

Research paper

An examination of places where African American men who have sex with men (MSM) use drugs/drink alcohol: A focus on social and spatial characteristics

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ABSTRACT

Background: Drug and alcohol use are risk factors for HIV transmission. Much of the HIV behavioural research has focused on risk without consideration of the social and spatial context of the behaviour. Yet, risk may be specific or unique to place. The purpose of this study was to examine the social and spatial characteristics of places where African American men who have sex with men (AA MSM) use drugs and/or alcohol. Specifically, we examined spatial intensity and clustering of drug/alcohol places and characteristics of their social networks at these places.

Methods: Participants were recruited using outreach, on-line advertisements and word-of-mouth referrals. Inclusion criteria were: age 18 or older and sex with a man in the prior 90 days. Participants ($n = 51$) completed a socio-spatial inventory in which they provided addresses of $n = 187$ places where they most recently used drugs and/or drank alcohol. Participants described characteristics of people who were at these places.

Results: The mean age of participants was 36.5 years ($SD = 10.9$). Half (51%) identified as gay, 31% bisexual, 4% heterosexual and 10% as not sure/questioning and 27% self-reported HIV positive status. Drug/alcohol places were spatially concentrated in the inner part of the city and evidence of clustering by participant characteristics was present. Of $n = 187$ places named where the participant drank alcohol or used drugs, 68% were described as a residence (participants or "someone one else's house"), 20% were bars/clubs or restaurants, 8% were outside places and 4% were miscellaneous (e.g. on the bus/car). There were differences in the characteristics of social network members by place-type. At residential places, a greater proportion of networks listed were sex partners or kin, compared to other place-types. A greater proportion of networks listed at bars/clubs/restaurants were gay, knew that the participant had sex with men, and were younger compared to other place-types.

Conclusion: AA MSM drink alcohol and use drugs in a variety of place-types and with various social network members. Little research has been done on factors that shape the geography of AA MSM substance use. Future research is needed to explore these complex associations.

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Introduction

It is well established that drug and alcohol use are contributing factors to HIV risk among men who have sex with men (MSM) (Harawa et al., 2008; Mansergh et al., 2008; Mayer et al.,

2010; Mimiaga et al., 2010; Parsons, Kutnick, Halkitis, Punzalan, & Carbonari, 2005; Skeer et al., 2012; Stall et al., 2001). Substance-using MSM are at especially elevated risk for HIV, attributable to having sex under the influence of drugs (Catania et al., 2001; Celentano et al., 2006; Harawa et al., 2008; Koblin et al., 2006; Mansergh et al., 2008; McKirnan, Vanable, Ostrow, & Hope, 2001; Mimiaga et al., 2010), as well as exchanging sex for money or drugs, and lower condom use (Bachmann et al., 2009; Colfax et al., 2005; Crosby, Stall, Paul, Barrett, & Midanik, 1996; Garfein, Metzner, Cuevas, Bousman, & Patterson, 2010; Gorbach, Murphy, Weiss, Hucks-Ortiz, & Shoptaw, 2009; Reisner et al., 2010; Rhodes et al., 1999; Semple, Strathdee, Zians, & Patterson, 2010; Stall et al., 2003).

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Heavy episodic drinking and problematic alcohol use are other key factors associated with unprotected anal sex (Pollock et al., 2012; Reisner et al., 2010; Wen, Balluz, & Town, 2012).

Place facilitates social interactions and HIV risk behaviour (Gesler et al., 2006; Gilbert, 1998) with social network members from multiple spheres of influence such as sex or drug partners, friends, family, neighbors, and co-workers. A study conducted by Grov (2012) compared MSM recruited from bathhouses, Craigslist.org, and bars/clubs and found specific risk behaviours were associated with each venue. MSM recruited from bars/clubs were significantly more likely to report higher levels of alcohol consumption and ever having used cocaine, ecstasy/MDMA, or ketamine. Current approaches to understanding drug and alcohol-related HIV risk among MSM have focused on either the people or the venue but little research has explored the complex relationships between social networks, place and substance use. Moreover, few studies have focused on minority MSM, who may have different interactions with places and social networks as compared to white MSM due to issues of stigma, economic resources, and patterns of socialization. Mason et al. (2010) utilized a novel place-based social network approach to examine substance use among adolescents. They report that the social networks of adolescents conferred protective effects against substance use, but this was dependent on whether the place was perceived by the adolescent as risky or a favourite place. In a qualitative study that utilized a time-geography framework to explore the daily routines and daily paths of AA MSM, substance abuse was associated with interactions with risky social network members, such as sex exchange partners and other drug users, within a path that was dependent on their substance dependence (Tobin, Cutchin, Latkin, & Takahashi, 2013).

