HIV-Related Sexual Risk Among Transgender Men Who Are Gay, Bisexual, or Have Sex With Men

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Background: This study is among the first to examine factors associated with HIV-related sexual risk among transgender men and other transmasculine persons who are gay, bisexual, or have sex with men (T-GBMSM).

Methods: In 2009–2010, 433 transgender people in Ontario, Canada, participated in a multimode respondent-driven sampling survey, including 158 T-GBMSM. Analyses were weighted using respondent-driven sampling II methods to adjust for differential recruitment probabilities; confidence intervals (CI) were adjusted for clustering by shared recruiter. Prevalence ratios (PR) for associations with past-year high sexual risk (condomless intercourse outside a seroconcordant monogamous relationship) were estimated using average marginal predictions from logistic regression.

Results: Of T-GBMSM (mean age = 29.8; 52% living full time in felt gender; 25% Aboriginal or persons of color; 0% self-reported HIV positive), 10% had high sexual risk activity in the past year. Among the 34% with a past-year cisgender (non-transgender) male sex partner, 29% had high sexual risk. In multivariable analyses, older age, childhood sexual abuse (adjusted PR, APR = 14.03, 95% CI: 2.32 to 84.70), living full time in one's felt gender (APR = 5.20, 95% CI: 1.11 to 24.33), and being primarily or exclusively attracted to men (APR = 5.54, 95% CI: 2.27 to 13.54) were each associated with sexual risk. Of psychosocial factors examined, past-year stimulant use (APR = 4.02, 95% CI: 1.31 to 12.30) and moderate depressive symptoms (APR = 5.77, 95% CI: 1.14 to 29.25) were associated with higher sexual risk.

Conclusions: T-GBMSM seem to share some HIV acquisition risk factors with their cisgender counterparts. HIV prevention interventions targeting T-GBMSM who are predominantly attracted to men and interventions addressing sequelae of childhood sexual abuse may be warranted.

Received for publication June 7, 2016; accepted October 14, 2016.

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- Supported by operating grants from the Canadian Institutes of Health Research, Institute of Gender and Health (Funding Reference MOP-106478) and HIV/AIDS Community-Based Research Program (Funding Reference 167492). A.I.S. was supported by Trudeau Foundation and Vanier Canada Graduate Scholarships.
- Presented at the Canadian Association for HIV Research Conference, May 13, 2016, Winnipeg, MB, Canada.

The authors have no conflicts of interest to disclose.

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Key Words: transgender, men who have sex with men, HIV risk, childhood sexual abuse, trans PULSE

(J Acquir Immune Defic Syndr 2017;74:e89–e96)

INTRODUCTION

Transgender men who have sex with men have been labeled a key population at disproportionate risk of sexually transmitted HIV.¹ Yet, there is a dearth of research evidence regarding the HIV disease burden, prevalence of HIV-related sexual risk, and factors associated with sexual risk among transmasculine persons who are gay, bisexual, or have sex with men (T-GBMSM). We use the term "transmasculine" herein to refer to individuals who were assigned a female sex at birth but identify as male or masculine. Contrary to traditional assumptions that most transmasculine persons identify as heterosexual or are exclusively sexually attracted to women, an estimated 63% of transmasculine Ontarians identified as gay, bisexual, or queer and/or reported past-year sex with men, whereas 21% had a past-year cisgender (non-transgender) male sex partner.² Similarly, three-quarters of transmasculine participants in the largest US transgender survey identified as sexual minorities.³

A review of research published through 2014 found only 10 studies with laboratory-confirmed HIV seroprevalence data for transmasculine persons,⁴ of which most found no HIV infections. Three studies documented HIV seroprevalence ranging from 2.0% to 4.3%.^{5–7} Self-reported HIV prevalence ranged from 0% to 10%.⁴ Most of these reports were based on small samples with 1 or 2 HIV-positive cases. The sole population-based estimate of HIV prevalence among transmasculine persons comes from Ontario, Canada, where an estimated 0.6% identified as HIV positive; however, half had never been tested.⁸ Two recent estimates of self-reported HIV prevalence in the subgroup of transmasculine persons who have sex with men are available from internet-based studies in the United States⁹ and globally,¹⁰ finding 1.2% (1/81) and 1.4% (1/69) prevalence, respectively.

