Depression, sexual behavior, and HIV treatment outcomes among transgender women, cisgender women and men who have sex with men living with HIV in Brazil and Thailand: a short report

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ABSTRACT
One in five transgender women (TW) are living with HIV, yet little has been published about their health outcomes. We analyzed data from TW ($n = 37$), cisgender women (CW, $n = 165$), and cisgender men who have sex with men (MSM, $n = 151$) in Thailand and Brazil. We hypothesized: (1) TW will have higher odds of depressive symptoms, lower odds of condom use and greater odds of a detectable viral load compared to MSM and CW; and (2) TW will have lower odds of condom use and higher odds of detectable viral load. We found that TW had higher odds of depression (OR 2.2, 95%CI: 1.0, 4.8, $p = 0.04$) and were less likely than MSM (22% v. 42%, $p = 0.01$) to use condoms with partners of unknown serostatus. In multivariable models, TW had lower odds than MSM of using condoms with partners with unknown serostatus (OR 0.38, 95%CI: 0.15, 0.90) and CW had lower odds than MSM of using condoms with HIV-negative partners (0.60 [0.38, 0.95], $p = 0.029$). We found no significant differences in detectable viral load. Disaggregating data by gender is important to understand factors that contribute to viral suppression and HIV transmission risk among people living with HIV.

Introduction

One in five (19%) TW are estimated to be living with HIV worldwide (Baral et al., 2013). In addition to HIV, prevalence estimates of lifetime depression among TW are also high, ranging from 35% to 63% (Bazargan & Galvan, 2012; Jefferson, Neilands, & Sevelius, 2013; Nutt-brock et al., 2013). Depression has been associated with HIV risk behavior as well as treatment non-adherence and lack of viral suppression among people living with HIV (PLHIV) (Brickman, Propert, Voytek, Metzger, & Gross, 2017; Castel et al., 2016; Do et al., 2014).

Despite high rates of HIV and depression among TW, data are limited on the mental health, sexual behavior, or HIV treatment outcomes of TW living with HIV (TWLHIV) (Poteat et al., 2019). TW are often conflated with MSM in pooled data that make it difficult to identify the unique factors relevant for TW (Poteat, German, & Flynn, 2016). Very few studies situate TWLHIV in the context of other women living with HIV who may share common experiences as women. The few published studies on TWLHIV are based in North America, and

data from low and middle-income countries are scant (Poteat, Scheim, Xavier, Reisner, & Baral, 2016).

The HIV Prevention Trials Network (HPTN) 063 study was a one-year multi-site observational cohort of adults in HIV care in Chiang Mai, Thailand; Rio de Janeiro, Brazil; and Lusaka, Zambia. While not actively recruited, TW were not excluded from participation. The present analysis tests the hypotheses that TW will have higher odds of depressive symptoms, lower odds of condom use, and greater odds of a detectable viral load than MSM and CW.

Methods

We analyzed baseline data from 353 participants enrolled in Brazil and Thailand. The Zambia site did not include MSM or TW; therefore, those data were excluded. TW included participants assigned male at birth who reported their current gender as "female" or who responded "yes" to the question, "Do you consider yourself transgender?" The final sample included 37

TW, 151 MSM, and 165 CW. The study was approved by ethical review boards in both Brazil and Thailand.

Participants

Enrolled participants were 18 years of age or older; had documented HIV infection; had at least two visits within nine months of enrollment at a formal health care setting; and had a history of sexual risk behavior in the prior 12 months. Informed consent was obtained from all participants. Details about the parent study are published elsewhere (Magidson et al., 2016).

Data collection

Interviewer-administered individual structured interviews were conducted with each participant. Sexual behaviors were assessed via Audio-Computerized Self-Interview (ACASI). All data are from the baseline enrollment visit.

