



# Syndemic Experiences, Protective Factors, and HIV Vulnerabilities Among Lesbian, Gay, Bisexual and Transgender Persons in Jamaica

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## Abstract

Syndemics approaches explore the convergence of psychosocial factors that elevate HIV vulnerabilities. Less research has explored syndemics among lesbian, gay, bisexual and transgender (LGBT) persons in contexts where criminalization has downstream impacts on LGBT discrimination, such as Jamaica. We implemented a cross-sectional survey with LGBT persons ( $n = 911$ ) in Jamaica. We conducted structural equation modeling to examine direct and indirect effects of a latent syndemics construct (binge drinking, depressive symptoms, childhood/adult abuse) on HIV vulnerabilities (lifetime sex partners, perceived HIV risk, condom self-efficacy) and the mediating role of protective factors (social support, resilient coping). Direct paths from syndemics to lifetime sex partners, perceived HIV risk, and condom self-efficacy were significant. Resilient coping and social support partially mediated the association between syndemics and condom use self-efficacy. Resilient coping partially mediated the relationship between syndemics and lifetime sex partners. Interventions can target syndemic issues to reduce HIV vulnerabilities among Jamaican LGBT persons.

**Keywords** Syndemics · LGBT · Resilience · Jamaica · HIV risk · Social support

## Introduction

Jamaica's strategic HIV response [1] contributed to a decrease in HIV incidence and a current adult HIV prevalence of 1.7% (95% CI 1.4–2.0) [2]. Yet lesbian, gay, bisexual and transgender (LGBT) individuals experience increased HIV vulnerabilities. For example, men who have sex with men (MSM) and transgender (trans) women continue to have the highest HIV prevalence in Latin America and the Caribbean (10.6% and 17.7% respectively) [3], and

remain overrepresented in Jamaica's epidemic. A 2012 Jamaican study indicated that MSM accounted for 32% of all new HIV infections [4] and a 2016 study reported an HIV prevalence of 25% among trans women in Jamaica [5].

Furthermore, although underexplored in the Caribbean and low and middle-income countries (LMIC) at large, systematic review findings suggest that lesbian, bisexual and other women who have sex with women (WSW) have an HIV prevalence ranging from 0 to 2.9% in the Caribbean and Latin America, with risk factors including sex with men, sex work, and substance use [6]. HIV vulnerabilities are understudied among lesbian, bisexual and WSW in Jamaica. While sexually and gender diverse persons have unique experiences and health needs [7], they share experiences of stigma and social exclusion that contribute to LGBT social and health disparities [8–12]. An important 2015 study demonstrated associations between social vulnerabilities, adverse life events, and exposure to HIV infection among MSM in Jamaica [13]. HIV vulnerabilities and protective factors remain underexplored among the larger LGBT community in Jamaica.

The syndemics biosocial framework details the interplay between social and health disparities, and has been

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helpful in elucidating pathways from socio-environmental factors to HIV vulnerabilities among LGBT persons [14–17]. Syndemics describe the multiple, co-occurring, mutually reinforcing psychosocial and structural factors, such as violence and substance use, that harm individual and population level health [14]. Syndemics frameworks may be valuable for better understanding HIV vulnerabilities among LGBT persons in Jamaica, where co-occurring violence, mental health, and substance use issues may elevate HIV vulnerabilities [18–20].

The association between syndemic factors and HIV vulnerabilities in LGBT populations is well established globally [21–24]. Syndemic factors such as poor mental health, substance use, violent victimization, discrimination, and economic insecurity are associated with HIV vulnerabilities in trans populations in diverse global contexts [16, 22]. Canadian [24] and U.S. [25] cross-sectional studies with MSM reported that syndemics, including a history of STIs and multiple sex partners, are related to depression and sexual stigma. A study with MSM ( $n = 3934$ ) in 151 countries reported associations between syndemic conditions, condomless anal sex, and HIV infection—yet Caribbean countries were not included in this study [21]. Research with MSM in Jamaica reported that indicators of social marginalization, including low socio-economic status, homelessness, and history of physical violence were associated with twice the likelihood of HIV infection [26]. Similarly, adverse life events such as a history of violence and sexual assault were associated with increased likelihood of HIV infection in another sample of MSM in Jamaica [13]. We build on these findings in Jamaica by (a) examining other syndemic issues such as mental health challenges (depressive symptoms, substance use), (b) exploring protective factors as mediators of the association between syndemics and HIV vulnerabilities, and (c) including a combined sample of LGBT persons.

Condom self-efficacy, the confidence in one's ability to obtain condoms, use them correctly, and negotiate condom use during sex, may be compromised by syndemic factors [27]. Longitudinal and cross-sectional research in the U.S. [27, 28], South Africa [29], Hong Kong [30], and Jamaica [31] reported that condom self-efficacy is associated with reduced sexual risk practices among MSM. Stigma and depression, however, are associated with reduced condom self-efficacy [29, 31].

The syndemics framework is particularly salient for contextualizing LGBT health and HIV exposure in Jamaica due to socio-political environmental factors including violence, a lack of human rights protections, and sex tourism. Jamaica has high reported rates of violence, with a homicide rate ranking of 6th in the world [32] and higher rates of sexual violence than other Caribbean countries [33]. Jamaican children are disproportionately affected by violence, including

high levels of sexual abuse [32]. There is also a high prevalence of intimate partner violence in Jamaica [34].

There is a lack of human rights protection for LGBT persons in Jamaica. Jamaica is one of 72 countries that criminalizes “buggery” (referring to anal sex) [35], a remnant of Jamaica's colonial past [36]. The “buggery” law, upheld in the Offences Against the Person Act, 1864, is used to justify state and socially-sanctioned violence and discrimination against toward LGBT persons [35]. Political corruption and state-sanctioned violence have undermined government attempts to address violence in Jamaica [37], and may exacerbate the lack of LGBT human rights protections [38]. Pervasive stigma, family rejection, and socially sanctioned violence from community members and police targeting LGBT persons are reported in Jamaica [39–41], as well as healthcare discrimination [42, 43]. Jamaica is a tourist destination for commercial sex and sex tourism, which heightens exposure to HIV and other STI transmission [44]. Taken together, these contextual factors may both elevate LGBT persons' exposure to violence while reducing their access to HIV prevention and care [39].