Thus, limited available data suggest a low burden of HIV among T-GBMSM relative to cisgender MSM and transgender women, though potentially higher than the broader population. In Ontario, seroprevalence among cisgender MSM was estimated to be 16% in 2011.¹¹ Among transgender women, pooled seroprevalence from urban convenience samples in high-income countries was 22%,¹² whereas self-reported prevalence was estimated at 4.3% in a broad primarily online US sample³ and 3% across Ontario.⁸

J Acquir Immune Defic Syndr • Volume 74, Number 4, April 1, 2017

Despite consistent findings of relatively low HIV prevalence among transmasculine persons who have been tested for HIV, T-GBMSM are increasingly integrated in cisgender MSM sexual networks¹³ where HIV prevalence is high. Estimates of HIV-related sexual risk behavior among T-GBMSM are highly variable,⁴ and most combine data from transmasculine persons of all sexual orientations, including those at low risk of sexually transmitted HIV by definition (ie, those who only have sex with cisgender women). In one small study of transmasculine persons reporting recent sex with cisgender men, 45% had condomless vaginal or anal intercourse in the past 3 months.⁹ Sexual mixing with cisgender MSM, combined with such levels of sexual risk behavior, may potentiate an increase in seroprevalence among T-GBMSM. Therefore, HIV prevention interventions targeted to T-GBMSM seem timely.

Only one study to date has identified correlates of HIVrelated sexual risk in T-GBMSM,14 employing a syndemic framework, which posits that HIV risk is only one component of a set of co-occurring mutually reinforcing epidemics resulting from social stigma and deprivation.¹⁵ Reisner et al¹⁴ found that among those living in their felt gender role, higher scores on an index of potentially syndemic conditions (summation of indicators for binge drinking, substance use, depression, anxiety, childhood abuse, and intimate partner violence) were associated with lifetime sexually transmitted infection diagnosis, multiple recent sex partners, and condomless anal or vaginal intercourse at last sexual encounter. This suggests that T-GBMSM who are living in their felt gender role share pathways to sexual risk with cisgender MSM, among whom syndemic conditions have consistently been linked to HIV risk behavior.16-18

Studies of urban transfeminine (ie, male-to-female transgender) persons who have sex with men have found experiences of violence,¹⁹ transphobia or trans-related stigma,²⁰ depressive symptoms,¹⁹ substance use,^{21,22} unstable housing,²³ and extreme poverty²⁴ to affect HIV-related sexual risk behavior; in some cases, these factors cluster together, suggesting syndemic production of HIV risk.^{20,25}

Specific to transmasculine persons, social and medical transition status may contribute to sexual risk via increased sex drive related to testosterone therapy²⁶ or transition-related sexual experimentation,²⁷ including perceived shifts in sexual desire and attraction.²⁸ In addition, T-GBMSM have described seeking gender validation and affirmation as a gay or bisexual man through sexual activity, thereby reducing agency in negotiating condom use.^{27,29} The need for gender affirmation may vary with transition status. As among transfeminine persons, experiences of stigma and violence related to trans status^{26,30,31} have also been posited to increase risk behavior for T-GBMSM, but this relationship has not been empirically assessed.

Building upon our previously published descriptive findings regarding gay, bisexual, queer, and other TMSM in Ontario,² the current analysis sought to identify factors associated with past-year HIV-related sexual risk for T-GBMSM. We assessed the impact of potential contributors to sexual risk specific to T-GBMSM, as identified in the extant literature, and known correlates of sexual risk among transfeminine persons and cisgender MSM, which may also affect T-GBMSM.

METHODS

Study Design and Participants

Trans PULSE was a community-based research project that explored the health of trans people in Ontario, Canada's most populous province. "Trans" was defined broadly for recruitment and included anyone whose gender identity did not match the sex they were assigned at birth; having taken steps to socially transition (eg, through changing one's name) or medically transition (eg, by taking hormones) was not required. In 2009–2010, 433 trans Ontarians aged 16 years and above completed a respondent-driven sampling (RDS) survey via a self-administered questionnaire either online or using a visually identical paper copy. RDS is an adapted chain-referral sampling method for hidden populations.^{32,33} Combining systematic recruitment through participants' social networks with analytic methods that weigh data on recruitment probability and account for nonindependence within recruitment chains, RDS can generate estimates for all networked members of the target population. RDS II weights,³⁴ based on personal network size, were used for this analysis. Recruitment began with 16 seeds; 22 were added after 4-5 waves of recruitment were obtained (to ensure adequate chain length). Each participant received 3 tracked (virtual or paper) coupons to recruit peers. Ethics approval was obtained from Research Ethics Boards at The University of Western Ontario and Wilfrid Laurier University.

