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ORIGINAL PAPER

Using Social Networks to Reach Black MSM for HIV Testing and Linkage to Care

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Abstract Black men who have sex with men (MSM) are disproportionately affected by HIV infection. Black MSM in San Francisco may have higher rates of unrecognized HIV infections. Increased HIV testing among Black MSM may reduce the numbers of unrecognized infections, inform more men of their status and thus reduce the potential for ongoing transmissions. Social network HIV testing programs have focused on asking HIV-positive and/or high-risk negative men to recruit their social or sexual contacts. We used a network approach to deliver HIV testing to Black MSM in San Francisco and collected risk assessment data. Participants were asked to recruit any of their social contacts who were also Black MSM. Recruitment by risk level and HIV status was heterogeneous. HIV infection among this population is associated with older age, having a high school education or higher and currently being homeless. Fully 23% of HIV positive Black MSM are unaware of their infection. Only a third of unrecognized infections were recruited by a known HIV-positive participant. Linkage to care was a challenge and underscores the need for comprehensive systems and support to link Black MSM to care and treatment.

Keywords Black men who have sex with men · HIV testing · Social networks · Unrecognized HIV infections

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Introduction

In the United States, Black MSM are disproportionately affected by HIV infection compared to other racial/ethnic groups of MSM [1, 2]. This national pattern of disparity is also found in San Francisco where the estimated prevalence of HIV among Black MSM is 32% compared to an overall figure of 24% among other MSM [3].

Data from San Francisco also suggest that Black MSM have high levels of unrecognized HIV infection (i.e. HIV infected individuals who are unaware of their infection) [4]. Individuals who are unaware of their HIV infection are more likely to continue to engage in sexual activity presuming that they are HIV-negative thus increasing the risk of transmitting HIV to others. High rates of unrecognized HIV infection coupled with already high rates of HIV infection in a population with potentially dense social and sexual networks may serve to perpetuate patterns of health disparity [5–7]. Reducing the number of unrecognized HIV infections through increased uptake of HIV testing, among other interventions (e.g. detecting acute HIV infections) would arguably reduce the potential for ongoing transmission of HIV [8–11]. Novel approaches to increasing uptake of HIV testing in this sub-population have been proposed including, targeted venue based testing and employing social networks to refer the sexual partners of HIV-positive men into testing and in detecting unrecognized HIV infections [12].

Compounding this situation is a lack of risk behavior data specifically on Black MSM. Traditional approaches to sampling MSM such as time location sampling (TLS) achieve large samples of MSM, however, the number of Black MSM sampled, while represented at the expected proportion, are too few to facilitate analyses of the differences in characteristics and risk behaviors between HIV-negatives and HIV-positives [13].

In an effort to increase uptake of HIV testing, identify new HIV infections and to collect robust risk assessment data specifically from Black MSM in San Francisco, the San Francisco Department of Public Health's HIV Prevention Section undertook a pilot HIV testing program that utilized respondent driven sampling (RDS) to reach Black MSM. RDS was initially developed to deliver peer based harm reduction interventions to intravenous drug users (IDU) and then as a method to make population based inferences from collected risk behavior data [14–16]. This manuscript documents the results of this pilot HIV testing program and also contributes insight into factors associated with HIV infection among a population of MSM who are at high risk for HIV infection and who often remain understudied.

Methods

Initial seed participants were purposefully selected via key informants to reflect the diversity of Black MSM in San Francisco (e.g. by age, neighborhood of residence, educational level). These initial participants completed a pre-HIV test risk assessment and HIV testing. They were given three referral coupons to give to other Black MSM, 18 years old or older, resident of San Francisco and regardless of current HIV status. Men receiving referral coupons either called for a HIV test appointment or dropped in during testing hours. In addition to questions about HIV risk, participants were asked to describe their relationship to their recruiter (How would you describe your relationship to the person who gave you the referral coupon?) and to estimate the size of their Black MSM social network (How many other Black MSM do you know who live in San Francisco?). The former question was used to assess whether the recruit and recruiter were acquainted and not strangers. The latter was later used as part of statistical adjustment during analysis. All participants, regardless of HIV status or risk behavior profile were invited to recruit up to three other Black MSM, regardless of HIV status, over the age of 18 who resided in San Francisco and were considered by participants to be members of their social network.

