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Heterogeneity of HIV prevalence among the sexual networks of Black and White MSM in Atlanta: illuminating a mechanism for increased HIV risk for young Black MSM

Alfonso C. Hernández-Romieu, MD, MPH¹, Patrick S. Sullivan, PhD, DVM¹, Richard Rothenberg, MD, MPH², Jeremy Grey, PhD¹, Nicole Luisi, MPH, MS¹, Colleen F. Kelley, MD, MPH^{1,3}, and Eli S. Rosenberg, PhD¹

¹Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA, USA

²Department of Epidemiology and Biostatistics, School of Public Health, Georgia State University, Atlanta, GA, USA

³Division of Infectious Diseases, School of Medicine, Emory University, Atlanta, GA, USA

Abstract

Background—Studying the heterogeneity and correlates of HIV risk in the sexual networks of Black and White MSM may help explain racial disparities in HIV-infection.

Methods—Black and White MSM were recruited as seeds using venue-based time sampling, and provided data regarding their recent sex partners. We used chain referral methods to enroll seeds' recent sex partners; newly enrolled partners in turn provided data on their recent sex partners, some of whom later enrolled. Data about unenrolled recent sex partners obtained from seeds and enrolled participants were also analyzed. We estimated the prevalence of HIV in sexual networks of MSM and assessed differential patterns of network HIV risk by the race of the seed.

Results—The mean network prevalence of HIV in sexual networks of Black MSM (n=117) was 36% compared to 4% in networks of White MSM (n=78) (P<0.0001). Sexual networks of unemployed Black MSM had a higher prevalence of HIV than their employed counterparts (51% vs. 29%, P=0.007). The networks of HIV-negative Black MSM seeds aged 18–24 had a network prevalence of 9% compared to 2% among those aged 30 or older. In networks originating from a Black HIV-positive seed, the prevalence ranged from 63% among those aged 18–24 to 80% among those 30 or older.

Conclusion—The high prevalence of HIV in the networks of HIV-negative young Black MSM demonstrates a mechanism for the increased HIV incidence observed in this age group. More research is needed into how age and socioeconomic factors shape sexual networks and HIV risk.

Corresponding author/Reprint requests: Alfonso C. Hernández-Romieu, Department of Epidemiology, Rollins School of Public Health, Emory University, 1518 Clifton Rd. NE, Room 444 GCR, Atlanta, Georgia 30322, Phone: (+1) (404)727-8974 / Fax: (404)712-8392, alfonso.claudio.hernandez@emory.edu.

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Keywords

sexual partners; homosexual men; HIV seroprevalence; sexual behavior; socioeconomic factors; epidemiology

INTRODUCTION

In the United States, there are disparities in HIV incidence among MSM, with Black MSM at higher risk of HIV than non-Black MSM (1). In 2011, Georgia ranked fifth among states in total number of new HIV infections diagnosed, with the majority of infections occurring in Atlanta (2, 3), where marked racial disparities in HIV among MSM exist. A recent cohort study in Atlanta observed a nearly four-fold higher HIV incidence among Black MSM relative to White MSM. (4)

Individual risk behaviors have failed to explain racial disparities in HIV. In studies of MSM, Black participants report lower or similar levels of risk behaviors compared to non-Black participants (5–7). Studying social and structural factors that determine HIV risk, such as racial differences in the composition of sexual networks of MSM, may better explain these disparities (6).

Studying sexual networks can provide insight into the heterogeneity of risk that exists among specific subpopulations. The hypothesis that sexual networks might be responsible for racial disparities in HIV infection is based on the high prevalence already observed among Black MSM (6), which recent studies of the impact of racial mixing patterns on HIV prevalence and incidence support (4, 8). However, HIV prevalence may not be uniformly distributed within racial groups. Theoretical models of sexual networks have shown that HIV transmission risk is not uniform, but determined by underlying structures of sexual networks within a population (9).