Across the globe, LGBT persons experience exposure to violence, and violence may be a distal driver of HIV vulnerabilities via depression and substance use. Meta-analyses including North American studies [45] and a systematic review of global studies [46] reported increased odds of experiencing childhood sexual abuse among sexual minorities in comparison with heterosexuals. Childhood sexual abuse is associated with depressive symptoms, suicidality, alcohol-related problems, sexual practices, and adulthood violence re-victimization [46]. Harris and Dunn's recent qualitative study focused on childhood sexual abuse with young Jamaican MSM discussed the lasting psychosexual trauma that continued into adulthood, fears of reporting, and associated maladaptive coping strategies such as substance use [47]. Adulthood violent victimization is also common among LGBT individuals. A study with 62 LGB individuals in Jamaica found that over half reported experiencing abuse related to their sexual orientation, that in turn was associated with depression and/or substance use challenges [48]. Qualitative research with LGBT youth in Jamaica described pervasive violence that resulted in depression, concealment of gender identity and/or sexuality, and coping strategies such as substance use [49]. The syndemic of violent victimization, depression, and substance use can increase sexual risk, and reduce HIV prevention and care engagement, in turn elevating HIV exposure and disease progression. This is referred to as the substance use, violence and AIDS “SAVA” syndemic [18–20, 48].

Protective factors such as resilience and social support may mitigate the negative impact of syndemics on LGBT persons' wellbeing. Resilience, the development of adaptive coping skills and stress-related growth, and social support

can buffer a host of negative outcomes in LGBT individuals [50]. A U.S. study with MSM reported that resilient coping was inversely related to syndemics and associated with uptake of risk reduction practices [51]. Qualitative studies with LGBT individuals in Jamaica [49] and African, Caribbean and Black LGBT individuals in Canada [52] report that social support and connectedness to LGBT communities are strategies to cope with violence, discrimination, and health care barriers. Further research on how resilience and social support may reduce the impact of syndemic factors on HIV vulnerabilities is needed, particularly in high stigma contexts with limited social support and sexual health resources for LGBT individuals.

Previous syndemics research typically uses condomless anal sex as an indicator of HIV risk in MSM [51, 53, 54] and trans women [23]. Broadening the lens to address HIV and other sexually transmitted infections vulnerabilities by including HIV risk perception and number of sex partners may enhance the applicability of the syndemics framework to the larger LGBT population, and has been examined in research with WSW [55] and women who have sex with men [56, 57]. There is a knowledge gap regarding associations between syndemics and the concept of condom self-efficacy, a sexual risk indicator with actionable implications that is understudied among trans individuals and WSW. We used the SAVA syndemic framework to explore associations between syndemics, protective factors, and HIV vulnerabilities among LGBT persons in Jamaica. Specifically, we examined associations between a latent syndemics construct (including binge drinking, depressive symptoms, childhood sexual abuse, adulthood intimate partner violence) and HIV vulnerabilities (condom self-efficacy, number of sex partners, HIV risk perception), and the mediating role of protective factors (resilient coping, social support) in the relationship between syndemics and HIV vulnerabilities, among LGBT persons in Jamaica.

## Methods

### Study Design and Population

We conducted a community-based research project that involved a cross-sectional survey administered to LGBT individuals in Kingston, Montego Bay, Ocho Rios and surrounding areas. We collaborated with a community-based AIDS Service Organization in Jamaica that identified the need for the research and initiated the relationship with the primary investigator (CHL). The community agency remained an active collaborator throughout the process of study design, data collection, data analysis and interpretation, and manuscript preparation. LGBT-identified peer research assistants (PRAs) were recruited, provided

feedback on the survey design, and were trained in research methods. Survey pilot testing was conducted with PRAs to enhance clarity and relevance of items. PRAs signed confidentiality agreements, recruited participants and conducted the surveys. The tablet-based, PRA-administered survey took approximately 35–40 min to complete. Respondents received an honorarium of \$1000 Jamaica dollars (approximately \$8 USD) for completing the survey.

We used chain-referral sampling, a sampling technique used to access marginalized populations [58]. Chain referral sampling uses a series of participant referrals to other members of the same target population and strategically accesses multiple networks to expand the scope of investigation beyond a single social network [59]. Chains of referrals are combined to form a sample that is more representative of the study group. Survey participants were provided with a coupon with a unique participant identification (ID) number, and were invited to refer a maximum of five other LGBT individuals in their social networks to participate in the study. Respondents were issued up to five coupons to recruit other LGBT individuals and received \$500 Jamaican dollars (~\$4 USD) for each participant that they recruited.

### Measures

*HIV risk factors* included condom self-efficacy, number of lifetime sexual partners, and perceived HIV risk. *Condom self-efficacy* was assessed by using Kalichman et al.'s scale for negotiating safer sex [60] (continuous, range 5–20, Cronbach's alpha: 0.75). This scale includes 5 items (e.g., "I am confident about suggesting using condoms or barriers with new sex partners") and a higher score indicates higher efficacy. *Number of lifetime sex partners* was measured continuously by asking "what is the number of sexual partners you have had so far?" *Perceived HIV risk* ("How much do you think you are at risk for HIV infection?") was measured with a Likert scale (1: no risk, 2: low risk, 3: medium risk and 4: high risk).

*Syndemic variables* assessed in this study included binge drinking, depressive symptoms in the past 2 weeks, intimate partner violence during adulthood, and childhood sexual abuse. *Binge drinking* was assessed by asking the number of drinks they usually have per sitting/outing. If the participants reported 5 or more, they were coded as binge drinking (Yes = 1), and participants that reported less than 5 drinks or never drinking were coded as not binge drinking (No = 0). Depressive symptoms in the last 2 weeks were measured continuously by using the two-item Patient Health Questionnaire-2 (PHQ-2) (range 2–8) [61]. *Adulthood intimate partner violence* was measured by asking: "Have you ever experienced interpersonal violence/domestic violence by a partner during your adulthood?" (Yes = 1, No = 0). *Childhood sexual abuse* was measured by asking: "Have you ever

experienced sexual abuse in childhood?” (Yes = 1, No = 0). For the purpose of this study, the explanatory variable was a latent construct of syndemics created with syndemic variables (binge drinking, depressive symptoms in the past 2 weeks, adulthood intimate partner violence, and childhood sexual abuse).

Protective factors—social support and resilient coping—were assessed and tested as mediators. *Needs for social support* were assessed continuously by using a scale developed by Bernal et al. [62] (range 7–35, Cronbach’s  $\alpha=0.80$ ) (e.g., “On a scale 1 (none) to 5 (a lot), how much emotional support did you need last month?”). We measured *resilient coping* using the Brief Resilience Scale [63] (continuous 6-item Likert scale, range 6–30, Cronbach’s  $\alpha=0.70$ ) (e.g., “On a scale 1 (strongly disagree) to 5 (strongly agree), how much do you agree with the following”: “I tend to bounce back quickly after hard times”).

We also included sociodemographic factors as covariates: age (continuous); monthly income in US dollars (continuous); city of residence (categories: Kingston, Montego Bay, Ochos Rios, and other); food insecurity (continuous, range 1–4; “On a scale of 1 [never] to 4 [everyday], how often do you go to bed hungry [because you didn’t have enough food] each week”); unstable housing in last month (no/yes; participants were coded as having unstable housing if they usually slept outside, in a shelter, or at a friend or relative’s house vs. their own room or shared apartment); current unemployment (unemployed vs. employed or studying); education level (less than high school vs. completed high school); and sexual and gender minority status (categories: gay, bisexual or MSM; transgender women; and lesbian, bisexual or WSW).