Of 227 transmasculine participants (ie, those assigned a female sex at birth), 173 were coded as T-GBMSM, based on (1) endorsing a sexual minority identity (eg, gay, bisexual, pansexual, queer) while not reporting exclusive attraction to cisgender women or (2) reporting past-year sexual activity with a cisgender or trans man. T-GBMSM were excluded from this analysis if they were missing data for the outcome (n = 13) or were missing data for more than 20% of covariates (n = 2), resulting in an analytic sample of 158 participants.

Measures

A copy of the survey is available online at http:// transpulseproject.ca/resources/trans-pulse-survey/.

Network Size (for RDS Estimation)

Participants completed 3 eligibility questions, indicating whether they were 16 years of age or older; considered themselves "trans," of "trans experience," or "trans-identified"; and currently lived, worked, or received health care in Ontario. Next, they were asked: "How many other people do you personally know who could answer yes to all 3 eligibility questions?"

Demographics and Background Factors

Participants indicated their year of birth, educational attainment, lived gender (living in one's felt gender full time, part time, or not at all, dichotomized as full time versus not for regression analyses), sexual orientation identity, and use of masculinizing hormones. Ethnoracial group was coded as Aboriginal (First Nations, Inuit, Métis, or another Indigenous group), non-Aboriginal racialized (ie, person of color), or

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white. Residence in Toronto, Ontario's capital and most populous metropolitan area, was coded based on the first letter of the respondent's postal code. Income-to-needs ratio was calculated by dividing the midpoint of reported household income categories (ranging from <\$5000 Canadian to >\$100,000) by the number of household members being supported. Sexual attraction was categorized as primarily attracted to men (including transfeminine persons), primarily attracted to women (including transfeminine persons), attracted to multiple genders, or not attracted to others and dichotomized into primarily attracted to men versus not. Childhood sexual abuse (CSA) was defined as any unwanted sexual contact before 16 years of age. Self-reported HIV status was not included in regression analyses because no T-GBMSM participants reported being HIV positive.

Social Marginalization and Inclusion

An 11-item scale of self-reported transphobia (Cronbach $\alpha = 0.81$) was adapted from a measure of homophobia³⁵ and assessed the frequency with which participants experienced enacted (eg, being denied employment) and felt (eg, hearing that trans people are not normal) trans-related stigma, with higher scores indicating greater exposure.³⁶ Separately, participants indicated whether they had ever experienced physical or sexual violence related to being trans. The Medical Outcomes Study Social Support scale was used to measure social support.³⁷ The study team developed measures of perceived support for gender identity from a range of sources (or expected, for those who had not disclosed). For this analysis, received or expected support from parents was included and dichotomized as strongly supportive versus not (including "not applicable"), given evidence that strong parental support is uniquely important for trans mental and behavioral health.³⁸ Indication of past-year attendance at an lesbian, gay, bisexual, transgender community event or membership in an lesbian, gay, bisexual, transgender student or religious group and attendance at a trans-specific bar or club night were included as separate variables to reflect their potentially divergent relationships with sexual risk.

Substance Use and Mental Health

Those scoring 2 or greater on the CAGE screener³⁹ were coded as having problematic alcohol use. Past-year stimulant use included any use of cocaine, crack, crystal methamphetamine, or other amphetamines. Center for Epidemiological Studies Depression scale⁴⁰ scores were categorized into low (<16), moderate (16-26), and high (27-60) depressive symptomatology. A scale of self-efficacy for negotiating condom use⁴¹ was adapted to include other barrier methods and trans-specific situations (eg, "how certain are you that you could ask a non-trans partner to use a protective barrier?"). This revised 8-item barrier negotiation scale had high internal consistency (Cronbach $\alpha = 0.92$). The research team developed a measure of trans-specific worries in sexual situations (7 items, Cronbach $\alpha = 0.80$), as a validated measure of this construct was not available. It included items such as "I worry that once I'm naked, people will not see me as the gender I am" and "I worry that there are very few people who would want to have sex with me."

HIV-Related Sexual Risk

Participants reported whether they engaged in condomless receptive intercourse to ejaculation in the past year, for both vaginal and anal intercourse, and the type of partner involved (eg, spouse, one-time partner, exchange partner). Sexual risk was classified as high for participants reporting any such condomless intercourse, unless it occurred within a monogamous relationship with a seroconcordant partner (ie, if they were reported to have received a negative HIV test result after their last sexual risk activity). Those who had any other kind of past-year sexual activity with a partner were classified as low risk, whereas those with no past-year sex partners were considered at no risk.

