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An examination of social network characteristics of drug using men who have sex with men (MSM)

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Abstract

Objectives—The purpose of this study was to compare the social network characteristics of men who have sex with men (MSM) to non-MSM (NMSM) in a sample of predominately African American drug users. Specifically, we were interested in examining the differences in structure of the networks and drug and sexual risk partners within the network.

Methods—Data came from 481 male participants who reported having ≥ 1 sex partner in the past 90 days. MSM was defined as having sex with a male. Data on social network composition were collected using a Social Network Inventory.

Results—Of 481 men, 7% ($n=32$) were categorized as MSM. Nearly two-thirds of MSM did not identify as gay. MSM were more likely to be HIV positive as compared to men who did not have sex with men. Social networks of MSM were younger and a greater proportion were HIV positive. After adjusting for HIV status, networks of MSM were less dense, indicating fewer connections among network members. Among injection drug using men in the sample, MSM reported a greater number of needle sharing networks than NMSM.

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Contributions of authors

Karin Tobin conceived of the idea for the study, conducted the data analysis and took the lead in writing the manuscript.

Carl Latkin provided guidance and comment on the data analysis and assisted with writing the manuscript.

Key messages that highlight the features of the manuscript:

- Social network characteristics should be included in future studies examining HIV risk among MSM. Social support or social conflict may be important factors associated with risk especially for MSM populations.
- MSM IDU are a unique risk population and needle sharing risk behaviors warrant attention in the literature.
- Interventions should include communications skills training so that MSM can talk with their networks about HIV. MSM may serve as an avenue for promoting access to HIV care and prevention of HIV transmission to their social networks who may not seek prevention services because of stigma.

Conclusions—These findings underscore the importance of including social network factors in investigations of HIV risk among MSM. Further studies should focus on dynamics within a network and how they may operate to affect behavior and health.

Keywords

MSM; social networks; HIV

Introduction

Male to male sexual contact remains the most prominent route of HIV transmission in the United States (1) and African American men who have sex with men (MSM) experience disproportionate rates of HIV infection as compared to white MSM (2-6). Several studies of MSM have identified individual level factors associated with HIV risk (7-9). Few studies, however, have examined characteristics of the social networks of MSM and the risk partners within these networks.

Social networks have been found to be a powerful source of influence on a number of HIV risk behaviors including drug use and needle sharing (10-12) and sexual partnerships (13). Network members may include multiple social spheres of influence, such as sex or drug partners, friends, family, neighbors, and co-workers (14). Structural characteristics of personal networks include size of total network, racial composition, number of sex partners, density, and overlap of function. Miller and colleagues conducted in-depth interviews with African American MSM and inquired about the composition of their social networks (15). They found that MSM nominated twice as many non-MSM male friends and more female sex partners compared to MSM friends. Few MSM, in this study, nominated MSM friends with whom they do not have sex, indicating overlap in function of networks. Smith et al (2004) (16) reported that among a predominantly White MSM sample, a higher density network was associated with lower sex risk which may be attributable to social monitoring of network members' behaviors or to peer norms that favor safer behavior. The purpose of this study was to compare the social network characteristics of MSM to non-MSM in a sample of predominately African American drug users. Specifically, we were interested in examining the differences in structure of the networks and drug and sexual risk partners within the network.

Methods

The STEP into Action study was an experimental, longitudinal social-network oriented HIV prevention intervention study. The study sample included active injection drug users (referred to as Index participants) and behavioral risk partners (referred to as Networks) whom the Indexes invited to enroll in the study. Index participants were recruited from March, 2004 through March 2006 using advertisements placed at needle exchange locations, drug treatment centers and through participant word-of-mouth. Additionally, trained recruiters distributed fliers in areas that had been identified by ethnographers, as active with drug users. Inclusion criteria for the Index participants were being aged 18 years old or older and self-report of injection drug use in the prior 6 months. Eligible Index participants met with study staff in private offices at the research clinic for their baseline visit which included providing written informed consent, behavioral risk assessment and social network survey. After completion of the Index baseline visit, the Index participant was asked to invite their Network members to enroll into the study. The Index was provided with a Network recruitment flyer to use as an invitation. The Network recruitment flyer included information about the study but did not identify the Index as a drug user. Inclusion criteria for the Network participants were being aged 18 years or older and nominated by an Index participant. Injection drug use was not inclusion criteria for the Network participants. After providing written informed consent,

Network participants completed similar risk behavior assessment surveys and social network inventories. All participants (Index and Network) were offered HIV testing using Orasure specimen collection and received \$35 for completing the baseline visit. This study was reviewed and approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

For the current study, data were from 481 male participants (n=300 Index; 181 Networks) who completed the baseline visit of the STEP Into Action study.