The use of Geographic Information Systems (GIS) and spatial analysis enables researchers to address whether specific types of places are concentrated in certain areas (referred to as spatial intensity) and whether they are spatially dependent (referred to as spatial clustering). Examination of the spatial intensity and clustering of drug/alcohol use places provides a characterization of the spatial distribution where substance use occurs, and can potentially inform placement of public health resources. Estimated spatial intensity that appears geographically uniform and lacks evidence of spatial clustering (a property known as complete spatial randomness (CSR)), suggests that substance use among AA MSM is not dependent upon geography, and that programs need not be geographically based.

The purpose of this study was to examine the social and spatial characteristics of places where AA MSM use drugs or alcohol. Specifically, to (1) examine the spatial distribution of places where AA MSM use drugs and/or alcohol within Baltimore City, (2) explore the characteristics of network members with whom they drank alcohol/used drugs, and (3) examine associations between social network characteristics and drug/alcohol use place.

Methods

Setting

This study was conducted in Baltimore, Maryland, a city of approximately 650,000 people, the majority of whom are African American (64%) (The Baltimore Neighborhood Indicators Alliance, 2010). Baltimore is one of the most burdened cities in the country, ranking the second highest for gonorrhea, seventh for syphilis cases, and fourth highest for Chlamydia (Centers for Disease Control and Prevention, 2011). Results from the most recent men who have sex with men (MSM) wave of the National HIV Behavioral Surveillance study (NHBS), found that, of 21 cities, HIV prevalence rates

(38%) and unrecognized HIV infection (73%) were the highest in Baltimore (Centers for Disease Control and Prevention, 2010).

Participants

Data for this study came from a cross-sectional survey conducted from February 2012 to August 2012. Participants were recruited into the study using multiple methods, including printed study fliers that were placed throughout the city at community-based organizations who serve AA MSM, virtual postings on the website Craigslist.org and word-of mouth referrals. Interested participants were screened on the phone or in-person by a trained Research Assistant. Eligible participants were (1) aged 18 years old or older, (2) self-reported African American race/ethnicity, (3) self-reported male sex, (4) self-reported sex with a male in the prior 90 days, and (5) reported living address within Baltimore City. After providing written informed consent, participants completed a self-administered HIV risk behaviour survey using Audio computer assisted self interview technology (ACASI) and an interviewer administered socio-spatial inventory. Interviews were conducted in private offices at a community-based research clinic, which was located in a mixed residential/business area easily accessible by public transportation. Interviews typically lasted 90 min. Participants were remunerated \$50 for completing the visit. All research protocols were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

To assess participants' (herein referred to as Index) social and spatial context, a socio-spatial inventory was developed based on the Social Network inventory (Tardy, 1985). The socio-spatial inventory consists of three sections: the (1) social network, (2) place, and (3) linking section. Within the social network and place section, there were two components: (a) the generating component and (b) the relationship/attribute component.

Social network section

The socio-spatial inventory begins with the social network section – generating component – in which participants are asked 15 questions to generate a list of their social network members. These items elicit initials of individuals who provide various forms of support (e.g. emotional, financial, housing), with whom they have sex, with whom they reside, and for whom the participant provides material support. To assess the drug and alcohol network, Indexes were asked, "Who are the people you have used drugs or alcohol with in the past 3 months?" This name generator was followed by the question "The last time you used drugs or alcohol with each network, what substance(s) did you use?" Indexes could choose all that apply from alcohol, cannabis, crack and heroin. Once the social network list was generated, the Index was asked 23 relationship/attribute questions about the networks listed. Relationship/attribute questions assessed the social network members' age, race, relationship type, perceived HIV status, sexual orientation, employment status, and whether the network knows that the Index has sex with men.

