How Bisexual-Identified Men Use the Internet to Seek Sex with Other Men in Ontario: Factors Associated with HIV/STI Testing and Condom Use
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ABSTRACT
Although seeking sex on the Internet may be associated with HIV risk for some men who have sex with men (MSM), little is specifically known about bisexual-identified MSM. Data were drawn from a community-based online survey of 1,830 MSM in Ontario. Among these MSM, 24.0% (n = 438) self-identified as bisexual. The authors examined (1) demographic, testing, and behavioral differences between bisexual- and other-identified MSM using chi-squared and logistic regression tests, and (2) among bisexual men, factors associated with condom use during last male anal sex using logistic regression. Bisexual men were less likely to have received sexual health information online and to have recently tested for STIs but more likely to report condom use during their last male anal sex. Among bisexual men, the only significant predictor of condom nonuse at last male anal sex was substance use. Service providers and researchers should pay attention to the differences in the risk profiles of bisexual-identified men who use the Internet to seek sex with other men to engage these men in HIV prevention efforts.

KEYWORDS
bisexual men; HIV; internet; STI; condom use; sexual health; substance use

Introduction
As of 2011, 56% of people living with Human Immunodeficiency Virus (HIV) in Ontario (Canada’s most populous province) were gay, bisexual and other men who have sex with men (MSM) (Public Health Agency of Canada [PHAC], 2014), and more than half of all new HIV infections (52%) were MSM (Public Health Agency of Canada [PHAC], 2015). MSM have been early adopters of online technologies, utilizing social media, mobile applications and sociosexual networking websites to seek sexual, social, and romantic partners (Brennan et al., 2015). Research has explored the use of sociosexual mobile applications and websites for online-based sexual health outreach (Brennan et al., 2018; Fantus, Souleymanov, Lachowsky, & Brennan, 2017) and whether these online technologies facilitate sexual risk practices among MSM (Chiasson et al., 2007; Grov, Breslow, Newcomb, Rosenberger, & Bauermeister, 2014; Mustanski, 2007; Souleymanov & Huang, 2016). Any link between Internet use and new cases of HIV among MSM is complex, as intersecting factors related to HIV stigma, trauma symptomatology, and antigay attitudes have significant effects on engaging in sexual risk behaviors (Bien et al., 2015; Burnham et al., 2016). Although online networking may not directly/explicitly foster sexual risk behaviors among MSM, the use of sociosexual networking websites and mobile applications may increase the frequency of sexual behaviors, as well as the number of sexual partners (Chiasson et al., 2007; Mustanski, 2007). Empirical data show that the use of the Internet and mobile apps may be associated with increased risk of HIV and sexually transmitted infection (STI) transmission for MSM (Garofalo, Herrick, Mustanski, & Donenberg, 2007; Mustanski, 2007; Wei, Lim, Guadamuz, & Koe, 2014), condomless anal intercourse (CAI; Abara, Annang, Spencer, Fairchild, & Billings, 2014; Lewnard & Berrang-Ford, 2014), and polysubstance or methamphetamine use (Benotsch, Kalichman, & Cage, 2002; Grov, Parsons, & Bimbi, 2007; Liau, Millett, & Marks, 2006).
Notwithstanding the importance of these findings, empirical findings have generalized MSMs’ sexual behaviors which, in turn, have overlooked the unique needs of bisexual-identified MSM who use the Internet to seek sex with other men (Dodge et al., 2013; Iantaffi, Grey, & Rosser, 2015; Namaste et al., 2012). Most research that has examined sexual risk behaviors of bisexual men categorize bisexuality on the basis of a participant’s sexual attraction or gender of their recent sexual partners, as opposed to a participant’s self-reported identity (Lyons et al., 2012). Additionally, research has typically amalgamated the experiences of gay and bisexual men, or heterosexual and bisexual men, overlooking the potentially unique physical and sexual health of bisexual men (Hubach et al., 2014).

