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Syndemic Conditions, HIV Transmission Risk Behavior, and Transactional Sex among Transgender Women

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Abstract

This study examined the effect of four syndemic conditions—namely, polydrug use, depression, childhood sexual abuse, and intimate partner violence—on rates of HIV transmission risk behavior (TRB) and separately, transactional sex among transgender women. TRB was defined as the number of condomless penetrative sex events with a casual or main partner of discordant or unknown HIV status. Using data from 212 transgender women in New York City, multivariable analyses revealed that, compared to those with no syndemic conditions, dramatically higher rates of recent HIV TRB events ($ARR = 8.84, p < .001$) and recent transactional sex events ($ARR = 8.32, p < .001$) were reported by participants with all four syndemic conditions. These findings highlight the importance of considering the role of syndemic conditions in HIV risk among transgender women, and the need for comprehensive psychosocial interventions to improve sexual health among this population.

Keywords

syndemics; HIV transmission risk behavior; transactional sex; transgender women

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INTRODUCTION

Transgender women—individuals who were assigned a male sex at birth and currently identify as female—comprise one of the most vulnerable populations to the acquisition of HIV. High rates of HIV among transgender women have been noted in a recent meta-analytic study which estimated that almost 22% of transgender women in high-income countries, including the United States, are living with HIV [1]. Within the transgender population, transgender women of color are disproportionately affected by HIV [2–5], with an averaged HIV prevalence of 56% among African-American transgender women [6]. In addition, a systematic review of published studies identified very low rates of serostatus awareness or willingness to disclose; although 28% of transgender women tested HIV-positive, only 12% reported being HIV-positive [6].

Syndemics and HIV Risk in Transgender Women

The high prevalence of HIV among transgender women could be partly explained by their exposure to syndemic conditions, such as polydrug use, depression, childhood sexual abuse, and intimate partner violence. A syndemic occurs when multiple epidemics interact and mutually reinforce one another, and thereby increase the risk and consequences of disease [7]. Syndemic conditions generally develop in the context of social disadvantage and inequality, and as such, are more commonly experienced by marginalized groups, such as transgender women and men who have sex with men (MSM). Studies have found considerable empirical support for the co-occurrence of psychosocial syndemic conditions among MSM—most commonly polydrug use (use of two or more different drugs), depression, childhood sexual abuse, and intimate partner violence—and their additive effect on HIV risk via condomless sex [8–12]. However, research on the utility of the syndemics framework in explaining HIV risk among transgender women is comparatively scarce. Addressing this scarcity is especially important given findings that transgender women also experience high rates of substance use [3, 4, 13, 14], depression [4, 15], and sexual abuse/victimization [4, 14, 16], and engage in high rates of various HIV transmission risk behaviors [17–19]. For example, in a meta-analytic study, 44% of transgender women reported condomless receptive anal sex, while 27% reported condomless insertive anal sex, and 39% reported sex under the influence of drugs [6]. Understanding syndemic conditions associated with sexual behaviors involving HIV risk among transgender women is thus imperative.

Researchers have suggested that HIV transmission risk in transgender women increases with exposure to various conditions, such as violence and substance use [4, 5, 20, 21], but very few studies have utilized the syndemics framework to understand their overlapping and potentially synergistic effect on HIV transmission risk in this population. Brennan et al. (2012) reported that multiple syndemic conditions, such as polysubstance use and intimate partner violence, contributed to HIV transmission risk behavior among young transgender women in Chicago and Los Angeles [22]. Further, depression, violence victimization, and frequent alcohol use were found to be positively and additively related to sexual risk among transgender women in India [23], further supporting consideration as syndemic conditions.

Syndemics and Transactional Sex among Transgender Women

Additionally, transgender women, and particularly transgender women of color, experience disproportionately high rates of engagement in transactional sex, defined as exchanging sex for something such as money, shelter, food, drugs, and the like [3, 6, 17, 24–29].

Transactional sex is inclusive of sex work (typically referred to exchanging sex for money), but also captures events where sex was exchanged for other things that are not money, such as a temporary shelter (i.e., a place to spend the night). Accordingly, transactional sex is often termed survival sex, especially in the context of vulnerable groups such as transgender women [30]. Indeed, for many transgender women, transactional sex is often an economic necessity given the persistent employment discrimination and economic insecurity they face [31–40]. So far, with the exception of a limited number of studies, previous research with transgender women has primarily focused on sex work (sex in exchange of money), while overlooking the broader phenomenon of transactional sex.

