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App-Based Sexual Partner Seeking and Sexually Transmitted Infection Outcomes: A Cross-Sectional Study of HIV-negative MSM Attending an STI Clinic in Los Angeles, California

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Abstract

Background—Gay, bisexual, and other men who have sex with men (MSM) face higher rates of sexually transmitted infections (STIs) than the general population. The association between venues where sexual partners are met and STI transmission is dynamic and poorly understood, especially among those who use geosocial networking (GSN) apps. This study aimed to determine whether there is a difference in STI incidence between MSM who met their last sexual partner through a GSN app and MSM who met their last partner via other venues.

Methods—Data were analyzed from HIV-negative MSM attending the Los Angeles LBGT Center between August 2015 and July 2016 (n = 9,499). Logistic regression models were used to investigate the relationship between STI incidence and whether or not an individual met their last partner through a GSN app.

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Conflicts of Interest

None declared

Results—No relationship was detected between STI incidence and whether one’s last sexual partner was met via GSN app. However, an association was detected between STI incidence and having used GSN apps to meet sexual partners in the past three months. A dose-response relationship was observed between the number of venues used to meet partners and testing positive for any STI (aOR: 1.11, 95% CI: 1.05, 1.20).

Conclusions—The relationship between how people meet sexual partners and STI acquisition is much more nuanced than previously thought. GSN apps do not inherently expose users to high-risk reservoirs of STIs, but further understanding of the complexity of sexual networks and networking methods is warranted, given increasing rates of STIs.

Keywords

Chlamydia; Gay/bisexual men; Geosocial networking apps; Gonorrhea; STI incidence

INTRODUCTION

Gay, bisexual, and other men who have sex with men (MSM) are disproportionately diagnosed with gonorrhea and chlamydia when compared to the general population in the United States. Despite composing approximately 2% of the US population (1, 2), MSM make up over 27% of all cases of gonorrhea (3) and 10% to 20% of chlamydia infections nationwide (4). Each of these sexually transmitted infections (STIs) increases an individual’s susceptibility to HIV, which also continues to disproportionately impact MSM (5).

Previous studies have examined the prevalence of GSN app use among MSM and the associations between GSN app use and indicators of high-risk sexual behavior. It is estimated that as many as half of all MSM in the United States have used a GSN app to meet sexual partners, and this proportion is even higher among MSM under age 35 (6, 7). Frequency and duration of app use, number of sexual partners, STI history, and sexualized profile photos have all been associated with sexual risk behaviors among MSM who use GSN apps (7–10). Additionally, meeting sexual partners through multiple venues, e.g., both online and in person, is associated with increased behavioral risk-taking (11). Self-reported sexual risk behaviors, however, may not be accurate predictors for actual STI outcomes (12). It is also important to note that such broad venue categories as “online” or “in person” each include a diverse array of specific sites.

Despite increasing public health interest in the effects of GSN apps on STI rates, most research to date has relied upon self-reported sexual behaviors as a surrogate for the risk of current STIs. To our knowledge, only one previous study has examined the association between GSN app use and medical STI testing outcomes. In 2014, Beymer et al. analyzed data from 7,184 HIV-negative MSM who sought STI testing or treatment at the Los Angeles Gay & Lesbian Center (now the Los Angeles LGBT Center). The study found that the odds of testing positive for either gonorrhea or chlamydia were higher among those who used GSN apps in the past three months—alone or in combination with other venues—compared to those who did not use apps to facilitate sexual encounters (13). This early study had several limitations. It controlled for demographics and substance use, but it did not control for an individual’s number of sexual partners. This limitation is key because GSN app use

may be correlated with number of partners, so meeting sexual partners through GSN apps may not be fundamentally any riskier than through any other venue. Additionally, the 2014 study investigated the impact of how sexual partners were met in the last three months, but there were no data available at the time about how one's most recent partner was met. GSN app use in the last three months by itself may be a poor proxy for whether sex with app-met partners is associated with higher risk than sex with partners met through other means. Because people met sexual partners through multiple venues in a three-month window, it remained unclear which venues were actually linked to STI transmission.

In their 2012 study on condom use by partner type among young MSM who use the GSN app Grindr, Rice et al. analyzed data from participants' most recent sexual encounter (10). This study was conducted at a time when GSN app users were early adopters of the technology, a population that may differ from average users today. Although Rice et al. did not investigate the relationship between meeting one's last partner through a GSN app and testing positive for STIs, using data from the most recent sexual partner allowed for an event-level investigation of the impact of GSN app use, minimizing the mixing of effects that contribute to risk outcomes.

