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Congruence of Home, Social and Sex Neighborhoods among Men Who Have Sex with Men, NYCM2M Study

Beryl A. Koblin · James E. Egan · Vijay Nandi ·
Jordan M. Sang · Magdalena Cerdá · Hong-Van Tieu ·
Danielle C. Ompad · Donald R. Hoover · Victoria Frye

Abstract Substantial literature demonstrates the influence of the neighborhood environment on health behaviors and outcomes. But limited research examines on how gay and bisexual men experience and exist in various geographic and virtual spaces and how this relates to their sexual behavior. New York City Men 2 Men (NYCM2M) was a cross-sectional study designed to identify neighborhood-level characteristics within the urban environment that influence sexual risk behaviors, substance use, and depression among men who have sex with men (MSM) living in NYC. The sample was recruited using a modified venue-based time-space sampling methodology and through select websites and mobile applications. Whether key neighborhoods of human activity, where a participant resided (termed home), socialized (termed social), or had sex most often (termed sex), were the same or different was evaluated. "Congruence" (or the sameness) of home, social, and most often sex neighborhood was reported by 17 % of men, while 30 % reported that none of their neighborhoods were the same. The largest group of men (39 %) reported that their home and sex neighborhoods were the same but their social neighborhood was different while 10 % reported that their home neighborhood

B. A. Koblin (✉) · V. Nandi · H.-V. Tieu
Laboratory of Infectious Disease Prevention, Lindsley F. Kimball
Research Institute, New York Blood Center, 310 E.67th Street,
New York, NY 10065, USA
e-mail: bkoblin@nybloodcenter.org

J. E. Egan
Department of Behavioral and Community Health Sciences,
Graduate School of Public Health, University of Pittsburgh,
Pittsburgh, PA, USA

J. M. Sang · D. C. Ompad
College of Global Public Health, New York University,
New York, NY, USA

M. Cerdá
Department of Emergency Medicine, School of Medicine,
University of California, Davis, Sacramento, CA, USA

H.-V. Tieu
Division of Infectious Diseases, Department of Medicine,
Columbia University Medical Center, New York, NY, USA

D. C. Ompad
Center for Drug Use and HIV Research, NYU Rory Meyers
College of Nursing, New York, NY, USA

D. R. Hoover
Department of Statistics and Biostatistics and Institute
for Health, Health Care Policy and Aging Research,
Rutgers, The State University of New Jersey, Piscataway,
NJ, USA

V. Frye
Laboratory of Social and Behavioral Sciences, Lindsley F.
Kimball Research Institute, New York Blood Center, New York,
NY, USA

V. Frye
Department of Community Health and Social Medicine, City
College of New York, CUNY Medical School, City University of
New York, New York, NY, USA

was different than their social and sex neighborhood; 5 % men reported same home and social neighborhoods with a different sex neighborhood. Complete neighborhood incongruence was highest among men who were Black and/or Latino, had lower education and personal income levels, and had greater financial insecurity. In adjusted analysis, serodiscordant condomless anal intercourse and condomless anal intercourse with partners from the Internet or mobile applications were significantly associated with having the same social and sex (but not home) neighborhoods. Understanding the complexity of how different spaces and places relate to the health and sexual behavior of MSM is essential for focusing interventions to best reach various populations of interest.

Keywords HIV · Neighborhoods · Risk behaviors

Introduction

Men who have sex with men (MSM) comprise the largest proportion of all new HIV diagnoses in the USA [1]. Black and Latino MSM are disproportionately affected [1]. Recent literature has emphasized the importance of factors beyond those at the individual level in explaining race/ethnic disparities in HIV infection among MSM in the USA, including structural barriers such as poverty, stigma, and incarceration and how they create barriers to prevention and care services. [2–4] Substantial literature demonstrates the influence of the neighborhood environment, including built and social characteristics, on health behaviors and outcomes, such as mortality, coronary heart disease, self-rated health, depression, violence, drug use, sexual behavior, sexual partnering patterns, and sexually transmitted infections [5–10].