Our understanding of HIV risk in sexual networks of MSM is limited. Previous network studies of Black MSM have observed prevalences of HIV between 8–41% (10, 11). However, the variability of HIV prevalence among these networks has not been quantified, nor have differences in network prevalence of HIV been studied by race. Identifying HIV prevalence patterns present in sexual networks of MSM may help understand social and network factors associated with increased risk of HIV, and lead to development of focused prevention programs.

Our objective was to study the heterogeneity and correlates of HIV prevalence in 195 sexual networks of Black MSM and White MSM, in Atlanta, GA.

MATERIALS AND METHODS

Study procedures

The Men's Atlanta Networks (MAN) Project was a cross-sectional sexual networks study of MSM in Atlanta, GA, conducted from April, 2011, to March, 2013. We recruited participants using chain referral sampling (12), in which 'seed' participants referred recent

male sex partners (previous 12 months); referred partners were able to enroll and also refer other partners. Seeds were recruited using time-space venue sampling. (13) Venues sampled and day-time periods used were identical to a recent cohort study conducted in Atlanta, and have been published. (14)

Seeds were eligible if they were non-Hispanic Black or White, aged between 18–40 years, and had had sex with a man in the three months prior to the survey. Referred partners could be any race/ethnicity, were eligible if aged ≥ 18 years, had sex with the participant who referred them, and lived in the Atlanta metropolitan area. Our study included three types of individuals: seeds (n=195), enrolled partners (i.e., referred partners eligible for the study and willing to participate; n=119), and non-enrolled partners (i.e., partners that were not referred, could not be located, or unwilling to participate; n=1,299) whose information was still collected. Hereafter, seeds and their enrolled partners are referred to as participants. We obtained informed written consent from participants. The Emory University Institutional Review Board approved the study.

Measures

Participants completed self-administered computer questionnaires that collected data on up to 10 recent sex partners. Participants provided the age, race/ethnicity, and perceived HIV status of recent sexual partners based on serodiscussion prior to their first or last sexual encounter. Questions used to assess sexual serodiscussion have been published (15). Participants reported whether they had anal intercourse, and used condoms, alcohol, or drugs at last sex. During a referral session with the study counselor, participants referred eligible partners described in the survey to the study. Referred partners were contacted by the participant himself, and by study staff if desired, to assess interest in participation. Participants' partner survey data were able to be directly linked to study data of referred partners who later enrolled.

Participants' HIV status was determined by rapid test screening (Clearview Complete; Alere, Waltham, Massachusetts, or Insti; Bioanalytical, Richmond, British Columbia) on blood; preliminary positives were confirmed using western blot. Unenrolled partners' HIV status was based on self-reports from their partners (i.e., HIV-positive, HIV-negative, or unknown).

Statistical Analysis

Seeds and partner characteristics—Demographic and socioeconomic characteristics, risk behaviors, and HIV status of seeds, enrolled, and unenrolled partners were compared by seed race using χ^2 tests. We used general estimating equation (GEE) log models to test differences in racial concordance, partnership attributes, and partner HIV status within networks by seed race, controlling for network size.

Network prevalence of HIV—We calculated personal network-level HIV prevalence as the proportion HIV-positive network members, with two variations. The first, included network seeds and represented a measure of HIV risk for any individual entering a given sexual network. The second, excluded the network seed, providing a measure of HIV risk

for an HIV-negative seed in his network. We then estimated a group network prevalence for Black MSM and White MSM seeds for both variations by obtaining the mean prevalence of all personal network prevalences. These group network prevalences were compared by seed demographic and socioeconomic characteristics, and risk behaviors using Wilcoxon rank-sum and Kruskal-Wallis tests.