HIV testing was conducted using a standard ELISA rapid-test among all participants regardless of their self-reported HIV status. Those testing HIV-negative on the initial rapid test were given the HIV-negative result. For those participants who self-reported being HIV-positive during the risk assessment, we performed the rapid-test similarly with all other participants, as well as standard blood collection for conventional HIV testing as confirmation of their HIV-positive status. For those who self-reported being HIV-negative or HIV-unknown (e.g. never had an HIV test before) but whose rapid test result was preliminary-positive we performed confirmation testing using a standard blood collection for conventional HIV testing. Preliminary HIV-positive results were explained as being preliminary and that confirmation was necessary to definitively determine HIV status. Counseling and referrals were given to these participants and they were scheduled to come back for confirmation results within a week for additional counseling and referrals. All participants received pre and post-test counseling and referrals regardless of their HIV status.

Participation in HIV testing was confidential while participating in the risk assessment was anonymous. A temporary linking form was used to ensure HIV results were properly matched with risk assessment data. After merging the HIV result and risk assessment data, the link was destroyed. Confidential HIV testing allowed project staff to follow up with participants for their HIV test results and to follow HIV reporting regulations. Systems were not in place to allow the project to cross-check care and treatment status with case registries. The pilot project was a program to bring HIV testing to a high-risk population and as such was not research. Analysis of secondary anonymous risk assessment data was reviewed by the Committee on Human Research and the University of California San Francisco and determined not to be human subjects research.

Analyses were conducted using R (www.R-project.org) and RDS Analysis Tool (RDSAT) v 6.0. RDSAT adjusts for the probability of inclusion for each individual based on reported social network size and for differential recruitment patterns within a given characteristic [16]. These adjustments allow for inference to be made to the population from which the sample was drawn. Individualized weights based on HIV status were calculated in RDSAT then exported and merged with the crude dataset permitting statistical tests, weighted for the sampling method, of association with HIV infection [17]. We conducted multivariable analysis of correlates of HIV infection using likelihood ratio tests for the logistic regression models. Network diagrams were produced using Graphviz (http://www.graphviz.org).

Results

Recruitment

Beginning with 10 seeds, recruitment was conducted over a 6 month period from February 2009 to September 2009. A total of 391 men returned with recruitment coupons and were screened for eligibility. Overall coupon return rate was 47%. All seeds recruited at least one wave of recruits while the most productive recruitment chain reached 18

waves of recruitment. Of the 256 eligible men, all agreed to participate in HIV testing and risk assessment. A majority of men indicated that they were given a referral coupon for the study by a friend or acquaintance (83%). Participating men reported a mean social network size of 11.2 (Standard Deviation (SD) 14.4) Black MSM.

Overall Demographic and Risk Characteristics

Estimates of demographic characteristics adjusted for the sampling method, as described in "Methods" section above, suggest that the majority of Black MSM in San Francisco are 41 years old or older (65.7%), half (51.1%) have a high school education and 28.7% have more than a high school education, while over half (60.9%) have annual incomes of less than 10,000 USD a year. Examining risk behaviors, the majority (71.5%) of Black MSM in San Francisco have not had any female sex partners in the past 6 months while only 18.0% have had no male partners in the same period. Almost equal proportions of Black MSM in San Francisco have engaged in or not engaged in unprotected anal intercourse in the past 6 months. Only 12.7% of Black MSM in San Francisco have any HIV-positive partners. Just over a third (33.9%) of Black MSM living in San Francisco have injected drugs in their lifetime. In terms of HIV testing history, a majority of Black MSM have ever tested for HIV (92.3%) while 58.0 and 33.1% have had an HIV test in the past12 and 6 months, respectively. Adjusted estimates suggest that 17.3% of Black MSM in San Francisco will report that they are HIV-positive. Testing in the present study estimated that 24.5% are actually infected with HIV (Table 1).