Transactional sex represents another potentially risky context for HIV transmission behavior among transgender women in general [3, 41], and transgender women living with HIV in particular [3, 25, 42]. Transgender women engaging in transactional sex are at greater risk for engaging in condomless penetrative sex [3, 16, 24, 25, 43], which is often motivated by increased pay [36]. In their systematic review, Operario et al. (2008) concluded that transgender women who engage in transactional sex were at higher risk for becoming HIV-positive compared to other sex workers and to transgender women who did not engage in transactional sex [21].

Furthermore, previous research studies documented the associations between transactional sex and each of the four individual syndemic conditions discussed above [4, 6, 16, 17, 21, 24], especially drug use [21, 34, 44, 45]. For example, Wilson et al. (2009) reported that engagement in transactional sex among transgender women was related to drug use, which is not surprising given that some transgender women exchanged sex for drugs [29]. Further, Logie et al. (2017) reported positive associations between transactional sex and drug use, depression, childhood sexual abuse, and intimate partner violence in their study with transgender women in Jamaica [45]. Similarly, Harcourt et al. (2001) reported that transgender women in Australia who engaged in transactional sex often experienced violence and victimization, mainly from their exchange partners [33]. Since transactional sex often co-occurs with the four syndemic conditions which may increase HIV risk for transgender women, it seems appropriate to test the associations between these psychosocial conditions and transactional sex events in this population. However, studies examining the effect of the four co-occurring syndemic conditions described above on transactional sex among transgender women are scarce. Additionally, transgender women of color are more likely to be affected by many of the above conditions compared to both MSM and White transgender women, and may therefore be differentially exposed to HIV risk [15, 16, 46, 47].

In an effort to address the research gaps identified above, the present study aimed to examine the effect of interrelated syndemic conditions on HIV transmission risk behavior events with main and casual partners, as well as transactional sex events, among both HIV-positive and HIV-negative transgender women in New York City. The patterns of these associations were

explored in this study as previous studies found that the effect of the tested syndemic conditions, namely polydrug use, depression, childhood sexual abuse, and intimate partner violence, on HIV transmission risk behavior and transactional sex events could be either additive (i.e., linear) or synergistic (i.e., interaction, curvilinear).

METHODS

Between May 2014 and September 2016, data were collected from transgender women from the New York City metropolitan area who completed a baseline assessment as part of enrollment in a behavioral intervention for transgender women, *T-Talk*, which aimed to reduce substance use and sexual risk behavior through a combination of individual- and group-based, peer-led sessions in a waitlist design. Transgender women represent a hard-to-reach population and recruitment efforts remain challenging [48], and thus a mixture of active, passive, and online recruitment strategies that have been effective in studies recruiting gay and bisexual men were modified and utilized [49]. Our active recruitment efforts included collaborating with community-based organizations, and visiting venues, bars, and nightclubs frequented by transgender women. Awareness of the study was further increased by attending transgender-related events and meetings, building our reputation and trustworthiness in the local transgender community. Passive recruitment efforts focused on providing study materials to case workers, social workers, and providers of health, mental health, and substance use services for transgender women. Drop-in hours were also employed to allow participants to show up for a baseline visit throughout the workday and evenings. Online recruitment efforts included advertising the study on numerous social networking and media websites (e.g., Facebook, Craigslist), LISTSERV emails, and a Project Newsletter e-mailed to transgender women who had expressed interest in participating in the study.

Four hundred and eighty-seven transgender women were screened, of whom 382 (78%) screened preliminarily eligible for a baseline visit. Eligible participants had to be 18 or older and able to complete a survey in English, identify as a transgender woman (i.e., operationalized in this study as individuals who were assigned a male sex at birth and currently identify as female), provide contact information, reside in the New York City or New Jersey metropolitan area, and report at least one sexual act (regardless of condom use) or one day of drug use (excluding alcohol) in the past 60 days. Those who were, at the time of the study, enrolled in a drug abuse treatment or in an HIV risk or drug use intervention study were excluded. Of the 382 transgender women who screened preliminarily eligible, 37 were not interested in participating or declined prior to consent, 121 did not attend their scheduled baseline, and five were excluded during the baseline due to psychiatric reasons or inconsistent answers. Of the 219 transgender women who were assessed at baseline, 214 completed the assessment. Of these, two were missing data on either a demographic or syndemic variable, and thus 212 were included in the analytic sample of the current study. The baseline assessment included a Time-Line Follow-Back interview [50], during which participants were asked about their sexual behavior and substance use in the past 60 days, and a Computer-Assisted Self-Interviewing (CASI) survey. The Timeline Follow Back interview was administered by a trained research assistant and was audio-recorded, and quality assurance was ensured by subsequent checking by a separate, trained research

