INDIVIDUAL AND NETWORK FACTORS ASSOCIATED WITH RACIAL DISPARITIES IN HIV AMONG YOUNG MEN WHO HAVE SEX WITH MEN: RESULTS FROM THE RADAR COHORT STUDY

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Abstract

Background: Individual sexual risk behaviors have failed to explain the observed racial disparity in HIV acquisition. To increase understanding of potential drivers in disparities, we assessed differences across individual, network, and social determinants.

Methods: Data come from RADAR (N=1015), a longitudinal cohort study of multilevel HIV-risk factors among young men who have sex with men (YMSM) aged 16–29 in Chicago. Data collection includes biological specimens; network data, including detailed information about social, sexual, and drug-use networks; and psychosocial characteristics of YMSM.

Results: Compared to white YMSM (24.8%) and Hispanic YMSM (30.0%), black YMSM (33.9%) had a higher prevalence of both HIV (32%; p<0.001) and rectal STIs (26.5%; p=0.011) with no observed differences in PrEP use. Black YMSM reported lower rates of sexual risk behaviors and more lifetime HIV tests (p<0.001) compared to all other YMSM, however, were also significantly less likely to achieve viral suppression (p=0.01). Black YMSM reported the highest rate of cannabis use (p=0.03) as well as greater levels of stigma (p<0.001), victimization (p=0.04), trauma (p<0.001), and childhood sexual abuse (p<0.001). White YMSM reported higher

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rates of depression (p<0.001) and alcohol use (p<0.001). In network analyses, significant differences existed across network characteristics with black YMSM having the lowest transitivity (p=0.002), the highest density (p<0.001), and the highest homophily (p<0.001).

Conclusion: Black YMSM do not report higher rates of HIV risk behaviors, but social and network determinants are aligned towards increased HIV risk. These results suggest that network interventions and those addressing social determinants may help reduce disparities.

Keywords

HIV; racial disparities; networks; epidemiology

Introduction

There is a marked racial disparity observed in HIV in the United States (U.S.) with black men who have sex with men (MSM) experiencing the greatest burden of infection compared to other racial/ethnic groups. In 2015, two-thirds of all new HIV diagnoses in the U.S. occurred among MSM, with black MSM (41.4%) accounting for the plurality of these diagnoses followed by white MSM (30.4%) and Hispanic MSM (28.2%).[1] During the period 2010 to 2014, the Centers for Disease Control and Prevention (CDC) reported differential trends in HIV diagnoses by race and ethnicity: white MSM saw an 11% decline, black MSM experienced a 1% increase, and Hispanic MSM saw a 14% increase in the rate of new HIV diagnoses.[1] Further, over one-third of new diagnoses in 2014 occurred among young MSM (YMSM; aged 13–29).[1] Should these disparities persist, the U.S. CDC predicts one in two black MSM, one in five Hispanic MSM, and one in eleven white MSM will become infected with HIV during their lifetime.[2] To inform research on disparities, the National Institute of Minority Health and Health Disparities has developed a multilevel research framework that is applicable across a broad range of health conditions, including HIV.[3] We drew from this framework, which encourages consideration of how biological, behavioral, and sociocultural factors at multiple levels of influence (individual, social, systems) impact health outcomes, to identify putative driving factors for observed racial disparities in HIV among YMSM.

Meta-analyses of research on individual HIV risk behaviors among MSM have demonstrated few racial differences, leading to hypotheses that network and social determinants may be explanatory.[4] However, to date there have been few studies of YMSM with the multilevel and network data and diverse participants required to test these hypotheses. For example, young black YMSM, compared to YMSM of other racial/ethnic groups, have been found to have more homophilous networks[5,6] with one study suggesting they are three times more likely to have a same race sexual partner compared to other young MSM.[7] Findings such as these highlight how ongoing disparities can be supported by inherent network structures. Homophilious networks act as feedback loops where black YMSM become infected with HIV, the network environment facilitates the spread of the virus primarily to other black YMSM, and the process repeats. Beyond homophily, more dense networks have also been shown to potentiate spread of sexually transmitted infections (STIs).[8] Here too, black YMSM, compared to white YMSM, are particularly vulnerable as they enter and participate in sexual networks characterized by high density and racial homogeneity.[5] These types of network environments and sexual mixing patterns facilitate transmission of HIV and STIs

among black YMSM; developing a more nuanced understanding of their network environments is key to disrupting future HIV infections and reducing racial disparities among YMSM.