Among MSM, the neighborhood environment may operate in a number of ways; it may offer opportunities to connect with other gay people or it may manifest barriers to full expression and experience of a gay identity. Traditionally, a critical mass of gay people living in a neighborhood, along with services tailored to their needs, has been conceptualized as either "gay presence" or "gay space" [11, 12]. Gay neighborhood presence has been found to be positively associated with protective sexual behaviors such as consistent condom use [13]. Conversely, other studies have found living in

a gay neighborhood was associated with methamphetamine use and condomless receptive anal intercourse, while protective against substance use dependency [14, 15]. A lack of significant neighborhood gay presence may result in gay and bisexual men migrating into urban areas to seek a more supportive, less homophobic environment [16, 17]. At the same time, gay and bisexual men born and raised in large urban areas such as New York City (NYC) also report challenging experiences of homophobia and heterosexism in neighborhoods with little gay space. Our qualitative research suggests that young men of color born in neighborhoods with little gay space often seek gay space and/or sex outside of their home neighborhoods; when these MSM are not out about their sexuality and/or their home neighborhoods are not supportive, sexual and partnering activity may take place far away from familiar home contexts or in risky environments [18].

In addition to neighborhood influences on health and well-being, feelings of connectedness to non-geographically bounded, identity-based communities may be important to sexual behavior among MSM. In a germinal study, O'Donnell and colleagues found that Latino MSM were less likely to engage in unprotected anal intercourse if they felt strong feelings of connectedness to the Latino community [19]. Similarly, Warren and colleagues found that stronger ethnic identity was protective of higher risk sex among Latino MSM [20]. More recently, Van Sluytman and colleagues [21] found that attachment to the Black community and/or gay Black community reduced the likelihood of psychological distress. Thus, connectedness to identity-based communities is also relevant to the sexual health and well-being of MSM. Likewise, connectedness to the gay community has been found to be important for MSM with a stronger attachment associated with decreased sexual risk [22]. This attachment may be shaped by social relations or ties and networks, including friends, families, and families of choice [12].

A limitation of many studies of neighborhood or spatial influence on health is the reliance on a single neighborhood space, typically residential neighborhood as the geographic unit of interest [23]. As a result, few studies have examined how gay and bisexual men exist in various geographic and virtual spaces and how this relates to sexual behavior. MSM, as is the general population, are likely influenced by multiple geographic and virtual environments [24, 25]. Here, we examined
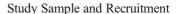
the congruence (or sameness) of three neighborhoods of potential influence: where the men live (home), where they socialize most often (social), and where they most often have sex (sexual). Then, we determined the association of sociodemographic characteristics, levels of outness and gay community attachment, and self-reported neighborhood factors (e.g., experiences of discrimination, neighborhood connectedness, social ties) with neighborhood congruence. Finally, we assessed the association of levels of neighborhood congruence with sexual risk behavior, including sexual partner seeking through the Internet or mobile applications. Connectedness to neighborhood and community is no longer bounded by physical space, with the advent of the Internet and the ability for individuals to congregate and create community online or in "virtual spaces." The role of the Internet and portable, smart devices in partner seeking, connecting people, bridging physical divides, and other social activities for gay and bisexual men has been significant [26–28]. Multiple studies have found that many MSM meet their partners through the Internet, with an estimated 6.2 million gay and bisexual men in the USA using virtual tools for romantic and sexual encounters [26]. This increased connectivity and readily available outlets for casual sex may have increased sexual risk for some groups of MSM [26, 29].

Results of these analyses may help us better understand how the intersections among and characteristics of the various spaces where MSM live, socialize, and have sex influence HIV risk. This information may lead to more effective HIV prevention programs that target those most at risk while taking into account how existence across various life spaces influences risk.

Methods

Ethics Statement

The New York Blood Center Institutional Review Board first approved this study and provided ongoing oversight. Institutional review boards at co-investigator institutions including New York University's University Committee on Activities Involving Human Subjects, Hunter College Institutional Review Board, and the New York Academy of Medicine Institutional Review Board also reviewed the study. All participants provided written informed consent.

