

Community mapping and respondent-driven sampling of gay and bisexual men's communities in Vancouver, Canada

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Abstract

Literature suggests formative research is vital for those using respondent-driven sampling (RDS) to study hidden populations of interest. However, few authors have described in detail how different qualitative methodologies can address the objectives of formative research for understanding the social network properties of the study population, selecting seeds, and adapting survey logistics to best fit the population. In this paper we describe the use of community mapping exercises as a tool within focus groups to collect data on social and sexual network characteristics of gay and bisexual men in the metropolitan area of Vancouver, Canada. Three key themes emerged from analyzing community maps along with other formative research data: (a) connections between physical spaces and social networks of gay and bisexual men, (b) diversity in communities, and (c) substance use connected with formation of sub-communities. We discuss how these themes informed the planning and operations of a longitudinal epidemiological cohort study recruited by RDS. We argue that using community mapping within formative research is a valuable qualitative tool for characterizing network structures of a diverse and differentiated population of gay and bisexual men in a highly developed urban setting.

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Keywords

Respondent driven sampling; community mapping; formative research; gay and bisexual men; Canada

Introduction

Respondent-driven sampling (RDS) is a widely used sampling methodology for HIV surveillance and bio-behavioural research among gay and bisexual men, injecting drug users and sex workers. RDS leverages network connections between members of these hidden populations to recruit chains of participants into the sample from a set of purposefully selected seeds (Heckathorn 1997). Monitoring data on reported network size, participant characteristics, and recruitment links enables researchers to estimate the population prevalence of HIV and other traits. However, the accuracy of these estimates depends on a number of theoretical and practical issues that are currently under debate (Johnston et al. 2013; Rudolph, Fuller, and Latkin 2013). In particular, RDS has been criticized for vulnerability to bias in the chain-referral recruitment method because underlying network structures of the population, distribution of traits within different geographic or social networks and recruitment dynamics through these networks can all influence the representativeness of the sample and the accuracy of the prevalence estimates (Simic et al. 2006; Malekinejad et al. 2011; Toledo et al. 2011). To address these matters, formative research can help gather information on the network structures and assess how RDS survey tools can best be adapted to the study population before initiating recruitment (Johnston and Sabin 2010). However, few authors have described in detail how different formative research methodologies can meet these objectives.

Formative research is the systematic and formal process by which researchers or public health practitioners define the population of interest, ways to access that population, and attributes of the population relevant to the specific public health issue of interest (Higgins et al. 1996; Allen et al. 2009). Techniques such as focus group discussions (FGDs), key informant interviews (KIIs) and direct observation are used to explore key aspects of RDS such as network structures, acceptability of RDS to the population, seed selection, and survey logistics (Simic et al. 2006; Johnston et al. 2010). For studying network structures, the particular technique has to distinguish features that may affect recruitment. These include isolated components, 'bottlenecks' that may arise when recruitment chains remain within highly interconnected networks, and bridges or 'special connectors' linking network components with limited ties. Johnston et al. (2010) suggest that these network features can be identified by asking the following questions in KIIs or FGDs: 'Do you know members of the target population who work in/are from other parts of the city?' and, 'Do you know target population members who are of a type different from you (e.g. older vs. younger)?' However, among highly diverse populations such as gay and bisexual men in resource rich urban settings, additional methodologies may be needed to capture the social and geographic diversity of network components which structure this population.

In this paper, we describe the value of community mapping in exploring network structures and contributing to the broader formative research strategy of the Momentum Health Study. Momentum is a longitudinal HIV bio-behavioural cohort study recruited using RDS to investigate the impact of British Columbia's provincial programme of expanded access to highly active antiretroviral therapy (HAART) on mean community HIV viral load, sexual risk behaviour, and beliefs and attitudes towards HIV prevention strategies among gay and bisexual men in Vancouver, British Columbia, Canada. The research team considered time-location sampling (TLS) in designing the research protocol of the Momentum Health Study, but previous research experience posed challenges with respect to the representativeness of gay and bisexual men in Vancouver. Specifically, participants of previous TLS studies reported never or extremely rarely attending the venues at which they were recruited, and when conducting analysis, the range of sample weights spanned two orders of magnitude even after using a number of statistical methods of adjustment (Gustafson et al. 2013). RDS was thus chosen for its ability to recruit a diverse and potentially more representative sample of gay and bisexual men.