Place section

In the place section of the socio-spatial inventory, 17 questions were used to generate various places in which the Index spends their time, such as place(s) of residence, and places to socialize, meet sex partners and work. For each place listed, Indexes were asked to provide the street address or closest cross-street location. Interviewers used the Google Maps web-based program to obtain the latitude and longitude coordinates of the location. Indexes were shown the street-view of the various locations named (the images for which were available through Google Maps) and were asked to

validate if this appeared to be the location that they provided. Upon validation, the latitude and longitude of each place was entered into the database and used for subsequent mapping and analysis. Drug/alcohol use locations identified through the place section of the socio-spatial inventory were mapped. Analysis of the mapped drug/alcohol use places focused on examining spatial distribution, specifically, spatial intensity and spatial clustering of these places. Spatial intensity is defined as the expected number of events per unit area. After the places were generated, Indexes were asked 15 relationship/attribute questions, such as the type of place (residential, bar/club, outside) and frequency of time spent at the place.

Linking section

To link social network members with specific places, for each of the social networks listed in response to the item, “who did you use drugs or alcohol with in the past 90 days?,” the Index was asked where they were the last time they used drugs or alcohol. Using the procedures described in the place section, the latitude and longitude coordinates of the drug/alcohol places were obtained and characteristics of the place were assessed.

Index characteristics

Index participants reported age, highest educational attainment and current employment status. Sexual identity was assessed with the question, “Do you consider yourself to be: heterosexual or straight; bisexual; queer, homosexual, gay, same-gender loving; or not sure/questioning?” They also reported their HIV status as negative, positive, or unknown.

Analysis

Spatial intensity was estimated throughout Baltimore City based on the mapped point pattern of drug/alcohol use places using the edge-corrected kernel density approach (Kelsall & Diggle, 1995a, 1995b; Waller & Gotway, 2004). The output from this analysis was a map describing the spatial concentration of drug and alcohol use places within Baltimore City (expected numbers of drug and alcohol use places per unit area).

Spatial clustering was assessed using K-function analysis. The K-function is defined as the expected number of events within a given distance of an arbitrary event (scaled relative to the overall intensity of all observed events), with event here denoting a drug and alcohol use place location (Ripley, 1976). Therefore, larger K-function values for given distances suggests a higher degree of spatial clustering (events more spatially compact). For the current analysis, the difference in the degree of clustering (assessed using difference in K-functions) for the drug/alcohol use places was examined for varying characteristics of the Index person and of the place. For example, we examined whether the degree of spatial clustering for drug/alcohol use places differed by the index person being HIV positive or negative, self-reported as being gay or not, 30 plus years of age or younger, and whether or not the place was identified as a residence or non-residence. Statistical significance was assessed using the random labeling permutation approach (Diggle, 2003). Analyses were performed in R, with contributed packages *spatstat*, *splancs*, *maptools*, and *maps* (R Development Core Team, 2008). Maps for presentation were generated in ArcGIS (Environmental Systems Research Institute, 2010).

Results

A total of $n=77$ participants completed the socio-spatial inventory. Table 1 presents the characteristics of $n=51$ Indexes who provided data on $n=187$ social network members with whom they used drugs/alcohol in the past 3 months and $n=187$ places/locations of last use. The majority had at least 12 years of education (82%), nearly half were working full or part time, about

Table 1

Characteristics of $n=51$ Index participants who drank alcohol/used drugs with social network members and provided place location.