Recruitment Networks and HIV Testing

While not explicitly social networks where secondary links between participants are known, RDS also provides the opportunity to examine the network ties between recruiters and recruits. The resulting recruitment network diagrams indicate that in terms of current HIV status, ever injecting drugs and having female partners in the past 6 months, Black MSM in San Francisco are very inter-connected. We did not observe any chains of recruitment that were entirely composed of any one of these characteristics. For example, one recruitment chain started with an HIV-negative participant (Wave 0) who then recruited two more HIV-negative participants (Waves 1 and 2) who then in turn recruited one HIV-negative, one HIV-positive IDU and one HIV-positive non-IDU (Wave 3). The HIV-negative recruit at Wave 3 then recruited a HIV-negative (Wave 4) who then recruited an HIV-positive injector (Wave 5). The recruitment chain then consisted of a series of four HIV-negative men who also had female partners in the past 6 months (Waves 6–9). The next recruit was an HIV-negative man without female partners in the past 6 month (Wave 10). He then in turn recruited two HIV-negatives, one HIV-positive IDU and one HIV-negative IDU (Wave 11) (Fig. 1, Second recruitment chain from left).

Associations with HIV Infection

Bivariate analysis are shown in Table 2. Adjusted bivariate analysis suggests that HIV-positive status is significantly associated with older age ($P < 0.001$), having achieved a greater than high school education ($P = 0.02$), and being currently homeless ($P = 0.05$). Of note low income and having health insurance are associated with HIV infection ($P < 0.001$ and $P = 0.01$, respectively). HIV-infected individuals are less likely than those not infected to have sex while under the influence of drugs in the past 6 months ($P < 0.001$). IDU in the past 6 months is associated with being HIV-positive but not significantly so ($P = 0.09$) while ever IDU is not ($P = 0.92$). Ever being in drug treatment is not associated with HIV-infection ($P = 0.01$). Having been told by a health care professional that one has Hepatitis B, Hepatitis C and Syphilis (in the past 6 months) are significantly associated with being HIV-positive ($P < 0.001$, $P = 0.01$, 0.02, respectively). Herpes was not significantly associated with HIV-infection. Having both male and female partners in the past 6 months was associated with being HIV-negative ($P < 0.001$). Having fewer episodes of unprotected vaginal intercourse (UVI) with female partners and fewer espisodes of unprotected insertive anal intercourse (UIAI) with male partners in the past 6 months are associated with being HIV-infected ($P < 0.001$ and $P = 0.01$, respectively).

Multivariable analyses are shown in Table 3. In adjusted multivariable analysis of only demographics, being older, having a greater than high school education, not being currently homelessness and having a yearly income between $10,000 and $30,000 ($P = 0.01$, 0.02, 0.01, 0.01, respectively) remained significantly associated with HIV infection. Analyzing behavioral variables while adjusting for demographics indicated that not ever being in drug treatment, having been told by a doctor they had Hepatitis B, and not having both male and female partners ($P < 0.001$, <0.001, $P = 0.02$, respectively) are associated with HIV infection.

Unrecognized HIV Infections

We also compared HIV-negative participants with those who tested HIV-positive for the first time in our study (i.e. unrecognized infections). In bivariate analysis, men with unrecognized infections are significantly more likely to be older ($P = 0.02$), to not have health insurance ($P < 0.001$),

Table 1 Crude and RDS weighted demographic and risk characteristics of Black MSM: San Francisco 2009