Study Sample and Recruitment

Methods for the NYCM2M Study have been previously published [30–32]. Briefly, individuals were eligible to participate if they report being a biological male at birth, were at least 18 years of age, resided in NYC, reported engaging in anal sex with a man in the past 3 months, and communicated in English or Spanish. Recruitment involved using a modified venue-based time-space sampling methodology and placement of ads on select social media and websites [33]. Recruitment occurred at the locations during designated sampling events. Men were systematically approached (e.g., every third man) at the sampling events, and eligible participants were asked to provide contact information. A similar process occurred for online recruitment as men were directed to the study website and those eligible were asked to provide contact information.

Study Visit

After providing informed consent, participants met with a staff member to complete the Neighborhood Locator Questionnaire which collected information on the location of four neighborhoods: home (where they currently live), social (where they socialize most often), and sexual (where they most recently had sex and most often have sex) using Google Earth to "drop a pin" at the closest intersection [30, 34], as well as place of birth and place where the majority of their childhood was spent. For each neighborhood, participants were also asked to identify the neighborhood name from a list of 347 neighborhoods within the 59 NYC community districts. Community districts range in population size from a little more than 50,000 residents to more than 200,000 [35].

Participants then completed an ACASI assessment and a social and sexual network questionnaire with an interviewer. Participants received HIV risk-reduction counseling and a rapid HIV antibody test was conducted. Those who tested HIV positive were referred for treatment and medical and social services, as needed. Upon completion of the visit, participants received $50 and a two-way public transportation card.

Outcome Measures

For these analyses, two dichotomous outcomes related to sexual risk in the last 3 months were defined: (1)

serodiscordant/unknown status condomless anal intercourse (serodiscordant CAI) and (2) CAI with partners found using the Internet or mobile application.

Neighborhood Congruence

Using the home, social, and most often sex neighborhood names from the Neighborhood Locator Questionnaire, level of congruence was categorized as (1) all neighborhoods the same; (2) same home and social but different sex neighborhood; (3) same social and sex but different home neighborhood; (4) same home and sex but different social neighborhood; or (5) none of the neighborhoods the same.

Covariates

The questionnaire included questions regarding age, race/ethnicity, sexual identity, and measures of socioeconomic status (education, employment, annual personal income, and financial security). A measure of outness ("How many of the people you know or see day-to-day know you have sex with men?") was included with responses ranging from not out to anyone to out to everyone. Gay community attachment was measured with seven items, such as "I feel a part of New York City's gay community" and "Participating in New York City's gay community is a positive thing for me." These were measured by a 4-point response scale ranging from strongly disagree to strongly agree and a mean value was calculated for each participant ($\alpha = 0.81$) [36].

The current analysis included data on place of birth (in NYC, outside of NYC in the USA, outside the USA), place where the participant spent most of their childhood (in their current home neighborhood, in another NYC neighborhood, outside NYC), and whether the participant would live in their current home neighborhood if they could live anywhere in NYC. Exposure to the neighborhood was measured with a question on duration of residence or going to the neighborhood to socialize. Social ties were assessed by asking participants how many relatives and friends were in their home and social neighborhoods. Neighborhood connectedness was measured with 12 items such as "I feel this place is a part of who I am" using a 4-point self-reported scale ranging from strongly disagree to strongly agree

($\alpha = 0.96$) [37]. A mean value was calculated for each participant.

Experience of racial/ethnic and sexual orientation discrimination in the home and social neighborhoods in the prior 3 months was based on neighborhood lifetime and recent experience items as follows: "Have you ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior in your home neighborhood because of your race, ethnicity, or color?," "If yes, how many times did this happen?," "How many times did this happen in the past 3 months?." These questions were asked for the home and social neighborhoods separately. The same set of questions are asked in the context of sexual orientation discrimination: "Have you ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior in your home neighborhood because of your sexual orientation?" also for both home and social neighborhoods.

Statistical Analysis

Correlates of Neighborhood Congruence

All analyses were conducted in SAS version 9.3 (SAS Institute Inc., SAS/Stat, NC, USA). Bivariate associations between sociodemographic characteristics, levels of outness and gay community attachment, and neighborhood variables with neighborhood congruence were conducted. Chi-square tests of association were used for categorical measures and linear models for overall tests of association for continuous measures.