To most effectively apply RDS to our study population, the research team felt that it was necessary to understand the particular features that structure Vancouver's gay and bisexual men's communities. Based on Collins and Harshberger's (2010, 82) definition of community as, 'the social networks where men who identify as gay or bisexual interact with friends, lovers and other sexual partners', we aimed to identify different social networks and social groups that collectively comprise the larger population of Vancouver's gay and bisexual men. Peacock et al.'s (2001) ethnographic work with the gay community in San Francisco suggests that men participate in distinct sub-cultures and sub-groups. Wayne Brekhus (2003) also writes about different types of gay suburban men, finding three broad identity categories of 'lifestylers', 'commuters', and 'integrators', each with different behavioural patterns and conceptualizations of gay identity. Recognizing this complexity in Vancouver from previous research and personal experience, we wanted to explore how the different groups and types of men connected, both sexually and socially, and the venues and means (i.e. Internet sites, communities) by which they did so to identify distinct and isolated groups, bridges between the different network structures and potential recruitment bottlenecks. We therefore used community mapping to elicit *emic* or internally constructed (Headland, Pike, and Harris 1990) representations of Vancouver's gay and bisexual population from the multiple points of view of these sub-groups to outline these features.

Community mapping is a tool used to stimulate and share local knowledge of social and spatial determinants of particular health phenomena. Community mapping has been applied to uncover hidden populations (Schensul 1999), as a user-friendly evaluation of health clinics (Amsden 2005), as a smoking cessation intervention (Struthers et al. 2003) and as a technique to chart episodes of violence and policing (Shannon et al. 2008). Moreover, community mapping exercises can organize community members and their knowledge and expertise, guiding academic research, to better reflect the shape and characteristics of perceived communities of interest (Lydon 2003).

Community mapping produces ethnographic data in a rapid way that offers descriptive representations of spatial-temporal regions and networks of interest (Schensul 1999). In

doing so it may capture a more diverse array of social network structures than purely verbal data transcribed from KIIs and FGDs. We present results from community mapping exercises conducted within FGDs with Vancouver MSM and argue that they add valuable and complementary data to that collected by more conventional methods of formative research.

Methods

In preparation for the Momentum Health Study, formative research was conducted between April 2011 and February 2012 and included KIIs and FGDs that facilitated community mapping exercises throughout Vancouver and the surrounding suburbs that form the Greater Vancouver Regional District (GVRD). Both KIIs and FGDs followed a similar inquiry guide for eliciting the data needed to operationalize our RDS study. These included questions about social network size, identification of RDS seeds, and study logistics such as incentive schemes, coupon design and study office location. KIIs also identified community agencies working with gay and bisexual Vancouver men who assisted recruitment from their memberships for the subsequent FGDs. The research team was interested in social network structure among gay and bisexual men not only for the purposes of RDS implementation, but also for the ability of a RDS recruited sample to provide novel data on Vancouver MSM network structure as it relates to sexual risk. Therefore, community mapping exercises were included in the FGDs to provide a better understanding of the underlying geographic distribution of gay and bisexual men in the GVRD.

All community organizations selected for hosting FGDs provided programming and services to gay and bisexual communities in Vancouver. Organizations were selected based on serving a diversity of gay and bisexual men's sub-populations; specifically young people under 30 years of age, Vancouver gay men, people living with HIV in Vancouver, people living with HIV in Surrey (a Vancouver suburb), and BC's queer community. FGD participants represented a diversity of gay and bisexual in terms of age, sero-status, residence area, income, and ethnicity. However, due to the small size of some of these communities, we did not include demographic identifiers on the maps shown in this paper (Figures 1–4) in order to ensure the confidentiality of participants. To further protect participant confidentiality, we digitally created facsimile reproductions of individual maps for inclusion in this paper.

