ard & Makadon provide recommendations for IPV screening in lesbian, gay, bisexual, transgender (LGBT) patients;⁴⁴ these women may face unique barriers to reporting abuse or find that resources do not address their needs.⁴⁴⁻⁴⁶ As Jewkes recently noted, increased routine IPV screening by clinicians has had little benefit, recommending research into new approaches.⁴⁷ From a syndemic perspective, violence prevention must take into account sexual minority status, high-risk sex, substance use and environmental factors, such as poverty, to be effective.⁴⁸ For clinicians, screening for substance use, high-risk sexual behaviors, and violence will enable them to provide targeted referrals and social service support. Substance use treatment providers and violence prevention programs can offer easier access and develop new methods to jointly address these problems,^{46, 49-51} while being accepting of sexual minority women.⁴⁵

In our framework, multiple recent sex partners, transactional sex, and substance use mediated the association with violence. We found support for this model, as these high-risk behaviors attenuated the effect sizes and had significant indirect effects. Further research to elucidate the causal pathways between bisexual identity, WSMW and physical violence is needed. Bisexual identity may be associated with unique stresses, multiple marginalization, and limited

support.⁵²⁻⁵⁴ Childhood sexual abuse also emerged as an important predictor of abuse; this is in line with previous studies, which found that women abused as children were twice as likely to experience violence as adults,⁴ and may support the importance of early interventions.⁵⁵

There are several limitations to this study. Sexual identity was asked only at baseline; women, especially sexual minorities, often change their identity over time, potentially leading to misclassification.^{56,57} Women were not asked if all recent sex partners were consensual, which could overestimate the relationship between number of recent partners and sexual abuse. The perpetrators of sexual and physical abuse were not identified, so it is unclear if these are instances of other forms of IPV. Substance use of partners was also unavailable. All data are based on self-report. These results are not generalizable to all women, as we specifically recruited women who were substance users, having risky sex, or HIV- infected; in particular, women with no male partners must have used illicit drugs to meet enrollment criteria or to contract HIV. While sexual identity and behavior were measured prior to the outcomes, we are unable to establish causality; for many women violence exposure and substance use began prior to enrollment. We also recognize that this initial framework represents a simplified approach and these relationships may be bi-directional. Substance use may be a risk factor for and a reaction to violence;^{10,12,58} substance use or poverty may have led women to engage with partners of a gender they would not otherwise have sex with.^{22,59}

Strengths of this study include its multisite, longitudinal design and long follow-up period spanning mid-life for most women. Due to the large sample size, we were able to examine both sexual identity and behavior within the same sample, as well as distinguish differences among sexual minority women.

The more we understand the interconnected nature of the SAVA syndemic, the more we realize that the solutions must be equally interconnected.⁴⁴ At a societal level, violence prevention should include promotion of gender equality and increased access to economic opportunities and safe housing.⁴⁸ At a local level, violence against women with or at-risk for HIV requires integration of services and collaborations between clinicians, substance use programs, violence survivor resources, and lesbian, gay, bisexual, transgender, and queer (LGBTQ) centers.

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