Behaviorally bisexual MSM are presumed to be a high-risk population for STI and HIV transmission (Doll et al., 2013; Hubach et al., 2014). Previous research has demonstrated that bisexual MSM are more likely than other MSM to have a higher number of sexual partners, higher rates of condomless anal intercourse (Doll & Beeker, 1996; Dodge, Sandfort, & Firestein, 1992), as well as being more likely to engage in transactional sex (Boles & Elifson, 1994; Dyer & das Nair, 2013; Stokes, Vanable, & McKirnan, 1997) and intravenous drug use (Doll & Beeker, 2007). In an Australian-based study conducted among gay-identified men (n=854) and bisexual-identified men (n=4164), bisexual-identified men were more likely to have had sex with a male partner who was either serodiscordant or whose HIV status was unknown (Lyons et al., 2012). In the same Australian study, only 62% of bisexual-identified men had ever been tested for HIV (Lyons et al., 2012), compared with 84% of gay-identified men. As a result, bisexual men may be less likely to seek sexual health information or HIV/STI testing.

However, findings with respect to the sexual behaviors of bisexual MSM have been inconsistent. For instance, recent scholarly work has shown that bisexual men have similar or lower levels of sexual risk when compared to gay men (Crosby, Mena, Geter, & Hickson, 2016; Engler, Otis, Alary, & Masse, 2005; Jeffries & Dodge, 2007; Klein, 2009). Behaviorally bisexual men report lower intentions to use condoms with male and female partners than their heterosexual counterparts, but higher intentions than their exclusively gay counterparts (Goodenow, Netherland, & Szalacha, 2002). In a recent U.S.-based study, condom use was frequent among behaviorally bisexual men (n=75) during vaginal and oral sex, but less often for oral sex (Doll et al., 2013). Behaviorally bisexual men have explained that condom use is more difficult with male partners, as they are less likely to insist on using a condom during sex (Hubach et al., 2014). The perceived risk of STIs or HIV was associated with condom use among male partners and, alternatively, the risk of unintended pregnancy was a consideration for condom use with female partners (Hubach et al., 2014).

Overall, previous research has lacked a specific focus on bisexual-identified men who use the Internet to seek physical sexual encounters with other men. There is a propensity in research to attribute the Internet with increased sexual risk behaviors of all MSM (Melendez-Torres, Nye, & Bonell, 2015), rather than understanding the potential behavioral differences of bisexual-identified MSM. Understanding the demographics, behaviors, and attitudes of bisexual-identified MSM can help inform and develop specific sexual health outreach and information regarding safer sex, HIV testing, and education for bisexual-identified MSM.

Although online sexual networking has emerged as an important variable in understanding the higher prevalence of HIV and other STIs among self-identified gay men, most research has been conducted in the United States (Ciesielski, 2003; Wong, Chaw, Kent, & Klausner, 2005; Rhodes et al., 2011). Moreover, existing research with gay and bisexual men has not explored the distinct experiences of self-identified bisexual men, thus rendering them
invisible in research practices. The purpose of this particular analysis was to understand the demographic and behavioral differences between bisexual and other-identified MSM who use the Internet to seek sex with other men, particularly in relation to HIV/STI-related behaviors such as testing and condom use.

**Methods**

**Study and participants**

Data were drawn from a large mixed-method community-based research study titled Cruising Counts, which involved partnerships across Ontario (Canada’s most populous province). The study consisted of qualitative and quantitative arms. In the qualitative arm (Brennan et al., 2018), the research team conducted interviews with online sexual health outreach providers and managers at a number of AIDS Service Organizations (ASOs) the province to explore their perspectives and experiences of conducting online outreach to MSM online. The quantitative phase included an anonymous online questionnaire administered to MSM to examine how MSM in Ontario access, experience, and perceive online sexual health outreach. The results presented in this article came from the quantitative arm of the study.

The research team included HIV/AIDS policy experts, researchers from academic institutions (University of Toronto, University of Guelph), frontline staff and managers from Ontario ASOs who provided online outreach services to MSM, and staff at Ontario’s Gay Men’s Sexual Health Alliance. This community-based study was also derived from and included an active Community Advisory Board (CAB) with diverse MSM representatives from across Ontario. The CAB was exclusively composed of MSM and met regularly to provide feedback on the research process, data collection tools, recruitment of study participants, and knowledge translation activities. All research protocols were granted ethics clearance from the University of Toronto HIV Research Ethics Board and the University of Guelph Research Ethics Board.