Measures

Demographics included sex assigned a birth, current gender, age, education, employment, and country of residence. Sexual risk behaviors included: (1) insertive positioning with last penetrative sexual partner (MSM and TW only); (2) receptive positioning with last penetrative sexual partner (MSM and TW only); and (3) condom use with partners in the prior three months–dichotomized as "always" or "not always." The Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) measured depressive symptoms. A score of 16 or higher was used as the cut-off for significant depressive symptoms. HIV viral load was abstracted from the medical record.

Analysis

Analyses were conducted using Stata 14 (StataCorp, College Station, Texas, USA). Due to previously identified country by risk group interactions (Safren et al., 2016), we conducted stratified analyses and adjusted results by country. Descriptive statistics, chi square tests of association, and multivariable logistic regression models were conducted to test relationships between gender and key outcome variables. Due to the small number of TW, we did not control for other covariates.

Results

Demographics

The mean age of participants was 37 (range 18–62) with no difference by gender (Table 1). TW had the lowest proportion of unemployment (16%) and the highest engagement in sex work (11%). None of the TW had undergone genital reconstruction surgery; and all retained a penis.

Depressive symptoms

Depressive symptoms were common with mean scores consistent with significant depression in all gender groups (Table 2). Controlling for site, TW had twice the odds of significant depression compared with MSM (OR 2.24 [95%CI: 1.04, 4.80], $p = 0.039$); however, differences between TW and CW did not reach statistical significance.

Sexual position and condom use

The vast majority (97%) of TW had receptive anal sex with their last partner and had greater odds of doing so

Table 1. Demographic characteristics.

Participant characteristic	Transgender women ($n = 37$)	Cisgender women ($n = 165$)	Cisgender MSM ($n = 151$)	TOTAL ($n = 353$)
Age in years				
Mean (range)	37 (19–54)	38 (18–54)	36 (18–62)	37 (18–62)
Country				
Thailand	73.0% ($n = 27$)	40.0% ($n = 66$)	40.4% ($n = 61$)	43.6% ($n = 154$)
Brazil	27.0% ($n = 10$)	60.0% ($n = 99$)	59.6% ($n = 90$)	56.5% ($n = 199$)
Education				
Primary or less	37.8% ($n = 14$)	**61.2% ($n = 101$)***	24.5% ($n = 37$)	43.1% ($n = 152$)
Secondary	46.0% ($n = 17$)	**29.7% ($n = 49$)***	39.7% ($n = 60$)	35.7% ($n = 126$)
Tech/Some college	5.4% ($n = 2$)	6.1% ($n = 10$)	17.2% ($n = 26$)	10.8% ($n = 38$)
College graduate	10.8% ($n = 4$)	**3.0% ($n = 5$)***	18.5% ($n = 28$)	10.4% ($n = 37$)
Work Situation				
Unemployed	16.2% ($n = 6$)	21.2% ($n = 35$)	18.5% ($n = 28$)	19.5% ($n = 69$)
Sex work	10.8% ($n = 4$)	**0.0%***	**0.66% ($n = 1$)***	1.4% ($n = 5$)
Marital Status				
Never married	100% ($n = 37$)	**43% ($n = 70$)***	92% ($n = 139$)	69.7% ($n = 246$)
Currently married	0%	**41% ($n = 68$)***	5% ($n = 7$)	21.2% ($n = 75$)
Separated/Divorced	0%	**10% ($n = 17$)***	1% ($n = 2$)	5.4% ($n = 19$)
Widowed	0%	**6% ($n = 10$)***	2% ($n = 3$)	3.7% ($n = 13$)

TW = transgender women, CW = cisgender women, and MSM = cisgender men who have sex with men.
*$p < 0.05$ compared with TW.

Table 2. Depressive Symptom Scores by Gender.

