### PLACE Methodological Approach

The PLACE method consists of five steps: 1) Identify high transmission areas in a given geographic area, 2) Identify sites in high transmission areas where individuals meet new sexual partners, 3) Visit, map, and characterize sites in each area, 4) Describe the characteristics of people socializing at sites, and 5) Inform interventions. PLACE has previously been used to characterize heterosexual transmission networks in Baltimore [1, 2]. In these studies, venues with HIV positive patrons had more high risk sexual partnering [2] and drug and/or sex markets were more likely than other venues to have core transmitters who reported concurrent partners and bacterial STI infection present [1]. Prior studies in Baltimore have shown increasing reports of internet-based places as sex partner meeting venues, [3, 4] with the most popular venues remaining constant over time [4] as part of tightly connected clusters [3]. Building on prior research, the present study was developed using the PLACE method in the context of internet-based sex partner meeting locations.

We adapted the five steps of the PLACE method to the GSN app environment with the goal of identifying geographic areas and times within Baltimore City with the highest volume of MSM GSN-app users as described below.

#### Step One: Identify community viral load by census tract using surveillance and in-care viral load data

Using viral load data provided by Baltimore City Health Department (BCHD), we divided the 200 census tracts in Baltimore into four quantiles based on community viral load, i.e., the number of individuals with unsuppressed viral load. We then selected 100% of the census tracts in the two highest quantiles (n=100) and 20% of the census tracts in the lowest two quantiles (n=20) for sampling.

#### Step Two: Identify popular GSN apps based on reports from MSM newly diagnosed with HIV or syphilis from BCHD data

BCHD collects data on the sex partner meeting venues of all newly diagnosed HIV and/or syphilis cases as part of standard surveillance, including online venues. Using this data, the team selected the three most commonly reported GSN apps as recruitment targets.

#### Step Three: “Visit” virtual areas in selected census tracts to count the number of users logged in

For each census tract selected for sampling, the team identified the center of the tract and the largest radius area within the tract that did not overlap with any other tract. This area was used when searching for profiles within the tract. Using GPS spoofing, research assistants virtually toured the census tracts on the three GSN apps most commonly reported to BCHD as sex partner meeting venues during weekdays and weekends at four time periods: 4am-8am, 10am-2pm, 4pm-8pm, 10pm-2am.

#### Step Four: Characterize users logged on during location-day-time units

During each of the designated time periods, research assistants logged into each of the GSN apps and recorded demographic information publicly available on user profiles within the designated radius using an electronic data entry form developed using Research Electronic Data Capture (REDCap) software.

#### Step Five: Use these data to identify locations for mobile van outreach and HIV/STI testing

We identified 68 potential location-day-time units for recruitment using an initial threshold of at least three profiles per time period, either on one app or a combination of the three targeted. Increasing the threshold to five per period lowered the number of potential units to 18. We then added 5 additional units from the 4th quantile of unsuppressed viral load tracts that were located within one mile of a physical sex partner meeting venue reported to BCHD, which led to a total of 23 location-day-time units for recruitment across 15 locations.

References

1. Jennings, J.M., et al., *Social place as a location of potential core transmitters-implications for the targeted control of sexually transmitted disease transmission in urban areas.* Ann Epidemiol, 2015. **25**(11): p. 861-7.

2. Polk, S., et al., *Identifying and characterizing places for the targeted control of heterosexual HIV transmission in urban areas.* AIDS Behav, 2014. **18**(8): p. 1476-82.

3. Brantley, M., et al., *The network structure of sex partner meeting places reported by HIV-infected MSM: Opportunities for HIV targeted control.* Soc Sci Med, 2017. **182**: p. 20-29.

4. Jennings, J.M., et al., *Sex Partner Meeting Places Over Time Among Newly HIV-Diagnosed Men Who Have Sex With Men in Baltimore, Maryland.* Sex Transm Dis, 2015. **42**(10): p. 549-53.