This study has four objectives. First, we will perform a replication analysis to determine if the results of the 2014 Beymer et al. study—that meeting sexual partners through GSN apps in the past three months is associated with STI acquisition—are observed in the current sample. Second, we will determine whether an association exists between meeting one's most recent sexual partner through a GSN app and STI test outcomes. Since many clients get tested more than once per year, the third objective is to identify potential trends in episodic risk that may exist between how an individual met their most recent sexual partner (via GSN app vs. through another venue) and their STI outcomes using repeated measurements data. Fourth, we will examine the number of sites where sexual partners are met as an alternative explanation for any findings of this study in the context of the existing literature.

MATERIALS AND METHODS

The Los Angeles LGBT Center (the Center) is a community-based organization that primarily serves lesbian, gay, bisexual, and transgender (LGBT) individuals at multiple sites throughout the Los Angeles metropolitan area. Its two STI testing clinics serve over 16,000 unique clients each year. When a client visits the Center for STI testing, demographic data such as age, race/ethnicity, and educational background are collected during the registration process. Each client then meets face-to-face with an STI testing counselor to complete a sexual health risk assessment that includes questions about the client's prior STI history, history of substance use, knowledge and utilization of post- and pre-exposure prophylaxis (PEP and PrEP), and most recent sexual encounter.

A lab technician performs a throat swab and collects a sample of the client's blood. Each client is also instructed to self-collect a urine sample and a rectal swab. The urine and rectal specimens are tested for both *Chlamydia trachomatis* (chlamydia) and *Neisseria gonorrhoeae* (gonorrhea), and the throat specimen is tested for gonorrhea only (Aptima Combo 2 Assay, Hologic, Inc., Bedford, MA). A rapid plasma reagin (RPR) assay is

performed to test for syphilis (ASI RPR Carbon Antigen Test, Arlington Scientific, Inc., Springville, UT). An on-site rapid HIV antibody screening test (INTSI HIV-1/HIV-2 Rapid Antibody Test, BioLytical Laboratories, Inc., Richmond, VA) is performed on the blood sample and, if negative, a remnant sample is sent for an HIV nucleic acid amplification test (NAAT) at an offsite laboratory (Aptima HIV-1 RNA Qualitative Assay, Hologic, Inc., Bedford, VA). If the rapid HIV antibody test result is positive, a second antibody test (UniGold Recombigen HIV-1/2 or OraQuick ADVANCE Rapid HIV-1/2 Antibody Test) is performed. If the second rapid test is negative, then a confirmatory NAAT is ordered, and if both rapid tests are positive, the individual is immediately linked to HIV medical care.

Clients were included in the study if they 1) were classified as cisgender MSM; 2) received testing for gonorrhea, chlamydia, syphilis, and/or HIV between August 2015 and July 2016; 3) reported that their most recent sexual partner was male; 4) reported how they met their most recent sexual partner; and 5) reported venues where sexual partners were met over the past three months. For the purposes of this study, clients were defined as MSM if they reported that their birth sex and gender identity are both male, and they either self-identified as gay/bisexual or disclosed that their most recent sexual partner was male. Clients were excluded from analysis if they self-reported their serostatus as HIV-positive, as research has documented behavioral changes in sexual risk-taking among MSM who have been diagnosed with HIV (14, 15). The sample includes 9,499 unique individuals who met these criteria during the study period.

The five outcomes measured in these analyses are testing positive for gonorrhea, testing positive for chlamydia, receiving a new diagnosis of syphilis, receiving a new HIV diagnosis, and testing positive for any one or more of these four STIs. These outcomes were recorded as binary variables. All infection variables were coded as positive if an individual tested positive at any anatomic site. To replicate the results of the 2014 Beymer et al. study, the first predictor we investigated was whether individuals used GSN apps to meet sexual partners in the past three months, either alone or in combination with other venues. This information was collected by a question in the sexual health risk assessment that asked “Where did you meet your sexual partner(s) in the last three months? (Check all that apply),” followed by a list of twenty specific sites and a write-in field for “Other.” The second predictor was whether individuals used a GSN app to meet their most recent sexual partner, determined by asking each client if their last partner was “found through phone apps (Grindr, Scruff, etc.)” The three-month and last-partner models were each fit separately, adjusting for age group, race/ethnicity, education, substance use in the past year, and number of sexual partners in the past three months.