Measures

Sociodemographic data—Data were based on self-reported gender, age, race/ethnicity, drug and alcohol use in the past 6 months. Sexual identity was assessed using the question “Do you consider yourself gay, heterosexual (straight), or bisexual”. All participants were offered HIV testing during their study visit and these results were used to indicate their HIV status. There were 74 who did not provide a specimen for testing or whose test results were indeterminate. Of these 71 self-reported HIV negative status and were coded as HIV negative and 3 self-reported HIV positive status and were coded HIV positive.

Social network data—The Social Network Inventory, was used to delineate social network composition (11). The first part of this assessment asks participants to list individuals who provide emotional support, with whom they socialize, use drugs or depend on for drugs, and those with whom they have sex. The individuals listed were referred to as networks. After the name elicitation section, the participant was asked about each of the networks such as their age, race, gender, relationship (e.g. family, friend, professional) HIV status, employment status, drug use and injection risk behaviors. Participants were asked to identify those networks with whom they do not get along with or often disagree with which was coded as a conflictual relationship. Density was measured by asking participants to indicate which networks know other networks and was calculated as a score from 0-1.00 indicating high to low density, such that a score of zero means that 100% of the networks know each other and a score of 1.00 means that none of their networks know each other. Needle sharing was assessed, among participants who reported injection drug use in the prior 6 months, by asking which networks they shared needles.

Analysis—Data were analyzed using STATA version 8 (17). Bivariate comparisons of sociodemographic and drug history variables with MSM were calculated using Fishers exact chi square for categorical variables. For continuous variables, two-sample Wilcoxon rank-sum (Mann-Whitney) test were used to compare means. Given sample size limitations, a maximum of 2 variables were entered simultaneously into the regression models. Variables for the regressions were chosen based on their statistical significance level in the bivariate comparisons ($p<0.10$) and relevance to the literature.

Results

The majority of the sample was African American (82%), unemployed (88%) and had injected drugs in the prior 6 months (89%) (Table 1). Of 481 men who reported having at least one sex partner in the prior 90 days, n=32 (7%) reported sex with a male and were categorized as MSM. Among MSM, 34% identified as gay, 41% “straight” or heterosexual and 25% bisexual as compared to 99% of NMSM who identified as heterosexual. There were no differences in the proportions of participants who smoked crack or injected in the past 6 months. In bivariate analysis, being MSM was associated with younger age (38 years versus 44 years; $p<0.001$) and HIV positive status as compared to NMSM.

Social Network Characteristics

No differences were observed between MSM and NMSM in total size of network or number of females. The networks of MSM were on average younger, HIV positive and with they experienced conflict with a greater number (Table 2). MSM had on average more networks with whom they received emotional support. However, MSM networks were less dense as compared to NMSM indicating that fewer members within the network knew other members.

Drug and Sex network

There were no differences in the mean number of drug users, injectors, or crack smokers in the social networks of MSM and NMSM. Among participants who reported injecting drugs in the past 6 months ($n=402$ NMSM; 28 MSM), MSM reported sharing needles with more networks as compared to NMSM. There were no statistical differences in the number of sex partners or number of drug users who are sex partners. Less than 100% condom use was reported among both MSM and NMSM.

Associations between Social Network Characteristics and MSM

Tables 3, 4 and 5 present associations of social network factors and MSM, adjusting for HIV status. Decreasing density was associated with a nearly 5 fold increase in odds of being MSM (Adjusted Odds Ratio (AOR)=4.85; 95% CI=1.20-19.7) controlling for HIV status. MSM was associated with having greater number of networks who provide emotional support (AOR=1.30; 95% CI=1.06-1.61). Among injection drug users, sharing needles with more networks was marginally associated with greater odds of MSM ($p=0.07$), after adjusting for HIV status.