Agencies recruited FGD participants using a combination of flyers, electronic mailing lists and word of mouth advertisement. FGDs were hosted by community agencies and averaged two hours in duration. The project coordinator of the Momentum Health Study, trained in facilitating FGDs, led the community mapping and debriefing exercises. Using large sheets of paper and markers, participants were instructed to create pictograms depicting their understanding of how Vancouver's gay, bisexual communities are socially and geographically organized. The following series of questions helped guide participants and clarify the exercise: (1) what do the various communities of gay and bisexual men look like in Vancouver? (2) what are their distinguishing features?; (3) who is a part of these communities and who is not?; and (4) how are communities divided and where do they overlap? Following the drawing exercise, each participant was asked to explain their map's

features, while others were encouraged to join the dialogue (Lydon 2003). The research team then facilitated a discussion of preliminary conclusions about gay community structure based on the maps as a data verification strategy. A second member of the research team made summary notes during the discussions as well as recording other relevant field notes.

FGD participants were offered CA\$30 to compensate them for their time. The research ethics boards of Simon Fraser University, University of British Columbia, Providence Healthcare Society, and University of Victoria granted ethical approval for this study. Following each FGD, community maps were taped to a wall and reviewed by the research team, including the FGD facilitators and senior investigators, to elicit and clarify ideas and common descriptive themes observed in the maps. Field notes collected during the focus groups and key informant interviews were also reviewed during this process to contextualize findings from the maps, which were checked for inter-team consistency.

Findings

In total, there were 24 key informant interviews and six focus groups with a total of 39 participants and 39 maps. The more traditional FGD and KII elements of our formative research protocol confirmed the acceptability of RDS, suggested the need for a more valuable and flexible participation incentive scheme to take into account the socioeconomic characteristics of local gay and bisexual communities, and recommended setting up a study office off-site from the organization's hospital location in order to appeal to the community and de-medicalize the study experience.

Results from community mapping went beyond confirming information regarding RDS operationalization gained from the traditional FGD and KII elements and generated highly descriptive data regarding the social geography of Vancouver gay and bisexual communities. Emerging themes from analyzing community maps include: (1) connections between physical spaces and social networks, (2) demographic diversity of communities and, (3) substance use in shaping social networks. We describe below how these themes helped inform our understanding of the underlying network structures of the population of gay and bisexual men and discuss further how they helped design the strategy for implementing RDS. The summary of these findings and their application to RDS is presented in Table 1.

Connecting physical and virtual spaces through social networks

Participants suggested that within GVRD, gay and bisexual men continue to connect socially and sexually through physical spaces that explicitly facilitate social interactions, such as community organizations, sports teams, bars, bathhouses and cruising locales. Increasingly though, gay and bisexual men form connections via online networks, with many community maps making reference to both hookup websites such as Manhunt and mobile phone applications (apps), including GRINDR, GROWLR and Scruff. Coupled with the general integration of gay men into mainstream North American urban culture (Holt 2011; Rosser and West 2008; Zablotska, Holt, and Prestage 2011), the rise of online networks may be driving the significant geographic and social decentralization of this population from

traditional, exclusively gay enclaves. As a result, gay men's networks now appear widely geographically distributed, including both outlying suburbs and broad urban settings.

This theme is exemplified with one participant positioning the Internet in the center of his map with lines and two-way arrows connecting the various community 'scenes' or social groups, such as leather, bar/club and drag queen networks (Figure 1). He defined the Internet here to include GRINDR, Manhunt, FetLife and Craigslist, suggesting that virtual spaces and mobile apps can act as key facilitators in bridging different social groups into sexual networks. Another participant drew smaller clusters within Internet-connected larger sub-networks and labeled various geographical locales, suggesting that Vancouver gay and bisexual men may have network connections that stretch beyond simple urban/suburban boundaries, and that this process may be mediated by the increased use of digital technology.

Community maps generated by participants who lived in the suburbs were qualitatively different, however, from those produced by urban participants. As exemplified by Figure 2, this map shows connections to Vancouver's downtown core where many gay men continue to live and socialize. However, its representation of gay suburban communities was markedly less differentiated into social groups. Specifically, suburban participants did not provide the same degree of detail depicting different substance use norms, social contexts, and interactions between groups. The primary characteristic of gay communities for suburban participants was the urban/suburban divide, not the specific neighborhood level social identification referenced in urban participants' maps.