Association with Behavior Outcomes

Sexual behavior outcomes (serodiscordant CAI, CAI with partners from the Internet or mobile application) were examined with logit models of association for each of these outcomes with neighborhood congruence. The relationships between the sexual behavior outcomes and neighborhood congruence, sociodemographics, and the correlates of neighborhood congruence (p value <0.1) as covariates were examined. Final models included neighborhood congruence, sociodemographics, and covariates with p value <0.05.

Results

Study Sample

A total of 398 venue-based recruitment events and four Internet-based advertisements were placed to recruit 1503 men from October 2010 through June 2013. Complete interview data were obtained for 1493 men, 778 from venue-based recruitment and 685 from Internet-based ads. The average age was 32.1 (SD = 10.3); 31.9 % of the sample was White (non-Hispanic); 30.4 % Latino; 25.2 % Black/African American; and 12.5 % reported another race/ethnicity (Table 1). Most men (87.3 %) self-identified as gay, homosexual, queer, or same-gender loving. About half (49.3 %) reported possessing at least a college degree, and 63.3 % were employed. Over a quarter of men (26.3 %) reported an average personal income of less than $10,000 per year, and 47.9 % reported that they did not have enough money for necessities in the prior 3 months.

Neighborhood Congruence

Congruence of home, social, and most often sex neighborhood was reported by 248 (16.6 %) men, while 443 (29.7 %) reported that none of their neighborhoods were the same (Table 1). The largest group of men (39.2 %) reported that their home and sex neighborhoods were the same but their social neighborhood was different, while 148 (9.9 %) men reported that their home neighborhood was different than their social and sex neighborhood. Only 68 (4.6 %) men reported same home and social neighborhoods with a different sex neighborhood.

Correlates of Neighborhood Congruence

Several sociodemographic characteristics were associated with neighborhood congruence (Table 1). The mean age was youngest for men whose social and sex neighborhoods were the same and for men whose neighborhoods were all different. Men who were White, had higher education, and highest income were more likely to report all their neighborhoods were the same. Men who were Black, Latino, had lower education and income, and had higher financial insecurity were more likely to report that all their neighborhoods were

different. Men who were recruited through online recruitment were more likely to report all their neighborhoods were the same, whereas those recruited through venue-based sampling were more likely to report that none of the neighborhoods were the same.

Men who reported lowest scores on the outness scale were more likely to report that none of their neighborhoods were the same, although this association was of borderline significance (Table 2). Gay community attachment was highest for men who reported same home and sex neighborhoods.

Men born in NYC were more likely to report that all their neighborhoods were different, whereas men born within the USA but outside of NYC and those born outside of the USA were more likely to report that all their neighborhoods were the same (Table 3). Likewise, men who grew up outside of NYC were more likely to report that all their neighborhoods were currently the same. With respect to men's perspectives on their home neighborhood, those who reported that they would live in their current home neighborhood if they could live anywhere in NYC were more likely to report that their home, social, and sex neighborhoods were the same. Men with the shortest duration of residency in their home neighborhood (less than 1 year) were more likely to report same social and sex neighborhoods but different home neighborhood or that all of their neighborhoods were different. Men who had resided in their home neighborhood the longest (5 or more years) were more likely to report that all of their neighborhoods were different. Men with relatives in their home neighborhood were more likely to report that all of their neighborhoods were different whereas men with multiple friends in their home neighborhood were more likely to report that all of their neighborhoods were the same or that their home and social neighborhoods were the same. Home neighborhood connectedness was highest among men who reported that all of their neighborhoods were the same.

With regard to men's perspectives on their social neighborhood, men with relatives in their social neighborhood were more likely to report the same home and social (but not sex) neighborhood. Men with multiple friends in their social neighborhood were more likely to report that all of their neighborhoods were the same or that their home and social neighborhoods were the same.