Beyond networks, other social determinants of health have been implicated in racial disparities in HIV.[9] Sexual minority youth have been shown to experience disproportionately high rates of stress and stigma related to their sexual minority status.[10] Similar to network structures, these types of stigma have been found to vary by race and ethnicity with black and Hispanic YMSM having higher rates of both perceived and internalized stigma compared to white YMSM.[10] Past research has also shown that internalized stigma related to, or as a result of, one's sexual orientation is associated with a lack of access to needed health care resources, particularly those related to mental health[11] and HIV care and treatment.[12] One recent study noted that nearly half of black MSM went without health coverage sometime in the preceding two-year period and that those who experienced greater health provider-related stigma had longer gaps between medical visits.[12] Differences in healthcare access can drive disparities by increasing rates of undiagnosed or untreated HIV and STIs; HIV treatment reduces the likelihood of future transmission[13] and STIs increase infection risk.[14]

While more recent work has begun to focus on network drivers of HIV among MSM in general, little work has characterized how network characteristics and measures related to stress and stigma may impact HIV specifically among YMSM. By examining these characteristics, we can gain a better understanding of the drivers of persistent racial disparities in HIV. To address this, we analyze biological, self-report, and network data from YMSM in Chicago in order to: 1) compare how sexual network characteristics may differ by race and ethnicity; 2) assess how measures related to stress and stigma – such as victimization and trauma – may be drivers of racial disparities in HIV infection; and 3) develop a better understanding of how health care services are utilized among YMSM and whether these differ by race and ethnicity.

Methods

Study Design and Recruitment

Data were from the baseline visit of RADAR, a longitudinal cohort study of YMSM living in the Chicago metropolitan area (N=1,015). The primary objective of this cohort study is to apply a multilevel perspective to a syndemic of health issues associated with HIV among diverse YMSM. Diverse methods for participant recruitment have been previously described[6] and were selected in order to achieve the multiple cohort, accelerated longitudinal design. First, a subset of participants from two cohorts of YMSM, Project Q2 (n = 65) and Crew 450 (n = 162), who were first recruited in 2007 and 2010, respectively, enrolled in the cohort. In 2015, a third cohort of YMSM (current n = 468) was recruited. At the time of enrollment into their original respective cohorts, all participants were between 16 and 20 years of age, assigned male at birth, spoke English, and had a sexual encounter with a man in the previous year or identified as gay, bisexual or transgender. Next, the RADAR cohort was expanded through an iterative process where serious romantic partners were recruited at each visit, thereby creating a dynamic dyadic network. All serious romantic

partners who were assigned male at birth were eligible for enrollment into the cohort regardless of current gender identity or sexual orientation. Romantic partners who were assigned female at birth or were older than 29 completed a study visit but were not enrolled in the cohort. Lastly, cohort members were allowed to refer a maximum of three YMSM peers for enrollment into the study as long as they were between 16 and 29 years of age. Demographic characteristics of the sample are shown in Table 1.

Measures

Network Measures.

Network data were captured using a touchscreen based interview assisted network inventory developed for the RADAR study.[15] Network members were elicited via five "name generator" questions asking the participant to indicate close social ties, drug use partners, and sexual partners. After the list of names of alters was generated, demographic characteristics (age, race, gender, perceived sexual identity, neighborhood of residence), characteristics of the relationship (frequency of contact, strength of relationship, and relationship type), and behaviors with that alter were obtained. Given the focus of the current paper, we focus on network members that were named as sexual partners in the 6 months prior to the interview. Detailed sexual behavior (first and last date of sexual contact, type of sexual contact, frequency of sexual contact, condom use) was obtained about these sexual partners.

In addition to capturing data about network members, data was also captured about the perceived relationships between network members. Therefore, it was possible to calculate a number of key network characteristics which expose dynamics important to disease spread. Within each network interview, we calculate two different measures of sexual connectedness – density and transitivity. The density of each YMSM sexual network was calculated by summing the number of sexual connections observed between all network members (including the participant) and then dividing by the total number of possible pairs given the number of YMSM in the sexual network. The transitivity was measured using the number of sexual ties of an ego's YMSM alters, calculated by summing the total number of sexual connections between other nominated YMSM and dividing by the number of other nominated YMSM. Homophily was measured using the assortativity coefficient, a commonly used statistic to measure the extent of mixing within a network. In the current case, this measure ranges from 1, indicating only same-race sexual partnerships, to −1, indicating only different-race sexual partnerships. Multiplexity was also calculated using the quadratic assignment procedure (QAP) correlation function by determining the extent of overlap between a participant's sex, support, and drug networks. Finally, the number of concurrent sexual partners was calculated using the start and end date of sexual contact.