Statistical Analyses

Weighted frequencies and their 95% confidence intervals (CIs) were calculated in SAS 9.3.42 RDS II weights (inverse of network size, rescaled to the sample size)³⁴ were used to account for differential recruitment probabilities. CIs were estimated using Taylor linearization, and variances were adjusted for clustering by shared recruiter. Crude and adjusted prevalence ratios (PRs and APRs) for high sexual risk, versus low or no risk, were estimated using average marginal predictions from logistic regression models⁴³ in SAS-callable SUDAAN 11.44 For multivariable analyses only, simple imputation of the median, mean, or mode was used for variables with less than 10% missingness. Two variables had more than 10% missing: CSA (10.8%) and income-to-needs ratio (12.0%). These were multiply imputed using weighted sequential hot-deck imputation in SUDAAN, with 5 imputations.

After identifying bivariate associations with sociodemographic and background variables, a model was built containing all with P < 0.25. Next, both bivariate and APRs were estimated for each of the social marginalization/inclusion and substance use/mental health variables of interest. These associations were adjusted for age, CSA, and lived gender, based on the potential for these variables to act as confounders. Presentation of PRs using average marginal predictions requires selection of reference values for continuous variables; therefore, ratios for scale variables are presented as comparisons of the weighted 75th versus 25th percentiles and those aged 40 or 30 years are compared with those aged 20 years. As this analysis was exploratory, and the absolute number of outcome events was small, we did not enter all variables of interest into a single multivariable model.

RESULTS

Figure 1 is a recruitment network diagram for the full study sample (n = 433) coded by T-GBMSM status and pastyear HIV-related sexual risk. Characteristics of Ontario T-GBMSM are described in Table 1. A minority reported being primarily or exclusively attracted to men (9.1%, 95% CI: 0.9 to 17.3); most were attracted to multiple genders (70.7%, 95% CI: 59.0 to 82.4). Similar to previously published results for all transmasculine Ontarians,² the most commonly endorsed sexual orientation identities were *queer*, *bisexual* or *pansexual*,

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FIGURE 1. Recruitment diagram for trans PULSE RDS survey of transgender Ontarians (n = 433). Triangles = T-GBMSM; squares = other transmasculine persons; circles = transfeminine persons. Black = high past-year HIV-related sexual risk; white = low risk; dark gray = no past-year sex partners; light gray = missing.

and *gay*. None reported being HIV positive, but only 18.7% (95% CI: 9.2 to 28.3) had tested for HIV in the past year; 39.3% (95% CI: 26.4 to 52.2) had never been tested. An estimated 10.0% (95% CI: 1.5 to 18.6) had past-year high sexual risk. Among the 34.2% (95% CI: 22.2 to 46.3) with a past-year cisgender male sex partner (data not shown), this proportion rose to 29.3% (95% CI: 8.4 to 50.2). Most risk was related to receptive vaginal intercourse: of those reporting any high-risk sexual activity, 64% (unweighted) reported condomless receptive vaginal intercourse only.

Crude associations and a multivariable model for sociodemographic and background factors are displayed in Table 2. Only CSA was associated with increased sexual risk in bivariate analyses. In the multivariable model, CSA remained associated with sexual risk behavior (APR = 14.03, 95% CI: 2.32 to 84.70). In addition, increasing age (APR for 40 years old versus 20 = 4.02, 95% CI: 1.23 to 13.14), having some postsecondary education versus graduating (APR = 2.74, 95% CI: 1.18 to 6.37), being primarily attracted to men (APR = 5.54, 95% CI: 2.27 to 13.54), and living in one's felt gender full time (APR = 5.20, 95% CI: 1.11 to 24.33) were associated with HIV-related sexual risk. Masculinizing hormone use was not associated with sexual risk.

Crude and adjusted associations for social marginalization and inclusion, substance use, and mental health factors are displayed in Table 3. Past-year stimulant use (APR = 4.02, 95% CI: 1.31 to 12.30) and moderate versus low depressive symptoms (APR = 5.77, 95% CI: 1.14 to 29.25) were associated with increased sexual risk after adjustment for age, CSA, and lived gender. Sexual body image worries were negatively associated with sexual risk for HIV (APR = 0.43, 95% CI: 0.21 to 0.90).