Heterogeneity of network prevalence of HIV among Black MSM—We explored how group network prevalence varied by seed HIV-status among Black seeds ($n=117$) and their partners ($n=799$). We did not examine heterogeneity of network prevalence by HIV status among White MSM networks owing to the low HIV prevalence of White seeds (4%; $n=3$). We estimated group network prevalences of HIV by seed HIV status and performed tests of interaction using the adjusted rank transform test (16).

Sensitivity Analyses—Among 1,299 non-enrolled partners in our study, 49.7% ($n=646$) were reported HIV-negative, 7.6% ($n=99$) HIV-positive, 39.6% ($n=514$) HIV status unknown, and 3.1% ($n=40$) missing. Because self-reports of partner HIV status are subject to a number of biases we performed sensitivity analyses to assess changes in network prevalence of HIV and in associations of network prevalence with seed characteristics under four different assumptions. Our primary analysis excluded all members with unknown/missing HIV status (i.e., missingness assumed to be random and non-informative). A second analysis assumed HIV-status unknown partners to be HIV negative, providing a “lower bound” for network HIV prevalence. In a third iteration, we performed multiple imputations for HIV prevalence of unknown HIV status partners by using age- and race-specific prevalence for comparable MSM populations (14, 17, 18). In our final iteration, in addition to imputations conducted for unknown status partners, we imputed HIV prevalence for HIV negative unenrolled partners based estimates of awareness of HIV infection (19), providing an “upper bound” for network prevalence. Hereafter we will refer to our second, third, and final sensitivity analyses as “lower bound”, “imputed mean”, and “upper bound”, respectively. All four analyses included seed HIV status in calculations of network prevalence. The estimates of imputed prevalences and their sources in Supplemental Digital Content (SDC) Table 5.

Statistical tests were performed with an $\alpha=0.05$ and analyses were conducted using SAS v9.3 (SAS Institute; Cary, NC).

RESULTS

Seed and partner characteristics

We recruited 195 seed participants, of whom 60% ($n=117$) were Black MSM. Black MSM were younger, less likely to identify as gay, less educated, more likely to live in poverty, less likely to be employed, and more likely of reporting homelessness in the previous 12 months compared to White MSM (Table 1). Conversely, White MSM reported a higher number of partners in the previous 12 months and reported more drug use than their Black counterparts. HIV prevalence (95%CI) among Black MSM was 44% (34–53%) compared to 4% (0–11%) among White MSM. The combined HIV prevalence among Black MSM seeds and their

partners was 30% (26–34%) and was higher relative to White MSM seeds and their partners, 5% (3–7%), (p -value<0.0001; not shown).

Compared to unenrolled partners, enrolled partners were more likely to be main partners, having had sex more than once, and engaging in unprotected anal intercourse (UAI), with no differences by seed race (Table 2). Proportions of serodiscussion with enrolled partners (73%) were higher compared to unenrolled partners (50%) in networks of Black MSM, with no difference in networks of White MSM. Proportions of serodiscussion among Black and White MSM seeds did not differ by seed HIV-status (p -value=0.84 and p -value=0.98, respectively). Among Black MSM networks, 46% of enrolled partners tested HIV-positive, and 12% of unenrolled partners were reported as HIV-positive. In contrast, 12% of enrolled partners of White MSM seeds tested HIV-positive, and 3% of unenrolled partners were reported as HIV-positive.

GEE analyses comparing sexual networks of Black and White MSM are also shown in Table 2. We noted no significant differences in the proportion of race-concordant partnerships (77% Black vs. 72% White, p -value=0.07, data not shown). The age of network members between Black and White seed networks were similar. Alcohol use at last sex was higher in networks of White MSM compared to Black MSM. Networks of Black MSM were more likely to include HIV-positive and -unknown status members than did the networks of White MSM, and Black MSM network members were less likely to have discussed theirs or their partners' HIV status compared to White MSM network members. The median [Inter-Quartile Range (IQR)] network size was similar by race, with 7 [4–11] and 8 [4–11] members for Black and White MSM seeds, respectively (p -value=0.4).