	Crude count (%)	Weighted percent (95% CI)
Relationship to recruiter		
Friend	159 (69.7)	78.4 (71.3, 85.1)
Other	69 (30.3)	21.6 (14.9, 28.8)
Age		
18–20	2 (0.8)	3.2 (0.0, 7.7)
21–25	12 (4.7)	7.9 (1.3, 16.5)
26–30	17 (6.6)	4.5 (2.1, 7.8)
31–35	17 (6.6)	4.6 (2.3, 7.9)
36–40	25 (9.8)	14.2 (5.6, 20.4)
41–45	58 (22.7)	16.6 (11.3,22.4)
46–50	59 (23.0)	21.1 (12.9, 30.8)
51+	66 (25.8)	28.0 (21.3, 40.5)
Education		
Less than high school	37 (14.5)	20.2 (11.1, 29.2)
High school	98 (38.3)	51.1 (40.8, 61.9)
Greater than high school	121 (47.3)	28.7 (20.9, 38.1)
Income		
[0, 10 k)	107 (41.8)	60.9 (50.5, 70.4)
[11 k, 20 k)	67 (26.2)	18.8 (13.2, 25.9)
[21 k, 30 k)	37 (14.5)	10.0 (4.9, 14.7)
[31 k, Inf)	45 (17.6)	10.3 (6.5, 15.5)
Ever tested for HIV		
Yes	239 (93.4)	92.3 (87.7, 96.3)
No	17 (6.6)	7.7 (3.7, 12.3)
HIV test, past 12 months		
Yes	136 (53.1)	58.0 (47.8, 67.8)
No	120 (46.9)	42.0 (32.3, 52.2)
HIV test, past 6 months		
Yes	82 (32.0)	33.1 (24.1, 43.0)
No	174 (68.0)	66.9 (57.1, 75.9)
Self reported HIV status		
HIV+	69 (27.0)	17.3 (10.5, 26.5)
HIV−/Unknown	187 (73.0)	82.7 (73.5, 89.5)
HIV status		
HIV+	81 (31.6)	24.5 (16.3, 35.0)
HIV−	168 (65.6)	74.8 (64.4, 83.1)
Unknown	7 (2.7)	0.7 (0.0, 1.5)
New HIV+ result	14 (5.5)	5.5 (2.4, 9.3)
Number of partners, past 6 months		
[0,1)	32 (12.5)	12.9 (7.3, 19.4)
[1,5)	174 (68.0)	75.2 (67.8, 83.0)
[6,12)	23 (9.0)	4.6 (2.6, 6.9)
[12,Inf)	27 (10.5)	7.3 (3.2, 11.9)
Number of male partners, past 6 months		
0	47 (18.4)	18.0 (11.6, 25.1)
1	70 (27.3)	40.7 (30.4, 51.8)
2+	139 (54.3)	41.3 (32.2, 51.3)
Number of female partners, past 6 months		
0	192 (75.0)	71.5 (60.3, 82.1)
1	25 (9.8)	9.5 (5, 14.6)
2+	39 (15.2)	19.1 (10.3, 28.7)

Table 1 continued

	Crude count (%)	Weighted percent (95% CI)
UAI, past 6 months		
Yes	117 (45.7)	48.8 (37.6, 61.3)
No	139 (54.3)	51.2 (38.8, 62.6)
Had any HIV-positive partners		
Yes	59 (23.29)	12.7 (8.7, 17.4)
No	185 (76.8)	87.3 (82.7, 91.3)
IDU, ever		
Yes	94 (36.7)	33.9 (25.2, 42.9)
No	162 (63.3)	66.1 (57.1, 74.9)
IDU, past 6 months		
Yes	40 (15.6)	12.8 (7.7, 18.0)
No	216 (84.4)	87.2 (82.0, 92.3)