DISCUSSION

Drawing on data that are generalizable to the networked trans population of Canada's most populous province, we found no self-reported HIV infections, but low uptake of HIV **TABLE 1.** Weighted Characteristics of Gay, Bisexual, and Other Transmasculine Persons Who Have Sex With Men in Ontario, Canada (n = 158)

| | % or | |
|--|-------|--------------|
| | Ī | 95% CI |
| Sociodemographic and background factors | | |
| Age (\bar{x}) , yrs | 29.8 | 26.9 to 32.7 |
| Ethnoracial group (%) | | |
| Aboriginal | 3.7 | 0.2 to 7.2 |
| Non-Aboriginal white | 74.9 | 63.6 to 86.1 |
| Non-Aboriginal racialized | 21.5 | 10.6 to 32.4 |
| Residence in Toronto area (%) | 49.8 | 36.2 to 63.4 |
| Education (%) | | |
| High school diploma or less | 25.8 | 12.7 to 38.8 |
| Some postsecondary | 26.0 | 15.3 to 36.7 |
| Postsecondary graduate | 48.2 | 35.3 to 61.2 |
| Income-to-needs ratio (%) | | |
| <\$10,000 CDN per household member | 24.0 | 13.5 to 34.5 |
| \$10.000-19.999 | 33.6 | 23.0 to 44.3 |
| \$20.000-29.999 | 25.4 | 12.5 to 38.2 |
| >\$30.000 | 17.0 | 9.3 to 24.8 |
| Sexual attraction (%) | | |
| Primarily to male identified | 9.1 | 0.9 to 17.3 |
| Primarily to female identified | 16.3 | 6.5 to 26.0 |
| Multiple genders | 70.7 | 59.0 to 82.4 |
| Not attracted to anyone | 3.9 | 0.0 to 9.9 |
| CSA (%) | 58.6 | 45.9 to 71.4 |
| Lived gender (%) | | |
| Living full time in felt gender | 51.6 | 38.3 to 64.8 |
| Living part time in felt gender | 36.7 | 24.9 to 48.6 |
| Not living in felt gender | 11.7 | 2.9 to 20.5 |
| Currently using hormones (%) | 39.0 | 27.1 to 51.0 |
| Self-reported HIV status | | |
| Positive | 0.0 | * |
| Negative | 82.8 | 72.9 to 92.6 |
| Don't know or prefer not to say | 17.2 | 7.4 to 27.1 |
| Tested for HIV | 1712 | /// 10 2//1 |
| Yes in the past year | 18 7 | 9.2 to 28.3 |
| Yes more than 1 yr ago | 41.9 | 29.0 to 54.8 |
| Never | 39.3 | 26.4 to 52.2 |
| Social marginalization and inclusion | 0,710 | 2011 10 0212 |
| Lifetime transphobia scale score | 13.3 | 11.6 to 14.9 |
| (range = $0-33$; \bar{x}) | | |
| Lifetime transphobic violence (%) | | |
| None | 43.2 | 29.7 to 56.7 |
| Verbal harassment or threats | 37.6 | 26.3 to 48.8 |
| Physical or sexual assault | 19.3 | 9.6 to 29.0 |
| Social support (range = $0-5$; \bar{x}) | 3.7 | 3.5 to 3.9 |
| Strong received or expected parental support for gender identity (%) | 18.0 | 10.9 to 25.0 |
| Attended LGBT community, student, or religious event in past year (%) | 38.4 | 26.3 to 50.5 |
| Attended trans-specific bar or club | 27.3 | 17.1 to 37.5 |
| mgm, past year (70) | | |
| Problem drinking (CACE > 2: $\frac{94}{2}$) | 22.1 | 20 2 to 12 0 |
| Past-year stimulant use $(%)$ | 12.1 | 4 3 to 21 5 |
| | | |

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| TABLE 1. (Continued) Weighted Characteristics of Gay, |
|--|
| Bisexual, and Other Transmasculine Persons Who Have Sex |
| With Men in Ontario, Canada (n = 158) |

| | % or | |
|--|------|--------------|
| | Ā | 95% CI |
| Depressive symptoms (%) | | |
| Low: CESD score < 16 | 31.8 | 20.7 to 42.9 |
| Moderate: CESD score 16-26 | 25.8 | 14.5 to 37.0 |
| High: CESD score 27-60 | 42.4 | 29.2 to 55.7 |
| Sexual worries scale (range = $0-4$; \bar{x}) | 1.7 | 1.5 to 2.0 |
| Barrier negotiation scale (range = $0-6$; \bar{x}) | 5.0 | 4.7 to 5.3 |
| Past-year HIV-related sexual risk | | |
| No partnered sex (%) | 15.0 | 6.3 to 23.7 |
| Low risk | 75.0 | 64.2 to 85.7 |
| High risk | 10.0 | 1.5 to 18.6 |

*Cannot be estimated using RDS methods because 0 T-GBMSM reported being HIV positive.