## Statistical Analyses

We first conducted descriptive analyses of all variables for the entire sample. Unadjusted and adjusted linear regression analyses were used to estimate the regression coefficients of condom self-efficacy, number of lifetime sex partners, and perceived HIV risk. The explanatory variable was the latent construct of syndemics, controlling for socio-demographic factors. Structural equation modeling was conducted using maximum likelihood estimation methods to test the direct effects of the latent construct of syndemics on HIV vulnerabilities (condom self-efficacy, number of lifetime sex partners, HIV risk perception) and the indirect effects via social support needs and resilient coping, adjusting for socio-demographic factors. Model fit was assessed using Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Standardized Root Mean Square Residual (SRMR) where a score of  $<0.08$  for RMSEA, a score greater than 0.90 for CFI, and a SRMR value lower than 0.05 indicate

an acceptable model fit [64–67]. For smaller sample sizes, Chi square can also be a measure of fit, however this measure is very sensitive to sample size and is not the defining result for model fit with sample sizes larger than 200, as the Chi square will generally be statistically significant with samples  $>400$  (such as in the present study) [68, 69]. For this reason the SRMR index is often preferred with large sample studies as it is relatively independent from sample size [65]. Statistical significance was set at the  $p < 0.05$  level. Missing responses ( $n = 11$ ) were excluded from the analyses. All statistical analyses were performed using STATA (version 14.0) and Mplus (version 1.40).

## Results

### Participant Characteristics

Table 1 displays the sociodemographic characteristics for the entire sample ( $N = 911$ ). The average age for the sample was approximately 26 years old ( $SD = 5.42$ , range 15–55), and the mean monthly income was US \$290.30 ( $SD = 1679.57$ , range 0–47355.63). Nearly one-third of the sample (32.30%,  $n = 284$ ) reported having unstable housing. Most participants (86.66%,  $n = 786$ ) reported depressive symptoms in the past 2 weeks. Over one-fifth (22.61%;  $n = 205$ ) reported binge drinking in the past 3 months. Nearly one-third (32.45%,  $n = 294$ ) experienced childhood sexual abuse and one-fifth (20.77%,  $n = 188$ ) intimate partner violence in adulthood. Bivariate analysis revealed significant differences in socio-demographic characteristics (age, monthly income, city of residence, education level, food insecurity and housing insecurity) by sexual and gender minority identities (see Table 1).

### Multivariate Linear Regression Exploring Associations Between Syndemics, HIV Risk Factors, and Proposed Mediators

Table 2 illustrates the unadjusted and adjusted regression coefficients for HIV vulnerability measures. In adjusted analyses, the latent construct of syndemics was positively and significantly associated with number of lifetime sex partners and perceived HIV risk. Higher social support needs and lower resilient coping were also associated with higher perceived HIV risk. Lower social support needs and higher resilient coping were associated with higher condom self-efficacy. All results were adjusted for age, education level, city of residence, relationship status, food insecurity, unstable housing, and sexual and gender minority identity.

**Table 1** Socio-demographic characteristics among lesbian, gay, bisexual and transgender persons in Jamaica (N = 911)

Characteristics	Full Sample	Missing (n)	Gay, bisexual and MSM	Transgender women	Lesbian, bisexual and WSW	P value
	N (%) / mean (SD, range)		N (%) / mean (SD, range)	N (%) / mean (SD, range)	N (%) / mean (SD, range)	
Total	n = 911		n = 569, 62.46%	n = 137, 15.04%	n = 205, 22.50%	
Age	25.46 (5.42, 15–55)	38	25.49 (5.73, 16–55)	24.22 (4.57, 15–44)	26.22 (4.86, 18–47)	< 0.01
Monthly income in US dollars	290.30 (1679.57, 0–47355.63)	81	203.26 (341.70)	215.00 (322.84, 0–2367.78)	660.73 (3809.79, 0–47355.63)	< 0.01
Location		4	n = 569	n = 134	n = 204	< 0.001
<i>Kingston</i>	354 (39.03)		159 (27.94)	92 (68.66)	103 (50.49)	
<i>Montego Bay</i>	140 (15.44)		125 (21.97)	3 (2.24)	12 (5.88)	
<i>Ocho Rios</i>	293 (32.30)		217 (38.14)	27 (20.15)	49 (24.02)	
<i>Other</i>	120 (13.23)		68 (11.95)	12 (8.96)	40 (19.61)	
Food insecurity	1.71 (0.86, 1–4)	2	1.72 (0.87, 1–4)	1.99 (0.95, 1–4)	1.50 (0.71, 1–4)	< 0.001
Unstable housing	284 (32.35)	33	182 (33.46)	71 (52.99)	31 (15.50)	< 0.001
Education, high school or higher	786 (86.66)	4	485 (85.84)	110 (80.29)	191 (93.17)	< 0.01
Depressive symptoms in the past 2 weeks	791 (86.83)		498 (87.52)	117 (85.40)	176 (85.85)	0.721
Binge drinking	206 (22.61)		117 (20.56)	26 (18.98)	63 (30.73)	< 0.01
Sexual abuse in childhood	294 (32.45)	5	182 (32.04)	47 (34.31)	65 (32.34)	0.878
Intimate partner violence in adulthood	188 (20.77)	6	97 (17.20)	36 (26.47)	55 (26.83)	< 0.01
Needs for social support	22.46 (6.30, 7–35)		22.75 (6.38, 7–35)	23.26 (6.52, 8–35)	21.13 (5.77, 7–35)	< 0.01
Resilience	19.90 (4.97, 6–30)		20.01 (4.77, 6–30)	19.69 (5.79, 6–30)	19.75 (4.94, 6–30)	0.701

**Table 2** Multivariate linear analyses of correlates of HIV vulnerabilities among lesbian, gay, bisexual and transgender persons in Jamaica (n = 900)

Variables	Condom self-efficacy		Number of lifetime sex partners		Perceived HIV risk	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
Latent construct of syndemics	−7.99 (3.62 to 12.87)**	−4.66 (−11.93 to 0.08)	105.12 (41.18 to 195.53)**	111.32 (20.75 to 228.40)*	5.27 (3.83 to 7.63)***	5.29 (3.18 to 9.73)**
Needs for social support	−0.01 (−0.03 to 0.03)	−0.05 (−0.08 to (−0.01))*	0.30 (−0.24 to 0.83)	−0.11 (−0.65 to 0.24)	0.03 (0.02 to 0.04)***	0.01 (0.01 to 0.03)*
Resilient coping	0.17 (0.13 to 0.21)***	0.13 (0.09 to 0.17)***	−0.21 (−0.89 to 0.46)	−0.13 (−0.80 to 0.42)	−0.04 (−0.05 to (−0.02))***	−0.03 (−0.04 to (−0.01))***