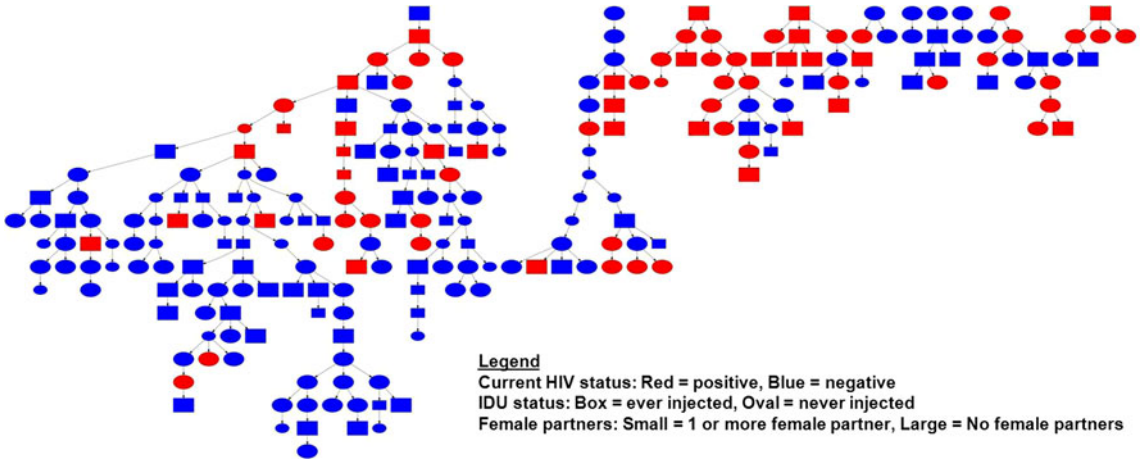

Fig. 1 Recruitment chains among Black MSM: San Francisco 2009 (Color figure online)

to not have ever tested for HIV ($P < 0.001$) to not have tested for HIV in the past 12 months ($P = 0.01$) and to have used injection drugs in the last 6 months ($P < 0.001$) when compared to HIV-negative men. Based on our adjusted analysis, fully 23% of HIV-positive Black MSM in San Francisco are potentially unaware of their HIV status (i.e. unrecognized infections or those individuals who are HIV-positive but have not yet obtained an HIV-positive test result) at any given moment in time. Again examining recruitment chains, we note that these previously undetected/unrecognized infections were not clustered within one or two recruitment chains nor were they clustered together but were often embedded in networks many waves apart and often not recruited by known HIV-positives. Only 5 out of 13 (38%) unrecognized infections were recruited by a known HIV-positive participant. For example, one recruitment chain, which started with a known HIV-positive participant, resulted in recruitment of an unrecognized infection in the first wave then progressed through three more waves (two known infections and one HIV-negative) before recruiting another unrecognized infection (Fig. 2, third recruitment chain from left).

Linkage to Care

Ensuring that people were in care or linked to care was important to assess in this project. In the project 75% (51) of participants self-reporting being HIV-positive reported already being in care. Of the participants who were newly diagnosed in this project, 27% (4) came back for their confirmatory HIV test results and all four reported that they already followed up with care services. Everyone who was newly diagnosed with a preliminary HIV-positive result was given a referral package to care services. Project staff provided reminder phone calls for the follow-up confirmatory results appointment for new preliminary HIV-positive participants. For those participants who did not attend their confirmatory results appointment several

Table 2 RDS weighted bivariate associations with HIV infection among Black MSM: San Francisco 2009