Network prevalence of HIV

The mean network prevalence of HIV was 36% (38–43%) among networks of Black MSM compared to 4% (1–6%) among networks of White MSM (p -value<0.0001; not shown). When removing seeds from calculations, the mean network prevalence of HIV was 29% for Black MSM and 5% for White MSM (SDC Table 1). The lower and upper bounds of network prevalence were 21–40% for Black MSM (SDC Tables 2 and 4, respectively) and 3–11% for White MSM. The imputed mean network prevalence was 35% for Black MSM (SDC Table 3) and 8% for White MSM. Among White MSM, no differences were observed in the network prevalence of HIV by demographics, or risk behaviors (not shown).

Heterogeneity of network prevalence of HIV among Black MSM

We observed heterogeneity of network HIV prevalence in the networks of Black MSM, exemplified in SDC Figure 1. Black MSM seeds aged 30 or more years, and those reporting current unemployment were more likely to be HIV-positive (Table 3). The median [IQR] size of the networks was similar among Black HIV-negative and -positive seeds (7 [4–10] vs. 7 [4–11] members, p -value=0.8), suggesting a similar number of individuals contributing to within-network prevalence. The overall network prevalence of HIV-positive Black MSM was 74% compared to 6% among HIV-negative Black MSM when including network seeds in calculations (Table 3), and 56% and 10% respectively, when excluding network seeds (SDC Table 1). Sensitivity analyses yielded lower and upper bounds of network prevalence

of 44–66% and 4–21% for HIV-positive seeds and HIV-negative seeds, respectively. The imputed mean network prevalence was 62% and 14% among HIV-positive and HIV-negative seeds, respectively.

We observed differences in overall HIV network prevalence by seed age-group, and a significant interaction between seed HIV status and age. This interaction is displayed in Figure 1, demonstrating that the overall HIV prevalence is a weighted average of network-level components. Both the frequency of and HIV prevalence in networks with an HIV-positive seed increased with age; the opposite was seen among HIV-negative seed networks. Specifically, among HIV-negative seed participants aged 18–24, the network prevalence of HIV was 9%, compared to 3% among those aged 25–29, and 2% among those 30 years or older. This interaction was robust to sensitivity analyses. Figure 2 depicts the imputed mean, and lower and upper bounds by age-group and HIV-status.

The mean network prevalence of HIV was higher among seeds reporting unemployment (Table 3), and was observed in all sensitivity analyses (SDC Tables 1–4).

DISCUSSION

We observed heterogeneity of HIV prevalence in sexual networks of Black MSM. By dissecting the mean network prevalence of HIV among Black MSM by age-group and then further by HIV status of network seeds, we were able to detect differences in HIV risk by age and employment status in a group often described as uniformly burdened by HIV. Specifically, although we observed that networks of HIV-negative Black MSM were almost entirely comprised of other HIV-negative members, networks of young Black HIV-negative MSM had a higher prevalence of HIV-positive partners in their networks than older Black MSM. The variability of network prevalence of HIV in our study is consistent with the variation observed across studies of single sexual networks of Black MSM (10, 11). Our data highlight the role of sexual networks in HIV transmission and indicate the existence of complex social and environmental structures that influence heterogeneity of HIV risk in sexual networks of Black MSM.

In our study 9% of the partners in networks of young Black HIV-negative MSM were HIV-positive compared to 2% in networks of older Black HIV-negative MSM. The high network prevalence of HIV among HIV-negative young Black men corroborates findings from another Atlanta MSM cohort, where Black MSM aged 18–24 had a three-fold higher incidence of HIV compared to older Black MSM (4), and may help explain why young Black MSM have the highest incidence of any subpopulation of MSM (20). Factors contributing to this phenomenon remain unclear. Insularity with respect to age, sex, and race in sexual networks of young Black MSM could explain high network prevalences of HIV (21). This is supported by other studies, where age-mixing patterns were similar among White and Black MSM, and having older MSM partners failed to account for racial differences in HIV prevalence and incidence among young MSM (4, 14)(J. Grey, personal communication 2014). Network position may also play a role in HIV transmission. In a study of young Black MSM in Chicago, moderate and high bridging positions – a person that connects individuals who are not otherwise connected in a network – were associated

with HIV infection (22). While our findings highlight the existence of a dichotomy of risk networks among young Black MSM, they do not explain the mechanism by which it arises. Future studies should seek to identify predictors of membership to higher prevalence networks among young Black MSM.