Variable	N (%)
Mean age (SD)	36.5 (10.9)
Education	
≤11 years	9 (18)
12 years/GED	19 (37)
≥some college	23 (45)
Employment status	
Full-time	9 (18)
Part-time	12 (24)
Not working	18 (35)
On disability	12 (24)
Sexual identity	
Gay	26 (51)
Bisexual	16 (31)
Heterosexual	4 (8)
Not sure/questioning/other	5 (10)
Self-reported HIV positive status	14 (27)
Substances used with social network at most recent use	
Alcohol only	51 (27)
Cannabis only	31 (16)
Alcohol and cannabis	50 (27)
Combinations of alcohol, cannabis, crack, heroin	37 (20)

half identified as gay and nearly one-third self-report HIV positive status (31%). Substance use with social networks included alcohol only (27%), alcohol and cannabis (27%), cannabis only (16%), and combinations of alcohol, crack, heroin (20%). Fig. 1 shows a map of the residential locations of the $n=51$ Indexes overlaid on a map of poverty levels. This map indicates that residences were located throughout the City in fairly impoverished areas.

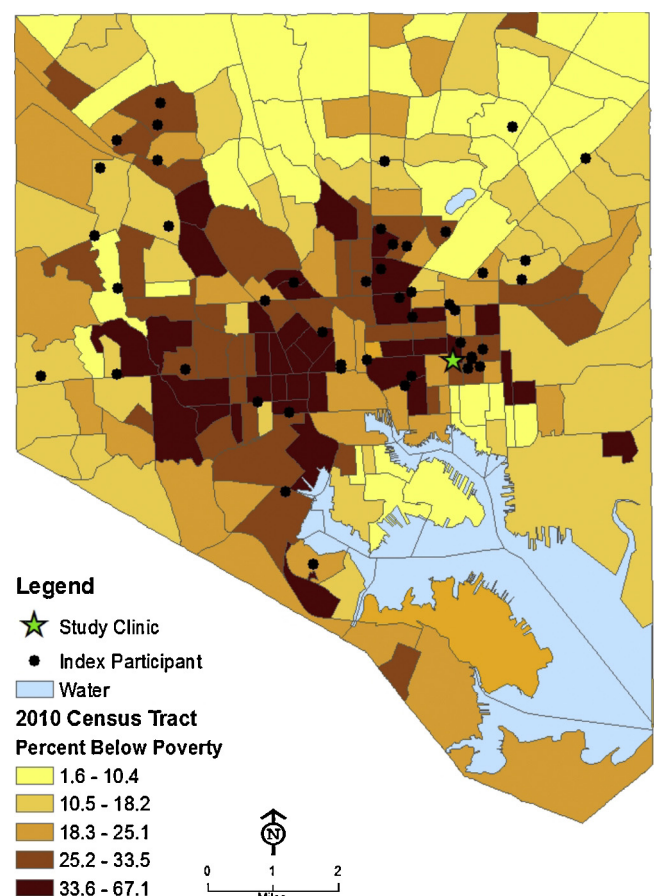


Fig. 1. Distribution of Index participant residence in Baltimore City.