assistant. Participants were asked to recall days when drug use and/or sex events occurred—and, if so, what types of drugs were used and whether the sex involved penetration, condom use, a casual vs. main partner (as well as perceived HIV status), and whether it involved transactional sex. The full baseline assessment lasted between 70–150 minutes. All participants provided informed consent to participate, and those who completed the baseline assessment described above received a \$40 stipend for their participation. All study protocols were approved by the City University of New York Institutional Review Board.

Measures

Participant characteristics—Participants self-reported their age, race and ethnicity, annual income (in brackets of \$10,000), level of education, sexual orientation identity (heterosexual versus lesbian, gay, bisexual, or queer; LGBQ), relationship status (assessed by asking participants whether they are currently seeing someone they consider to be a main partner), HIV status (HIV-negative status confirmed by testing or self-reported HIV-positive status), and the age when the participant first began their gender-affirming process (i.e., transition) or living as a woman. Other than self-identifying as a transgender woman, gender identity was assessed using an open-ended question that was then re-coded into three main categories: participants whose gender identity label included the any of the words “female”, “woman”, or “girl” without the term “trans” were grouped as female/woman/girl; (2) participants whose gender identity label included the word “trans” in any form (e.g., “transgender”, “trans-feminine”) were grouped as trans*, and (3) participants whose gender identity label was not captured by the first two options, such as “Gender Fluid”, were grouped as other.

Polydrug use—Participants reported on their use of any of the following substances in the past 60 days: crack/cocaine, gamma-hydroxybutyrate (GHB), ketamine, ecstasy, heroin/opiates, crystal methamphetamine, and marijuana. Polydrug use was defined as the use of two or more of these substances (1 = yes, 0 = no) in the past 60 days.

Depression—The 20-item Center for Epidemiological Studies Depression Scale (CESD) [51] to assess depression symptomology in the past three months was utilized. Response options ranged between 0 (*rarely or none of the time*) to 3 (*most or all of the time*), and possible scores range from 0 to 60. We summed these responses—and the internal consistency of the scale was $\alpha = 0.88$. We used a cut-off of 23 or greater to indicate symptomology of depression (1 = yes, 0 = no), and extended the timeframe from past seven days to past three months. The higher cut-off of 23 was employed to adjust for the extended timeframe, as has been done in previous studies of syndemics [9, 10, 11, 12].

Childhood sexual abuse—Participants were asked about whether they had experienced childhood sexual abuse when they were aged 16 or younger. Consistent with previous studies on syndemics [10, 12], childhood sexual abuse was defined as a past sexual activity when aged 16 or younger, into which participants felt forced or frightened by someone who was one or more years older than them (1 = yes, 0 = no).

Intimate partner violence—Participants were asked about whether they had experienced any form of intimate partner violence within the past five years. Utilizing Greenwood et al.'s (2002) adaptation of the Revised Conflict Tactics Scale [52, 53], participants who indicated that they had experienced any of 12 forms of intimate partner violence within the last five years were coded as a 1 on a dichotomous variable of intimate partner violence.

HIV transmission risk behavior events—Utilizing the Timeline Follow-Back interview, participants were asked to indicate the number of events when they had engaged in any vaginal or anal (i.e., penetrative) sex with a casual or main partner who was of known discordant or unknown HIV status in the past 60 days. On days when events were indicated, participants were asked to report on whether condoms were used. The number of condomless penetrative sex events with a casual or main partner of discordant or unknown HIV status in the past 60 days (constituting HIV TRB) was summed as a count variable.

Transactional sex events—For each sex event (whether involving oral, anal, or vaginal sex) reported above, participants were asked whether the sexual event involved the exchange of goods, accommodation, and/or money. Unlike HIV TRB, the operationalization of transactional sex in this study included oral sex to capture all possible sex events that were of a transactional nature, despite the relatively lower HIV risk involved in oral sex. The number of total events in the past 60 days was summed as a count variable.