The decreased prevalence of HIV in networks of older Black HIV-negative MSM provides evidence of selective processes, whereby prevalence of HIV decreases among the networks of HIV-negative and increases among networks of Black HIV-positive MSM networks across the age-span. Although the specific factors contributing to Black MSM remaining HIV-negative are unknown, there is evidence that men who remain HIV-negative may be more resilient to minority stress and other factors that may lead to poor psychosocial and ultimately HIV/STI outcomes (e.g., substance use, depression, high-risk sexual behaviors) (23). For example, resolution of internalized homophobia has been linked to positive health outcomes among MSM (24). More research is needed focusing on the mechanisms by which Black MSM remain HIV-negative throughout their lifetimes, particularly individual resilience factors and social and environmental structures that diminish susceptibility to minority stress.

We observed a significant association between a marker of lower socioeconomic position (SEP) – being currently unemployed – and a higher mean network prevalence of HIV among Black MSM. This finding agrees with previous research in which a lower SEP has been associated with higher HIV transmission by increasing psychological and physical stress resulting in riskier behaviors (25), decreasing access to healthcare and prevention services resulting in untreated HIV infection (5), and geographical restriction which may result in close-knit sexual networks and higher proportions of racial homophily (14). Interventions aimed at increasing access to ART and achieving viral suppression among socially vulnerable populations will be effective in reducing network transmission risk, even in high prevalence networks, and should be coupled with strategies to ensure engagement and retention in care.

The stratification of network HIV prevalence by participant seed HIV-status provided evidence of clustering of sexual network members. There could be several mechanisms by which this happens. First, serosorting as a measure to avoid HIV infection has been observed among Black MSM (26). The high network prevalence observed among HIV-positive seeds in our primary analysis suggests serosorting. However, HIV-positive seeds were equally likely to report serodiscussion than HIV-negative seeds, indicating mechanisms other than serosorting may account for clustering. Second, although clustering of high and low prevalence networks could be due to continued HIV transmission among stable sexual networks, this is not likely the case in our study because only 21% of seeds' partners were reported to be main partners, and more than half were one-time partners. Other possibilities include the clustering of HIV-positive individuals at venues (27), sexual adventurism (28), and increased neighborhood stigma and discrimination (28).

Our analysis has several limitations. First, the sexual networks observed are likely to be incomplete, as we depended on participant referral of partners. Although we conducted probabilistic name matching to identify overlapping sexual networks of Black MSM, we

identified 3 matches under limited certainty, and did not include matched networks in our analysis. Second, network HIV prevalence calculations relied on self-reported partner HIV status and may be biased. In our study the predictive value of partners of Black MSM seeds perceived to be HIV-negative/unknown was 70%.⁽²⁹⁾ However, our sensitivity analyses provide a thorough exploration of variations in prevalence under several assumptions, and were consistent with our primary findings. Third, the prevalence of HIV among White MSM seeds was lower than expected, which limited race- and HIV status-stratified comparisons of sexual networks. Finally, future analyses should incorporate measures of viral load, including the prevalence of suppressed viral load, to provide a more accurate measure of network transmission risk⁽³⁰⁾.