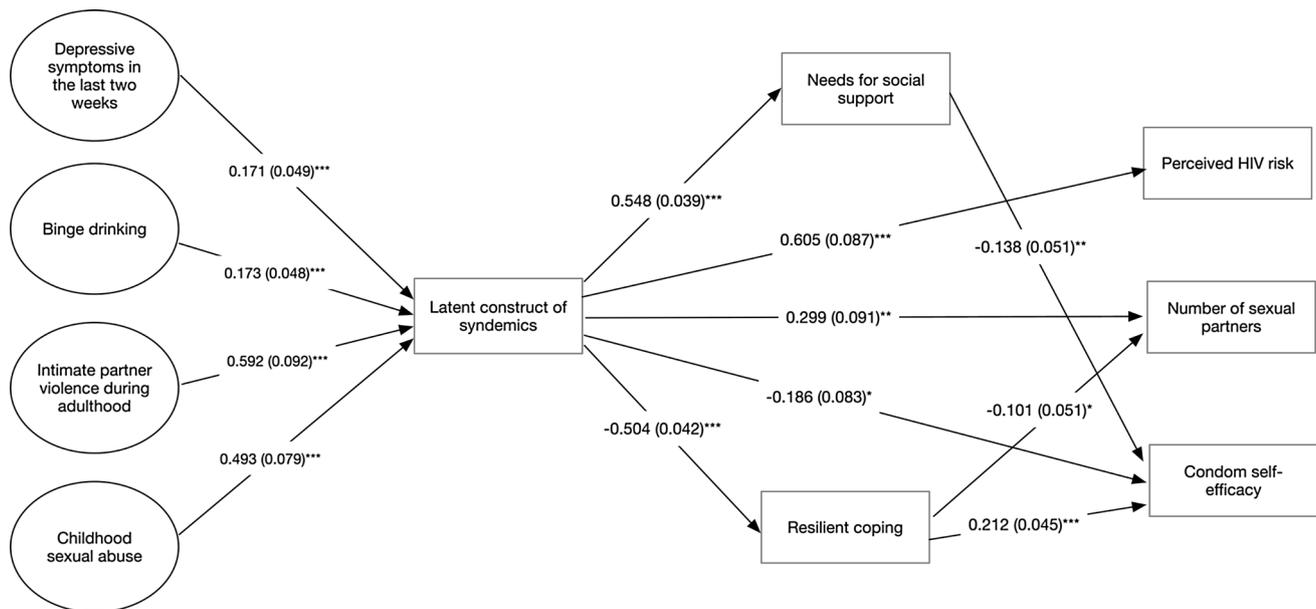
Covariates include: age, education level, city of residence, relationship status, food insecurity, unstable housing, and sexual and gender identity  
 \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

### Structural Equation Modeling of Associations Between Syndemics, HIV Risk Factors, and Proposed Mediators

Structural equation modelling was conducted to examine the direct and indirect effects of the latent construct of syndemics on HIV vulnerabilities. Model fit indices suggest that our model fit the data well ( $\chi^2[4] = 56.608, p < 0.001$ ;

CFI = 0.944; RMSEA = 0.054 [90% CI 0.041–0.080]; SRMR = 0.044).

Figure 1 illustrates the model with regression coefficients and the significance level of each pathway in our model. Standard coefficients indicate that with a standard deviation increase in the independent variable, the dependent variable would increase by x standard deviation, holding all other variables constant [70]. For example, with one unit standard deviation increase in the latent construct of syndemics,



**Fig. 1** Final structural equation modeling results for syndemic experiences on perceived HIV risk, lifetime number of sexual partners, and condom self-efficacy. Standard coefficients are reported with the standard errors in parentheses. Statistical significance is noted with

the following notations: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Covariates include age, income, city of residence, food and housing insecurity, unemployment, education level, sexual and gender minority identity.

condom self-efficacy would reduce by 0.186 standard deviations, holding all other variables constant. Standard errors were included in parentheses.

Results displayed in Table 3 illustrate that the direct paths from the latent construct of syndemics to number of lifetime sex partners, perceived HIV risk, and condom self-efficacy were significant, accounting for the mediation effects of social support needs and resilient coping. Social support needs accounted for 35.02% (0.076/0.217), and resilient coping 49.30% (0.107/0.217), of the total effect of the latent syndemics construct on condom self-efficacy. Resilient coping accounted for 26.56% ( $-0.057/-0.192$ ) of the total effect of the latent syndemics construct on lifetime sex partners.

## Discussion

In this community-based study with sexually and gender diverse persons in three Jamaican cities, we demonstrate evidence of co-existing health issues (depressive symptoms, binge drinking), social issues (childhood and adulthood violence experiences), and HIV vulnerabilities. Of urgent concern are the mental health and substance use concerns demonstrated by the high rates of depressive symptoms (86.66%) and past 3-month binge drinking (22.61%). Also important is addressing the long-term effects of childhood sexual abuse experienced by nearly one-third (32.45%), and

adulthood intimate partner violence reported by one-fifth (20.77%), of participants.

Our finding that syndemics were associated with HIV vulnerabilities corroborates prior research with MSM [51, 53, 54, 71], trans women [16, 23], and WSW [25] in North America. Research with MSM in Jamaica has established a connection between social vulnerability, sexual stigma, adverse life events, and HIV [13, 26, 40] and sexual abuse history, depression and inconsistent condom use [31]. Our study is novel in demonstrating the cumulative effect of these adverse psychosocial factors on a range of HIV vulnerability indicators among LGBT persons at large in Jamaica.