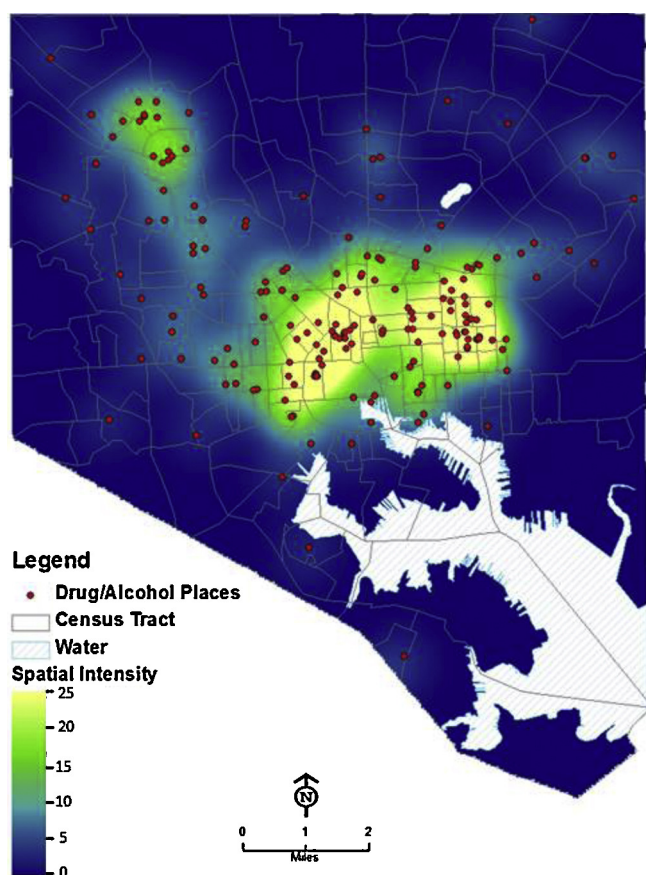


Fig. 2. Estimated spatial intensity of drug/alcohol use places of Index participants in Baltimore City.

Spatial distribution of drug/alcohol places reported by AA MSM

Fig. 2 is the map of the 187 drug/alcohol use locations identified in Baltimore City and the underlying estimated spatial intensity (color shading) denoting the expected number of drug/alcohol use places per square mile. Drug/alcohol use places vary spatially throughout Baltimore City with a higher concentration in the central area, corresponding with a business district.

Given the spatial distribution of drug/alcohol use places shown in Fig. 2; Figure 3 provides a series of plots, displaying the difference in estimated K-functions as a means for assessing difference in clustering by characteristics of the index person and of the place. The y-axes of these plots and the plotted solid black line represent the difference in the scaled expected number of drug and alcohol use places within varying distances (x-axes) of other drug and alcohol use places. The horizontal line at a zero difference represents the benchmark of no difference in clustering, while the dotted red lines represent Monte Carlo significance envelopes.

Fig. 3(a) shows that the drug/alcohol use places identified by index participants who were HIV+, tended to cluster more (be closer to one another) than the places identified by index participants who were HIV–, although this difference did not reach statistical significance. Similar trends were seen with other index characteristics. Identified drug/alcohol use places clustered more for those index participants who self-reported as being gay compared to not-gay (Fig. 3(b)) and aged 30 years or older compared to younger than 30 (Fig. 3(c)). Fig. 3(d) shows that drug and alcohol use places that were non-residences clustered significantly more than places that were identified as a residence.

Characteristics of social networks at drug/alcohol places

The mean age of the social network members with whom the Index had used drugs or alcohol was 34 years (SD = 12) (Table 2). The majority of the social network members was African American, male, friends, and knew the Index had sex with men. Over half (51%) were gay, 22% bisexual, and 27% heterosexual. One-third were unemployed. A small proportion was reported to be HIV positive (9%).

Associations between social network characteristics and drug/alcohol place type

Of $n = 186$ places located within the city where the Indexes used drugs/alcohol with other social network members: $n = 127$ (68%) were a residence (of these, $n = 45$ (35%) were the Indexes' residence and $n = 82$ (65%) was someone else's residence), $n = 37$ (20%) were bars/clubs/restaurants, $n = 15$ (12%) were locations outside such as parks and $n = 7$ (4%) were categorized as miscellaneous such as buses or motels. In bivariate analysis, a significantly greater proportion of network members at bars/clubs were gay identified compared to bisexual or heterosexual ($p < 0.001$) and friends compared to partners or kin ($p < 0.001$). A lower proportion of network members in outside locations (53%) knew that the Index had sex with men as compared to networks at residences, bars/clubs outside setting or miscellaneous places.

