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Young age and sex work are associated with HIV seroconversion among transgender women in São Paulo, Brazil

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Abstract

Background: Transgender women worldwide have among the highest prevalence of HIV and the lowest access to prevention among groups at risk. However, few longitudinal studies have directly measured HIV incidence and identified predictors of HIV acquisition among transgender women.

Setting: São Paulo, Latin America's largest city.

Methods: We conducted a longitudinal study among transgender women in São Paulo. Participants were recruited by a long-chain peer referral process from May 2017 to July 2019. Those age 18 years and older and HIV-negative at baseline were retested every 6 months up to 18 months. HIV incidence was calculated by dividing the number of seroconversions by the person-

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Protection of Human Subjects: Procedures were in accordance with ethical standards of the Brazilian National Ethical Review Committee, The Helsinki Declaration of 1975, 2000 revision, and The Universal Declaration on Bioethics and Human Rights from the United Nations Educational, Scientific and Cultural Organization (UNESCO) (2005). The protocol was approved by the Ethical Review Committee of the Centro de Referência DST/AIDS (CRT DST/AIDS), the Brazilian National Ethical Review Commission (CONEP), and the Internal Review Board of the University of California San Francisco. Written informed consent was obtained from all participants.

years (py) of follow-up; 95% confidence intervals (CI) were constructed assuming a Poisson distribution. Conditional maximum likelihood ratios assessed differences in HIV incidence by risk factors.

Results: A racial/ethnically diverse sample of 545 transgender women were enrolled. In 485.5 py of follow-up, 13 seroconversions were observed yielding an incidence of 2.68 per 100 py (95% CI 1.43–4.58). HIV incidence was significantly higher among transgender women age 18 to 24 years (rate ratio 3.85, 95% CI 1.24–12.93) and among those who engaged in sex work in the preceding month (rate ratio 5.90, 95% CI 1.71–26.62).

Conclusion: HIV transmission continues at a high rate among transgender women in Brazil. Factors such as young age, lower level of education, and limited employment opportunities may lead to dependence upon sex work which in turn increase HIV risk. Transgender-friendly prevention services, particularly programs delivering pre-exposure prophylaxis (PrEP) are urgently needed.

Keywords

HIV incidence; cohort studies; HIV seroconversion; transgender persons

Transgender women worldwide have among the highest prevalence of HIV and the lowest access to prevention and care among groups at risk for HIV [1]. A worldwide review estimates a pooled HIV prevalence of 19.1% and a pooled odds 48.8 times higher than the general adult population. In one recent survey in Rio de Janeiro, HIV prevalence among transgender women was 31.2% [2]. In 2019, Brazil's surveillance system reported 41,909 new HIV infections with the majority among males (69%) and persons age 25–39 years (52%) [3]. Unfortunately, HIV cases reported to the Brazilian Ministry of Health combine transgender women with the category of men who have sex with men (MSM), obscuring understanding of the burden of HIV disease by different demographic factors and temporal trends in new infections.

Cross-sectional surveys of transgender women in Brazil have described high HIV prevalence and identified risk factors associated with infection. In the survey in Rio de Janeiro, previously undiagnosed HIV infection was higher among transgender women of Afro-Brazilian ethnicity and those engaging in sex work [2]. Another study inversely associated level of education with higher prevalence of HIV among transgender women in Brazil [4]. These findings suggest the importance of social determinants on HIV acquisition among transgender women, although HIV incidence was not directly measured. Directly observed measures of HIV incidence in longitudinal studies among transgender women are rare worldwide [5], yet needed to determine the current trajectory of the HIV epidemic, identify causal risk factors for acquiring infection, and prioritize prevention programs such as pre-exposure prophylaxis (PrEP). To address the lack of data on HIV incidence among transgender women, we conducted a community-recruited longitudinal cohort study in São Paulo, Latin America's largest city. To our knowledge, this is the first study dedicated specifically to measure HIV incidence in transgender women in Brazil.