Analytic Plan

Analyses included three steps. First, the presence of each syndemic condition reported by participants was summed to form an overall score ranging from 0–4. Analyses involving the count variables, HIV TRB events and transactional sex events, were conducted using negative binomial regressions, as the distributions of these count variables were non-normal and would have violated the assumptions of linear regressions. Negative binomial regressions have been used for count variables in previous studies involving sex events [54, 55]. The demographic comparisons of HIV TRB events and transactional sex events were conducted with negative binomial regressions in which the demographic variable of interest was entered as the only predictor, generating estimated marginal means. Comparisons of HIV-seropositivity among the various demographic groupings used independent chi-square tests for categorical variables and independent samples *t*-tests for continuous variables. Second, associations between the four syndemic conditions were tested using a binary logistic regression, as were their associations with the total syndemics score. Their associations with both outcome variables (i.e., HIV TRB events and transactional sex events) were tested using a negative binomial regression. Spearman's correlations were computed between the total syndemics score and the two outcomes variables. Last, we ran two separate multivariable negative binomial regression models—one with number of syndemic conditions predicting the count of recent HIV TRB events and one predicting the count of recent transactional sex events. In each of these models, the same demographic characteristics were adjusted for: age, race/ethnicity (referent = White), relationship status (referent = partnered), sexual orientation (with LGBQ as the referent), education level (referent = having an undergraduate or graduate degree), and HIV status (with a negative or

unknown HIV status as the referent). Model fit statistics are reported utilizing the Likelihood Ratio Chi-Square statistic for each full model.

RESULTS

Table 1 shows the demographic characteristics of the sample. Participants' age ranged from 18 to 65 years ($M = 34.3$, $SD = 11.6$), and 75.5% were women of color. Note that the grouping of women of color was comprised of 67 Black women, 71 Latina women, 17 women reporting multiple racial backgrounds, four women identifying as American Indian or Native Alaskan, and one as Asian. Due to small cell sizes, the latter three categories were combined as Multiracial or Other. Age of first living as a woman ranged from 1 to 64 years ($M = 22.4$, $SD = 10.1$). A majority of the participants self-identified as female/woman/girl (59.0%) compared to being trans* or other, and as LGBTQ (lesbian, gay, bisexual, or queer; 52.4%). Seventy-four (34.9%) transgender women reported having an HIV-positive status. The majority of the sample (80.2%) earned less than \$20,000 annually, and half of the sample (50.9%) was single. A total of 86 transgender women in this sample engaged in at least one HIV TRB event in the past 60 days ($M = 3.9$, $SD = 11.4$, range 0 – 87), and ninety transgender women reported at least one transactional sex event in the past 60 days ($M = 3.9$, $SD = 8.5$, range 0–60). Number of past 60-day HIV TRB events were, on average, higher among: women of color (compared to White participants); those with an annual income below \$20,000 (compared to those earning \$20,000 or more); those currently receiving income assistance (compared to those who were not); partnered participants (compared to single participants); women identifying as heterosexual/straight (compared to LGBTQ); and, among those with high school education or less (compared to those with some college). Differences among those with a bachelor or graduate degree did not reach statistical significance. Moreover, being Black/African-American or Latina, single, heterosexual, and those receiving income assistance were found to have, on average, higher number of transactional sex events in the past 60 days.

In addition, it was found that a total of 28 (13.2%) transgender women reported no syndemic conditions, 54 (25.5%) reported one, 70 (33.0%) reported two, 50 (23.6%) reported three, and 10 (4.7%) reported all four conditions. Of these, 70 (33.0%) reported polydrug use, 88 (41.5%) met the cut-off for depression, 88 (41.5%) reported a history of childhood sexual abuse, and 138 (65.1%) reported experiencing intimate partner violence in the past five years. Median-split comparisons of the number of these syndemic conditions between the various demographic groups revealed that the median differed according to race and ethnicity (with White participants having a median of one syndemic condition while women of color had a median of two) and HIV status (HIV-negative participants had a median of one condition and HIV-positive participants had a median of two).