Demographic diversity of communities

Diversity of age, socio-economic status and socio-cultural identity was highlighted in a number of community maps. One younger participant drew networks of 22–30 year-olds described as "party gays having no money", in contrast to '30–45 year-old successful gays' and '45 year-old + mega rich gays we'll never know'. 'Gay hipsters' were a group identified by a number of community maps, often distinguished in direct contrast to more conventional downtown gay men. Indeed, 'gay hipsters' or "East side alternagays" (Figure 3) were considered as younger gay men's alternative to mainstream gay culture, and as such, inhabit very distinctive geographic and social networks. Participants noted generally that money limits access to certain social activities, influencing the types of available network connections.

Participants depicted race as an important marker of diversity among Vancouver gay and bisexual men. However, in focus group discussion, they qualified this point by noting that length of residency and number of family generations in Canada (i.e. born inside or outside the country) may play a more important role in understanding how 'visible' minority identity influences one's integration within sexual minority communities. This last point was exemplified by another community map where a bubble labeled 'Asian' overlapped with many other identified groups, such as 'jocks', 'drag queens', and 'twinks' (Figure not shown). This suggests that common social identifiers among gay men are not mutually exclusive and point to the multidimensionality of identities and the many ways of belonging in communities (Brekhus 2008). Further to this theme, another map depicted racial

minorities as community outsiders, but focused explicitly on immigrants. This confirms the broader point that ethnicity may structure networks among gay and bisexual men differently, depending on how well socially integrated those men of marked ethnicity perceive themselves and simultaneously are perceived to be.

Substance use connected with distinct sub-communities

A third and final theme that emerged from community mapping data was the common place of substance use in many gay and bisexual networks and the role different substances played structuring distinctive networks. One participant depicted illicit substances at the centre of his pictogram, overlapping with geographical communities in Vancouver where gay and bisexual men live and play (Figure 4). The respondent centered the list of specific illicit substances on his map to stress its ubiquity in many networks.

Other participants also noted the importance of specific substance preferences in their maps. For example, one depicts the Internet's central role in determining gay and bisexual men's networks, while characterizing specific substance and their association with particular social networks (Figure 1). This participant labeled the substance use associated with each network as either public or private and in some examples named the drug(s) common to that scene. This corroborates another participant who labeled distinctive social networks 'hipsters', 'party boys' and 'drag queens' that were also identified by the substance use unique to these groups of men. Lastly, participants frequently indicated that those who abstain from using any substances might be socially isolated from those who use, as exemplified by the group identified as 'those who don't go out' (Figure 3).

Overall, the three key themes identified in the analysis of community maps contributed directly to the operationalization of RDS and the use of this sampling methodology in understanding social network structure. These general themes and their application to Momentum's RDS strategy are outlined (Table 1) and discussed more fully in the following section.

Discussion

In the first theme, the portrayal of geographically and socially diverse groups of men connecting through the use of Internet sites and online mobile apps has implications for the ways in which RDS is best operationalized. In response to these data, we developed an electronic recruitment coupon system accessed by participants from our study website. Study staff programmed electronic coupons into each participant's account, which can be accessed by participants via their email addresses. Electronic coupons are then printed from a personal computer or downloaded to a mobile device and brought to the study office to redeem for participation. Subsequent unpublished data showed a high correlation between participants who opted for electronic recruitment coupons and the use of mobile hookup apps. A recent study, recruiting participants via the mobile app GRINDR, showed participants at high risk of HIV acquisition or transmission (Burrell et al. 2012). Thus, offering both paper and electronic RDS coupons may reach greater and more diverse networks of gay and bisexual men, many of whom may be at an increased risk of acquiring or transmitting HIV and other STIs.