Resilience and social support needs partially mediated the relationship between syndemics and condom use self-efficacy in this study. Our findings are in line with recent research; a 2017 study with MSM in Canada found that psychosocial strengths including social support predicted reduced serodiscordant condomless anal sex even after accounting for syndemics [17]. Similarly, a 2014 study with MSM in Cape Town found that condom self-efficacy mediated the relationship between sexual stigma and condomless anal sex [29]. We contribute to the literature by demonstrating that protective factors are connected to enhanced confidence in one's ability to use condoms among the broader LGBT population. Research examining resilience and protective factors moves beyond deficits models that solely focus on the negative impact of syndemics, toward strengths-based health promotion and policy [50]. Recent qualitative

**Table 3** Final path model of syndemic experiences on HIV vulnerabilities among lesbian, gay, bisexual and transgender persons in Jamaica (n = 900)

Parameter	Coefficient (SE)	Critical Ratio	P value	Standardized estimate
Latent construct of syndemics BY				
Depressive symptoms in the last 2 weeks	1.000 (0.000)	999.000	999.000	0.171
Binge drinking	1.250 (0.485)	2.578	<0.05	0.173
Intimate partner violence during adulthood	4.150 (1.439)	2.884	<0.01	0.592
Childhood sexual abuse	4.220 (1.344)	3.139	<0.01	0.493
Condom self-efficacy ON				
Latent construct of syndemics	-3.870 (1.801)	-2.149	<0.05	0.186
Needs for social support	-0.067 (0.024)	-2.730	<0.01	-0.138
Resilient coping	0.130 (0.028)	4.615	<0.001	0.212
Number of lifetime sex partners				
Latent construct of syndemics	104.958 (34.464)	3.045	<0.01	0.299
Needs for social support	-0.837(0.453)	-01.847	0.065	-0.103
Resilient coping	-1.035 (0.522)	-1.982	<0.05	-0.101
Perceived HIV risk				
Latent construct of syndemics	3.948 (0.748)	5.276	<0.001	0.605
Needs for social support	-0.016 (0.009)	-1.774	0.076	-0.104
Resilient coping	0.017 (0.010)	1.664	0.096	-0.086
Needs for social support				
Latent construct of syndemics	23.751 (3.017)	7.872	<0.001	0.548
Resilient coping				
Latent construct of syndemics	-17.180 (2.006)	-8.563	<0.001	-0.504

\*All results were adjusted by: age, education level, city of residence, relationship status, food insecurity, unstable housing, and sexual and gender identity

research with young MSM in Jamaica indicated that MSM affirmed their identities and mitigated the effects of sexual stigma through accessing social support, safe spaces, and community building with friends and intimate partners [72]. LGBT communities develop resilience mechanisms to cope with stigma and discrimination. Interventions and policy that supports community building and social support can foster wellbeing among LGBT individuals in Jamaica, with potential downstream impacts on HIV vulnerability. These interventions can build on Jamaica's cultural strengths and growing acceptance of LGBT persons, demonstrated through the myriad ways that families, social networks and intimate partners in Jamaica offer LGBT persons opportunities for acceptance and connections [72] that provide emotional and material support to manage stigma, social exclusion and safety concerns.

While 4.1% of the population in Jamaica have alcohol use disorders and 15% of individuals who consume alcohol report heavy episodic drinking, there is currently no national policy or action plan targeting alcohol use [73]. Researchers have noted that substance use treatment centres in Jamaica called for more group therapy, recreational and skills training within treatment facilities, and increased program funding [74]. National policy for problematic alcohol use prevention and treatment is necessary, and trauma-affirmed, harm

reduction and LGBT affirmative approaches to substance use could explore the associations between stress and alcohol use to develop adaptive coping strategies with LGBT persons.

While laws prohibiting intimate partner violence exist [75], and legislation such as the Child Care Protection Act was introduced in 2004 [76], the Inter-American Commission on Human Rights indicates that the Jamaican police force can be averse to enforcing such laws, reinforcing mistrust of law enforcement systems [75, 77]. There are no laws in Jamaica regarding sexual harassment in general, and no protection from discrimination based on gender identity or sexual orientation [75, 78]. Thus, law enforcement may be perceived as the 'middle man', simply enforcing the Offences Against the Person Act, 1864. The Government of Jamaica rejected the 2015 United Nation's Universal Period Review recommendations regarding LGBT decriminalization and codifying non-discrimination provisions [35]: state leadership in protecting LGBT legal rights is essential for ensuring just treatment of LGBT persons by law enforcement. Taken together these factors may exacerbate a climate of tolerance for violence against LGBT persons. Policy and advocacy that addresses law enforcement practices and pervasive generalized violence targeting LGBT people is urgently needed.

Childhood sexual abuse impacts the endocrine and immune system, creating chronic stress that may increase vulnerability to multiple health risks, including HIV [79]. Violence is also related to the uptake of maladaptive coping mechanisms such as binge drinking, and further exposure to abuse in adulthood [49, 80–83]. Creating early support and interventions for LGBT youth could help buffer the negative effects of stigma and attenuate the association between early life adversity and adulthood syndemic experiences [84].

A syndemics framework has meaningful implications for developing HIV-prevention interventions in high stigma contexts such as Jamaica. Structural vulnerabilities such as stigma and a lack of human rights protections elevate exposure to social and health adversities that converge to produce a syndemic [84], while limiting access to social support and resources [39, 49]. As syndemic factors mutually reinforce one another to increase HIV vulnerability, targeting health in any syndemic area (i.e. mental health, interpersonal violence) may have a downstream impact on reducing HIV vulnerability [50, 84]. Moreover, multi-level interventions that address syndemic factors rather than condom use alone may be more efficacious for LGBT individuals in Jamaica. For example, while enhancing condom self-efficacy may be a goal of HIV prevention, we found that resilience and social support also played substantial roles in fostering this outcome. Building social support and solidarity via group-based interventions, and implementing strategies to foster resilient coping, may amplify the effectiveness of HIV prevention strategies with LGBT persons in Jamaica.

Increased access to community-based organizations that promote multi-level empowerment practice with LGBT individuals are needed in high stigma contexts [85]. At the individual level, trauma-informed, cognitive behavioral therapy that targets depressive symptoms, histories of abuse and violence, and safer sex self-efficacy can help LGBT individuals acquire skills for HIV prevention uptake [86]. At the social and sexual network level, community empowerment such as peer-based interventions focused on HIV prevention, stigma reduction, and mental health can bolster resilience and reduce isolation by connecting LGBT individuals [85] in a supportive environment [87]. This is particularly relevant given the sex tourism industry in Jamaica [44] and the substantial proportion of LGBT persons involved in sex work: Jamaican studies report that half of a sample of trans women [5], one-third of a sample of MSM [41], and one-fifth of a sample of WSW [88] report ever selling sex. Community empowerment among sex workers facilitates uptake of HIV prevention strategies [89]. At the systemic level, LGBT sensitization trainings for healthcare professionals, police and policy makers are needed to combat structural stigma that prevents LGBT people from accessing appropriate HIV and other health services [85, 89]. Human rights protections for LGBT

persons, public health campaigns that include LGBT persons in HIV prevention messaging, and the enforcement of laws against childhood sexual abuse and intimate partner violence may have downstream impacts on HIV vulnerabilities [89].