Table 2 displays bivariate associations expressed as odds ratios for categorical outcomes, and rate ratios or Spearman's correlations for count outcomes. At the bivariate level, intimate partner violence was associated with polydrug use, childhood sexual abuse, depression, the total syndemics score, and both HIV TRB and transactional sex events. Each of the four syndemic conditions (except for depression) and total syndemics score were associated with higher numbers of recent HIV TRB events. Each of the four syndemic conditions (except for

childhood sexual abuse), the total syndemics score, and the number of HIV TRB events were associated with higher numbers of recent transactional sex events.

Table 3 presents the results of the first multivariable logistic regression model, with the number of syndemic conditions predicting the number of recent HIV TRB events, adjusting for the covariates of age, race and ethnicity, relationship status, sexual orientation, income, education, and HIV status. Having all four syndemic conditions was associated with the highest rate ratios of HIV TRB events (ARR = 8.84, 95%-CI: 3.79, 20.64, $p < .001$) compared to those with no syndemic conditions, adjusting for the covariates. Further, those with one condition had, on average, three times more HIV TRB events than those with no conditions (ARR = 3.17, 95%-CI: 1.70, 5.91, $p < .001$), and those with two or three conditions had almost two times as many (ARR = 1.78, 95%-CI: 1.01, 3.14, $p < .05$ and ARR = 1.97, 95%-CI: 1.07, 3.64, $p < .05$, respectively). Additionally, higher numbers of HIV TRB were also predicted by race and ethnicity (higher among women of color), lower income, being heterosexual/straight, and having a Bachelor or graduate degree.

Table 4 displays the results of the second negative binomial regression with the number of syndemic conditions predicting the number of recent transactional sex events adjusting for the same covariates listed above. Having all four syndemic conditions was associated with the highest rate ratios of transactional sex events (ARR = 8.32, 95%-CI: 3.22, 21.50, $p < .001$) compared to those with no syndemic conditions, adjusting for the covariates. Having three conditions was also associated with reporting more than eight times the rates of transactional sex events than those with no conditions (ARR = 8.14, 95%-CI: 4.00, 16.59, $p < .001$). Additionally, higher rates of transactional sex events were also predicted by race and ethnicity (higher among women of color), being single, being heterosexual/straight, having less than a Bachelor or graduate degree, and being HIV-negative.

DISCUSSION

We examined associations between syndemic conditions—namely polydrug use, depression, childhood sexual abuse, and intimate partner violence—and the frequency of recent HIV TRB events and of transactional sex events in a diverse sample of transgender women in New York City enrolled at the beginning of an intervention study targeting sexual risk behavior and substance use. At the bivariate level, each syndemic condition (except depression) was associated with higher rates of HIV TRB events, and polydrug use and intimate partner violence were both significantly associated with higher rates of transactional sex events. Further, at the multivariable level—adjusting for age, race and ethnicity, relationship status, sexual orientation, education level, and HIV status—we found that transgender women facing all four identified syndemic conditions reported greater rates of both HIV TRB events and transactional sex events, than those with fewer syndemic conditions. These findings highlight the importance of considering these syndemic conditions in relation to sexual health among transgender women, and are consistent with previous studies examining the association between exposure to certain psychosocial conditions and HIV transmission risk behavior [3–6, 13, 14, 16, 20, 21], as well as greater rates of transactional sex events [29, 33, 44, 45].

In addition to providing further support for the association between individual psychosocial conditions (e.g., polydrug use, intimate partner violence) and HIV transmission risk behavior, our findings also support the trends documented in the few studies that have utilized the syndemics framework to explain HIV transmission risk behavior among transgender women. For instance, Brennan et al. (2012) found that young transgender women residing in Chicago and Los Angeles who reported two, compared to three or four, syndemic conditions had the greatest odds of engaging in condomless anal intercourse, indicating that the pattern of the association between the number of syndemic conditions and HIV TRB events reported by transgender women is not necessarily linear and continuously additive [19]. Our findings also indicate a non-linear relationship with participants' total syndemics scores. This suggests that the linear pattern often found in studies of MSM samples is somewhat different for transgender women. It is possible that transgender women facing two, rather than one, syndemic conditions are more "inoculated" to stress and are therefore better able to withstand its deleterious consequences, such as HIV TRB and transactional sex events. However, further studies are needed to explore how and whether resilience is involved in this pattern of findings.