Psychological and Behavioral Measures.

Social behavioral measures included items assessing mental health, stigma, substance use, and sexual risk-taking behaviors. Mental health was measured by the PROMIS Depression Scale[16] and three items which measured suicidal ideation, suicidal planning, and suicide attempts over the prior six months.[17] Substance use was measured by the Alcohol Use

Disorders Identification Test (AUDIT)[18] and the Cannabis Use Disorder Identification Test (CUDIT).[19] Sexual risk taking was captured within the network interview through the total number of sexual partners, the total number of condomless anal sex partners, and the total number of condomless anal sex acts over the prior six months. Stigma was measured by two scales, one which measured internalized stigma using an adapted 8-item measure[20] and one which measured externalized stigma using an adapted 7-item measure.[20]

Biological Measures.

NAAT testing for gonorrhea and chlamydia, via self-administered rectal swabs, was completed for all participants regardless of HIV status. Additionally, for HIV-positive individuals, viral load was captured through blood samples from which plasma was extracted and testing performed using Abbot RealTime HIV-1 RNA PCR with a sensitivity of 40 copies/mL.

Structural Measures.

Structural measures included experiences of violence and trauma, living in a high disadvantage neighborhood, and access to prevention and treatment services. Experiences of violence and trauma was measured by a six-item measure of LGBT-related victimization and harassment,[21] the Traumatic Events Experiences Scale,[22] a measure of Intimate Partner Violence for those currently engaged in serious relationships[23], and a measure of childhood sexual abuse.[24] Access to prevention services was measured by an item assessing HIV testing history and an item assessing use of PrEP over the last six months. For those who were HIV-positive, treatment access was measured by an item assessing whether ART medication doses were missed in the past week, and an item assessing the number of visits to a health care provider.

Analyses

To describe differences by race, continuous variables were analyzed using t-tests and categorical variables using chi-square tests. To test the significance of differences among means for multiple groups, analyses of variance (ANOVAs) were used.

Results

Individual Level

There were significant racial differences in self-reports of depressive symptoms, with white YMSM reporting the highest rates (16.69) and black YMSM (14.31) reporting the lowest levels (Table 2; $p < 0.001$). Similar to depression, there were significant racial differences across alcohol ($p < 0.001$) and cannabis use ($p < 0.001$). Black YMSM were significantly more likely to report hazardous marijuana use while white YMSM were significantly more likely to report high levels of alcohol problems. Similarly, there were significant racial differences in sexual risk taking ($p < 0.001$), where black YMSM reported the lowest number of sexual partners as well as the lowest number of CAS partners. Unlike most other hypothesized social and behavioral drivers of HIV, black YMSM reported significantly higher externalized ($p < 0.001$) and internalized ($p < 0.001$) stigma, compared to both white and Latino MSM.

Biological Level

Racial differences were found in rectal STI prevalence (combined gonorrhea or chlamydia; Table 2), with black YMSM being more likely to test positive (p < 0.001). Additionally, among HIV-positive individuals, black YMSM were significantly more likely to have a detectable viral load (p = 0.0001).

Structural Level

Significant racial differences were observed across experiences of violence and trauma (Table 2), with black YMSM reporting the greatest victimization (p=0.0370), trauma (p = 0.0002), and childhood sexual abuse (p < 0.0001). There were no significant differences with regards to intimate partner violence. Black YMSM reported significantly greater numbers of lifetime HIV tests (p < 0.001); however, no differences were observed when examining PrEP use in the past six months. Additionally, among those who are HIV-positive, there were no observed racial differences when examining the number of missed antiretroviral medication doses in the past week nor the number of visits to a health care provider.

Sexual Partner and Network Characteristics

Racial differences were found across all sexual partner characteristics (Table 3). Black YMSM were significantly more likely to have non-male, and non-gay, sexual partners (p < 0.001). Black YMSM were also the least likely to report having a very close relationship and most likely to report being not close at all with their sexual partners (p < 0.001). Examining network characteristics (Table 4), black YMSM also had the lowest transitivity among all sex ties (p < 0.001) while white YMSM had the highest. Black YMSM also had the highest density among all sex ties (p < 0.001), the highest racial homophily (p < 0.001), and the lowest number of concurrent partners (p = 0.029). No significant racial differences were observed when measuring multiplexity.