Conclusion

Sexual networks play an important role in sustaining HIV transmission among Black MSM; however, HIV risk is not uniformly distributed in this population. We observed a high prevalence of HIV in networks of HIV-negative young Black MSM, demonstrating a possible mechanism for increased HIV incidence observed in this population. Our findings also highlighted heterogeneity of HIV risk in sexual networks by SEP of network seeds. Future research should seek to elucidate individual predictors of membership to higher- and lower-risk sexual networks, structural differences between networks, and how social and environmental factors determine risk of HIV in sexual networks.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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SUMMARY

A study of sexual networks of Black MSM in Atlanta, Georgia, observed that younger HIV-negative MSM and unemployed MSM had higher prevalences of HIV in their sexual networks.

Figure 1.

HIV prevalence among 117 networks of black MSM by age group and HIV-status of network seed, Atlanta, GA, 2010–2014

Figure 2.

Sensitivity analysis: Imputed mean, and lower and upper bounds of network HIV prevalence by seed age-group and HIV status among 117 networks of Black MSM seeds, Atlanta, GA, 2010–2014

Table 1

Demographic characteristics, behaviors, HIV testing history and HIV status of 195 seed participants by race in a sexual networks study, Atlanta, GA, 2010–2014

Individual characteristics	Network seed race		<i>p</i> -value
	Black (n = 117) % (# / n)	White (n = 78) % (# / n)	
Age (years)			0.02
18–24	45 (53/117)	27 (21/78)	
25–29	25 (29/117)	27 (21/78)	
30+	30 (35/117)	46 (36/78)	
Sexual identity			0.001
Homosexual/gay	78 (90/115)	96 (75/78)	
Bisexual	21 (24/115)	3 (2/78)	
Heterosexual/other	3 (3)	1 (1)	
Education			<0.0001
High school or GED or lower	30 (35/115)	6 (5/78)	
Some college, associate's degree, and/or technical school	48 (55/115)	27 (21/78)	
College, post-graduate, or professional school	22 (25/115)	67 (52/78)	
Poverty (currently)	27 (31/115)	5 (4/78)	0.0001
Employed (currently)	66 (74/113)	90 (70/78)	0.0001
Homeless (previous 12 months)	27 (31/116)	5 (4/78)	0.0001
Aggregated sexual behaviors (previous 12 months)			
Total partners, median (IQR)	4 (3 – 7)	6 (3 – 12)	0.03
UAI partners, median (IQR)	1 (0 – 2)	1 (1 – 2)	0.96
Drugs use (self-report, previous 12 months)			
Any drugs	26 (30/116)	45 (35/78)	0.006
Marijuana	24 (28/116)	38 (30/78)	0.03
HIV-testing history			
Lifetime	93 (107/115)	94 (73/78)	0.9
Lifetime (excl. positive aware)	92 (72/78)	93 (71/76)	0.8
Previous 12 months (excl. positive aware)	65 (51/78)	67 (51/76)	0.8
HIV status			<0.0001
Positive	44 (51/117)	4 (3/78)	
Negative	56 (66/117)	96 (75/78)	

HIV=Human Immunodeficiency Virus, GED=general educational development, IQR=interquartile range, UAI=unprotected anal intercourse

Race, age, behaviors, and HIV status of enrolled and non-enrolled partners in sexual networks of Black and White MSM, Atlanta, GA, 2010–2014

Race, age, behaviors, and HIV status of enrolled and non-enrolled partners in sexual networks of Black and White MSM, Atlanta, GA, 2010–2014

Network seed race		Black % (# / n)		White % (# / n)	
<i>Partners</i>	<i>Enrolled</i>	<i>Non-enrolled</i>	<i>p-value</i>	<i>Enrolled</i>	<i>Non-enrolled</i>
Unknown	---	48 (337/707)		---	32 (177/552)

MSM=men who have sex with men, UAI=unprotected anal intercourse, HIV=Human Immunodeficiency Virus;

* Indicates any serodiscussion and includes serodiscussion at first and last sex;

[†] Indicates the best know HIV status;