	HIV− (%)	HIV+ (%)	Odds ratio (95% CI)	χ^2, df	*P* value
Age				21.4, 7	<0.001
18–20	3.0	0.1	–		
21–25	11.7	0.3	0.01 (0–0.56)		
26–30	5.0	2.7	0.23 (0.03–1.71)		
31–35	3.1	5.9	0.68 (0.11–4.14)		
36–40	12.1	16.6	0.36 (0.07–1.79)		
41–45	15.3	23.3	0.52 (0.11–2.39)		
46–50	20.9	24.0	0.41 (0.09–1.84)		
51+	29.0	27.1	0.28 (0.06–1.25)		
Education				7.8, 2	0.02
Greater than high school	22.2	48.4	2.22 (0.96–5.15)		
High school	56.9	34.4	0.95 (0.41–2.21)		
Less than high school	21.0	17.2	–		
Homeless, ever	50.6	36.0	0.68 (0.38–1.21)	1.7, 1	0.19
Homeless, currently	34.7	16.3	0.52 (0.27–1.03)	3.8, 1	0.05
Relationship status				3.5, 3	0.31
In committed relationship	16.3	23.1	6.63 (0.22–202.72)		
Married/domestic partnership	3.2	0.7	–		
Single	77.3	75.5	5.18 (0.18–151.73)		
Unknown/other	3.2	0.6	1.01 (0.01–117.79)		
Income, per year				19.2, 3	<0.001
[0,10 k)	66.1	41.7	–		
[10 k,20 k)	15.4	28.9	3.61 (1.81–7.21)		
[21 k,30 k)	7.3	20.4	3.29 (1.31–8.29)		
[31 k,Inf)	11.1	9.0	0.73 (0.26–2.02)		
Has health insurance	57.2	71.0	2.38 (1.26–4.48)	7.7, 1	0.01
Sex under the influence of drugs, past 6 months	57.4	25.9	0.37 (0.2–0.67)	11.4, 1	<0.001
IDU, ever	34.2	32.6	1.03 (0.56–1.88)	0.0, 1	0.92
IDU, past 6 months	9.2	21.0	2.05 (0.91–4.64)	2.8, 1	0.09
Non-injection drugs, past 6 months	56.9	43.2	0.65 (0.37–1.16)	2.1, 1	0.14
Drug treatment, ever	59.3	42.2	0.48 (0.27–0.86)	6.2, 1	0.01
Drug treatment, past 6 months	30.4	18.3	0.55 (0.27–1.11)	3.0, 1	0.08
Circumcised	78.0	81.5	1.29 (0.61–2.72)	0.5, 1	0.50
Been told has					
Hepatitis B	1.5	24.4	15.94 (5.01–50.78)	29.2, 1	< 0.001
Hepatitis C	20.1	37.2	2.33 (1.25–4.36)	6.8, 1	0.01
Syphilis, past 6 months	0.9	0.0	8.25 (1.27–53.79)	5.6, 1	0.02
Herpes, past 6 months	0.2	1.1	0.27 (0.02–3.81)	1.3, 1	0.25
#Partners, past 6 months				29.5, 3	<0.001
[0]	6.0	35.6	–		
[1, 5]	79.1	61.5	0.14 (0.06–0.32)		
[6,11]	5.7	1.3	0.28 (0.08–1.02)		
[12,Inf)	9.2	1.5	0.02 (0–0.29)		
Both male and female partners, past 6 months	27.5	6.9	0.15 (0.05–0.48)	16.3, 1	<0.001

Table 2 continued

	HIV− (%)	HIV+ (%)	Odds ratio (95% CI)	χ^2, df	*P* value
# Male UAI episodes, past 6 months				6.2, 3	0.10
[0]	46.4	55.9	–		
[1,5]	30.6	21.5	0.56 (0.27–1.17)		
[6,11]	6.5	15.1	1.91 (0.75–4.86)		
[12,Inf)	16.5	7.5	0.67 (0.29–1.58)		
# Male UIAI episodes, past 6 months				4.9, 3	0.18
[0]	51.5	69.8	–		
[1,5]	26.5	21.8	0.61 (0.3–1.23)		
[6,11]	14.6	4.9	0.6 (0.23–1.53)		
[12,Inf)	7.4	3.4	0.32 (0.08–1.3)		
# Male URAI episodes, past 6 months				11.5, 3	0.01
[0]	79.2	68.1	–		
[1,5]	18.1	18.6	1.19 (0.56–2.55)		
[6,11]	1.6	7.6	5.66 (1.19–26.95)		
[12,Inf)	1.0	5.7	4.91 (1.56–15.44)		
# Female UVI episodes, past 6 months				13.0, 1	<0.001
[0]	78.1	97.1	–		
[1,Inf]	21.9	2.9	0.13 (0.03–0.56)		
# Female UIAI episodes, past 6 months				10.3, 2	0.01
[0]	88.9	99.5	–		
[1,Inf]	11.1	0.5	0.03 (0–1.81)		
Ever Tested for HIV	92.6	91.6	0.89 (0.3–2.69)	0.0, 1	0.84
Self-reported HIV status				177.1, 1	<0.001
HIV-positive	0.0	77.0	–		
HIV-negative/unknown	100.0	23.0	0 (0–0.01)		
Days since last test				39.3, 4	<0.001
[0,30]	5.1	6.1	–		
[31,180]	31.6	13.6	0.26 (0.07–1.0)		
[181,365]	29.9	9.0	0.2 (0.05–0.82)		
[366,730]	3.6	5.4	2.2 (0.47–10.22)		
[731,Inf)	29.5	65.9	1.6 (0.48–5.32)		
Where last tested				23.4, 6	<0.001
Community health center	31.0	53.9	–		
Correctional facility	19.8	5.7	0.14 (0.04–0.51)		
Counseling site	6.5	8.8	0.49 (0.17–1.45)		
Hospital	3.6	11.7	1.92 (0.64–5.77)		
Private doctor	2.2	2.0	1.24 (0.25–6.13)		
Other	26.4	8.1	0.28 (0.11–1.59)		
Never tested	10.5	9.9	0.57 (0.2–1.59)		
Tested for HIV, past 12 months	67.1	30.2	0.17 (0.09–0.32)	34.2, 1	<0.001
Utilization of HIV prevention services, past 6 months					
Received free condoms	80.6	89.1	1.34 (0.64–2.82)	0.6, 1	0.44
Used free condoms	52.8	48.0	0.8 (0.44–1.45)	0.6, 1	0.46
Received free needles	4.6	13.3	2.83 (1.04–7.69)	3.9, 1	0.05
Used free needles	4.4	11.6	2.51 (0.88–7.12)	2.8, 1	0.09
Talked about HIV in an individual session	33.8	31.8	0.82 (0.44–1.53)	0.4, 1	0.53
Talked about HIV in a group session	28.3	52.4	2.6 (1.45–4.69)	10.1, 1	<0.001