Discussion

In a large and diverse sample of young MSM in Chicago, we found that black YMSM had a higher prevalence of both HIV and rectal STIs while observing no significant differences in PrEP use. Young black MSM reported lower rates of HIV transmission risk practices compared to all other YMSM as well as a greater number of lifetime HIV tests; however, HIV-positive YBMSM were significantly less likely to achieve viral suppression. Young black MSM reported the highest rate of cannabis use and greater levels of stigma, victimization, trauma, and childhood sexual abuse. Young white MSM, meanwhile, reported higher rates of depression and the highest rates of alcohol use. In network analyses, black YMSM reported a greater number of sexual partners identifying as non-male and non-gay and reported more HIV-positive sexual partners. Significant differences existed across network characteristics with black YMSM having the lowest transitivity, the highest density, and the lowest number of concurrent partners among YMSM. Finally, no significant differences were observed in access to health care treatment, including missed HIV medication doses in the past week and number of visits to a health care provider.

The composition of one's risk environment, including sexual network characteristics (e.g. density, homophily, etc), as well as the characteristics of an individual's sexual partners have previously been hypothesized to play a role in HIV disparities.[4,5,25] In this cohort, black YMSM had the lowest transitivity, lowest number of concurrent partners, highest network density, and highest homophily among all participants. Transitivity–a measure of the extent to which three individuals are all connected, representing the smallest cyclic structure in a network–has previously been associated with increased HIV transmission due to individuals in transitive triads having potential to be exposed to the virus from multiple sources.[26] Density, meanwhile, is a measure of the degree to which all possible relationships between individuals are observed with past research finding an inverse relationship between network density and number of sexual partners.[25] It is therefore interesting that, in this cohort, black YMSM experience the lowest overall transitivity but the highest density, suggesting that black YMSM are exposed to HIV through fewer pathways while also participating in a greater number of sexual relationships with network members. In other words, although there is a higher percentage of sexual partnerships between black YMSM themselves, there are a lower number of total partnerships.

Data such as these have the potential to yield novel HIV interventions aimed at reducing racial disparities in diagnosis rates. For example, it has proven possible to use network interventions to more accurately trace past partners of those newly diagnosed with HIV.[27] Furthermore, network interventions are also likely to grow more sophisticated as traditional network data, like those used in the current study, are increasingly integrated with other sources of network data such as from partner services programs and molecular surveillance. [28] In addition, network data identifying differences in the composition of sexual partners can also be leveraged to better understand the long term impact of prevention activities on racial disparities[29] and improve targeting of influential members of sexual networks.[30] Future research should aim to develop a better understanding of the dynamic nature of these networks over time and utilize diverse data sources in order to develop novel HIV network interventions.

Beyond differences in network composition and structure, black YMSM were observed to experience greater levels of stigma, victimization, trauma, and childhood sexual abuse. And while they reported the lowest rates of suicide ideation, they also reported the second highest rate of suicide planning as well as the highest rate of suicide attempts. As noted in one recent review and content analysis,[31] there is a dearth of research on suicidality among black YMSM. In fact, the analysis noted that across four articles addressing the issue among this population, three used the same dataset. This lack of research is surprising given the high level of suicidality observed in this cohort, particularly among black YMSM. Future research should be dedicated towards better understanding mental health and suicidality outcomes among this population as they may prove to be an important factor in reducing health disparities.

While historically, the diagnosis rate of HIV among Hispanic MSM has fallen between those of white and black MSM, young Hispanic MSM are the only racial/ethnic group to experience an increase in rate of diagnoses in the most recent CDC report.[1] With regards to their engagement in HIV risk behaviors, mental health outcomes, and network

characteristics, young Hispanic MSM in this cohort were found, with few exceptions, to consistently fall between young black and white MSM. They were, however, found to experience the lowest rates of externalized stigma, PrEP use, network homophily, and number of visits to a health care provider. These data suggest that we should expect the rate of new HIV diagnoses among Hispanic YMSM to fall between those of white and black YMSM; however, as previously mentioned the rate is increasing among Hispanic YMSM.[1] This pattern was predicted by a recent simulation of the HIV epidemic among YMSM informed by network data.[32] Taken together, further research is required in order to better understand the rising HIV diagnosis rates among young Hispanic MSM in the U.S. and to avoid widening disparities among this population.