**Participants & recruitment**

Between December 2013 and January 2014, participants were recruited from across Ontario using electronic advertisements on sociosexual websites (e.g., Squirt.org, recon.com, bgclive.com, craigslist.ca), mobile apps (e.g., Grindr), social media (e.g., Facebook, Twitter), and printed flyers distributed through ASOs. All participants had to review the consent form online and had a chance to contact the study office to have any questions answered. Participants were asked to complete an anonymous online questionnaire regarding their technology use, online behavior (sociosexual and health related), sexual health, and demographics. To be eligible, participants must have sought sexual partners or sexual health information online in the past 6 months (or had an interest in doing so); identify as a gay, bisexual, two-spirit, straight, queer, questioning cis- or transgender man; have ever had sex with another man; be at least age 16 years; and either live or work in Ontario. Participants were offered an opportunity to enter a random draw for one of 40 cash prizes of $100, which were delivered using online banking e-transfers.

**Measures**

Questions on sexual behavior focused mainly on hooking up (defined as any type of sex) with guys online. Participants were asked when they “most recently hooked-up with a guy met online” and, if so, how often this happened and “how many times they had hooked-up with a guy online” in the past 6 months. Participants were asked how many men they had anal sex with in
the past 6 months and if any, to answer a series of questions regarding the participant’s last anal sex encounter. Participants indicated whether this partner was met online (and, if so, through which website or app), whether they and/or their partner had been drinking or using drugs (illicit or off-label), whether they were aware of their partner’s HIV status, what sexual role they had (insertive, receptive, or both), and whether a condom was used.

Participants were asked whether they had ever looked for sexual health information online, and if so how often and through what means (e.g., looked it up, contacted, or were contacted by an online outreach worker, or clicked a banner/ad). Participants also indicated if they had tested and/or been treated for any STI, not including HIV, in the past year. In terms of HIV, participants were asked to indicate their HIV status (negative, positive, unsure, or prefer not to answer).

Sociodemographic information included age (in years), race/ethnicity (White, Black, Latino, Aboriginal, South-Asian, Southeast/East Asian, mixed race, or other), sexual orientation (gay/homosexual, bisexual, or other), gender (cis-gender male or transgender/two-spirit/genderqueer/other), highest level of formal education attained (at least some secondary school, college/trades, or university), and immigration status.

**Analyses**

Data were analyzed to determine the prevalence of sexual risk behaviors and associated factors. All quantitative data analyses were conducted using the statistical package SPSS version 22 and a p value of less than 0.05 was considered significant unless otherwise specified. The primary explanatory factor was bisexual identity and the outcome variable was event-level condom use. First, logistic regression (LR) and chi-squared tests were used to assess differences between bisexual-identified MSM and other-identified MSM (e.g., gay, queer). Next, LR was used to assess factors associated with condom use during last male anal sex event among bisexual MSM. A final multivariate model was built using a manual backward-stepwise elimination approach. Likelihood ratio tests were used to test overall significance of categorical variables prior to removal. All variables with a significant p value of <.05 were retained.

**Results**

Of 1,830 participants, four refused to answer the question regarding sexual orientation. A total of 438 men indicated that being “bisexual” described their sexual orientation (n = 438/1826, 24.0%). Of these 438 bisexual men, a number of other terms/labels were also used to describe their sexual orientation: 62 also selected “gay,” 31 “straight,” 25 “questioning,” and 12 “queer.”

**Characteristics of the sample**

Table 1 presents demographics of the sample stratified between bisexual and non-bisexual-identified MSM. In univariate analyses, bisexual MSM were less likely than non-bisexual MSM to be between ages 27 to 35 versus younger than 27 (14.8% vs. 30.1%; adjusted odds ratio [AOR]=.69), but more likely to be between ages 36 and 84 versus younger than age 27 (AOR=1.70 for age group 36–48, and AOR=2.62 for age group 49–84).