Data gathered under the theme of demographic diversity of communities helped generate a typology of *emic* social networks of gay and bisexual men in Vancouver. That such typologies are continually evolving was exemplified by the identification of a relatively new social group of gay and bisexual men in GVRD, the ‘East Side hipster’, made up of young men living outside the historic Vancouver gay enclaves of the Davie Village and Commercial Drive (Figures 3 and 4). In another example, several maps identified a sizeable group of Vancouver gay and bisexual men as ‘men who don’t go out’. Subsequent group discussions suggested that this group is composed in large part of older, partnered, and potentially HIV-positive gay men, although this last characteristic requires further empirical estimation. RDS, in contrast to venue-based sampling techniques (Weir et al. 2012), would have a greater probability of reaching this group to estimate their network size and structure. The typology of gay and bisexual men also greatly aided our purposive selection of RDS seeds by helping identify characteristics of men who might be more effective recruiters of diverse networks.

The social typologies we synthesized from the community mapping exercise also resulted in developing a set of questions in our behavioural survey asking participants about social group identity. The social representations of gay and bisexual networks generated through our community mapping exercise suggest that different group identities may be influential in structuring interaction between different social networks. Analyzing traditional socio-demographic, biological, attitudinal, and behavioural variables to make sense of network data may only provide partial insight into how social and sexual networks interact to differentially influence HIV transmission risk for gay and bisexual men (Willoughby et al. 2008). Data from community mapping suggest that measuring *emic* social identities, such as ‘Bear’, ‘Drag Queen’, ‘Leather Daddy’, and ‘Twink’ through questionnaires may help us understand recruitment bias, network size estimates, and factors correlated with demographics, behaviours, and other health markers.

On the final theme, the ways in which substance use shapes social networks, these data demonstrate the importance of monitoring markers and patterns of substance use in RDS samples of gay and bisexual men. In addition to monitoring key demographic variables for sample equilibrium, substance use patterns may aid in detecting potential bottlenecks in RDS recruitment. Furthermore, these results increased our confidence in the Momentum Health Study hypothesis that recreational substance use plays a central role in shaping gay communities’ response to increased HAART knowledge and accessibility. These data were also incorporated into a behavioural questionnaire section on substance use and led to the decision to monitor substance use prevalence in subsequent RDS samples.

Finally, community mapping as a methodology proved beneficial when speaking about the stigmatized topic of substance use. Since community maps are reflective of communities and not necessarily individuals, participants noted that maps helped them have an honest discussion of the substance use patterns within their networks while diverting attention away from their personal use.

Limitations

Readers should be cautious in interpreting our work, as the community maps may not be entirely representative of the underlying social networks of gay and bisexual men in Vancouver. There are few ways to assess the degree to which the maps created by the focus groups are representative of the communities depicted. Some of this concern can be mitigated by selecting focus group participants through the use of other qualitative formative methods, as our research team did by using KIIs to select FGD host organizations. However the generalizability of the mapping may still be an issue. Our rapid recruitment strategy for this formative research may mean we are potentially missing other men's perspective on the network structures of gay and bisexual men. Despite these limitations, community mapping performed remarkably well at identifying diverse sub-groups and the particular ways in which they connect. Our formative research was designed to rapidly gather information as effectively as possible on the underlying structures of the gay social networks in GVRD in an effort to inform the implementation of our cohort study protocol. Understanding the qualitative differences between gay and bisexual men's social and sexual networks across urban and suburban boundaries will be key to developing RDS monitoring tools (e.g. equilibrium monitoring) that trace recruitment dynamics through these networks.

Conclusions

Community mapping exercises as a component of a larger formative research strategy provide particularly rich data useful for investigating social network structure. This multi-method approach is most appropriate for a study such as Momentum, whose researchers are not solely interested in optimum RDS implementation, but also in efficiently operationalizing RDS to provide useful information on the social geography, diversity and networks of communities of Vancouver gay and bisexual men. Specifically, conducting community mapping exercises with different social groups of men in the GVRD allowed us to explore prior assumptions about the interconnected network structure of gay and bisexual men drawn from extensive literature reviews and previous field and research experience. In addition to informing our understanding of network connections and diversity, community maps added a visual component that helped qualify many concerns around RDS logistics.

While this paper discusses the role of community mapping as a valuable component of RDS formative research, we also note that these maps provided new data that we will explore in subsequent qualitative sub-studies. Specifically, we will use a sample of maps in future in-depth interviews as prompts to continue exploring topics such as substance use, differences in sexual sub-networks mediated or constituted by Internet and mobile phone apps, social factors underlying the emergence of gay communities in peri-urban and exurban suburbs, and to understand further the group composition of 'men who don't go out' and how to include them in future studies.