	TW	MSM	p value (TW v. MSM)	CW	p value (TW v CW)
ALL	n = 37	n = 151		n = 165	
Depression score (0–60), mean, [95% CI]	16.8 [13.3,20.4]	15.8 [13.9, 17.7]	–	17.0 [15.1,19.0]	–
Depression cutoff (>16) n (%)	19 (51%)	61 (40%)	**OR 2.24* [CI: 1.04, 4.80] p = 0.039**	78 (47%)	OR 1.67* [CI: 0.79, 3.54] p = 0.181
THAI	n = 27	n = 47		n = 41	
Depression score (0–60), mean, [95% CI]	13.6	11.3	–	13	–
Depression cutoff (>16) n (%)	11 (41%)	14 (23%)	0.797	25 (38%)	0.092
BRAZIL	n = 10	n = 90		n = 99	
Depression score (0–60), mean, [95% CI]	25.6	19	–	19.8	–
Depression cutoff (>16) n (%)	8 (80%)	47 (52%)	0.113	53 (53%)	0.127

*adjusted for site.

Table 3. Sexual Behavior by Gender.

	TW	MSM	OR [95%CI] (TW v. MSM)	CW	OR [95%CI] (CW v. TW)
*ALL**	n = 37	n = 151		n = 165	
Insertive anal sex with last partner	27%	56%	**0.21 [0.09, 0.51] p = 0.001**	–	–
Receptive anal sex with last partner	97%	78%	**11.6 [1.5, 90.6] p = 0.019**	–	–
Condom use (or no sex) with HIV-negative	46%	50%	0.89 [0.42, 1.85] p = 0.748	37%	0.56 [0.26, 1.21] p = 0.138
Condom use (or no sex) HIV-unknown	22%	42%	**0.33 [0.14, 0.80] p = 0.014**	33%	1.77 [0.74, 4.27] p = 0.201
Disclose to sex partners (last 3 months)	15%	19%	0.88 [0.30, 2.59] p = 0.813	62%	**9.25 [3.32, 25.79] p < 0.0001**
THAI	n = 27	n = 61		n = 66	
Insertive anal sex with last partner	39%	66%	**0.33 [0.12, 0.90] p = 0.032**	–	–
Receptive anal sex with last partner	96%	71%	**9.3 [1.2, 75.4] p = 0.036**	–	–
Condom use (or no sex) with HIV-negative	41%	57%	0.52 [0.21, 1.32] p = 0.172	29%	0.60 [0.23, 1.53] p = 0.281
Condom use (or no sex) HIV-unknown	27%	49%	0.38 [0.14, 1.05] p = 0.060	32%	1.29 [0.47, 3.57] p = 0.621
Disclose to sex partners (last 3 months)	22%	12%	2.08 [0.56, 7.70] P = 0.271	60%	**5.4 [1.77, 16.5] p = 0.003**
BRAZIL	n = 10	n = 90		n = 99	
Insertive anal sex with last partner	0	51%	**0.07 [0, 0.47] p = 0.003**	–	–
Receptive anal sex with last partner	100%	82%	2.87 [0.42, infinity] p = 0.326	–	–
Condom use (or no sex) with HIV-negative	60%	45%	1.81 [0.48, 6.87] P = 0.385	43%	0.50 [0.13, 1.88] p = 0.302
Condom use (or no sex) HIV-unknown	10%	36%	0.19 [0.20, 1.61] p = 0.128	34%	4.57 [0.55, 37.6] p = 0.158
Disclose to sex partners (last 3 months)	0	23%	0.25 [0, 1.70] p = 0.183	63%	**23.2 [3.56, infinity] p = 0.0002**

TW = transgender women, CW = cisgender women, and MSM = cisgender men who have sex with men.
OR = odds ratio; [95% CI] = confidence interval; * = adjusted for site.

than MSM (78%) [OR 11.6; 95% CI: 1.5, 90.6]. TW had reduced odds of insertive anal sex with their last partner (27%) compared with MSM (56%) [OR 0.21; 95%CI: 0.09, 0.51]. (Table 3). TW (22%) had significantly lower odds [OR 0.33, 95%CI: 0.14, 0.80] than MSM (42%) of reporting condom use with partners whose HIV status was unknown; however, in site-stratified analyses, this difference was no longer statistically significant.