This study has limitations. Non-random sampling limits the generalizability of findings to all LGBT individuals in Jamaica, and the cross-sectional design limits attributions of causality. These data were self-reported and may be influenced by recall bias or social desirability. Perceived HIV risk may also not reflect objective risk, yet it is a useful indicator of HIV vulnerability when using a combined LGBT sample where specific sexual acts may not generalize across varied sexual and gender minority groups. While recruitment through a community-based organization may have biased our sample towards those more likely to be engaged in care, we successfully recruited over 900 LGBT individuals in Jamaica utilizing PRAs and their networks in the context of stigma and criminalization. Additionally, PRAs recruited participants through their own networks, with the potential to include participants who do not regularly access care. Future studies may utilize respondent-driven sampling to explore social network factors and to increase the sample representativeness. Finally, we did not include trans men in this study, and understanding their needs and experiences is an important area for future research.

## Conclusions

Our study has a number of strengths and implications. We build on the literature regarding the ways in which resilience can attenuate the impact of syndemics on HIV vulnerabilities among LGBT persons in a country with no LGBT human rights protection. Much of the syndemics literature is situated in North America; we extend this knowledge by applying a syndemics framework in Jamaica's middle-income context. We also used a combined sample of LGBT individuals to include the under-researched groups of WSW and trans women, and while sexual risk indicators may differ across sexual orientations and gender identities, syndemics theory can elucidate shared social and health concerns that shape LGBT persons' HIV vulnerabilities. Our study emphasizes the need to target syndemic factors, resilience and social support rather than focus on sexual risk alone, to reduce HIV vulnerabilities among LGBT persons in Jamaica.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare they have no conflicts of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Toronto and the University of the West Indies, Mona and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

## References

1. Figueroa JP, Duncan J, Byfield L, Harvey K, Gebre Y, Hylton-Kong T, et al. A comprehensive response to the HIV/AIDS epidemic in Jamaica: a review of the past 20 years. *West Indian Med J*. 2008;57(6):562–76.
2. De Boni R, Veloso VG, Grinsztejn B. Epidemiology of HIV in Latin America and the Caribbean. *Curr Opin HIV AIDS*. 2014;9(2):192–8.
3. Garcia PJ, Bayer A, Carcamo CP. The changing face of HIV in Latin America and the Caribbean. *Curr HIV/AIDS Rep*. 2014;11(2):146–57.
4. UNAIDS. Modes of HIV transmission in Jamaica for 2012: recommendations for efficient resource allocation and prevention strategies. 2013.
5. Logie CH, Lacombe-Duncan A, Wang Y, Jones N, Levermore K, Neil A, et al. Prevalence and correlates of HIV infection and HIV testing among transgender women in Jamaica. *AIDS Patient Care STDS*. 2016;30(9):416–24.
6. Tat SA, Marrazzo JM, Graham SM. Women who have sex with women living in low-and middle-income countries: a systematic review of sexual health and risk behaviors. *LGBT Health*. 2015;2(2):91–104.
7. Cochran SD, Mays VM. Advancing the LGBT health research agenda: differential health trends within the lesbian, gay, and bisexual populations. *Am Public Health Assoc*. 2017;106(9):e4.
8. Gates GJ. LGBT Data collection amid social and demographic shifts of the US LGBT community. *Am J Public Health*. 2017;107(8):1220–2.
9. Meyer IH. The elusive promise of LGBT equality. *Am J Public Health*. 2016;106(8):1356–8.
10. Mayer KH, Garofalo R, Makadon HJ. Promoting the successful development of sexual and gender minority youths. *Am J Public Health*. 2014;104(6):976–81.
11. Mayer KH, Bradford JB, Makadon HJ, Stall R, Goldhammer H, Landers S. Sexual and gender minority health: what we know and what needs to be done. *Am J Public Health*. 2008;98(6):989–95.
12. Institute of Medicine. The health of lesbian, gay, bisexual, and transgender people: building a foundation for better understanding. Washington, DC: The National Academic Press; 2011.
13. Figueroa JP, Cooper CJ, Edwards JK, Byfield L, Eastman S, Hobbs MM, et al. Understanding the high prevalence of HIV and other sexually transmitted infections among socio-economically vulnerable men who have sex with men in Jamaica. *PLoS ONE*. 2015;10(2):e0117686.
14. Singer M, Clair S. Syndemics and public health: reconceptualizing disease in bio-social context. *Med Anthropol Q*. 2003;17(4):423–41.
15. Wilson PA, Nanin J, Amesty S, Wallace S, Cherenack EM, Fulilove R. Using syndemic theory to understand vulnerability to HIV infection among Black and Latino men in New York City. *J Urban Health*. 2014;91(5):983–98.
16. Brennan J, Kuhns LM, Johnson AK, Belzer M, Wilson EC, Garofalo R. Syndemic theory and HIV-related risk among young transgender women: the role of multiple, co-occurring health problems and social marginalization. *Am J Public Health*. 2012;102(9):1751–7.
17. Hart TA, Noor SW, Adam BD, Vernon JR, Brennan DJ, Gardner S, et al. Number of psychosocial strengths predicts reduced HIV sexual risk behaviors above and beyond syndemic problems among gay and bisexual men. *AIDS Behav*. 2017;21(10):3035–46.
18. Gilbert L, Raj A, Hien D, Stockman J, Terlikbayeva A, Wyatt G. Targeting the SAVA (substance abuse, violence and AIDS) syndemic among women and girls: a global review of epidemiology and integrated interventions. *J AIDS*. 2015;69(2):S118.
19. Sullivan KA, Messer LC, Quinlivan EB. Substance abuse, violence, and HIV/AIDS (SAVA) syndemic effects on viral suppression among HIV positive women of color. *AIDS Patient Care STDS*. 2015;29(S1):S42–8.
20. Illangasekare S, Burke J, Chander G, Gielen A. The syndemic effects of intimate partner violence, HIV/AIDS, and substance abuse on depression among low-income urban women. *J Urban Health*. 2013;90(5):934–47.
21. Santos G-M, Do T, Beck J, Makofane K, Arreola S, Pyun T, et al. Syndemic conditions associated with increased HIV risk in a global sample of men who have sex with men. *Sex Transm Infect*. 2014;90(3):250–3.
22. Operario D, Nemoto T. HIV in transgender communities: syndemic dynamics and a need for multicomponent interventions. *J AIDS*. 2010;55:S91–3.
23. Operario D, Yang M-F, Reisner SL, Iwamoto M, Nemoto T. Stigma and the syndemic of HIV-related health risk behaviors in a diverse sample of transgender women. *J Community Psychol*. 2014;42(5):544.
24. Logie CH, Lacombe-Duncan A, Poteat T, Wagner AC. Syndemic factors mediate the relationship between sexual stigma and depression among sexual minority women and gender minorities. *Womens Health Issues*. 2017;27(5):592–9.
25. Coulter RWS, Kinsky SM, Herrick AL, Stall RD, Bauermeister JA. Evidence of syndemics and sexuality-related discrimination among young sexual-minority women. *LGBT Health*. 2015;2(3):250–7.
26. Figueroa JP, Weir SS, Jones-Cooper C, Byfield L, Hobbs MM, McKnight I, et al. High HIV prevalence among men who have sex with men in Jamaica is associated with social vulnerability and other sexually transmitted infections. *West Indian Med J*. 2013;62(4):286–91.
27. Klein H. Condom use self-efficacy and HIV risk practices among men who use the internet to find male partners for unprotected sex. *Am J Mens Health*. 2014;8(3):190–204.
28. Schutz M, Godin G, Kok G, Vézina-Im L-A, Naccache H, Otis J. Determinants of condom use among HIV-positive men who have sex with men. *Int J STD AIDS*. 2011;22(7):391–7.
29. Tucker A, Liht J, de Swardt G, Jobson G, Rebe K, McIntyre J, et al. Homophobic stigma, depression, self-efficacy and unprotected anal intercourse for peri-urban township men who have sex with men in Cape Town, South Africa: a cross-sectional association model. *AIDS Care*. 2014;26(7):882–9.