Additionally, the findings of the current study support the extant, yet scant, research examining the relation between syndemic conditions and transactional sex among transgender women. We are aware of only one study that investigated and found a positive association between number of syndemic conditions and history of sex work among transgender women [22]. The present study further elucidates the relationship between the number of syndemic conditions and transactional sex events in transgender women. For instance, the association between lower income (i.e., below \$20,000 annually) and transactional sex events was only marginally significant, although numerous studies noted that income and economic hardship were the main reasons for which transgender women initiated engaging in transactional sex [29, 31–40]. However, it is possible that the association between lower income and transactional sex was only marginally significant because transgender women who engage in transactional sex may be motivated by financial reasons, which might suggest their earning more than \$20,000 annually. Taken together, these findings suggest the importance of assessing sociocultural factors when examining transactional sex among transgender women.

These findings provide further support for the application of the syndemics framework to analyze the multiple co-occurring psychosocial conditions and their relation to HIV TRB events and transactional sex events among transgender women. In particular, these findings highlight the importance of considering context in how interrelated psychosocial conditions contribute to health risk. That is, multi-component HIV and transactional sex prevention efforts may be found most useful with transgender women. Notably, the syndemic conditions identified in this study typically arise in the context of social inequality. As such, structural interventions addressing the high rates of unemployment or underemployment (i.e., being underpaid) and housing instability experienced by transgender women may not only contribute to a reduction in HIV burden and engagement in transactional sex, but also in other psychosocial HIV risk factors [17, 26, 56]. Further, these findings highlight the relative urgency of focusing such interventions at certain groups within the broader community of transgender women. The highest priority for interventions targeting HIV TRB

and/or transactional sex among transgender women remains for those who are faced with the highest number of syndemic conditions.

In terms of limitations, our sample size and the various recruitment efforts employed in this study limit generalizability to populations of transgender women outside of the Metropolitan New York City area. While this study's sample is larger than samples in other studies with transgender women [15, 22, 46, 57], there were insufficient numbers in certain subgroups (e.g. race/ethnicity) to conduct meaningful comparisons. Data analyzed in this study were cross-sectional, and therefore, no causality can be inferred. For instance, inability to obtain gender-congruent identification documents due to discriminatory policies may put transgender women in greater risk of becoming unemployed, which may lead to economic hardship, and thus to engage in transactional sex. Such conditions may also make many transgender women particularly vulnerable to HIV. Future studies would benefit from including other psychosocial, structural, and socioeconomic conditions relevant to transgender women, such as housing instability, lack of access to routine healthcare, police brutality, and incarceration [22, 29, 58]. Additionally, the timeframe used for assessing the experience of numerous syndemic conditions was inconsistent—for instance, the experience of past childhood sexual abuse refers to a different timespan than the recent, past 60-day polydrug use. Also, several studies that have utilized the syndemics framework to explain HIV TRB in transgender women have included alcohol consumption as part of a broader potential factor of polysubstance (rather than polydrug) use [e.g., 22]. However, this study did not include measures of alcohol consumption that allowed us to measure such an association. Finally, given the importance of certain sexual characteristics and the relatively recent progress in biomedical HIV prevention efforts, future research should also consider sexual positioning, use of PrEP, and viral load suppression in the coding of what constitutes HIV TRB.

CONCLUSIONS

In sum, our findings provide further evidence that multiple co-occurring psychosocial conditions are associated with HIV transmission risk behavior and transactional sex among transgender women. Accordingly, comprehensive interventions targeting the identified syndemic conditions in an effort to address the high HIV prevalence among transgender women are especially warranted [59]. Future research addressing the identified psychosocial conditions, along with other overlooked challenges, such as transgender-related discrimination, housing instability, and incarceration, would further contribute to our understanding of how syndemic conditions may increase HIV risk and transactional sex among transgender women, and help to inform interventions addressing such problems.