Bisexual MSM were also less likely than non-bisexual-identified MSM (gay/queer) to be South-East/East Asian versus White (4.0% vs. 6.9%), and less likely to live in Toronto versus the rest of the province (12.1% vs. 34.9%; AOR=.26). Bisexual MSM were also less likely than non-bisexual-identified MSM men to be HIV positive versus HIV negative (2.4% vs. 9.9%; AOR=.23). Bisexual MSM were also less likely than non-bisexual-identified MSM to have attained a
bachelor’s degree or higher level of education compared to non-bisexual-identified MSM (26.1% vs. 43.5%; AOR= .36), and were less likely to be an immigrant, refugee, visa, or Non-status migrant compared to non-bisexual-identified MSM (2.1% vs. 5.3%; AOR = .38).

**Online sexual health outcomes**

Univariate and multivariate associations of sexual and other health outcomes between bisexual and other men are shown in Table 2, the latter controlling for significant demographic differences between bisexual and other men shown above. All variables entered into the model were significant in univariate associations. However, when we controlled for significant demographic variables, results indicated that bisexual MSM used different websites and mobile apps than non-bisexual-identified MSM.

Specifically, compared to non-bisexual-identified MSM, bisexual MSM were significantly less likely to use Grindr (AOR= .21), but more likely to use Squirt (AOR =42.30) and Craigslist (AOR = 1.48) as online venues/tools to meet other men for sex in the past 6 months. Further, bisexual men were less likely than other MSM to ever receive sexual health information online (AOR = .63). Bisexual MSM were also less likely than other MSM to have been tested for STIs in the past 12 months versus not (AOR = .63), and more likely than non-bisexual-identified MSM to report any male anal sexual partners in the past 6 months (AOR =1.60). Although seeking sexual health information online emerged as a significant factor in a univariate model (OR = .49), the multivariable model was not significant (p > .05).

In a univariate model, bisexual MSM also were less likely to report being treated for STIs in the past 12 months (OR = .42), and were less likely to report more than one male anal sex partner during the past six months (OR = .74). However, neither of these associations were significant in a multivariate model (p > .05).

**Factors associated with condom use during last anal sex event**

Table 3 presents descriptive statistics of participants’ most recent anal sex events with another man, stratified by bisexual versus other identity. Among bisexual participants, Table 3 also presents the descriptive statistics and univariate associations of factors associated with condom use at last anal sex. Bisexual men were less likely than non-bisexual-identified MSM to be in an HIV discordant relationship (3.3% vs. 7.5%; AOR = .38) or HIV-positive concordant relationship (1.3% vs. 5.6%; AOR = .20) versus relationships where partners didn’t know their HIV status. Bisexual men, however, were more likely to report using condoms during their last anal sex experience with another man (65.7% vs. 59.2%, AOR = 1.32). Finally, we examined factors associated with condom use during the last sex event for bisexual men only (n=309).

Among bisexual MSM, the only significant predictor of condom non-use at last male anal sex was any alcohol/drug use by participant (AOR = .54); where the partner was met, anal sex position, HIV status concordance, and demographic factors were not significant predictors of condom use.

**Discussion**

The findings from this study suggested that bisexualy identified MSM who use the Internet to seek sex with other men exhibited lower levels of STI testing, less sexual health information received online, and higher levels condom use compared with other MSM. Among bisexually identified MSM the only significant predictor of condom non-use at last male anal sex was substance use. The findings from this study unveiled a picture where bisexual men exhibited
more condom use compared with other MSM. Although some scholarship suggested that gay and bisexual men do not differ significantly from one another in terms of risk-taking attitudes, including unwillingness to use condoms with sexual partners (Klein, 2009), other research pointed out that bisexual MSM who have sex with men and women are less likely to use a condom at last sex compared to MSM who have sex with men only (Phillips et al., 2018).