30. Teng Y, Mak WWS. The role of planning and self-efficacy in condom use among men who have sex with men: an application of the health action process approach model. *Health Psychol.* 2011;30(1):119–28.
31. Logie CH, Wang Y, Marcus NL, Levermore K, Jones N, Ellis T, et al. Pathways from sexual stigma to inconsistent condom use and condom breakage and slippage among men who have sex with men in Jamaica. *JAIDS.* 2018;78(5):513–21.
32. Harriot ADJ, M. Crime and Violence in Jamaica. Inter-American Development Bank 2016.
33. Le Franc E, Samms-Vaughan M, Hambleton I, Fox K, Brown D. Interpersonal violence in three Caribbean countries: Barbados, Jamaica, and Trinidad and Tobago. *Rev Panam Salud Publica.* 2008;24:409–21.
34. UNDP. Multidimensional progress: Well-being beyond income. United Nations Development Programme. 2016.
35. Carroll A, Mendos LM. State-Sponsored Homophobia: A World Survey of Sexual Orientation Laws: Criminalisation, Protection and Recognition. 12th Edition May 2017. Geneva: International Lesbian, Gay, Bisexual, Trans and Intersex Association. 2017.
36. West K. understanding and reducing sexual prejudice in Jamaica: theoretical and practical insights from a severely anti-gay society. *J Sex Res.* 2018;55(4–5):472–85.
37. Sives A. A calculated assault on the authority of the state? Crime, politics and extradition in 21st century Jamaica. *Crime Law Soc Change.* 2012;58(4):415–35.
38. White RC, Carr R. Homosexuality and HIV/AIDS stigma in Jamaica. *Cult Health Sex.* 2005;7(4):347–59.
39. Logie CH, Lacombe-Duncan A, Brien N, Jones N, Lee-Foon N, Levermore K, et al. Barriers and facilitators to HIV testing among young men who have sex with men and transgender women in Kingston, Jamaica: a qualitative study. *J Int AIDS Soc.* 2017;20(1):1–9.
40. Logie CH, Kenny KS, Lacombe-Duncan A, Levermore K, Jones N, Neil A, et al. Social-ecological factors associated with HIV infection among men who have sex with men in Jamaica. *Int J STD AIDS.* 2017;29(1):80–6.
41. Logie CH, Lacombe-Duncan A, Kenny KS, Levermore K, Jones N, Baral SD, et al. Social-ecological factors associated with selling sex among men who have sex with men in Jamaica: results from a cross-sectional tablet-based survey. *Glob Health Action.* 2018;11(1):1–10.
42. Bain BC. Improving community care for persons with the acquired immunodeficiency syndrome in Jamaica. *West Indian Med J.* 1998;47(Suppl 4):37–9.
43. Wickramasuriya TV. Attitudes of medical students toward the acquired immune deficiency syndrome (AIDS). *West Indian Med J.* 1995;44(1):7–10.
44. Padilla MBPMPH, Guilamo-Ramos VPMSW, Bouris APMSW, Reyes AMDDS. HIV/AIDS and tourism in the Caribbean: an ecological systems perspective. *Am J Public Health.* 2010;100(1):70–7.
45. Friedman MS, Marshal MP, Guadamuz TE, Wei C, Wong CF, Saewyc EM, et al. A meta-analysis of disparities in childhood sexual abuse, parental physical abuse, and peer victimization among sexual minority and sexual nonminority individuals. *Am J Public Health.* 2011;101(8):1481–94.
46. Schneeberger A, Dietl M, Muenzenmaier K, Huber C, Lang U. Stressful childhood experiences and health outcomes in sexual minority populations: a systematic review. *Soc Psychiatry Psychiatr Epidemiol.* 2014;49(9):1427–45.
47. Harris OO, Dunn LL. I kept it to myself: young Jamaican men who have sex with men's experiences with childhood sexual abuse and sexual assault. *Arch Sex Behav.* 2018. <https://doi.org/10.1007/s10508-018-1219-2>.
48. White YRG, Barnaby L, Swaby A, Sandfort T. Mental health needs of sexual minorities in Jamaica. *Int J Sex Health.* 2010;22(2):91–102.
49. Logie CH, Lee-Foon N, Jones N, Mena K, Levermore K, Newman PA, et al. Exploring lived experiences of violence and coping among lesbian, gay, bisexual and transgender youth in Kingston, Jamaica. *Int J Sex Health.* 2016;28(4):343–53.
50. Herrick AL, Stall R, Goldhammer H, Egan JE, Mayer KH. Resilience as a research framework and as a cornerstone of prevention research for gay and bisexual men: theory and evidence. *AIDS Behav.* 2014;18(1):1–9.
51. Kurtz SP, Buttram ME, Surratt HL, Stall RD. Resilience, syndemic factors, and serosorting behaviors among HIV-positive and HIV-negative substance-using MSM. *AIDS Educ Prev.* 2012;24(3):193–205.
52. Logie CH, Lacombe-Duncan A, Lee-Foon N, Ryan S, Ramsay H. “It’s for us—newcomers, LGBTQ persons, and HIV-positive persons. You feel free to be”: a qualitative study exploring social support group participation among African and Caribbean lesbian, gay, bisexual and transgender newcomers and refugees in Toronto, Canada. *BMC Int Health Hum Rights.* 2016;16(1):18.
53. Dyer TP, Shoptaw S, Guadamuz TE, Plankey M, Kao U, Ostrow D, et al. Application of syndemic theory to black men who have sex with men in the multicenter AIDS cohort study. *J Urban Health.* 2012;89(4):697–708.
54. Herrick A, Stall R, Egan J, Schragger S, Kipke M. Pathways towards risk: syndemic conditions mediate the effect of adversity on HIV risk behaviors among young men who have sex with men (YMSM). *J Urban Health.* 2014;91(5):969–82.
55. Estrich CG, Gratz B, Hotton AL. Differences in sexual health, risk behaviors, and substance use among women by sexual identity: Chicago, 2009–2011. *Sex Transm Dis.* 2014;41(3):194–9.
56. Koblin BA, Grant S, Frye V, Superak H, Sanchez B, Lucy D, et al. HIV sexual risk and syndemics among women in three urban areas in the United States: analysis from HVTN 906. *J Urban Health.* 2015;92(3):572–83.
57. Meyer JP, Springer SA, Altice FL. Substance abuse, violence, and HIV in women: a literature review of the syndemic. *J Womens Health (Larchmt).* 2011;20(7):991–1006.
58. Platt L, Wall M, Rhodes T, Judd A, Hickman M, Johnston LG, et al. Methods to recruit hard-to-reach groups: comparing two chain referral sampling methods of recruiting injecting drug users across nine studies in Russia and Estonia. *J Urban Health.* 2006;83(6 Suppl):i39–53.
59. Penrod J, Preston DB, Cain RE, Starks MT. A discussion of chain referral as a method of sampling hard-to-reach populations. *J Transcult Nurs.* 2003;14(2):100–7.
60. Kalichman SC, Rompa D, Difonzo K, Simpson D, Kyomugisha F, Austin J, et al. Initial development of scales to assess self-efficacy for disclosing HIV status and negotiating safer sex in HIV-positive persons. *AIDS Behav.* 2001;5(3):291–6.
61. Kroenke K, Spitzer RL, Williams JBW. The patient health questionnaire-2: validity of a two-item depression screener. *Med Care.* 2003;41(11):1284–92.
62. Bernal G, Maldonado Molina MM, del Río MRS. Development of a brief scale for social support: reliability and validity in Puerto Rico. *Int J Clin Health Psychol.* 2003;3(2):251–64.
63. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med.* 2008;15(3):194–200.
64. Mueller R, Hancock G. Best practices in structural equation modeling. In: Osborne J, editor. *Best practices in quantitative methods.* Thousand Oaks: Sage; 2008. p. 488–508.
65. Chen FF. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Model.* 2007;14(3):464–504.