Where we use the word “venues,” we refer to the broad categories of sexual partner meeting places: in-person, online, or GSN apps. To describe the specific meeting places within each venue type, we use the word “sites.” To investigate the effect of the number of sites where sexual partners are met on STI outcome, we defined the number of sites as any combination of twenty specific sites where people met their sexual partners. These included eight in-person sites (bar/club, party/mixer, through a friend, school, work, gym, street, and bathhouse/sex club), six social networking or dating websites (Facebook, Manhunt, Adam4Adam, Craigslist, Match, and OkCupid), six GSN apps (Grindr, Scruff, Jack’d,

Growlr, Tinder, and Badoo), and a write-in field for additional responses. Write-in responses were analyzed and included in each individual's total number of sites used. These specific site data were only available for how individuals met sexual partners within the past three months.

Statistical Methods

Logistic regression models were used to model STI positivity as a function of each of the two sexual networking criteria under investigation: first, whether an individual has used GSN apps to meet sexual partners in the last three months, and second, whether they met their last sexual partner through a GSN app. These models controlled for age group (18 to 24, 25 to 29, 30 to 39, and 40 or older), race/ethnicity (Black or African-American, Hispanic or Latino, Asian or Pacific Islander, White, and other), highest educational level (high school graduate or below, some college, college degree or beyond), substance use (meth, ecstasy, and nitrates) in the past year, and number of sexual partners in the last three months. These covariates were chosen because each has been shown to be associated with STI/HIV incidence (16–19). For any clients who had multiple STI screening visits during the study period, only data from their first visit were used in the development of these models.

Repeated measurements analyses were performed using generalized linear mixed models, also adjusting for age, race/ethnicity, education, substance use, and number of sexual partners in the past three months. These models were developed using data from all STI testing visits for individuals included in this study—regardless of whether they tested only once (n=7,918) or multiple times (n=1,581) during the study period—so long as they answered the risk assessment questions about their use of GSN apps and their last sexual partner at each visit. Logistic regression models were then used to investigate the role of the number of sites where sexual partners were met on STI outcomes, again using age, race/ethnicity, education, substance use, and number of sexual partners in the past three months as covariates in each model.

We also hypothesized that, compared to those who have had multiple recent sexual partners, individuals who report having just one sexual partner in the past three months may have STI outcomes more closely associated with the site where their partner was met. Thus, to further investigate the role of sexual partner meeting venues in STI acquisition, we also performed logistic regression analyses using the subset of individuals in the sample who report having only a single sexual partner in the past three months. Aside from the replication analyses (because the original study had not controlled for number of partners) and the analysis performed on those who reported only one partner in the past three months, all multivariable analyses performed for this study controlled for number of sexual partners in the past three months.

All analyses were performed using SAS software, version 9.4 (SAS Institute, Cary, NC).

Ethics

The study received approval from the University of California, Los Angeles South General Institutional Review Board (SGIRB) (IRB Number: 00004474; Project Number: 17-000231).

RESULTS

The mean age of the individuals in the sample was 33 years (standard deviation (SD): 9.8, median: 31, interquartile range (IQR): 26 – 38). Non-Hispanic White and Hispanic individuals composed the two largest racial/ethnic groups in the sample at 44% and 32%, respectively (Table 1). Fifty-eight percent of the sample had earned a college degree, 17% reported that they had completed some college, 8% had completed high school/GED or less, and 17% did not report their highest level of educational attainment.

When asked about the venues through which they have met sexual partners in the past three months, 41% reported that they exclusively met sexual partners in person during that period, 5% reported meeting sexual partners either online only or both online and in person, and 47% reported that they met sexual partners through GSN apps either alone or in combination with internet and in-person venues. When asked about their most recent sexual experience, 15% of the sample reported having met their last sexual partner through a GSN app, 2% met their last sexual partner online, and 83% reported that they met their last sexual partner in person.