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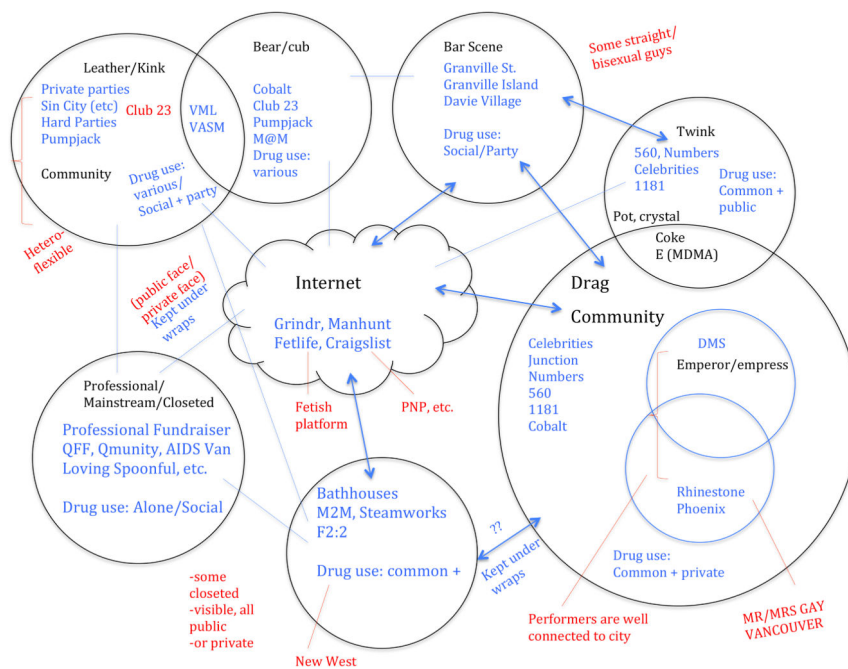


Figure 1. Community map drawn by focus group participants highlighting the Internet as a facilitator of sub-network connections.
 Note: Annotations made by the research team are in brown felt tip marker.

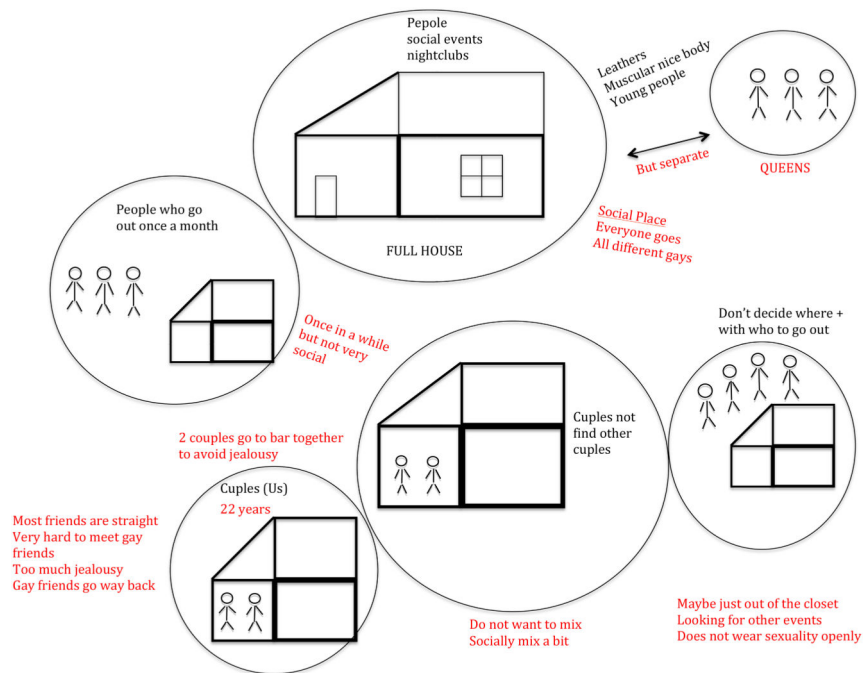


Figure 2. Community map produced by focus group participant depicting gay and bisexual men’s community structures in Greater Vancouver suburbs.
 Note: Annotations made by the research team are in grey script.