[‡] P-value for general estimating equations bivariate models of overall comparisons of all partners (regardless of enrollment status) of Black and White MSM

Network HIV prevalence of 117 black MSM seeds in a sexual networks study by demographic characteristics and risk behaviors: primary analysis*, Atlanta, GA, 2010–2014

	Distribution of network seeds				Network HIV prevalence of seeds						
	Total seeds	HIV- positive seeds	HIV- negative seeds	% (n)	p-value	mean (95% CI)	Overall network prevalence	HIV- positive seeds	HIV- negative seeds	HIV-status interaction	p-value
Total	117	44 (51)	56 (66)			36 (28 – 43)		74 (66 – 82)	6 (3 – 9)		
<i>Demographic/Socioeconomic</i>											
Age group					0.007						0.001
18–24	53	34 (18)	66 (35)			28 (18 – 37)		63 (46 – 80)	9 (4 – 15)		
25–29	29	34 (10)	66 (19)			29 (14 – 45)		80 (62 – 97)	3 (0 – 6)		
30+	35	66 (23)	34 (12)			53 (39 – 68)		80 (70 – 91)	2 (0 – 4)		
Education					0.9						0.2
High school / GED or lower	35	46 (16)	54 (19)			38 (23 – 52)		76 (58 – 93)	6 (0 – 13)		
Some college, Associate’s degree, and/or technical school	55	42 (23)	58 (32)			34 (23 – 45)		77 (65 – 89)	4 (1 – 7)		
College, post graduate, or professional school	25	44 (11)	56 (14)			36 (21 – 52)		69 (49 – 88)	11 (1 – 21)		
Poverty (income-based)					0.4						0.8
Yes	30	50 (15)	50 (15)			41 (26 – 56)		74 (58 – 89)	8 (0 – 16)		
No	62	40 (25)	60 (37)			35 (25 – 46)		78 (66 – 89)	7 (2 – 11)		
Currently Employed					0.002						0.09
Yes	74	34 (25)	66 (49)			29 (20 – 37)		73 (60 – 85)	6 (3 – 10)		
No	39	64 (25)	36 (14)			51 (38 – 65)		77 (65 – 88)	6 (0 – 14)		
Homeless (in the previous 12 months)					0.5						0.7
Yes	31	39 (12)	61 (19)			34 (19 – 49)		80 (63 – 97)	5 (1 – 9)		
No	84	45 (38)	55 (46)			36 (27 – 45)		72 (62– 82)	7 (2 – 17)		
<i>Risk Behaviors</i>											
Any UAI partners (in the previous 12 months)					0.8						0.05
Yes	86	44 (38)	56 (48)			38 (29 – 47)		78 (68 – 87)	7 (3 – 11)		
No	31	42 (13)	58 (18)			29 (15 – 42)		65 (47 – 82)	3 (0 – 9)		
Any drugs (self-report)					0.7						0.4
Yes	30	47 (14)	53 (16)			39 (25 – 53)		72 (55 – 89)	11 (4 – 18)		

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Distribution of network seeds				Network HIV prevalence of seeds				HIV-status interaction	p-value
Total seeds	HIV- positive seeds	HIV- negative seeds	% (n)	p-value	mean (95% CI)	Overall network prevalence	p-value	HIV- positive seeds	HIV- negative seeds
	n							mean (95% CI)	
No	86	43 (37)	57 (49)	0.8	35 (26 – 44)	75 (65 – 85)	0.3	4 (1 – 8)	0.5
Marijuana (self-report)									
Yes	28	46 (13)	54 (15)		40 (25 – 54)	72 (54 – 90)		12 (4 – 19)	
No	88	43 (38)	57 (50)		35 (26 – 43)	75 (65 – 84)		4 (1 – 8)	

HIV=Human Immunodeficiency Virus, GED=general educational development, UAI=unprotected anal intercourse;

* All unknown/missing status unenrolled partners were excluded from calculations of prevalence