66. Iacobucci D. Structural equations modeling: fit indices, sample size, and advanced topics. *J Consum Psychol.* 2010;20(1):90–8.
67. Kline RB. Principles and practice of structural equation modeling. 3rd ed. New York: The Guilford Press; 2011.
68. Vandenberg RJ. Introduction: statistical and methodological myths and urban legends: where, pray tell, did they get this idea?. Thousand Oaks: Sage; 2006.
69. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *Methods Psychol Res Online.* 2003;8(2):23–74.
70. Long JS, Freese J. Regression models for categorical dependent variables using Stata. College Station: Stata Press; 2006.
71. Parsons JT, Millar BM, Moody RL, Starks TJ, Rendina HJ, Grov C. Syndemic conditions and HIV transmission risk behavior among HIV-negative gay and bisexual men in a US national sample. *Health Psychol.* 2017;36(7):695.
72. Harris OO, Jarrett S. Beyond homophobia: how do Jamaican men who have sex with men build communities, affirm identity, and mitigate homophobia? *J Assoc Nurses AIDS Care.* 2018;29(5):749–61.
73. WHO. Jamaica: alcohol consumption, levels and patterns 2014. [http://www.who.int/substance\\_abuse/publications/global\\_alcohol\\_report/profiles/jam.pdf](http://www.who.int/substance_abuse/publications/global_alcohol_report/profiles/jam.pdf). Accessed 1 Dec 2018.
74. Reid P, Mann R, Strike C, Brands B, Khenti A. Comorbidity between psychological distress and drug use among patients in treatment centres in Jamaica: implications for policies and programme design. *Texto & Contexto-Enfermagem.* 2012;21:133–40.
75. IACHR. Report on the situation of human rights in Jamaica Inter-American Commission on Human Rights. 2012.
76. Samms KM, Cholewa BE. Exploring the context of child sexual abuse in Jamaica: addressing the deficits. *J Child Sexual Abuse.* 2014;23(2):115–27.
77. Smith DE. Prevalence of intimate partner violence in Jamaica: implications for prevention and intervention. *Int J Child Youth Fam Stud.* 2016;7(3–4):243–63.
78. OECD. Jamaica. Organization for Economic Cooperation and Development 2014.
79. Ayaydin H, Abali O, Akdeniz NO, Kok BE, Gunes A, Yildirim A, et al. Immune system changes after sexual abuse in adolescents. *Pediatr Int.* 2016;58(2):105–12.
80. Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the adverse childhood experiences (ACE) study. *Am J Prev Med.* 1998;14(4):245–58.
81. Kouyoumdjian FG, Findlay N, Schwandt M, Calzavara LM. A systematic review of the relationships between intimate partner violence and HIV/AIDS. *PLoS ONE.* 2013;8(11):e81044.
82. Leserman J, Whetten K, Lowe K, Stangl D, Swartz MS, Thielman NM. How trauma, recent stressful events, and PTSD affect functional health status and health utilization in HIV-infected patients in the south. *Psychosom Med.* 2005;67(3):500–7.
83. Ports KA, Ford DC, Merrick MT. Adverse childhood experiences and sexual victimization in adulthood. *Child Abuse Negl.* 2016;51:313–22.
84. Herrick AL, Lim SH, Wei C, Smith H, Guadamuz T, Friedman MS, et al. Resilience as an untapped resource in behavioral intervention design for gay men. *AIDS Behav.* 2011;15(Suppl 1):S25–9.
85. Logie CH, Lacombe-Duncan A, Levermore K, Jones N. Conceptualizing empowerment practice with lesbian, gay, bisexual and transgender youth in Jamaica. *Soc Work Educ.* 2017;36(4):456–65.
86. Safren SA, O’Cleirigh C, Tan JY, Raminani SR, Reilly LC, Otto MW, et al. A randomized controlled trial of cognitive behavioral therapy for adherence and depression (CBT-AD) in HIV-infected individuals. *Health Psychol.* 2009;28(1):1–10.
87. Steiner MJ, Taylor D, Hylton-Kong T, Mehta N, Figueroa JP, Bourne D, et al. Decreased condom breakage and slippage rates after counseling men at a sexually transmitted infection clinic in Jamaica. *Contraception.* 2007;75(4):289–93.
88. Logie C, Marcus N, Wang Y, Lacombe-Duncan A, Levermore K, Jones N, Bryan N, Back R, Marshall A. Contextualising sexual health practices among lesbian and bisexual women in Jamaica: a multi-methods study. *Reprod Health Matters.* 2018;26(52):1517543.
89. Baral S, Logie C, Grosso A, Wirtz AL, Beyrer C. Modified social ecological model: a tool to guide the assessment of the risks and risk contexts of HIV epidemics. *BMC Public Health.* 2011;13:482.

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