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Table 1
Demographic Characteristics and Comparisons of HIV TRB and Transactional Sex Events (N = 212)

	Total		Recent HIV/ TRB Events ^c			Transactional Sex Events ^d		
	n	%	M	95% CI	Wald χ^2	M	95% CI	Wald χ^2
Race and Ethnicity								
Black/African American	67	31.6	4.81 ¹	3.69, 6.25		5.60 ¹	4.32, 7.26	
Latina	71	33.5	5.93 ¹	4.61, 7.62	70.81***	4.56 ¹	3.52, 5.90	46.36***
White	52	24.5	0.92 ²	0.62, 1.37		1.40 ²	0.98, 2.00	
Multiracial or Other	22	10.4	2.00 ³	1.20, 3.34		2.36 ²	1.44, 3.89	
Gender Identity								
Female/Woman/Girl	125	59.0	3.65	2.99, 4.45		3.46	2.83, 4.22	
Trans ^a	80	37.7	4.74	3.72, 6.03	2.70	4.63	3.63, 5.89	3.56
Other	7	3.3	0	0, 0		3.14	1.34, 7.36	
Relationship Status								
Single	108	50.9	2.97	2.39, 3.70		5.21	4.24, 6.40	19.00***
Partnered	104	49.1	4.94	4.00, 6.10	9.91**	2.51	2.00, 3.15	
Sexual Orientation Identity								
LGBQ	111	52.4	2.88	2.32, 3.58		2.61	2.10, 3.25	17.27***
Heterosexual/Straight	101	47.6	5.10	4.12, 6.31	12.02**	5.29	4.27, 6.54	
Income								
Below \$20,000	170	80.2	4.37	3.70, 5.16		4.11	3.47, 4.86	2.99
\$20,000 or more	42	19.8	2.19	1.52, 3.16	15.61***	3.00	2.12, 4.25	
Receiving Income Assistance^b								
Yes	92	43.4	5.02	4.01, 6.28		3.11	2.53, 3.82	7.65**
No	120	56.6	3.11	2.53, 3.82	8.41**	4.90	3.92, 6.13	
Education								
High School or less	88	41.5	4.80 ¹	3.81, 6.03		3.81 ¹	3.012, 4.81	
Some college	62	29.2	2.69 ²	2.01, 3.61	11.81**	5.34 ²	4.07, 7.00	14.31**
Bachelor degree	49	23.1	3.31 ^{1,2}	2.40, 4.55		2.69 ^{1,3}	1.94, 3.74	

	Total		Recent HIV TRB Events ^c			Transactional Sex Events ^d		
	<i>n</i>	%	<i>M</i>	95% CI	Wald χ^2	<i>M</i>	95% CI	Wald χ^2
Graduate degree	13	6.1	6.46 ^{1,2}	3.60, 11.59		2.00 ³	1.03, 3.89	
HIV Status								
Negative	138	65.1	3.54	2.93, 4.27		3.99	3.31, 4.81	
Positive	74	34.9	4.69	3.65, 6.03	2.79	3.69	2.85, 4.77	0.24
	<i>M</i>	<i>SD</i>		<i>r</i>			<i>r</i>	
Age (Range 18–65)	34.3	11.6		.02			-.06	
Age of First Living as a Woman (Range 1–64) ^e	22.4	10.1		-.11			-.25**	

Note. TRB = Transmission risk behavior; LGBQ = Lesbian, Gay, Bisexual, or Queer; Superscript numbers indicate significant differences between groups in estimated marginal means at $p < 0.05$ when the variable has more than two categories.

^aAll participants whose gender identity label included the word trans in any form.

^bSupplemental Security Income or Public Assistance.

^cNumber of condomless penetrative sex events with a casual or main partner of discordant or unknown HIV status in the past 60 days.

^dNumber of oral/anal/vaginal sex events that involved exchange for goods, accommodation, and/or money in the past 60 days.

^eData is available for only 206 transgender women included in this sample. Means and Wald χ^2 results were generated from negative binomial regressions without covariates on the two count variables.

Table 2
Bivariate Associations between Syndemic Conditions, HIV TRB Events, and Transactional Sex Events (N = 212)

	Polydrug Use	Depression	Childhood Sexual Abuse	IPV	Total Syndemics	HIV TRB Events ^a	Transactional Sex Events ^b
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	RR (95% CI)	RR (95% CI) / r
Polydrug Use	---	1.00 (0.56, 1.78)	0.64 (0.35, 1.15)	2.33 [*] (1.22, 4.47)	3.15 ^{***} (2.17, 4.57)	1.79 ^{***} (1.30, 2.45)	2.64 ^{***} (1.92, 3.63)
Depression	---	---	1.55 (0.89, 2.70)	1.80 [†] (1.00, 3.25)	4.37 ^{***} (2.88, 6.61)	1.25 (0.92, 1.70)	1.34 [†] (0.99, 1.82)
Childhood Sexual Abuse	---	---	---	2.38 ^{**} (1.30, 4.36)	4.01 ^{***} (2.69, 5.96)	1.72 ^{***} (1.27, 2.33)	0.93 (0.69, 1.27)
IPV	---	---	---	---	9.50 ^{***} (5.24, 17.22)	1.66 ^{**} (1.20, 2.29)	1.67 ^{**} (1.21, 2.31)
Total Syndemics (0-4)	---	---	---	---	---	1.36 ^{***} (1.58, 2.82)	1.47 ^{***} (1.27, 1.72)
HIV TRB Events^a	---	---	---	---	---	---	.27 ^{***}