CESD, center for epidemiological studies depression; LGBT, lesbian, gay, bisexual, transgender.

testing. Thus, undiagnosed HIV infections are possible and should not be ruled out. This was a population recruited based on trans identity or status and sampled through trans social networks; participants were not recruited for being GBMSM and were not necessarily living their day-to-day lives as men

TABLE 2. Associations of Sociodemographic and Background Factors With HIV-Related Sexual Risk Among Gay, Bisexual, and Other Transmasculine Persons Who Have Sex With Men in Ontario, Canada (n = 158)

| | Crude Associations | | Demographic/ Background Mode | |
|---------------------------------------|--------------------|----------------|---------------------------------|---------------|
| | PR | 95% CI | APR | 95% CI |
| Age, yrs | | | | |
| 30 versus 20 | 1.64 | 0.61 to 4.38 | 2.04 | 0.98 to 4.22 |
| 40 versus 20 | 2.61 | 0.40 to 17.25 | 4.02 | 1.23 to 13.14 |
| Ethnoracial group | | | | |
| Aboriginal or racialized versus white | 0.24 | 0.05 to 1.14 | 0.37 | 0.09 to 1.54 |
| Residence in Toronto area | 0.86 | 0.16 to 4.72 | * | * |
| Education | | | | |
| High school diploma or less | 0.74 | 0.09 to 6.01 | 1.01 | 0.23 to 4.38 |
| Some postsecondary | 1.51 | 0.22 to 10.35 | 2.74 | 1.18 to 6.37 |
| Postsecondary graduate | 1.00 | | 1.00 | |
| Income-to-needs ratio | | | * | * |
| <\$10,000 CDN | 1.00 | | | |
| \$10,000-19,999 | 1.06 | 0.15 to 7.65 | | |
| \$20,000-29,999 | 1.40 | 0.19 to 10.35 | | |
| >\$30,000 | 0.33 | 0.05 to 2.09 | | |
| Primarily attracted to men | 4.36 | 0.76 to 24.92 | 5.54 | 2.27 to 13.54 |
| CSA | 18.78 | 2.81 to 125.35 | 14.03 | 2.32 to 84.70 |
| Living in felt gender | 1.99 | 0.27 to 14.72 | 5.20 | 1.11 to 24.33 |
| Using masculinizing hormones | 1.45 | 0.27 to 7.79 | 0.35 | 0.11 to 1.11 |

*Not retained in multivariable model because P > 0.25.

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Table 3. Crude and Adjusted Odds Ratios for Correlates of HIV-Related Sexual Risk Among Gay, Bisexual, and Other Transmasculine Persons Who Have Sex With Men in Ontario, Canada (n = 158)

| | Crude Associations | | Adjusted Associations* | |
|---|-----------------------|---------------|---------------------------|---------------|
| | PR | 95% CI | APR | 95% CI |
| Lifetime transphobia scale score, 75th versus 25th percentile | 1.34 | 0.43 to 4.21 | 1.13 | 0.45 to 2.84 |
| Lifetime transphobic violence | | | | |
| None | 1.00 | | 1.00 | |
| Verbal harassment or threats | 0.18 | 0.03 to 1.07 | 0.34 | 0.06 to 2.02 |
| Physical or sexual assault | 1.89 | 0.33 to 10.72 | 2.21 | 0.52 to 9.43 |
| Social support, 75th versus 25th percentile | 0.99 | 0.49 to 2.01 | 0.76 | 0.43 to 1.34 |
| Strong received or expected parental support for gender | 0.19 | 0.03 to 1.12 | 0.20 | 0.03 to 1.25 |
| Attended LGBT community, student, or religious event in the past year | 0.32 | 0.09 to 1.14 | 0.49 | 0.12 to 1.97 |
| Attended trans-specific bar or club night, past year | 2.12 | 0.41 to 11.09 | 1.88 | 0.52 to 6.86 |
| Problem drinking | 4.11 | 0.96 to 17.66 | 3.40 | 0.88 to 13.17 |
| Past-year stimulant use | 3.96 | 0.77 to 20.45 | 4.02 | 1.31 to 12.30 |
| Depressive symptoms | | | | |
| Low: CESD score < 16 | 1.00 | | 1.00 | |
| Moderate: CESD score 16-26 | 7.25 | 1.54 to 34.06 | 5.77 | 1.14 to 29.25 |
| High: CESD score 27-60 | 1.73 | 0.31 to 9.50 | 1.58 | 0.22 to 11.45 |
| Sexual worries scale, 75th versus 25th percentile | 0.72 | 0.42 to 1.24 | 0.43 | 0.21 to 0.90 |
| Barrier negotiation scale, 75th versus 25th percentile | 0.61 | 0.39 to 0.94 | 0.84 | 0.52 to 1.37 |