Table 1 Sociodemographic characteristics of participants by neighborhood congruence, NYCM2M Study

Characteristic	Total (n = 1493)		All the same (n = 248; 16.6 %)		Same home and social (n = 68; 4.6 %)		Same social and sex (n = 148; 9.9 %)		Same home and sex (n = 586; 39.2 %)		None the same (n = 443; 29.7 %)		p value[a]
	N	%	N	%	N	%	N	%	N	%	N	%	
Age (mean, SD)	32.1 (10.3)		34.3 (11.1)		33.2 (11.7)		30.5 (9.1)		32.8 (10.1)		30.3 (9.9)		<0.001
Race/ethnicity													
White	474	31.9	101	21.3	26	5.5	41	8.6	190	40.1	116	24.5	0.004
Black	375	25.2	56	14.9	13	3.5	44	11.7	137	36.5	125	33.3	
Hispanic	452	30.4	58	12.8	20	4.4	42	9.3	176	38.9	156	34.5	
All other	186	12.5	30	16.1	9	4.8	21	11.3	82	44.1	44	23.7	
Sexual identity													
Gay, homosexual, queer, same-gender loving, etc.	1303	87.3	220	16.9	56	4.3	124	9.5	522	40.1	381	29.2	0.51
Bisexual	140	9.4	23	16.4	9	6.4	17	12.1	47	33.6	44	31.4	
Straight, heterosexual/other	50	3.4	5	10.0	3	6.0	7	14.0	17	34.0	18	36.0	
Education													
≤High school graduate	253	16.9	27	10.7	15	5.9	36	14.2	85	33.6	90	35.6	<0.001
Some college	504	33.8	69	13.7	26	5.2	47	9.3	193	38.3	169	33.5	
College graduate+	736	49.3	152	20.7	27	3.7	65	8.8	308	41.8	184	25.0	
Employment													
Working	943	63.3	162	17.2	38	4.0	92	9.8	396	42.0	255	27.0	0.07
Not working	457	30.7	71	15.5	25	5.5	49	10.7	154	33.7	158	34.6	
Working off the book/other	90	6.0	14	15.6	5	5.6	7	7.8	35	38.9	29	32.2	
Personal income													
<$10,000	385	26.3	57	14.8	22	5.7	35	9.1	126	32.7	145	37.7	<0.001
$10,000–39,999	608	41.5	88	14.5	22	3.6	66	10.9	256	42.1	176	28.9	
$40,000–59,999	226	15.4	38	16.8	11	4.9	17	7.5	97	42.9	63	27.9	
$60,000+	245	16.7	62	25.3	12	4.9	27	11.0	99	40.4	45	18.4	
Financial insecurity in the last 3 months													
Not enough $ for rent, food, or utilities													
No	773	52.1	135	17.5	34	4.4	66	8.5	328	42.4	210	27.2	0.039
Yes	710	47.9	113	15.9	34	4.8	82	11.5	257	36.2	224	31.5	
Not enough $ for social activity													
No	451	30.3	87	19.3	20	4.4	39	8.6	187	41.5	118	26.2	0.13
Yes	1039	69.7	161	15.5	48	4.6	109	10.5	398	38.3	323	31.1	
Serodiscordant CAI in the last 3 months													
No	1105	74.0	187	75.4	45	66.2	97	65.5	435	74.2	341	77.0	0.041
Yes	388	26.0	61	24.6	23	33.8	51	34.5	151	25.8	102	23.0	
CAI with partners from Internet/mobile app in the last 3 months													
No	425	33.5	81	39.3	15	26.8	27	22.1	187	36.5	115	31.0	0.006
Yes	842	66.5	125	60.7	41	73.2	95	77.9	325	63.5	31	69.0	
Recruitment approach													
Venue based	778	53.2	113	14.5	30	3.9	78	10.0	306	39.3	251	32.3	0.027
Online	685	46.8	132	19.3	38	5.5	69	10.1	263	38.4	183	26.7	

CAI condomless anal intercourse

[a] For categorical characteristics, *p* value is for overall comparison between all levels

Table 2 Outness and gay community attachment reported by participants by neighborhood congruence, NYCM2M Study

Measure	Total (n = 1493) Mean (SD)	All the same (n = 248) Mean (SD)	Same home and social (n = 68) Mean (SD)	Same social and sex (n = 148) Mean (SD)	Same home and sex (n = 586) Mean (SD)	None the same (n = 443) Mean (SD)	p value
Outness scale	8.14 (2.25)	8.38 (1.99)	7.97 (2.69)	8.20 (2.26)	8.23 (2.16)	7.90 (2.42)	0.055
Gay community attachment	3.12 (0.54)	3.06 (0.54)	3.00 (0.48)	3.10 (0.53)	3.16 (0.50)	3.11 (0.59)	0.040