Furthermore, recent scholarship already identified significantly lower levels of STI testing among bisexual men, compared with gay-identifying men (Iantaffi et al., 2015). The findings from this study with regard to decreased testing add to existing knowledge about testing practices of bisexual MSM. Several aspects might influence STI testing among bisexual men. Social exclusion, stigma, and marginalization reinforce bisexual people’s invisibility in society (Loi, Lea, & Howard, 2017; Namaste et al., 2012) and may affect the access to, and the availability of, health and social care services that address bisexual men’s unique psychosocial or sexual health needs. Health services that are culturally insensitive toward the needs of bisexual people coupled with concerns about biphobia within lesbian, gay, bisexual, transgender, queer (LGBTQ) communities may discourage some bisexual people from seeking help at these organizations (Loi et al., 2017; Scrimshaw, Downing, Cohn, & Siegel, 2014; Willging, Salvador, & Kano, 2008). It is therefore essential to explore how the social context toward bisexual men (in the mainstream gay community and society at large) increases bisexual men’s invisibility and further decreases STI testing access and uptake for bisexual men. For instance, improving the capacity of mainstream services and health care providers in providing inclusive and culturally sensitive care for bisexual people could reduce stigma and discrimination (Chapman, Watkins, Zappia, Nicol, & Shields, 2012). Health and social care service providers may also require training and opportunities to increase information and skills to prepare them to adequately support bisexual people in healthcare contexts.

Furthermore, the findings from this study suggest that bisexual men were less likely than other men to ever receive sexual health information online. These findings may be explained by multiple factors, including the limited availability of culturally sensitive education materials or health information that is specifically targeted to the needs of bisexual people (Daneback, Ross, & Månsson, 2008). For instance, bisexual people experience unique barriers in terms of access to, engagement with, and retention in treatment and/or appropriate and affordable health care, due in part to concerns about stigma and discrimination from health care providers (Senreich, 2010), as well as perceptions that available services will not understand their needs (Adams, McCreanor, & Braun, 2013). This can be further exacerbated by distance from larger urban centers and isolation from services that are more likely to be accepting and respectful of bisexual clients (Wei, Lim, Guadamuz, & Koe, 2006). In this context of social exclusion, access to sexual health information online (including sexual health outreach services delivered via online informational and communication technologies) is an important point of care for bisexual men.

Research has already documented that bisexual people actively use the Internet as a resource for information (Daneback et al., 2008). The use of online information and communication technologies for health service providers, including online interventions and health care (Fantus et al., 2017; Peck, McCall, McLaren, & Rotem, 2000; Ross, Doctor, Dimito, Kuehl, & Armstrong, 2007), could extend the reach of health and social care to bisexual MSM. Therefore, it is important that health care services (particularly in the context of online sexual health outreach) be more knowledgeable and culturally sensitive when interacting with bisexual men who are seeking assistance and support to improve delivery of sexual health outreach to these men.
Importantly, among bisexual men in this sample, the only significant predictor of condom non-use at last male sex was substance use. Previous research already established that a strong independent association between substance use and sexual risk behaviors exists among gay and bisexual men (Prestage et al., 2018). Existing scholarship also suggests that bisexually active men are at significantly higher risk for HIV than exclusive heterosexually active men (Muñoz-Laboy & Dodge, 2005). Similarly, scholars suggest that the unique combination of minority stress and biphobia may lead bisexual people to experience greater, but potentially preventable, morbidity compared with their lesbian and gay peers (Elia, 2014; Flanders, Dobinson, & Logie, 2017; Pallotta-Chiarolli, 2014; Yescavage & Alexander, 2000).

Multiple factors, including tensions between sexual and gender identities, importance of the family context, as well as notions of hegemonic masculinity have been identified as the critical factors influencing sexual risk practices of bisexual MSM (Muñoz-Laboy & Dodge, 2005). The findings from this study add to the growing literature examining the relationship between substance use and condom use among bisexual MSM. More research is required to understand the association between substance use and sexual risk practices like condomless anal intercourse, particularly among bisexually identified MSM.

