Characterising a syndemic among black women at risk for HIV: the role of sociostructural inequity and adverse childhood experiences

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ABSTRACT

Objectives Black women disproportionately experience STIs (including HIV/AIDS), gender-based violence, substance misuse and mental health conditions. Addressing a gap in syndemic research, we characterised comorbidity overlap within the context of sociostructural inequities and adverse childhood experiences (ACEs) among black women in Baltimore, Maryland.

Methods Between 2015 and 2018, black women (n=305) were recruited from STI clinics in Baltimore, Maryland. Among those with complete survey data (n=230), we conducted a latent class analysis to characterise women based on their profile of the following syndemic comorbidities: STIs, adult sexual victimisation, substance misuse and mental health disorders. We then examined the association between ACEs and syndemic latent class membership.

Results Thirty-three percent of women experienced three to nine ACEs before age 18 years, and 44% reported four to six comorbidities. The two-class latent class solution demonstrated the best fit model, and women were categorised in either class 1 (past-year STI; 59%) or class 2 (syndemic comorbidities; 41%). Women in class 2 were more likely to report unstable housing (10% vs 3%) and identify as bisexual/gay (22% vs 10%) than women in class 1. ACEs were significantly associated with an increased likelihood of class 2 membership.

Conclusions This study reinforces the importance of screening for ACEs and offering trauma-informed, integrated care for black women with syndemic comorbidities. It also highlights the critical nature of tailoring interventions to improve sociostructural equity, preventing and reducing syndemic development.

INTRODUCTION

Black women bear the greatest burden of STIs, including HIV, among women in the USA. In 2018, black women had the highest HIV prevalence (57%)1 and HIV incidence rate (23.1/100 000)2 among US women.3 The national rate of reported cases of chlamydia, gonorrhea and syphilis among black women was 5.1, 8.4 and 7.0 times the rate of white women, respectively,4 increasing the likelihood of transmitting and acquiring HIV.

Black women also bear a substantial burden of gender-based violence (GBV), experiencing intimate partner violence (IPV) at a rate 21% higher than white women.3 Additionally, nearly 25% of black women report childhood physical or sexual abuse.5 Experiencing violence in childhood increases one’s risk for experiencing violence in adulthood.6 GBV exposure is also associated with an increased risk of developing substance use disorders (SUD), mental health conditions7 and engaging in sexual risk behaviours such as being forced into sex or being coerced into unprotected sex by male partners. GBV and comorbidities increase black women’s risk for HIV/STIs and impede HIV testing.7

These health disparities and their overlap can be understood through the lens of syndemic theory, which links sociostructural inequity to co-occurring and synergistic health epidemics (syndemics) that systematically and disproportionately affect disadvantaged populations.8 In particular, we draw from the Substance Abuse, Violence, and HIV/AIDS syndemic to include prevalent epidemics among black women (ie, substance misuse, violence, mental health and STIs). Syndemic theory is helpful to understand the interplay between comorbidities and sociostructural conditions that may increase or attenuate risk for syndemic development, thereby elucidating targets for intervention. Sociostructural inequity overburdens black women,9 and this inequity is linked to experiencing more housing instability10 and poverty. Homelessness and housing instability increase sexual risk behaviors associated with HIV,10 IPV and syndemic development among men who have sex with men (MSM)11 and transgender women.12 Understanding syndemics and identifying sociostructural targets for intervention among US black women at risk for HIV is critical, especially given the disparities in key HIV prevention interventions for women, including HIV testing and pre-exposure prophylaxis (PrEP).13 Moreover, HIV prevention interventions may be most effective for individuals with syndemic risk.13

Despite a substantial body of syndemic literature, and recent efforts to include more studies on racial and ethnic minorities, there is a paucity of studies to understand syndemic theory among cisgender heterosexual black women. Existing syndemic studies focus on people living with HIV or key populations at heightened risk for HIV like persons with SUD, sex workers, MSM and sexual or gender minority women. Syndemic research among black women at risk for HIV is essential given their disproportionate burden of violence3 and STIs,2
including HIV. Furthermore, comorbidities (e.g., SUD, mental health conditions and violence) are found to contribute differently to syndemic risk depending on racial and ethnic identity, sexual orientation and gender identity.