Table 3 RDS weighted multivariable associations with being HIV-positive among Black MSM: San Francisco 2009

Model	Adjusted odds ratio (95% CI)	χ^2, df	*P*– value
Demographics*			
Age			
18–20	–	19.8, 7	0.01
21–25	0.01 (0–0.56)		
26–30	0.11 (0.01–0.93)		
31–35	0.62 (0.09–4.18)		
36–40	0.24 (0.04–1.39)		
41–45	0.33 (0.07–1.66)		
46–50	0.25 (0.05–1.23)		
51+	0.13 (0.03–0.67)		
Education			
<High school	–	7.9, 2	0.02
High school	1.43 (0.54–3.74)		
>High school	3.48 (1.23–9.82)		
Currently homeless	0.37 (0.16–0.83)	6.3, 1	0.01
Income per year in dollars			
0–10,000	–	11.8, 3	0.01
10,001–20,000	2.58 (1.16–5.73)		
20,001–30,000	2.82 (0.98–8.15)		
30,001 and up	0.49 (0.15–1.6)		
Behaviors**			
Drug treatment, ever	0.21 (0.09–0.52)	13.0, 1	<0.001
Hepatitis B, told by doctor, ever	8.4 (2.11–33.49)	10.9, 1	<0.001
Hepatitis C, told by doctor, ever	2.26 (0.89–5.73)	3.0, 1	0.08
Syphilis, told by doctor, past 6 months	0.95 (0.06–13.85)	0.0, 1	1.0
Both male and female partners, past 6 months	0.24 (0.06–0.93)	5.4, 1	0.02