Adherence and detectable viral load

Adherence to ART was suboptimal with 50%, 54%, and 70% of CW, MSM, and TW reporting no missed doses in the prior 6 months (Table 4). A greater proportion of TW reported no missed doses compared to other gender groups, but this difference did not reach statistical significance. There were no significant differences in detectable viral load by gender within each site nor overall when adjusted for site (Table 5).

Predictors of condom use and viral load

On bivariate analysis, depression was not significantly associated with condom use. However, participants with significant depression had 1.6 times the odds [95% CI: 1.00, 2.71] (p = 0.05) of having a detectable

Table 4. Antiretroviral Therapy (ART) Use and Adherence by Gender.

	TW	MSM	OR [95%CI] (TW v. MSM)	CW	OR [95%CI] (CW v. TW)
ALL*					
Ever taken ART	34/37 (92%)	111/148 (75%)	2.02 [0.53, 7.75] p = 0.30	139/163 (85%)	0.80 [0.22,3.00] p = 0.75
ART in last 3 mo.	33/34 (97%)	111/111 (100%)	0.15 [0.0, 6.0] p = 0.27	131/139 (94%)	1.23 [0.02,11.9] p = 1.00
No missed doses, 3 mo.	23/33 (70%)	59/110(54%)	1.56 [0.66, 3.72] p = 0.31	66/131 (50%)	0.77 [0.31,1.94] p = 0.585
Adherence (1–6)*	4.8 [4.5, 5.0]	4.5 [4.3, 4.7]	–	4.4 [4.2, 4.6]	–
THAI					
Ever taken ART	26/27 (96%)	59/61 (97%)	0.88 [0.08,10.16] p = 0.92	62/66 (94%)	0.60 [0.06,5.59] p = 0.65
ART in last 3 mo.	26/26 (100%)	59/59 (100%)	***	62/62 (100%)	***
No missed doses in 3 mo.	20/26 (77%)	38/59 (59%)	1.84 [0.64,5.30] p = 0.26	47/62 (76%)	0.94 [0.32,2.77] p = 0.91
Adherence (1–6)*	4.7[4.4,5.0]	4.4[4.2,4.5]	–	4.3[4.2,4.6]	–
BRAZIL					
Ever taken ART	8/10 (80%)	52/87 (60%)	2.69 [0.53,13.43] p = 0.23	77/97 (79%)	0.96 [0.19,4.89] p = 0.96
ART in last 3 mo.	7/8 (88%)	52/52 (100%)	1.22 [0.02, 11.9] p = 1.00	69/77 (90%)	1.23 [0.13,11.34] p = 0.85
No missed doses in 3 mo.	3/7 (43%)	21/51 (41%)	1.07 [0.22,5.29] p = 0.93	19/69 (28%)	0.51 [0.10,2.48] p = 0.40
Adherence (1–6)*	4.9[3.7,6.0]	4.7[4.4,5.0]	–	4.5[4.2,4.8]	–

TW transgender women, CW = cisgender women, and MSM = cisgender men who have sex with men. Mo. = months.
OR = odds ratio; [95% CI] = confidence interval; *Adherence scores range from very poor (1) to excellent (6).
* = adjusted for site.

Table 5. Detectable Viral Load (VL) by Gender and Site.

	Both sites	Brazil	Thailand	OR [95%CI] Brazil v. Thailand
Transgender women	n = 30	n = 8	n = 22	
Current Detectable VL (%)	5 (17%)	4 (50%)	1 (5%)	**21.0 [1.8, 240.5] p = 0.014**
Cisgender MSM	n = 129	n = 77	n = 52	
Current Detectable VL (%)	44 (34%)	36 (47%)	8 (15%)	**4.8 [2.01, 11.60] p < 0.001**
Cisgender women	n = 135	n = 88	n = 52	
Current Detectable VL (%)	39 (28%)	31 (35%)	8 (15%)	**2.99 [1.24, 7.15] p = 0.014**
ALL GENDERS				
Current Detectable VL (%)	88/299 (29%)	71/173 (41%)	17/126 (13%)	**4.45 [2.46, 8.08] p < 0.001**

OR = odds ratio; $\overline{X}$ = mean score; [95% CI] = confidence interval.

viral load (Table 6). Among TW, higher depression scores were associated with a detectable viral load [OR 10.4, 95% CI: 1.24, infinity; p = 0.03]. The relationship between depressive symptoms and detectable viral load was not significant for CW nor MSM.