Note. Associations between the four syndemic conditions were tested using a binary logistic regression, as were their associations with the total syndemics score. Their associations with both outcome variables (i.e., HIV TRB events and transactional sex events) were tested using a negative binomial regression. Spearman's correlations were computed between the total syndemics score and the two outcomes variables. IPV = Intimate Partner Violence; OR = odds ratio; CI = confidence interval; RR = rate ratio;

^a HIV transmission risk behavior events = number of condomless penetrative sex events with a casual or main partner of discordant or unknown HIV status in the past 60 days;

^b Number of oral/anal/vaginal sex events that involved exchange for goods, accommodation, and/or money in the past 60 days;

[†] $p < .10$;

^{*} $p < .05$;

^{**} $p < .01$;

^{***} $p < .001$

Table 3

Negative Binomial Regression Predicting HIV TRB Events (N = 212)

	HIV Transmission Risk Behavior Events with a Casual or Main Partner ^a	
	ARR	95% CI
Constant	0.41*	0.20, 0.86
Age (Years)	1.01	0.99, 1.02
Race and Ethnicity (ref = White)		
Women of Color	4.88***	2.93, 8.12
Relationship Status (ref = Partnered)		
Single	0.93	0.65, 1.33
Sexual Orientation (ref = LGBQ)		
Heterosexual/Straight	1.46*	1.02, 2.11
Annual Income (ref = \$20,000 or More)		
Below \$20,000	1.54 [†]	0.98, 2.43
Education (ref = Bachelor/Graduate Degree)		
High school or less (1)	0.46**	0.29, 0.73
Some college (2)	0.45**	0.27, 0.75
HIV Status (ref = Negative)		
Positive	1.07	0.72, 1.58
Number of Syndemic Conditions (ref = 0)		
1	3.17***	1.70, 5.91
2	1.78*	1.01, 3.14
3	1.97*	1.07, 3.64
4	8.84***	3.79, 20.64
Model Statistics		
Likelihood Ratio Chi-Square	$\chi^2(12) = 110.29***$	

Note. ARR = adjusted rate ratio; ref = referent group. LGBQ = lesbian, gay, bisexual, or queer;

^aNumber of condomless penetrative sex events with a casual or main partner of discordant or unknown HIV status in the past 60 days.

Table 4

Negative Binomial Regression Predicting Transactional Sex Events (N = 212)

	Transactional Sex Events ^a	
	ARR	95% CI
Constant	0.09***	0.04, 0.22
Age (Years)	1.00	0.98, 1.01
Race and Ethnicity (ref = White)		
Women of Color	2.49***	1.49, 4.15
Relationship Status (ref = Partnered)		
Single	1.99***	1.38, 2.88
Sexual Orientation (ref = LGBQ)		
Heterosexual/Straight	2.43***	1.72, 3.43
Annual Income (ref = \$20,000 or More)		
Below \$20,000	1.08	0.68, 1.73
Education (ref = Bachelor/Graduate Degree)		
High school or less (1)	1.43	0.90, 2.29
Some college (2)	1.84*	1.10, 3.07
HIV Status (ref = Negative)		
Positive	0.66*	0.45, 0.98
Number of Syndemic Conditions (ref = 0)		
1	6.96***	3.40, 14.28
2	5.19***	2.58, 10.45
3	8.14***	4.00, 16.59
4	8.32***	3.22, 21.50
Model Statistics		
Likelihood Ratio Chi-Square	$\chi^2(12) = 122.16***$	

Note. ARR = adjusted rate ratio; ref = referent group. LGBQ = lesbian, gay, bisexual, or queer;

^aNumber of oral/anal/vaginal sex events that involved exchange for goods, accommodation, and/or money in the past 60 days.