Discussion

This study utilized a novel data collection inventory to assess the social and spatial dimensions of substance use behaviour of a sample of African American men who have sex with men. We observed evidence of spatial concentration of drug/alcohol places. Prior studies utilizing geographic methods have shown clustering of HIV-related risk behaviours such as sex exchange (Tobin, Hester, Davey-Rothwell, & Latkin, 2012) and sexually transmitted diseases (Hardick et al., 2003; Jennings, Curriero, Celentano, & Ellen, 2005; Towe et al., 2010; Zenilman, Elish, Fresia, & Glass, 1999). Spatial concentration of drug/alcohol use places may have both health promoting and deleterious effects on the health of AA MSM. Mills et al. (2001) in their study of the gay ghettos, found this concentration may confer a sense of identity and buffer effects of stigma and discrimination. Gay neighborhoods or enclaves also may have risk factors associated with them. Spatially focused alcohol/drug areas may be one mechanism for mixing individuals from diverse social networks, thus contributing to disease transmission dynamics (Millett et al., 2006). While we did observe clustering, the present study does not address how these clusters shape or influence patterns of substance use behaviour and whether the clusters explain variations in substance use in the city. Little research has been done on factors that shape the geography of where AA MSM use drugs and alcohol. While not reaching statistical significance, we did observe a trend in the data showing that places clustered by Index characteristics, namely age, HIV status and gay-identity. Further research is needed to determine underlying geographic characteristics or migratory patterns that could explain clustering by these characteristics. These factors may include a desire for privacy (i.e. avoiding disclosure of MSM identity), distance from residence, and the racial composition of the area. Our findings raise additional questions that warrant future research.

There was diversity in both the types of places where drug/alcohol use occurred and in the social networks with whom AA MSM used drugs/alcohol. The majority of places where drug/alcohol use occurred were residential spaces. Given the high

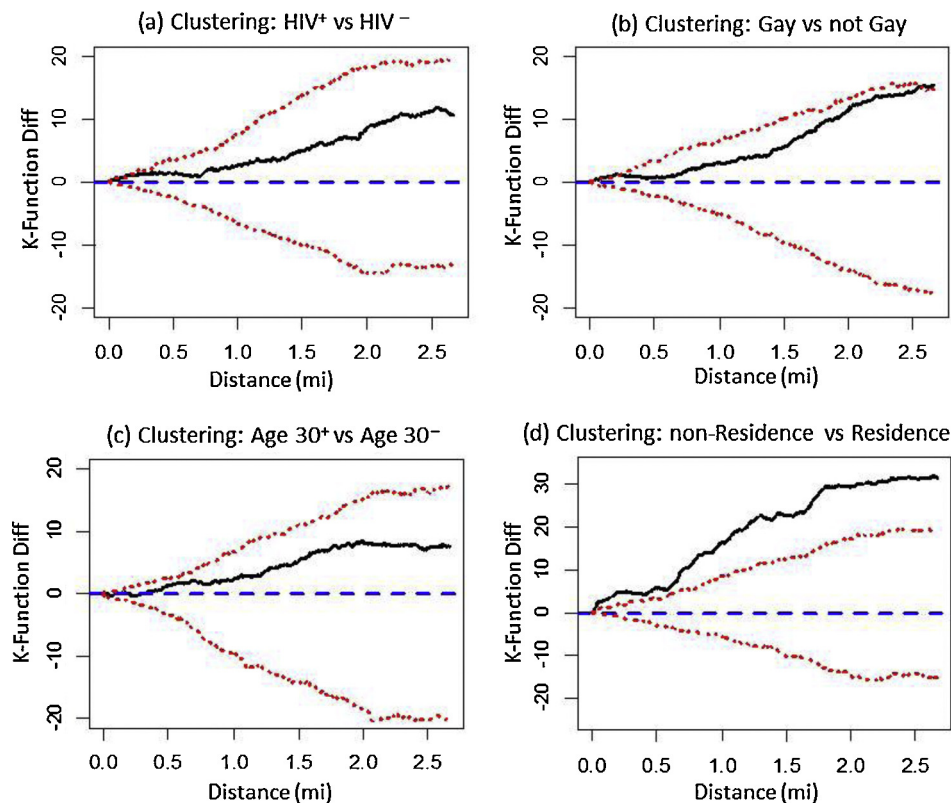


Fig. 3. Difference in the level of spatial clustering of the drug and alcohol use places for characteristics of the index person and place. Shown are the difference in estimated K-functions for (a) the index person being HIV positive or negative, (b) the index person self-reported as being gay or not, (c) for the index person being 30 plus years of age or younger, and (d) whether or not the place was identified as a residence or non-residence. The y-axes of these plots and the plotted solid black line represents the difference in the scaled expected number of drug and alcohol use places within distances (x-axes) of other drug and alcohol use places. The horizontal line at a zero represents the benchmark of no difference in clustering, while the dotted red lines represent 95% Monte Carlo significance envelopes.