Sexual Partners in the Last Three Months – Baseline Analyses

Twenty-seven percent of those who reported using GSN apps to meet sexual partners in the past three months tested positive for any STI at their initial visit, whereas only 23% of those who did not use apps to meet sexual partners within the past three months had any positive STI outcomes at baseline ($p < 0.0001$). App users were more likely to have tested positive for gonorrhea ($p = 0.0007$), chlamydia ($p = 0.001$), and a new diagnosis of syphilis ($p = 0.03$) than non-app users, but they were no more likely to have a positive HIV test result.

Controlling just for demographic and substance use variables, logistic regression models suggest that there is an association between app use in the past three months and increased odds of STIs, as seen in Beymer et al, 2014 (Table 2). When also controlling for the number of sexual partners in the past three months, however, this association is only seen for gonorrhea (Supplementary Material).

Most Recent Sexual Partner – Baseline Analyses

Individuals who reported that they met their most recent sexual partner through a GSN app had the same overall rate of STI positivity as individuals who reported meeting their most recent partner through other means (26% among those who met their last partner through a GSN app, and 25% among those who did not, $p = 0.25$). The positivity rates of gonorrhea (14%, $p = 0.73$), chlamydia (14% among those who met their last partner through a GSN app, and 12% among those who did not, $p = 0.23$), new syphilis diagnosis (1%, $p = 0.53$), and new HIV diagnosis (1%, $p = 0.58$) were also not significantly different between the two groups. Logistic regression models showed no difference in the odds of testing positive for gonorrhea, chlamydia, syphilis, HIV, or any STI overall between individuals who met their last sexual partner through a GSN app and those who did not when controlling for all demographic variables, substance use, and number of sexual partners in the past three months (Table 2, Supplementary Material).

Repeated Measures Analyses

Of the 9,499 unique individuals in the sample, 1,581 (17%) returned to the Center for multiple testing visits during the twelve months of the study period. The average number of visits per client during the study period was 1.2 (SD: 0.4). Among these repeat-visit clients, 90% had two testing visits, 9% had three testing visits, and the remaining 1% had either four or five testing visits during the twelve months of observation.

Generalized linear mixed modeling across 11,265 total visits for all individuals in this study showed that whether an individual had met sexual partners via GSN apps in the past three months is only associated with testing positive for gonorrhea, yet whether an individual met their most recent sexual partner through a GSN app did not influence their odds of testing positive for any STI when controlling for demographics, substance use, and number of sexual partners in the past three months (aOR: 1.08; 95% CL: 0.94, 1.23) (Table 3). Despite confirming that there were no substantive differences between single-visit testers and multi-visit testers in terms of the outcome and primary predictor variables, we also performed repeated measures analyses that included only multi-visit testers, and these model results were consistent with those observed when including all individuals. All repeated measures analyses also controlled for number of testing visits. Because individuals who take PrEP may differ from those who do not in terms of sexual partner seeking and STI risk, a follow-up analyses were performed on the subset of individuals in our sample who have had a PrEP intake visit and at least one PrEP follow-up visit. The generalized linear mixed model results for this subset of the sample were uniformly consistent with those among the full sample.

All analyses that included where an individual met their most recent sexual partner as a predictor were repeated while controlling for last-partner relationship type (main partner vs. other), and model results were consistent with those initially observed. That is, no association was detected between meeting one's most recent sexual partner through a GSN app and testing positive for STI when adjusting for last-partner relationship type.

Sites Used for Meeting Sexual Partners

Out of twenty-one possible sites (including twenty specific in-person, online, and app-based sites and up to one additional write-in site) where sexual partners were met in the past three months, the maximum number of sites reported by any individual was eleven. Again controlling for age, race/ethnicity, education, substance use, and number of sexual partners in the past three months, for each additional site in the total number of sites where sexual partners were met in the past three months, there is an 11% increase in the odds of testing positive for any STI overall (aOR: 1.11, 95% CL: 1.05, 1.17). In particular, the odds of testing positive for gonorrhea increase by 12% with each additional site used to meet sexual partners (aOR: 1.12, 95% CL: 1.05, 1.20), though no association was detected for chlamydia, syphilis, or HIV individually, all else equal.

We also investigated site-specific STI positivity among all sites where people met sexual partners in the past three months and observed substantial variability in STI incidence across all twenty sites. The number of sites where sexual partners were met in the past three months and the number of sexual partners in the past three months are positively correlated ($p <$

0.0001). Because individuals who report having just one sexual partner in the past three months may have STI outcomes more closely associated with the site where their partner was met, we performed logistic regression analyses of the subset of individuals with a single sexual partner in the past three months (n=1,825). The results of these analyses also showed that whether that partner was met through a GSN app was not significantly associated with STI outcomes.