This study was part of an international collaborative research project with transgender women, called the TransNational Study. We report on HIV incidence observed in the São Paulo, Brazil site during the study period of May 2017 to July 2019. Methods followed those previously reported for other TransNational sites, including San Francisco, USA [5], Nanjing, China [6], and Asunción, Paraguay [7]. Transgender women were enrolled into the cohort using a long-chain peer referral method. Initial recruits were identified in a formative phase and incentivized to refer other eligible transgender women from their social networks to the study, who also referred participants and so on to diversify the cohort. Eligibility criteria were being transgender women (i.e., assigned male sex at birth and now identifying as a woman, transgender woman, or gender other than male), age 18 years and older, and in possession of a referral coupon. After providing written informed consent, participants completed structured interviews and HIV testing conducted at research offices of the Faculdade de Ciências Médicas da Santa Casa de São Paulo. Transgender women who tested negative for HIV were invited for return visits at 6, 12, and 18 months for follow-up testing. Follow-up visits were scheduled prior to the participant leaving the office with reminders sent according to their preferences (e.g., by phone, WhatsApp, Facebook, email). A reminder was sent each 3 months and again closer to the visit. If agreed upon, a call was made three days before the appointment. Participants were given R$30.00 (Brazilian reis or ~$10 USD) for completing the survey and HIV testing at their initial visit, progressively increasing by R$10 (~$2.5 USD) above the incentive of the prior visit for each subsequent follow-up visit. Participants were also given R$30 for each eligible referral to the study. Analysis examined demographic correlates of HIV seroconversion, including age, indicators of socio-economic status, and engagement in sex work. HIV seroconversion rates were calculated by dividing the number of seroconversions by the person-time of follow-up; 95% confidence intervals (CI) were constructed assuming a Poisson distribution. Conditional maximum likelihood ratios were used to assess differences in HIV incidence between groups of transgender women. Referrals to HIV care were made for transgender women testing positive. Referrals to prevention programs were offered to HIV-negative transgender women at each visit. At the time of the study, PrEP programs were being developed in Brazil following recent approval.

A diverse sample of 545 HIV-negative transgender women were recruited to the cohort, including 50.7% identifying as of mixed race/ethnicity, 28.6% as White, 18.8% as Afro-Brazilian, and 1.9% as other. Of all enrolled, 362 (66.4%) completed their 6-month follow-up test. Subsequent retention was 320 at 12 months (88.4% of those seen at 6 months) and 289 at 18 months (90.3% of those seen at 12 months). Transgender women lost to follow-up were more like to be younger (age 18 to 24 years) compared to those retained (30.1% vs 37.4%, p=0.023) and to have engaged in sex work in the prior month (47.1% vs 37.8%, p=0.006). A total of 13 seroconversions were observed within 485.5 person-years (py) of follow-up, for an incidence rate of 2.68 per 100 py (95% CI 1.43–4.58).

Table 1 shows HIV incidence rates by socio-demographic variables. HIV incidence was significantly higher among younger transgender women age 18 to 24 years old (rate ratio 3.85, 95% CI 1.24–12.93, p=0.019). The rate of seroconversion was also significantly higher among transgender women who obtained income from sex work in the month preceding the baseline interview compared to those who did not (rate ratio 5.90, 95% CI 1.71–26.62,

p=0.004). Of note, all seroconversions occurred among transgender women with less than 12 years of schooling, although the incidence rate was not significantly different from those with high school education or more (p=0.146). There was a non-significant trend toward higher HIV incidence was seen among transgender women with unstable housing (rate ratio 2.25, 95% CI 0.71–6.94, p=0.160).

Our data show substantial HIV transmission that if unchecked would result in approximately 40% population prevalence by age 40 years [8] – a trajectory in line with cross-sectional data from Asunción [7], Nanjing [6], San Francisco [9], and elsewhere in Brazil [2]. The higher risk among younger transgender women is corroborated by a study in Rio de Janeiro, which describes 25% prevalence of HIV infection by age 24 years [10]. Transgender female youth also had lower perception of risk, lower awareness of PrEP, and higher levels of condomless anal intercourse [10]. In San Francisco, longitudinally measured HIV incidence was also significantly higher among transgender women age 18 to 24 years [5]. These data point to a need for early interventions to address HIV risk among younger transgender women [11].