Association of Neighborhood Congruence and Sexual Behavior Outcomes

In terms of sexual behavior outcomes in the prior 3 months, 26.0 % reported serodiscordant CAI and 66.5 % reported CAI with partners found by the Internet or mobile application. In bivariate analyses (Table 4), the odds of serodiscordant CAI was higher for men reporting same social and sex (but not home) neighborhoods (OR = 1.77; 95 % CI, 1.12, 2.80) compared with those reporting all the same neighborhoods. The odds of CAI with partners from the Internet or mobile application was higher for men reporting same social and sex (but not home) neighborhoods (OR = 2.01; 95 % CI, 1.20, 3.38) and those reporting none of the same neighborhoods (OR = 1.48; 95 % CI, 1.02, 2.14). In adjusted analysis (Table 4), serodiscordant CAI and CAI with partners from the Internet or mobile application were significantly associated with having the same social and sex (but not home) neighborhoods (serodiscordant CAI: adjusted odds ratio (aOR) = 1.98; 95 % CI, 1.23, 3.20; CAI with partners from the Internet or mobile application: aOR = 2.16; 95 % CI, 1.26, 3.72).

Discussion

Just one in six men in this study reported complete congruence among their home, social, and sex neighborhoods, with most reporting some incongruence among these neighborhoods. A previous study reported a higher proportion of men in NYC with congruence between any two types of neighborhoods (home, social, and sex) [38]. However, that analysis was based on the five boroughs within NYC, rather than specific neighborhoods within boroughs.

We conducted this analysis to assess whether this observed geographic incongruence translated into higher sexual risk behavior, perhaps reflecting disconnection within men's sociosexual lives. As expected,

and as observed in previous work in New York City [38], complete neighborhood incongruence was highest among MSM who reported being Black and/or Latino and had lower educational levels, lower personal income, and greater financial insecurity. These men were also more likely to be born and raised in New York City and thus may be less mobile for financial reasons and more anchored in the neighborhoods where they grew up, through kin networks. These men also had the lowest mean score on the outness scale. This ongoing connection to one's natal neighborhood community (e.g., relatives in the home neighborhood) may be a source of social support or a source of stress [18, 25]. In contrast, men who were White, more highly educated, with higher personal income, and born outside of NYC were more likely to report congruence of all neighborhoods. Neighborhood congruence in this situation may be an extension of higher control over their living situation within specific "sought-after" neighborhoods, reflecting individual-level socioeconomic status and the historical socioeconomic forces that drive race- and income-based segregation in urban areas.

While we observed significant differences in gay community attachment by neighborhood congruence, the highest mean score for gay community attachment was among those men who had the same home and sex (but not social) neighborhoods, rather than those for whom all neighborhoods were the same. These findings suggest that physical proximity to neighborhoods with high levels of gay social establishments is not required for strong feeling of gay community attachment [12].

We found that neighborhood incongruence was associated with sexual risk. Participants for whom the social and sex (but not home) neighborhoods were the same had a greater odds of serodiscordant CAI and CAI with partners met through the Internet. This finding may reflect, to some degree, engagement in the "party and play" subculture where individuals travel or migrate into areas and engage in riskier sexual behavior [25]. It may also reflect that individuals have less control over the

Table 3 Neighborhood factors of study participants by neighborhood congruence, NYCM2M Study