Personal life experiences also influence disease trajectories and intervention effectiveness. The life course perspective highlights the relationship between childhood experiences and adverse health outcomes. Tenants of the life course perspective suggest that lives and social networks are intertwined, social contexts influence life opportunities and challenges, the timing of significant events impacts developmental trajectories and individuals can exercise actions to shape their trajectories. A poignant example of the life-course perspective is the impact of adverse childhood experiences (ACEs)—7–10 types of childhood trauma, abuse and neglect—that results in cumulative lifetime stress. ACEs are associated with long-lasting, negative sexual health consequences that are stronger and more persistent among women than men. Unfortunately, differences by race and ethnicity are unknown because neither Brown’s analysis (71% white) nor Hillis’ analysis (77% white) stratified their data by race and ethnicity. People who experience 4+ ACEs are at increased risk for substance use disorders, mental health conditions and sexual risk behaviours for STIs.

A recent systematic review of HIV risk and syndemic development among black women highlighted that most studies fail to understand nuances by race and ethnicity. In one of the few studies that examined racial differences, black women experienced five times more childhood maltreatment than white women. Childhood sexual abuse increased adult risk for lifetime STI acquisition, along with partner concurrency, emotional trauma and lifetime sex trading in a sample of 66% black women. Among young women who used marijuana, black women were more likely to engage in high-risk sexual behaviours and progress to marijuana use than white women. Previous research found that each additional ACE reported among black women was associated with a 49% increased risk of experiencing very early sexual initiation at 11–12 years old. Women (24% Hispanic/associated with a 49% increased risk of experiencing very early sexual initiation at 11–12 years old. Women (24% Hispanic/white) nor Hillis’ analysis (77% white) stratified their data by race and ethnicity. People who experience 4+ ACEs are at increased risk for substance use disorders, mental health conditions and sexual risk behaviours for STIs.

The outcome variable was latent class membership, modelled using the following categorical syndemic comorbidity variables: STI, adult sexual victimisation, substance misuse (ie, harmful drinking and substance misuse) and mental health conditions (ie, symptoms of depression and post-traumatic stress disorder (PTSD)).

Past-year STI was measured using self-report that a doctor diagnosed them with any of the following STIs in the past year: chlamydia, gonorrhoea, trichomoniasis, syphilis, herpes, bacterial vaginosis, hepatitis B and/or hepatitis C in the past year.

Sexual victimisation as an adult was measured as a positive response to one of the following questions: (1) ‘Since you turned 18, has a man sex partner: used threats to make you have sex when you did not want to or used force (like hitting, holding down, or using a weapon) to make you have sex?’ and (2) ‘Since you turned 18, has any other male done any of the following: used threats to make you have sex when you did not want to or used force (like hitting, holding down, or using a weapon) to make you have sex?’.

Alcohol use was measured using the Alcohol Use Disorders Test (AUDIT), a 10-item, self-report measure that evaluates alcohol consumption, drinking behaviours and alcohol-related problems during the past year. Items included how much and often alcohol was consumed, how often they were unable to stop drinking and how often they felt guilt after drinking. Responses were measured on a five-point scale ranging from ‘0: never’ to ‘5: daily or almost daily’. Scores were summed (range: 0–40), and a cut-off score of ≥6 was chosen to denote alcohol use disorder (α=0.863), as studies suggest that women require a lower AUDIT score cut-off than men.

Participants were also asked how often (if ever) they used marijuana, crack, cocaine, non-medically prescribed Percocet and/or other prescription drugs in the past 6 months. For each substance, misuse was defined by use ≥2–3 days per week for the past 6 months.

Depression was measured using the Center for Epidemiologic Studies Short Depression scale, a 10-item, self-reported measure of an individual’s depressive feelings and behaviours during the past week. Items included being bothered by things, having trouble concentrating, and feeling lonely. Responses ranged from ‘0: rarely or none of the time (<1 day)’ to ‘3: all of the time (5–7 days)’. Scores were summed (range: 0–30), and a cut-off score of ≥10 denoted having symptoms indicative of depression (α=0.827).