In multivariable logistic regression models, TW had 62% lower odds than MSM of using a condom with a partner whose HIV status was unknown [OR 0.38, 95% CI: 0.16, 0.90; p = 0.03] (Table 7). Study site was the sole significant predictor of detectable viral load with a 4-fold

higher odds of a detectable viral load at the Brazil site [OR 4.1, 95%CI: 2.2,7.6; p < 0.001].

Discussion

We analyzed depression, sexual risk behavior, and detectable viral load among TW, CW, and MSM living with HIV in Thailand and Brazil. We found that TW had significantly greater odds of high depression scores compared with MSM but not with CW. TW had lower

Table 6. Bivariate Associations with Depression (CES-D Score >16) by Gender, OR [95%CI], p-value.

Outcome variable	Transgender women	Cisgender women	Cisgender MSM	ALL
Condom with HIV negative partner	1.13 [0.31, 4.10] p = 0.858	0.95 [0.50,1.82] p = 0.901	0.80 [0.41,1.55] p = 0.499	0.87 [0.57,1.34] p = 0.53
Condom with HIV unknown partner	0.52 [0.10, 2.61] p-0.427	1.18 [0.61,2.31] p = 0612	0.59 [0.30,1.16] p = 0.127	0.77 [0.50,1.22] p = 0.28
Detectable viral load	**10.36 [1.24, infinity] p = 0.028**	1.23 [0.59, 2.58] p = 0.583	1.80 [0.85,3.78] p = 0.127	**1.64 [1.00,2.71] p = 0.052**

CES-D = Center for Epidemiology Studies – Depression Scale.

Table 7. Multivariable Logistic Regression Models for Condom Use and Detectable Viral Load, OR [95%CI].

Dependent variables	Condom use: HIV-negative partner	Condom use: HIV-unknown partner	Detectable viral load
Gender			
Transgender woman	0.91 [0.43, 1.92], *p* = 0.807	**0.38 [0.16, 0.90], *p* = 0.028**	0.56 [0.19, 1.67], *p* = 0.301
Cisgender woman	**0.60 [0.38, 0.95], *p* = 0.029**	0.71 [0.44, 1.13], *p* = 0.150	0.68 [0.40, 1.18], *p* = 0.169
Cisgender MSM	ref	ref	ref
Depression score			
≥16	0.87 [0.55,1.36], *p* = 0.531	0.85 [0.53, 1.36], *p* = 0.504	1.33 [0.78, 2.27], *p* = 0.299
<16	ref	ref	ref
Site			
Brazil	1.18 [0.75, 1.87], *p* = 0.476	0.78 [0.49, 1.25], *p* = 0.296	**4.12 [2.22, 7.62], *p* < 0.001**
Thailand	ref	ref	ref

odds than MSM, but not CW, of using condoms with partners whose HIV status was unknown. The proportion with a detectable viral load did not vary significantly by gender. In multivariable regression models that accounted for geographic location, gender, and depressive symptoms, location was the only predictor of a detectable viral load that remained statistically significant.

This analysis was limited by the substantial differences between sites and the small number of TW at each site. Results should therefore be considered hypothesis-generating for future multi-national studies with TW. The finding that 10% of participants in a study designed to recruit MSM actually identified as TW supports the feasibility of recruiting larger samples of TW with tailored strategies. More research is needed to address the understudied HIV outcomes and risk behavior among TW outside of North America.

Disclosure statement

No potential conflict of interest was reported by the authors.

Data availability statement

The data that support the findings of this study are available the HIV Prevention Trials Network (HPTN at https://www.hptn.org/research/studies). Restrictions apply to the availability of these data, which were used after approval from the HPTN leadership for this study.

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