Characteristic	Total (n = 1493)		All the same (n = 248)		Same home and social (n = 68)		Same social and sex (n = 148)		Same home and sex (n = 586)		None the same (n = 443)		p value[a]
	N	%	N	%	N	%	N	%	N	%	N	%	
Birthplace													
In NYC	458	30.7	49	10.7	19	4.1	47	10.3	177	38.6	166	36.2	0.002
US born, not NYC	680	45.6	130	19.1	35	5.1	69	10.1	266	39.1	180	26.5	
Born outside the USA	355	23.8	69	19.4	14	3.9	32	9.0	143	40.3	97	27.3	
Childhood													
Current home neighborhood	107	7.3	11	10.3	7	6.5	12	11.2	39	36.4	38	35.5	<0.001
Other NYC neighborhood	254	17.4	26	10.2	13	5.1	28	11.0	87	34.3	100	39.4	
Outside NYC	1103	75.3	210	19.0	48	4.4	103	9.3	447	40.5	295	26.7	
Home neighborhood													
Would live in current neighborhood if had choice													
No	960	64.4	103	10.7	37	3.9	115	12.0	393	40.9	312	32.5	<0.001
Yes	531	35.6	145	27.3	31	5.8	33	6.2	192	36.2	130	24.5	
Length of time in home neighborhood													
Less than 1 year	499	33.5	67	13.4	24	4.8	62	12.4	179	35.9	167	33.5	<0.001
1 to <2 years	199	13.3	36	18.1	8	4.0	17	8.5	94	47.2	44	22.1	
2 to <5 years	310	20.8	60	19.4	13	4.2	29	9.4	134	43.2	74	23.9	
5+	484	32.4	85	17.6	23	4.8	40	8.3	179	37.0	157	32.4	
No. of relatives in home neighborhood													
0	1106	74.2	205	18.5	49	4.4	109	9.9	456	41.2	287	25.9	<0.001
1+	384	25.8	43	11.2	19	4.9	38	9.9	128	33.3	156	40.6	
No. of friends in home neighborhood													
0	620	41.5	54	8.7	14	2.3	62	10.0	255	41.1	235	37.9	<0.001
1–2	406	27.2	69	17.0	18	4.4	46	11.3	171	42.1	102	25.1	
3–5	287	19.2	63	22.0	21	7.3	26	9.1	105	36.6	72	25.1	
6+	180	12.1	62	34.4	15	8.3	14	7.8	55	30.6	34	18.9	
Experienced race/sex discrimination in neighborhood													
No	1299	87.7	216	16.6	60	4.6	131	10.1	516	39.7	376	29.0	0.61
Yes	182	12.3	30	16.5	8	4.4	17	9.3	64	35.2	63	34.6	
Connectedness mean (SD)	2.39 (0.68)		2.67 (0.61)		2.60 (0.63)		2.30 (0.68)		2.37 (0.68)		2.22 (0.68)		<0.001
Social neighborhood													
Length of time going to social neighborhood													
Less than 1 year	317	21.3	43	13.6	14	4.4	33	10.4	111	35.0	116	36.6	0.20
1 to <2 years	196	13.2	29	14.8	13	6.6	23	11.7	78	39.8	53	27.0	
2 to <5 years	395	26.5	74	18.7	19	4.8	37	9.4	156	39.5	109	27.6	
5+	582	39.1	102	17.5	22	3.8	54	9.3	239	41.1	165	28.4	
No. of relatives in social neighborhood													
0	1291	86.6	215	16.7	51	4.0	125	9.7	521	40.4	379	29.4	0.021
1+	199	13.4	33	16.6	17	8.5	22	11.1	64	32.2	63	31.7	
No. of friends in social neighborhood													
0	433	29.1	38	8.8	12	2.8	42	9.7	180	41.6	161	37.2	<0.001
1–2	457	30.7	69	15.1	20	4.4	44	9.6	191	41.8	133	29.1	

Table 3 (continued)

Characteristic	Total ($n = 1493$)		All the same ($n = 248$)		Same home and social ($n = 68$)		Same social and sex ($n = 148$)		Same home and sex ($n = 586$)		None the same ($n = 443$)		p value[a]
	N	%	N	%	N	%	N	%	N	%	N	%	
3–5	346	23.3	70	20.2	18	5.2	33	9.5	140	40.5	85	24.6	
6+	251	16.9	71	28.3	18	7.2	29	11.6	73	29.1	60	23.9	
Experienced race/sex discrimination in neighborhood													
No	1375	92.7	225	16.4	58	4.2	137	10.0	547	39.8	408	29.7	0.10
Yes	109	7.4	22	20.2	10	9.2	11	10.1	35	32.1	31	28.4	
Connectedness mean (SD)	2.67 (0.68)		2.67 (0.68)		2.64 (0.69)		2.61 (0.70)		2.70 (0.67)		2.66 (0.70)		0.74