* Adjusted for demographics

** Adjusted for demographics and behaviors

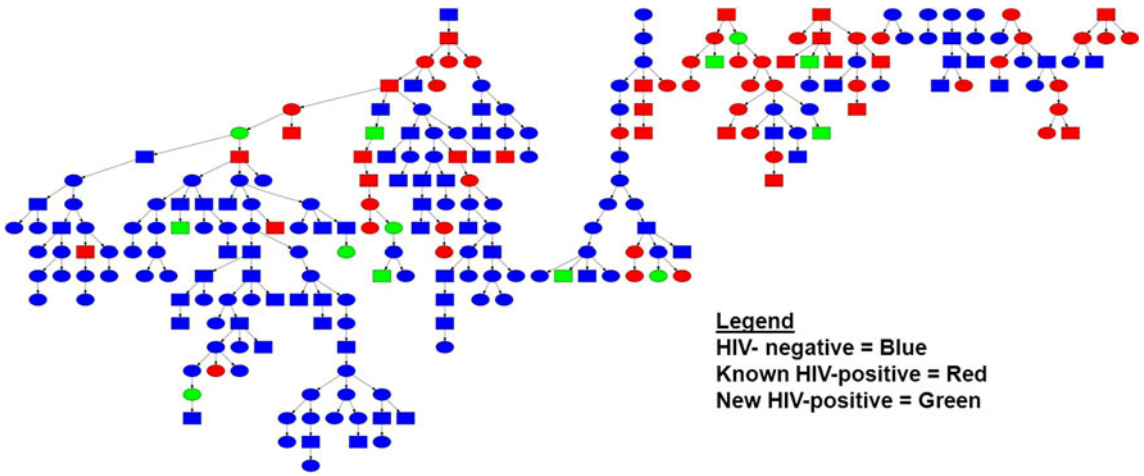

Fig. 2 Location of new detections of HIV infection in recruitment chains among Black MSM: San Francisco 2009 (Color figure online)

follow-up calls were made to encourage them to come in for their confirmatory results and to allow project staff to ascertain whether they followed through with the care referrals given to them at their initial test visit.

Discussion

This HIV testing project was able to deliver testing to and collect risk assessment data from a large number of Black

MSM in San Francisco. Utilizing the social networks of Black MSM enabled this novel HIV testing program to identify a substantial number of unrecognized HIV infections. Had the program only offered referral coupons to HIV-positive participants it would have only indentified less than half of the unrecognized infections than were detected in this study. Although this program detected new infections, a number of men did not return for HIV confirmation results and linking them to care was a challenge. There are many potential reasons for this challenge. It is possible that men with newly recognized infections were psychologically unready to receive the confirmation of their HIV-positive status or that they already had a health care provider that they chose to go to for follow-up. Future efforts will need to strengthen mechanisms to ensure linkage to care such as multiple rapid test HIV testing algorithms (i.e. a three rapid test procedure to ensure that testers receive their confirmed HIV-positive result during one visit) and dedicated health care peer navigators. This suggestion is bolstered by the finding that 25% of known HIV-positive men did not report being in care at the time of the interview.

Perhaps not surprisingly Black MSM in San Francisco have low levels of income regardless of educational attainment. This may suggest that overall these men have lower access to health care and health interventions including HIV prevention. We also found a high level of lifetime injection drug use among this population potentially suggesting higher levels of multiple HIV risk factors. However, an overwhelming majority do not have recent female partners suggesting that potential bridging on HIV from Black MSM to Black women may be less than thought. Furthermore, we were able to identify predictors of HIV infection and unrecognized HIV infections which could be useful in further tailoring network or outreach based HIV testing programs.

The analysis of risk assessment data is not without limitations. First, men participating in the study self-reported MSM behavior. Second, Black San Franciscan MSM participating in this pilot project are not representative of Black MSM nationwide. Third, although we present both newly diagnosed men and men with known HIV infections as one group, we acknowledge that newly diagnosed men may differ in their behavior patterns compared to men who have known about their HIV status for some time.

Despite these limitations, the key objective of this project was achieved. Social networks of Black MSM were successfully utilized to deliver HIV testing to an underserved population and substantial numbers of previously unrecognized HIV-infections were detected and referred to care and treatment. We recommend changes to model programs that focus on HIV-positives and/or high-risk individuals as links to identifying new cases of HIV-infection among Black MSM. Programs may better reach individuals for testing if the entireties of social networks are mobilized. Furthermore, testing programs may better serve high-risk populations such as Black MSM if they implement testing algorithms that exploit the advantages of multiple rapid HIV tests. Acceptability of these types of testing algorithms among Black MSM should be explored in future HIV testing programs and research. Proactive systems for future HIV testing initiatives among Black MSM in San Francisco should also include such activities as targeted social events and neighborhood specific health fairs that include HIV testing. In addition to specialized HIV testing initiatives, testing will need to be accompanied by novel systems for referrals to ensure that every person testing HIV-positive receives care and treatment. Referral systems will need to be proactive rather than passive and could be modeled on systems such as those developed by Craw et al. [18] that feature strengths based case management.

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