level of unemployment in our sample, it may be more economical to drink alcohol in a residential space compare to a bar. Less attention in the HIV risk literature has been focused on private settings such as households, which are frequent locations of both substance use and sexual behaviours. In our prior qualitative study examining how routine shaped risk, we found that home was also described as a “safe place” (Tobin et al., 2013). Among substance

users in the qualitative study, home was also a place of respite from the demands of seeking drugs. Private spaces may confer a greater degree of perceived control which may enable more personal social exchange of information and/or resources (Duff, 2011; Glover & Parry, 2009). Research has predominately focused on the role of bars and clubs in facilitating risk among MSM. The present findings suggest expanding our conceptualization of places where

Table 2
Characteristics of social network members with whom Index used drug/alcohol by place.

Network characteristics	Total sample N (%)	Residence 127 (68)	Bar/club 37 (20)	Outside 15 (8)	Misc 7 (4)
Mean age (SD)**	34.1 (11.5)	35.0 (11.7)	28.5 (8.81)	38.2 (12.4)	36.9 (11.9)
Race					
African American	168 (90)	115 (91)	33 (89)	13 (87)	6 (86)
Gender					
Male	133 (71)	88 (69)	26 (70)	12 (80)	6 (86)
Female	45 (24)	32 (25)	9 (24)	3 (20)	1 (14)
Transgender	9 (5)	7 (6)	2 (5)	0 (0)	0 (0)
Sexual orientation***					
Bisexual	39 (22)	30 (25)	2 (5)	5 (33)	2 (29)
Gay	93 (51)	56 (46)	31 (84)	3 (20)	3 (43)
Straight	49 (27)	35 (29)	4 (11)	7 (47)	2 (29)
Relationship***					
Kin	21 (11)	18 (14)	1 (3)	0 (0)	1 (14)
Partner	40 (21)	32 (25)	3 (8)	1 (7)	4 (57)
Friend/associate	126 (67)	77 (61)	33 (89)	14 (93)	2 (29)
HIV positive (yes)	15 (9)	10 (8)	3 (8)	1 (7)	1 (14)
Unemployed (yes)**	61 (33)	45 (35)	7 (19)	8 (53)	0 (0)
Knows Index is MSM (yes)	158 (85)	105 (83)	37 (100)	8 (53)	7 (100)

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

substance use and risk may occur and exploring how place may confer safety or risk.

Associations between social networks and place-type were observed. The social network members at bars and clubs were younger, gay-identified, and friends compared to residence places. The greater degree of homogeneity of the social network members at bars and clubs, lend support for efforts to expand peer-based interventions in bars/clubs, which rely on a credible and similar peer to diffuse information and change social norms, such as D-Up, an adaptation of the popular opinion leader model (Jones et al., 2008).

Limitations of this analysis should be noted. First, data came from a convenience sample of AA MSM, limiting generalizability of the findings. There is the possibility of selection bias due to our recruitment strategy which relied on virtual postings in addition to advertising at fixed geographical sites. The spatial location of drug/alcohol places was based on the self-reported addresses. Our assessment of substance use places did not distinguish between drug and alcohol use nor the degree of use, such as binge-drinking places versus social drinking or drinking one beer as opposed to taking one dose of crack.

These limitations aside, this study reports that AA MSM alcohol and drug use is spatially and socially dependent. Examining how specific social network members and place interact is a more nuanced approach and has implications for both drug policy and public health intervention, such as funding allocation and placement of public health resources. MSM are embedded within social networks and environmental contexts that must be considered in order to extend beyond individual behaviour frameworks (Degenhardt et al., 2010; Gorbach et al., 2009; Rhodes, 2009).

Conflict of interest

We have no conflicts of interest to declare.

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