[a] For categorical characteristics, p value is for overall comparison between all levels

sexual situation when sex does not occur at home, for example, having access to condoms or feeling more in control or efficacious when at home or having less control and access to condoms at sex parties or other venues where sex occurs. Interestingly, the association of complete neighborhood incongruence and serodiscordant CAI and CAI with partners found by the Internet or mobile application did not emerge, suggesting that MSM with entirely incongruent neighborhoods may have developed compensatory risk-reduction skills needed to transverse and exist in multiple spaces.

Taken together, these findings suggest that it may not be congruence of the home and another neighborhood that is critical to risk reduction. While further qualitative or mixed-method research to isolate the effects of congruence on sexual behavior is needed, these findings support the need for targeting biomedical intervention outreach efforts, such as pre- and post-exposure prophylaxis, to neighborhoods where social and sex activities

co-occur. Furthermore, based on the evidence that structural-level factors play a significant role in race disparities in HIV infection rates [3, 4, 39], these findings suggest a role for interventions to influence the environment of the multiple geographic spaces in which MSM exist.

This study has several limitations. The cross-sectional design of this study is a limitation as we are unable to assess causal associations, identifying what drives sexual decision-making and living choices. This design also limits our ability to look at how patterns of neighborhood choice (e.g., where one lives, where one prefers to have sex) change over time. This paper does, however, provide an initial snapshot of how MSM interact with different spaces and places in the urban environment. Longitudinal studies are needed to better understand how these relations change over time. Participants were recruited using a modified venue-based time-space sampling which allowed us to recruit a

Table 4 Multivariate associations with sexual behavior outcomes, NYCM2M Study

Neighborhood congruence	Serodiscordant CAI ($N = 1343$)			CAI with partners from Internet/mobile app ($N = 1195$)		
	N (%)	OR (95 %CI)	aOR (95 %CI)	N (%)	OR (95 %CI)	aOR (95 %CI)
All the same	61 (24.6)	Ref	Ref	125 (60.7)	Ref	Ref
Same home and social	23 (33.8)	1.65 (0.91, 2.95)	1.65 (0.89, 3.05)	41 (73.2)	1.77 (0.92, 3.41)	1.58 (0.79, 3.16)
Same social and sex	51 (34.5)	1.77 (1.12, 2.80)	1.98 (1.23, 3.20)	95 (77.9)	2.01 (1.20, 3.38)	2.16 (1.26, 3.72)
Same home and sex	151 (25.8)	1.14 (0.80, 1.62)	1.26 (0.87, 1.82)	325 (63.5)	1.11 (0.79, 1.56)	1.08 (0.75, 1.55)
None the same	102 (23.0)	0.91 (0.62, 1.33)	1.05 (0.71, 1.57)	31 (69.0)	1.48 (1.02, 2.14)	1.33 (0.89, 1.98)

All adjusted models control for age group, race/ethnicity, birthplace, education, employment, income, financial insecurity, recruitment source. Serodiscordant CAI: also controlled for gay community attachment. CAI with partners from the Internet: also controlled for friends in social neighborhood

CAI condomless anal intercourse

geographically and ethnically diverse sample. We used both the Internet and event/street spaces to reach as many men as possible; however, we likely missed some men who did not participate in the spaces chosen as recruitment venues. These findings are also limited by the New York City context. These results cannot be generalized beyond New York City; however, similar patterns may exist in other large cities with significant MSM populations which could lead to development of similar prevention interventions. More research is needed to understand how neighborhood/geography impacts the lives of men living in smaller cities and rural areas.

This paper raises important questions to consider as new biomedical and behavioral combination HIV prevention programs and structural-level interventions are implemented. These new HIV prevention methodologies require a more nuanced understanding of where and how to reach both individuals and communities. Understanding the complexity of how different spaces and places impact the health and behavior of MSM is essential to identifying where to focus various interventions to best reach the different populations of interest.

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