Discussion

We sought to describe and compare social networks characteristics of a sample of predominately African American MSM and NMSM. We acknowledge the small number of MSM in this study which limits our statistical power and ability to detect differences between groups. However, we did find that MSM in the sample were younger and a greater proportion was HIV positive as compared to NMSM. The social networks of MSM were younger and had a greater number of HIV positive networks as compared to NMSM. These data support the concept of differential affiliation, that is, persons who are similar tend to affiliate. Consequently, HIV positive MSMs may be able to recruit similar network members and may serve as an avenue for promoting access to HIV care and prevention of HIV transmission.

The social networks of MSM were less dense, meaning that fewer people within the network knew each other. This finding is not surprising given the stigma associated with MSM behavior. Density may be a proxy for levels of social monitoring within a network which has been found in one study to be associated with HIV risk behavior (16). We did not investigate the association between density and HIV risk behavior within this report and do not intend to suggest that having a lower density network implies higher risk behavior. Disconnection within the MSM social network may be a functional arrangement such that the MSM purposely fragments their network to prevent disclosure of their sexual behaviors and/or drug use. It is not clear from our data where the breaks in connection of the network occurred (e.g. kin to drug user or drug user to sex partner). However, further research is warranted to explore how density of network may mediate or moderate risk among MSM.

Social networks of MSM IDU included a greater number of people with whom they shared needles as compared to NMSM IDU. Given the high HIV prevalence among MSM, this level of sharing is of great concern. Men who have sex with men and inject drugs have been described as a “bridge” population that warrant attention because of their dual risk of HIV infection and

transmission via injection and sexual behaviors (18-23). This association was marginally significant after adjusting for serostatus suggesting that the finding it is not likely due to serosorting. Further, no differences in lifetime use of needle exchange were observed between groups. Social desirability bias may explain some of these results whereby those individuals who admit to stigmatized same sex behavior may also admit to the stigmatized behavior of sharing syringes. Studies on norms of needle sharing and the social contexts within which the sharing occurs of MSM IDU may be useful to elucidate these findings.

MSM tended to report a greater number of conflictual ties within their network. Studies of HIV infected individuals have found that conflictual relationships to be significant and related to negative mood (24). This difference did not persist after adjusting for HIV status. In a separate analysis, among MSM, we found overlap between conflictual ties and HIV status, such that a greater number of conflictual ties were with HIV seropositive networks. After controlling for HIV status, networks of MSM had more members who were sources of emotional support. Given the stigma associated with MSM behavior, this may reflect their efforts to select individuals to be in their social network who are supportive. Social support has been consistently identified as a protective health factor (25-26). Mitchell and colleagues (2007) (27) describe the importance of social support to decreasing drug use and improving communication with health care providers based on results from in-depth interviews conducted with HIV positive drug users. These findings underscore the importance of studying dynamics within a network and how they may operate to affect behavior and health.

Nearly two-thirds of the MSM did not identify as gay. This may be a result of the recruitment strategy which focused on drug use venues and not sex based venues. African American MSM are less likely to disclose their same sex behavior and less likely to identify as gay compared to than white MSM. (28-29). It is unclear whether the social networks of non-gay identified MSM differ from gay identified MSM. Further studies are needed to explore differences in the social networks of gay-identified versus non-gay identified MSM and how this is associated with HIV risk behaviors. Moreover, these results emphasize the need for culturally relevant interventions tailored to non-gay identified MSM.

There are a number of limitations to this study which should be acknowledged. Data for this study were drawn from a larger study, in Baltimore, MD, whose main recruitment target was active drug users and their risk partners resulting in a sample of predominately African American heroin users. Generalizations to MSM who may use other drugs such as methamphetamine or MSM who are not African American should be made with caution. As previously mentioned, with a small sample size of MSM, we had limited statistical power to detect correlations between all of the social network variables of interest. This limited our ability to control for multiple social network levels variables in statistical models. Finally, data for this study were collected in face-to-face interviews and were based on self-report which introduce recall and social desirability bias.

Despite these limitations, our findings describe the characteristics of social networks of MSM and are an important contribution to the literature. Network-level approaches to HIV prevention have been successfully used with injection drug users (30) and effective, culturally appropriate models of HIV prevention intervention are urgently needed for African American men who have sex with men to address their persistently high rates of HIV.

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Table 1

Comparisons of sociodemographic and substance use characteristics between men who have sex with men (MSM) and non- men who have sex with men (NMSM), Results from the Step into Action Study, Baltimore, MD.