DISCUSSION

The logistic regression and generalized linear mixed model results of this study consistently show a lack of association between use of GSN apps to meet one's last sexual partner and STI positivity. The findings of this study also replicate those of Beymer et al. in 2014 in that there does appear to be an association between app use in the past three months and testing positive for gonorrhea and chlamydia. However, controlling for the number of sexual partners in the past three months eliminates any observed relationship between app use and chlamydia. Lastly, we found the number of sites where sexual partners were met was significantly related to STI incidence, showing that the relationship between GSN apps and STI acquisition is more nuanced than previously thought.

GSN apps have marked a new era of increased efficiency in meeting sexual partners, but that efficiency does not specially imbue the apps with increased levels of risk. Just as previous studies have found that an individual's number of sexual partners is associated with STI risk (20), so is the number of sites used to meet sexual partners. The number of app, online, and in-person sites an individual uses to meet sexual partners is a greater determinant of STI risk than the particular sites. The dose-response relationship observed between number of sites used to meet sexual partners and STI incidence hints at the complexity of the shifting landscape of sexual risk.

This study has several limitations. The study may not be generalizable to all MSM in Los Angeles County in that it does not include those who never undergo STI screening and those who do but not at the Center. There are many reasons why an individual would choose not to test at the Los Angeles LGBT Center, including geographical limitations—Los Angeles is so large that despite the Center's central location in the city, it is far away for many—and discomfort with the idea of seeking services at an LGBT-focused organization.

Risk assessments were conducted in face-to-face interviews with sexual health counselors, so there may be a higher likelihood for social desirability bias in the self-reported data. The Center, however, prioritizes the cultural competence of its staff, and the counselors are experienced in addressing the needs of each client holistically, so this bias is likely minimal.

It is possible that some sexual partner meeting sites have been misclassified. When clients were asked about the characteristics of their most recent sexual partner, they were asked whether their last partner was “found through phone apps (Grindr, Scruff, etc.)” The authors propose that future risk assessments follow up by asking, “If yes, what app did you use?” By distinguishing between which apps are being used at the last sexual encounter, we will be better able to appropriately identify distinct networks of sexual risk. Though we do not have

the data to investigate these sexual networks, they are key to understanding the nuance and complexity of the relationship between STI risk and the array of venues where MSM meet sexual partners. In addition, there is substantial variability between specific sites within each of the three venues (in person, online, and GSN app). Each venue includes an array of sites that may be associated with differing rates of partner seeking, e.g., people may use bars/clubs to meet sexual partners more than gyms.

Study strengths included a large sample size, a diverse sample by age, race/ethnicity, and education, and the use of actual STI test results rather than self-reported STI histories. The most important implication of this study is that meeting sexual partners through GSN apps alone is not an appropriate proxy for sexual risk, though the number of sites where sexual partners are met may be. GSN apps are part of a shifting landscape of MSM community connection and sexual partner seeking, and they demonstrate the need for MSM-focused sexual health interventions and education to continue to evolve just as quickly. Apps themselves do not increase the risk of STI acquisition, but they are part of a constellation of tools and behaviors through which people may put themselves and their partners at increased risk and which mark a need for STI prevention. Because meeting sexual partners through GSN apps is already highly stigmatized by popular press and public health messaging, it is particularly important that health researchers and practitioners keep this complexity in mind and push back against that narrative. We must take care not to further stigmatize the constituent elements of navigating sex within an already-stigmatized community.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Demographics of the Sample of Clients Seeking STI Testing at the Los Angeles LGBT Center, August 2015 – July 2016 (n = 9,499).