Associations statistically significant at P < 0.05 are bolded.

*Adjusted for age, lived gender, and CSA.

CESD, center for epidemiological studies depression; LGBT, lesbian, gay, bisexual, transgender.

or transmasculine. Although most T-GBMSM (an estimated 91%) were not primarily or exclusively attracted to men, HIV-related sexual risk was higher among those who were, suggesting need for interventions for this subgroup. Considering preferences expressed by T-GBMSM,²⁹ interventions could be delivered not only through trans-specific initiatives but also by meaningfully including interested transmasculine persons in existing services designed for cisgender gay and bisexual men.

Our findings have additional implications for the development and tailoring of HIV and other sexually transmitted infection prevention interventions for T-GBMSM. They suggest that interventions should not focus on youth to the exclusion of adults or on residents of major urban centers to the exclusion of those residing in other settings. Residence in Toronto was unassociated with sexual risk, whereas increasing age was positively associated. Older T-GBMSM, who will be more likely to have lived substantial portions of their lives as women (potentially as sexual minority women), may face unique challenges in negotiating (safer) sexual relationships with cisgender men that deserve further investigation.

Contrary to theories postulated by T-GBMSM themselves in the qualitative research literature,^{26,31} masculinizing hormone use did not affect HIV-related sexual risk in this analysis. Although testosterone use may increase libido (and even sexual interest in cisgender men^{27,45}), our results indicate that this does not necessarily equate to engagement in sexual risk behavior. Adjusting for other background and demographic factors, those living in their felt gender were more likely to have high HIV-related sexual risk. This difference does not seem attributable to being more likely to have any sexual partners (86% of T-GBMSM living in their felt gender had any past-year sex versus 81% of those living in their felt gender part time or less, P = 0.57). Taken together, these findings suggest that social gender transition and affirmation may be more salient for understanding engagement in sexual risk behavior among T-GBMSM.

These analyses considered factors previously associated with HIV-related sexual risk behavior among both transgender women and cisgender men who have sex with men. We found that social determinants of health associated with HIV risk among transgender women (low incomes,²⁴ transphobia,²⁰ and violence¹⁹) are not necessarily generalizable to T-GBMSM. Rather, well-documented psychosocial correlates of sexual risk among cisgender MSM were associated with HIV risk for T-GBMSM, including CSA,^{46,47} moderate depression,⁴⁸ and stimulant use.⁴⁹

The reported frequency of CSA (58.6%, 95% CI: 45.9 to 71.4) in this population is alarming and is higher than the already elevated levels reported by cisgender sexual minority females and males (in the United States, this ranges from 19% of gay men to 44% of bisexual women⁴⁷). Gender variance in childhood is associated with increased risk of CSA, 50,51 perhaps because of targeting of nonconforming children for abuse. Our finding of a strong (albeit imprecisely estimated) association between CSA and HIV-related sexual risk among T-GBMSM indicates that CSA should be considered in the design and delivery of HIV prevention, sexual health, and mental health initiatives. CSA is also related to increased risk of psychopathology and substance use,^{52,53} sexual compul-sivity,⁵⁴ and intimate partner violence.⁵⁵ These conditions may mediate the association between CSA and HIV-related sexual risk,56 and CSA may confound associations between psychosocial conditions and sexual risk. Studies of HIV risk behavior among trans people have largely failed to collect data on CSA history. In light of these findings and the causal importance of CSA for many health outcomes later in life, sensitive collection of CSA data should be considered in transgender sexual health research.