**Limitations**

The results of this study can only be considered while taking into consideration its limitations. First, the measure used for bisexual MSM in this study was an identity label (participants had to self-identify as bisexual). However, we did allow participants to select as many identity labels as they desired, and 70.5% identified exclusively as bisexual. Some scholars highlighted that inconsistent indicators of bisexuality in research has meant that very little is known about testing behaviors among bisexual men (Bauer & Brennan, 2013; Iantaffi et al., 2015; Jeffries & Dodge, 2010). However, it should also be noted that behavioral bisexuality may in itself be a poor proxy measure for bisexual identity or lifetime sexual behavioral history (Bauer & Brennan, 2013). The timeframe plays a significant role in how behavioral bisexuality is defined. For example, individuals may be more likely to be captured in short-term (e.g., past year) behavioral bisexual categories during certain stages of life, such as at younger ages (Bauer, & Brennan, 2013). Although past-year behavior categorization or the use of longer timeframes may mitigate some of these limitations (Bauer, & Brennan, 2013), there is no clear evidence that a definition of behavioral bisexuality corresponds to the common definition of bisexuality held by bisexual-identified persons or society at large (Swan & Habibi, 2018).

Either way, to mitigate this limitation, it may be also important to collect data on behavioral bisexuality. This study lacked information on sex with women. Although bisexual men may report consistent condom use with male and female casual partners, many who do not use condoms describe doing so in the context of ongoing relationships and provide reasons for condom use and nonuse that vary based on the gender of their partner and/or the type of relationship with the partner (Hubach et al., 2014). Second, the generalization of the findings from this study with regard to condom use among bisexual men compared with non-bisexual-identified men have to be interpreted with caution, especially given that the representativity of this convenience sample is unknown. In addition to cross-sectional nature of this study, this study only investigated substance use and its relationship to condom use based on a single sexual event (most recent).

“One with many” event-level analyses of multiple sexual events across a person can improve causal evidence (Lachowsky et al., 2016). For example, event-level data typically
indicate that gay and bisexual men may be as likely to use drugs on occasions of condom use as they are on occasions of noncondom use (Prestage et al., 2005; Prestage et al., 2009). It is important that future investigations focusing on condom use and its relationship to substance use among bisexual men also take into account the unique complexities of gender and relationship configurations in this distinct population. Nevertheless, even with these limitations, this study advances our knowledge of important demographic and behavioral characteristics of bisexually identified MSM who use Internet to seek sex with other men.

Implications and conclusions

The findings from this study indicate that the development of HIV/STI prevention strategies (particularly online sexual health outreach) for bisexually identified MSM is contingent upon examining the sexual risk practices and online behaviors of these men. Bisexually identified men who use the Internet to seek sex with other men may exhibit distinct sexual risk behaviors (decreased levels of STI testing, less sexual health information received online, more condom use) compared with other MSM, supporting the need for targeted, culturally relevant HIV prevention and sexual health promotion.

This study results point to several important directions and implications for healthcare practice, policy, and research. Service providers and researchers should pay attention to the differences in these risk profiles (less STI testing, lower access to sexual health information) of bisexually identified men who use the Internet to seek sex with other men to engage these men in HIV prevention efforts. These findings can inform ASOs and community-based organizations and assist them to increase the effectiveness and cultural sensitivity of online outreach services for bisexual-identified MSM. Specifically, intervention efforts may seek to focus on STI testing awareness building through online outreach in order to increase uptake of STI screening among bisexually identified MSM.

Continued research efforts are needed to better understand factors that contribute to sexual risk behaviors among bisexual men to improve health outcomes for this population. HIV prevention requires men to incorporate increasingly complex understandings of transmission risks and sero-adaptive behaviors into their sexual lives. The extent to which bisexual MSM are able to do so and the level of sexual health literacy required to fulfill this task are worthy of further research. Researchers should pay attention to the differences and specificities in the risk profiles of bisexual men who use the Internet to seek sex with other men, including identifying the extent to which bisexual men access online sexual health services for their sexual health needs. Further research is also needed to understand the link between condom use and substance use within the context of preventing HIV risk among bisexual MSM who use the Internet to seek sex with other men.

Given that there is very limited HIV education that is specifically tailored for the needs of bisexual people in Canada (Namaste et al., 2012) or indeed globally, it is unclear if the programs that seek to target MSM are relevant to bisexual men. This study contributed to the knowledge base for bisexual men who use Internet to seek sex with other men in a North American context. Scholars may also need to continue to conceptualize and examine the development and implementation of sexual health interventions tailored specifically for bisexual men who use the Internet to seek sex with other men in order to meet the unique needs of this population.