	n	%
Age Group		
18 – 24	1,856	20%
25 – 29	2,638	28%
30 – 39	3,012	32%
40+	1,993	21%
Race/Ethnicity		
Black or African American	673	7%
Hispanic or Latino	3,036	32%
Asian or Pacific Islander	841	9%
White	4,208	44%
Other	578	6%
Unknown	163	2%
Education Level		
High School Graduate or Below	746	8%
Some College	1,621	17%
College Degree or Beyond	5,522	58%
Unknown	1,610	17%
Number of Sexual Partners in the Past 3 Months		
Mean (SD)/Median (IQR)	4.87 (7.53)	3 (2, 5)
Ecstasy Use		
Yes	1,086	11%
No	8,401	88%
Declined	12	0%
Meth Use		
Yes	434	5%
No	9,052	95%
Declined	13	0%
Nitrite Use		
Yes	1,556	16%
No	7,931	83%
Declined	12	0%
Past Three Months		
Met partners in person only	3,910	41%
Met partners online only	307	3%
Met partners through apps only	2,141	23%
Met partners in person and online only	137	1%
Met partners in person and through apps only	1,931	20%
Met partners online and through apps only	206	2%

	n	%
Met partners in person, online, and through apps	154	2%
Other	713	8%
Last Partner		
Met in person	7,894	83%
Met online	177	2%
Met through an app	1,428	15%
Total	9,499	100%

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Table 2

Unadjusted and adjusted odds ratios (OR) and 95% confidence intervals (95% CI) of testing positive for any STI (initial visits only), August 2015 – July 2016 (n = 9,499).

	Any STI		
	Unadjusted OR (95% CI)	Three-Month Adjusted OR (95% CI)	Last-Partner Adjusted OR (95% CI)
Past Three Months			
Met partners via GSN apps	1.28 (1.16–1.40)	1.19 (1.07–1.33)	-
Did not meet partners via GSN apps	1.00	1.00	-
Last Partner			
Met via GSN app	1.08 (0.95–1.23)	-	1.09 (0.95–1.26)
Did not meet via GSN app	1.00	-	1.00
Age Group			
18 – 24	2.10 (1.80–2.44)	1.98 (1.65–2.38)	2.02 (1.69–2.42)
25 – 29	1.90 (1.65–2.20)	1.76 (1.50–2.08)	1.78 (1.51–2.10)
30 – 39	1.49 (1.29–1.72)	1.46 (1.24–1.71)	1.48 (1.26–1.73)
40+	1.00	1.00	1.00
Race/Ethnicity			
Black or African American	1.69 (1.42–2.02)	1.71 (1.40–2.08)	1.69 (1.39–2.06)
Hispanic	1.30 (1.17–1.45)	1.22 (1.08–1.38)	1.21 (1.06–1.37)
Other	1.09 (0.94–1.25)	0.98 (0.84–1.15)	0.98 (0.84–1.15)
White	1.00	1.00	1.00
Education Level			
High School Graduate or Below	1.00	1.00	1.00
Some College	1.03 (0.85–1.25)	1.03 (0.85–1.26)	1.03 (0.85–1.25)
College Degree or Beyond	0.73 (0.61–0.86)	0.84 (0.70–1.01)	0.84 (0.71–1.01)
Ecstasy Use			
No	1.00	1.00	1.00
Yes	1.46 (1.27–1.68)	1.24 (1.05–1.47)	1.14 (1.05–1.46)
Meth Use			
No	1.00	1.00	1.00
Yes	1.82 (1.49–2.22)	1.36 (1.07–1.74)	1.38 (1.08–1.76)
Nitrite Use			
No	1.00	1.00	1.00
Yes	1.39 (1.23–1.56)	1.16 (1.00–1.34)	1.18 (1.02–1.36)
Number of Partners (past three months)	1.001 (1.000–1.002)	1.02 (1.01–1.02)	1.02 (1.01–1.03)

Table 3

Generalized linear mixed modeling outcomes: odds ratios (OR) and 95% confidence intervals (95% CI) of testing positive for gonorrhea, chlamydia, syphilis, or HIV by GSN app use (including repeated visits), August 2015 – July 2016 (n = 9,499, number of visits=11,265).

	Met Partners Via GSN App in the Last Three Months (ref = No)		Met Most Recent Partner Via GSN App (ref = No)	
Gonorrhea	1.23 (1.09–1.39)	p = 0.0008	1.00 (0.84–1.18)	p = 0.98
Chlamydia	1.14 (1.00–1.29)	p = 0.06	1.08 (0.90–1.28)	p = 0.41
Syphilis	0.74 (0.50–1.10)	p = 0.14	0.97 (0.56–1.69)	p = 0.92
HIV	1.06 (0.68–1.64)	p = 0.81	1.44 (0.82–2.54)	p = 0.20
Any STI	1.24 (1.12–1.37)	p < 0.0001	1.08 (0.94–1.23)	p = 0.27

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