Results must be interpreted in the context of study limitations. First, this sample was a community sample rather than a probability sample and, as such, findings may not generalize to the larger population of YMSM. Second, some data were self-reported, including network characteristics of alters and as well as the relationships between alters themselves. Errors in the reporting of this information by the participant may result in changes to our findings. Finally, reflecting the demographics of the HIV epidemic, we had few HIV positive white YMSM in the sample which limited the precision of our estimates of the proportion with a detectable viral load.

In summary, we found significant differences across several domains that may explain why HIV disparities persist across race/ethnicities among YMSM. Compared to other YMSM in the cohort, black YMSM had the highest network density as well as the highest concurrency among YMSM alters. They also reported higher rates of stigma, victimization, trauma, and childhood sexual abuse. And while no significant differences were observed with regards to health care treatment access, black YMSM did report a greater number of lifetime HIV tests as well as a lower proportion of viral suppression. This suggests current efforts to increase engagement in HIV prevention with black YMSM may be taking hold. Future research should focus on developing interventions which target social determinants of HIV such as stigma, victimization, and trauma and that these HIV prevention and care interventions may be benefit from understanding the structure of YMSM sexual networks.

Acknowledgments

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Table 1.

Demographic characteristics of sample, stratified by race and ethnicity, RADAR, Chicago 2015–2017

	Total		Black		Latino		White		Other	
	(N = 1015)		(n = 344)		(n = 304)		(n = 252)		(n = 115)	
	n	%	n	%	n	%	n	%	n	%
Age										
16–17	112	11.0	45	13.1	39	12.8	17	6.7	11	9.6
18–20	459	45.2	101	29.4	146	48.0	157	62.3	55	47.8
21–24	329	32.4	144	41.9	94	30.9	57	22.6	34	29.6
25–29	115	11.3	54	15.7	25	8.2	21	8.3	15	13.0
Gender Identity[1]										
Male	933	91.9	304	88.4	289	95.1	236	93.7	104	90.4
Transgender female	58	5.7	39	11.3	8	2.6	2	0.8	9	7.8
Other	23	2.3	1	0.3	7	2.3	13	5.2	2	1.7
Education[1]										
< High school	182	17.9	81	23.5	60	19.7	21	8.3	20	17.4
High school/GED	244	24.0	103	29.9	72	23.7	41	16.3	28	24.3
Some college	498	49.1	142	41.3	151	49.7	149	59.1	56	48.7
> Bachelor degree	90	8.9	18	5.2	21	6.9	40	15.9	11	9.6
Housing Situation[1]										
Living in shelter, group home, etc.	23	2.3	8	2.3	7	2.3	5	2.0	3	2.6
No permanent address	20	2.0	9	2.6	5	1.6	4	1.6	2	1.7
Sexual Orientation[1]										
Homosexual	705	69.5	226	65.7	210	69.1	195	77.4	74	64.3
Bisexual	216	21.3	89	25.9	71	23.4	26	10.3	30	26.1
Other	93	9.2	29	8.4	23	7.6	30	11.9	11	9.6
Sexual Debut[1]										
None	59	5.8	19	5.5	15	4.9	19	7.5	6	5.2
< 13	80	7.9	40	11.6	24	7.9	7	2.8	9	7.8
13–18	781	76.9	263	76.5	237	78.0	188	74.6	93	80.9
19–20	79	7.8	19	5.5	25	8.2	30	11.9	5	4.3
21+	13	1.3	3	0.9	3	1.0	6	2.4	1	0.9
HIV Status										
Negative	848	83.5	234	68.0	266	87.5	247	98.0	101	87.8
Positive	167	16.5	110	32.0	38	12.5	5	2.0	14	12.2

[1]
Mising data is present on one or more participants.

Table 2.

Social, biological, and structural characteristics of sample stratified by race and ethnicity, RADAR, Chicago 2015–2017 (N = 1015)