Variable	Total Sample (n=481)	Non-MSM (n=449)	MSM (n=32)	p-value
Mean age (SD)	43.8 (8.41)	44.1 (8.30)	38.1 (8.00)	<0.001
Sexual orientation				
Gay	11 (2)	0 (0)	11 (34)	
Straight	459 (95)	446 (99)	13 (41)	
Bisexual	11 (2)	3 (1)	8 (25)	<0.001
Race				
African American	392 (82)	370 (82)	22 (69)	
Other	89 (19)	79 (18)	10 (31)	0.06
Unemployed				
No	60 (12)	58 (13)	2 (6)	
Yes	421 (88)	391 (87)	30 (94)	0.41
Homeless past 6 months				
No	302 (63)	285 (63)	17 (53)	
Yes	179 (37)	164 (37)	15 (47)	0.26
Incarcerated past 6 months				
No	317 (66)	292 (65)	25 (78)	
Yes	164 (34)	157 (35)	7 (22)	0.18
HIV status				
Negative	413 (86)	393 (88)	20 (63)	
Positive	68 (14)	56 (12)	12 (37)	0.001
Alcohol use				
Never	101 (21)	96 (21)	5 (16)	
<once a week	94 (20)	83 (18)	11 (34)	
1-4 times a week	134 (28)	122 (27)	12 (38)	
>=Almost daily	152 (32)	148 (33)	4 (13)	0.02
Smoke crack				
No	183 (38)	174 (39)	9 (28)	
Yes	298 (62)	275 (61)	23 (72)	0.26
Inject past 6 months				
No	51 (11)	47 (10)	4 (13)	
Yes	430 (89)	402 (90)	28 (88)	0.76

Table 2

Comparisons of social network characteristics among between men who have sex with men (MSM) and non-men who have sex with men (NMSM), Results from the Step into Action Study, Baltimore, MD.

Variable	Non-MSM n=449 Mean (SD)	MSM n=32 Mean (SD)	Wilcoxon rank sum p-value
Total network size	8.33 (3.85)	8.38 (4.09)	0.68
Number of female	3.83 (2.28)	3.31 (1.65)	0.34
Mean network age	43.4 (7.17)	40.3 (6.00)	0.02
Number HIV positive	0.17 (0.61)	0.63 (1.32)	0.04
Number working full time	3.54 (2.57)	3.31 (2.72)	0.52
Number with conflict	0.84 (1.41)	1.41 (1.66)	<0.01
Number who provides emotional support	1.75 (1.36)	2.41 (1.58)	<0.01
Density of network[†]	0.48 (0.29)	0.59 (0.28)	0.03
<i>Drug network</i>			
Number who use drugs	4.29 (2.86)	5.03 (2.95)	0.16
Number of injectors	2.96 (2.42)	3.59 (2.59)	0.14
Number of crack smokers	2.92 (2.66)	3.47 (2.92)	0.26
Number who share needles (n=430)	1.15 (1.88)	1.82 (1.74)	<0.01
<i>Sex network</i>			
Number of sex partners	1.44 (0.98)	1.72 (1.55)	0.86
Number of sex partners who are drug users.	0.86 (0.98)	1.44 (1.66)	0.08
Condom use with sex partners ^{††}	2.17 (1.27)	2.18 (1.35)	0.92

[†] ranges from 0 (Indicates that 100% connection of networks) to 1 (Indicates zero connection of networks)

^{††} 4 point response scale (1=never, 2=less than half the time, 3=half the time, 4=all the time)

Table 3

Associations between Social Network Characteristics and men who have sex with men (MSM), controlling for HIV status among 477 men: Results from the Step into Action Study, Baltimore, MD.

Model 1	
Variable	Adjusted Odds Ratio (95% confidence interval)
HIV status (positive)	4.29 (1.97-9.34)
Density of network (decreasing)	4.85 (1.20-19.7)

Table 4

Associations between Social Network Characteristics and men who have sex with men (MSM), controlling for HIV status among 481 men: Results from the Step into Action Study, Baltimore, MD.

Model 2	
Variable	Adjusted Odds Ratio (95% confidence interval)
HIV status (positive)	4.17 (1.92-9.08)
Number of networks who provide emotional support	1.30 (1.06-1.61)

Table 5

Associations between Social Network Characteristics and MSM, controlling for HIV status among 430 men who injected in the past 6 month.

Variable	Adjusted Odds Ratio (95% confidence interval)	
HIV status (positive)	3.23 (1.38-7.55)	
Number who they share needles	1.16 (0.99-1.37)	p=0.07