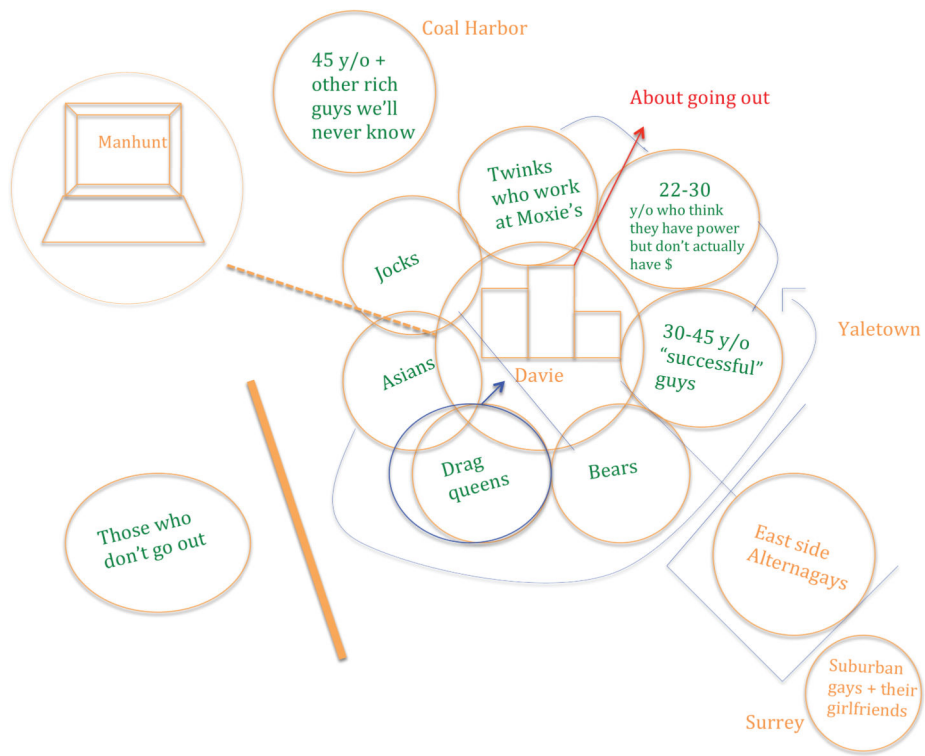


Figure 3. Community map produced by focus group participant identifying diversity of demographic groups of gay and bisexual men.
 Note: Annotations made by the research team are in grey pencil.