Characteristic	Black (n = 344)	Latino (n = 304)	White (n = 252)	Other (n = 115)	p-value
Individual					
Mental Health					
Depression, mean (SD)	14.31 (7.40)	16.17 (7.54)	16.69 (7.23)	15.35 (7.61)	<0.001
Suicide ideation, %	9.88	11.18	14.74	11.30	0.33
Suicide plan, %	7.84	6.57	4.78	8.70	0.41
Suicide attempt, %	6.39	3.29	1.59	6.09	0.01
Substance Use, mean (SD)					
AUDIT	4.50 (5.34)	6.30 (5.52)	7.61 (5.73)	5.48 (4.52)	<0.001
CUDIT	6.73 (6.54)	6.09 (6.53)	5.08 (5.73)	6.11 (6.13)	<0.001
Sexual Risk Taking, mean (SD)					
# Sexual partners	2.46 (2.84)	2.83 (2.95)	3.93 (3.81)	3.40 (3.25)	<0.001
# CAS partners	0.46 (0.50)	0.60 (0.49)	0.59 (0.49)	0.60 (0.49)	<0.001
Stigma, mean (SD)					
Internalized Stigma	1.85 (0.71)	1.68 (0.69)	1.63 (0.64)	1.87 (0.73)	<0.0001
Externalized Stigma	2.80 (0.80)	1.65 (0.70)	2.56 (0.68)	2.67 (0.74)	0.0001
Biological					
Detectable viral load, % [1]	61.11	42.10	20.00	28.57	0.01
Rectal STI positive, %	26.45	12.83	7.14	12.17	<0.0001
Structural					
Violence and Trauma					
Victimization, mean (SD)	0.28 (0.57)	0.19 (0.44)	0.15 (0.39)	0.27 (0.54)	0.037
Trauma (ever), mean (SD)	1.96 (1.98)	1.61 (1.92)	1.29 (1.61)	1.70 (1.76)	0.0002
Intimate partner violence, %	9.01	9.86	7.57	9.57	0.813
Childhood sexual abuse (ever), %	31.98	28.95	14.00	28.95	<0.0001
Prevention Access					
HIV test, mean (SD)	8.24 (13.63)	5.59 (11.49)	3.46 (5.92)	7.06 (14.21)	<0.001
PrEP use in past six months, %	7.14	4.78	7.72	7.84	0.510
Treatment Access[1]					
Missed dosage in the past week, %	28.76	27.59	0.00	27.27	0.835
Number of visits to health care provider, mean (SD)	2.92 (2.83)	2.75 (3.51)	0.00 (0.00)	5.08 (7.33)	0.424

Abbreviations: AUDIT = Alcohol Use Disorder Identification Test ; CUDIT = Cannabis Use Disorder Identification Test; CAS = condomless anal sex; PrEP = pre-exposure prophylaxis

[1] Among HIV-diagnosed participants only

Table 3.

Partner characteristics of sample, stratified by race and ethnicity, RADAR, Chicago 2015–2017

	Black		White		Latino		Other		p-value
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Gender									<0.001
Female	59	6.5	60	4.5	32	5.2	13	6.3	
Male	803	88.0	1220	91.3	553	90.7	181	88.3	
Not Listed	12	1.3	38	2.8	14	2.3	8	3.9	
Transgender: FTM	5	0.5	5	0.4	1	0.2	0	0.0	
Transgender: MTF	34	3.7	13	1.0	10	1.6	3	1.5	
Sexual Orientation									<0.001
Bisexual	204	22.3	141	10.6	96	15.9	29	14.2	
Gay / Lesbian	567	62.1	1052	78.8	450	74.4	146	71.6	
Heterosexual / Straight	73	8.0	52	3.9	29	4.8	7	3.4	
Other	69	7.6	90	6.7	30	5.0	22	10.8	
Relationship Strength									<0.001
Very Close	370	41.7	784	59.1	312	53.1	106	52.5	
Somewhat Close	272	30.6	301	22.7	149	25.3	50	24.8	
Not close at all	246	27.7	241	18.2	127	21.6	46	22.8	

Table 4.

Network characteristics of sample, stratified by race and ethnicity, RADAR, Chicago 2015–2017 (N = 1015)

	Black	White	Latino	Other	p-value
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Transitivity[1]					
All sex ties[a]	0.25 (0.39)	0.41 (0.39)	0.32 (0.41)	0.35 (0.46)	<0.001
Density[2]					
All sex ties[a]	0.58 (0.32)	0.40 (0.30)	0.50 (0.31)	0.45 (0.31)	<0.001
Homophily (Race)	0.62 (0.55)	0.36 (0.56)	0.15 (0.49)	-0.04 (0.23)	<0.001
# of Concurrent Partners[b]	0.06 (0.34)	0.14 (0.51)	0.06 (0.37)	0.08 (0.40)	0.029
Multiplexity					
Sex - Social	0.13 (0.17)	0.16 (0.13)	0.15 (0.14)	0.13 (0.14)	0.602
Sex - Drug	0.22 (0.25)	0.19 (0.22)	0.22 (0.24)	0.19 (0.23)	0.767

[a] Includes all alters in sexual network

[b] Concurrent partners 3 months prior to interview

[1] Transitivity = average number of sex ties between alters

[2] Density = ratio of number of sex ties out of all possible ties