To inform interventions, future research could explore pathways between CSA, depression, substance use, and HIV risk among T-GBMSM and the extent to which they are shared with cisgender MSM. For instance, does use of stimulants specifically to enhance sexual sensation and libido contribute to HIV risk among T-GBMSM? Do these mental health and substance use conditions *interact* to intensify HIV risk (above and beyond their combined individual effects) as suggested by syndemic theory?⁵⁷

Finally, this study reaffirms previous findings⁴ that despite sharing social vulnerabilities with transgender women

and cisgender MSM, T-GBMSM demonstrate comparatively low prevalence of HIV infection and related sexual risk. Although the present study did not identify any intervenable protective factors, understanding of such factors could contribute to prevention efforts both for transmasculine persons and other sexual and gender minorities. However, we note that twothirds of T-GBMSM were at low sexual risk almost by definition, as they had no cisgender male sex partners (transfeminine sex partners were relatively uncommon for transmasculine persons,² and all HIV-related sexual risk was borne by the subgroup who had cisgender male sex partners). Qualitative research with Ontario T-GBMSM⁵⁸ has pointed to a paradoxical role of the exclusion that some encounter from gay and bisexual men's communities and sexual networks: although potentially harmful for their overall well-being, the limited sexual opportunities that result likely reduce HIV transmission risk. At the same time, T-GBMSM's resilient strategies for navigating sexual partnerships in the face of such exclusion, such as negotiating sexual activities online in advance of meeting partners, may contribute to lower sexual risk among those who do have sex with cisgender men.

Strengths and Limitations

This represents only the second study to explore correlates of HIV-related sexual risk behavior among T-GBMSM. It also represents one of the largest samples of this population to date (15 of 27 studies in a 2015 review⁴ had n < 50). In addition to improving on previous research in this area by drawing on RDS data collected across Canada's most populous province, the present analysis benefited from the use of sexual behavior and risk measures developed specifically for trans respondents and from inclusion of key variables often excluded in transgender studies (eg, CSA). Nevertheless, this study was not without limitations. First, the small number of outcome events (14, unweighted) limited statistical power. CIs were often wide, and care should be taken to interpret estimates in relation to the full range of plausible values. Second, although RDS represented the best available strategy for obtaining a population-based sample of transgender people, generalizability of estimates rests on assumptions that may not be met in practice and biases unrelated to network size are unaccounted for.⁵⁹ The survey questionnaire only inquired about condomless intercourse to ejaculation, and sexual risk was further defined as such activity outside a seroconcordant monogamous partnership. To the extent that delayed condom application,⁶⁰ withdrawal before ejaculation, and inaccurate perceptions of mutual monogamy and seroconcordance are prevalent, this measure will underestimate actual HIV-related sexual risk. However, this definition will also misclassify some sexual activity as high risk by including condomless intercourse with casual or nonmonogamous partners known to be seroconcordant (data on HIV status of nonprimary partners were unavailable). Finally, biomedical HIV prevention technology use (eg, undetectable viral load, preexposure prophylaxis) was not captured in these data, which were collected before the introduction of preexposure prophylaxis as a recommended intervention for MSM and transgender people.

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CONCLUSIONS

In summary, we found that past-year sexual behavior posing high risk for HIV acquisition was uncommon overall in this broad population of T-GBMSM, but this was largely because of the fact that a minority had any cisgender male sexual partners. CSA emerged as a key predictor of sexual risk behavior and should be considered as a contributor to mental and behavioral health challenges for transmasculine persons in future research and interventions. Continued research, focused on T-GBMSM sexually active with cisgender men, is required to better understand HIV risk and vulnerability in this group. In the context of a perceived increase in sexual mixing with cisgender MSM,^{13,31} identifying and intervening on predictors of sexual risk behavior among T-GBMSM is particularly timely.

ACKNOWLEDGMENTS

Partners in trans PULSE included the Sherbourne Health Centre (Toronto), The 519 Church Street Community Centre (Toronto), The University of Western Ontario (London), Wilfrid Laurier University (Waterloo), and Rainbow Health Ontario. The trans PULSE Steering Committee members were G.R.B., R.T., Rebecca Hammond, Anjali K, Matthias Kaay, Jake Pyne, Nik Redman, Kyle Scanlon (deceased), and Anna Travers. The authors wish to acknowledge William Fisher, Mostafa Shokoohi, and Christoffer Dharma for helpful comments on the draft manuscript, the contributions of the 16 Community Engagement Team members and other trans PULSE contributors who worked to develop and promote the survey, the 89 first-phase participants, and the 433 survey participants.

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