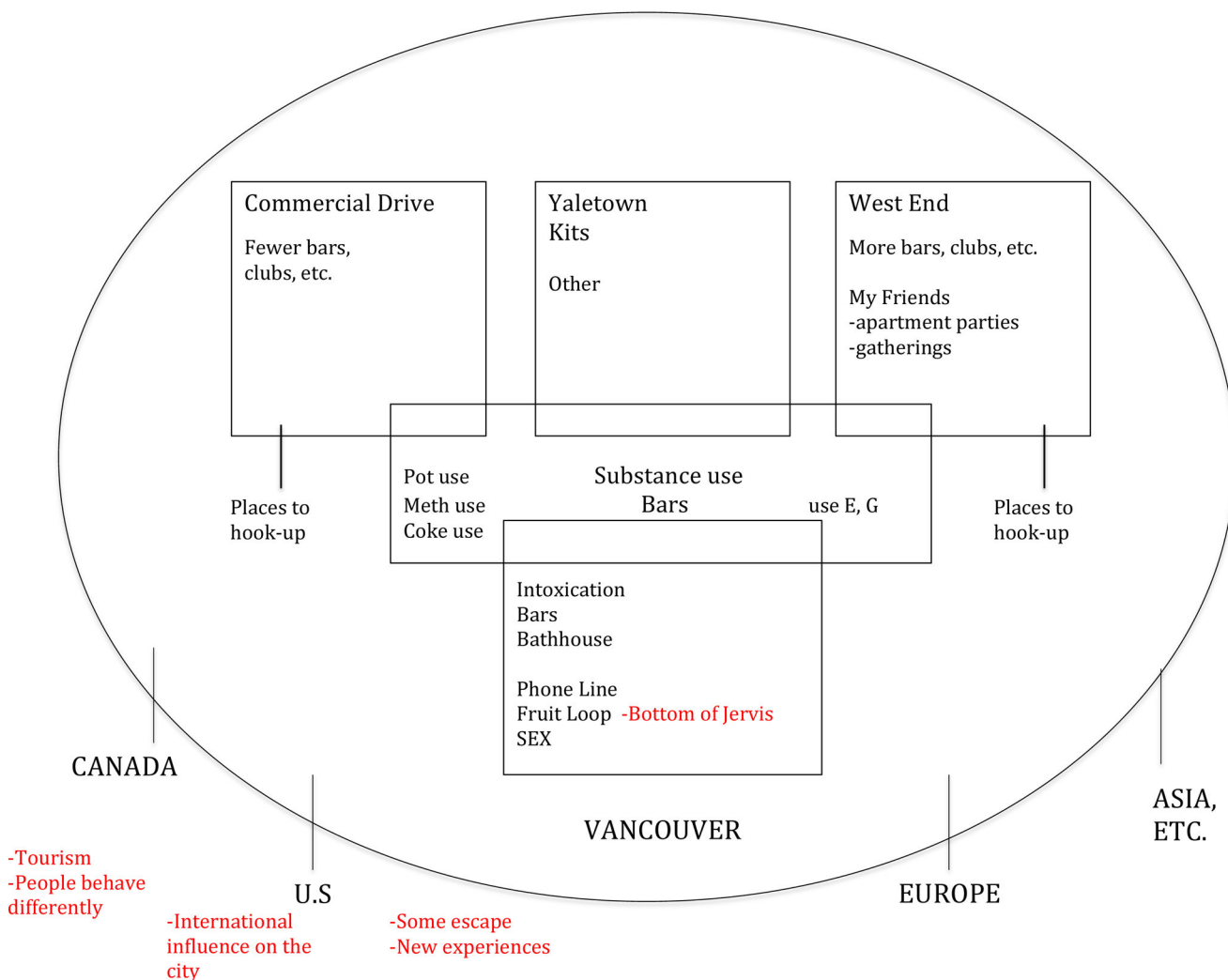


Figure 4. Community map produced by focus group participant positioning substance use at the centre of geographic communities of Vancouver.

Note: Annotations made by the research team are in red script.

Table 1

Summary of key themes from community mapping to inform respondent-driven sampling

| Theme | Findings from community mapping | Application of findings to RDS implementation in Momentum |
|---|---|--|
| Physical spaces and social networks of gay and bisexual men | <ul style="list-style-type: none"> Gay and bisexual men continue to socialize in physical venues Increased use of digital technology to bridge geography and facilitate new social-sexual networks | <ul style="list-style-type: none"> Offer alternative electronic RDS coupons in addition to paper to allow for inclusion of relationships mediated primarily through digital means Purchase advertising on and engage community members in social media Broadcast messages on GRINDR to assist RDS seed recruitment |
| Diversity in communities | <ul style="list-style-type: none"> Age and socioeconomic status structure networks of gay, bisexual men Ethnicity and number of generations in Canada are important factors in understanding community diversity Identification of new and dynamic social groups, such as 'gay hipsters' | <ul style="list-style-type: none"> Select seeds based on emic views of community diversity, identifying characteristics of men who might be productive recruiters Monitor for sample equilibrium demographic markers that structure networks of gay, bisexual men Develop questions for survey that categorise gay and bisexual men into social identity groups |
| Substance use connected with sub-communities | <ul style="list-style-type: none"> Substance use is common and associated with particular social sub-communities and 'scenes' Those who abstain from substance use may be socially isolated from those who do not | <ul style="list-style-type: none"> Monitor sample for representativeness of gay, bisexual networks by tracking substance use and modes of use in past six months |