We also found that sex work, and possibly lower level of education and unstable housing, was associated with higher HIV incidence. These factors may have a synergistic effect on HIV risk for transgender women. Education in Brazil is mandatory from age 4 to 17 years and is free through high school through the public school system and, in principle, beyond. There are free public universities; however, they are highly competitive, and a spot is not guaranteed. The study by Batista *et al* which found an association between HIV prevalence and lower level of education level, also noted that Brazilian transgender women who experienced physical aggression in school attended school for four years fewer than those who did not have such experiences [4]. Low education may be a driver for engaging in sex work among transgender women who face fewer educational and economic opportunities [11]. In São Paulo, a study with transgender women described life events such as expulsion from school and fewer years of education leading to reduced chances for transgender woman to have formal employment [12]. Moreover, as noted in a recent review, the global response for HIV prevention among sex workers is woefully inadequate and with particularly low coverage for transgender women [13].

Our study is subject to limitations. First, loss to follow-up was substantial overall (53.0%) with one-third not seen at the first follow-up. Moreover, the loss was greater for younger transgender women and for those who engaged in sex work. Because these two groups had significantly higher HIV incidence, the overall rate of seroconversion is likely under-estimated. Second, under-estimation of HIV incidence may have also resulted from the prevention effects of participating in the cohort study, which included frequent HIV testing and counseling with referral to prevention programs. Third, although to our knowledge our longitudinal study is the largest conducted specifically for transgender women in Latin America to date, there were few seroconversions observed overall. The study therefore had low power to detect small differences in HIV incidence attributable to risk factors. Lower recruitment and retention meant our sample size of 485.5 py fell short of our *a priori* estimate of 1,500 required to have 80% power to detect rate ratios of 2.0 or greater.

Despite limitations, we found that HIV incidence among transgender women in Brazil is high and likely to translate to a future high burden of disease for the current young generation. Social determinant-related risks may be exacerbated for transgender women in São Paulo, Brazil, which like San Francisco has wide disparities in wealth, housing, and employment [14, 15]. Interventions are needed to make biomedical preventions, such as PrEP, readily available for transgender women who have competing daily survival needs. A potential barrier to biomedical prevention is the anti-transgender discrimination transgender women face in the Brazilian public health system where most medical care is accessed [16, 17]. Young transgender women may avoid HIV prevention programs altogether for fear of being mistreated [15, 18]. Finally, efforts that provide for the basic needs of transgender women in Brazil may be most successful in preventing HIV acquisition for those at highest risk.

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Table 1.

HIV incidence among transgender women in a longitudinal cohort, São Paulo, Brazil, 2018–2020

Variables[1]	HIV− at baseline N (%)	HIV+ by 18 months	Person-years (py) of follow-up	Rate per 100 py (95% CI[2])	Rate ratio[3] (95% CI)	p-value[4]
Total	545 (100)	13	485.5	2.68 (1.43–4.58)	na	na
Age (years)						
18–24	204 (37.4)	8	141	5.67 (2.45–11.18)	3.85 (1.24–12.93)	0.019
25 and older	341 (62.6)	5	339	1.47 (0.48–3.44)	ref	
Race/ethnicity						
Black/mixed	389 (71.4)	9	316.5	2.84 (1.30–5.40)	1.16 (0.36–4.34)	0.832
White	156 (28.6)	4	163.5	2.45 (0.67–6.26)	ref	
Education						
Under 12 years	485 (89.0)	13	414	3.14 (167–5.37)	na	0.146
High school or more	60 (11.0)	0	66	0 (0–5.99)		
Current living situation						
Unstable[5]	191 (35.0)	6	132.5	4.53 (1.67–9.86)	2.25 (0.71–6.94)	0.160
Stable	354 (65.0)	7	348	2.01 (0.81–4.14)	ref	
Ever incarcerated						
Yes	107 (19.6)	1	90	1.11 (0.03–6.19)	0.36 (0.02–211)	0.343
No	438 (80.4)	12	394	3.05 (1.57–5.32)	ref	
Sex work last month						
Yes	256 (47.1)	10	173	5.78 (2.77–10.63)	5.90 (1.71–26.62)	0.004
No	288 (52.9)	2	306	098 (0.20–2.87)	ref	

1. Categories and person-years do not always add to total due to missing data

2. Poisson distribution, 97.5% one-sided if point estimate is 0

3. Conditional maximum likelihood ratio

4. Mid-P exact, 2-tailed

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[5]Homeless, shelter, transient, temporary housing