PTSD symptoms were measured using the National Stressful Events Survey PTSD Short Scale, a nine-item, self-reported measure that determines PTSD symptom severity during the past month. Responses were measured on a five-point scale ranging from 0 ‘never’ to 4 ‘extremely’. Items were averaged to derive a PTSD symptoms score with higher scores indicating greater PTSD severity (mild=1 to extreme=4). Then, we created a

METHODS
We analysed data from a cross-sectional, retrospective cohort study investigating the association between the built and social environment, sexual assault and HIV risk behaviours among black women in Baltimore, Maryland.

Procedure
Black women (n=305) seeking health services were recruited from two Baltimore City public STI clinics between November 2015 and May 2018. Interested participants were consented and screened for eligibility using the following: self-identified as a

Original research

binary cut-off score of ≥3 to denote severe/extreme PTSD symptoms (α=0.931).

The primary independent variable was the presence of ACEs at or before age 18 years. The original questionnaire measured seven categories of ACEs (emotional, physical and/or sexual abuse, witnessing maternal abuse, household substance misuse, household mental illness and incarcerated household member). It was expanded to include three additional categories (emotional and physical neglect and parental separation/divorce). We measured ACEs on the 10-item scale, where participants responded ‘yes’ (1) or ‘no’ (0) (α=0.807). Scores were summed for a total ACE score (range: 0–10).

Other variables included in our analyses were sociodemographic variables (i.e., age, education, employment status, yearly income, number of children and relationship status) and sociostructural variables (i.e., housing instability (defined as living in hotel/motel, transitional housing or on the streets) and sexual minority status).

Analysis
Analyses were conducted using Stata V.15. Listwise deletion was performed to include participants with complete data (n=230). Women excluded from the analysis due to missing data reported significantly more housing instability than those included. Descriptive statistics characterised sociodemographic and syndemic comorbidity characteristics (i.e., STIs, sexual violence, harmful drinking, substance misuse, depressive and PTSD symptoms) and ACEs.

We chose LCA because it is an innovative method that is stronger than other approaches (i.e., logistic regression), providing a granular description how syndemic comorbidities vary and covary. LCA is a person-centred (vs variable-centred) technique, which uses maximum likelihood estimation to create classes that are internally homogeneous and externally heterogeneous. LCA is also a model-based technique that provides fit statistics to indicate the most appropriate and parsimonious model for the data. Lastly, LCA provides conditional probabilities, which provide information of an individual’s probability of membership to variables within a particular class.

LCA was performed to differentiate groups of women based on comorbidity patterns. We chose best-fit LCA models to determine the number of latent classes based on model fit criteria, including Bayesian information criterion, Akaike information criterion, Likelihood ratio (LR) test and Scree-Plots to assess model fit. We then estimated each conditional probability (CP) of each syndemic comorbidity.

Finally, we estimated the association between ACEs (continuous and categorical) and latent class membership. When the prevalence of the outcome is >10%, the OR does not approximate the relative risk well. Because our two latent class solution resulted in a common outcome, we estimated log-binomial regression models. However, the model with the continuous ACE score as the independent variable did not reach convergence. To resolve this, we used a modified Poisson model with robust variance estimation to estimate the relative risk and CIs. Adjusted models accounted for age and other sociodemographic and sociostructural variables that significantly differentiated the latent classes (i.e., housing stability and sexual orientation) in the unadjusted models as potential confounders. We conducted a non-parametric trend test, an extension of the Wilcoxon rank-sum test, to test for a dose–response relationship between the number of ACEs reported and the number of syndemic comorbidities.

RESULTS
Of 230 women, the average age was 26.25 years old (SD=6.32), 85% had at least a high school education, 61% were employed, 59% had an annual income <50000, 6% did not have stable housing and 68% were single (data found in online supplemental appendix, table A). Nearly 33% experienced three to nine ACEs, with parental separation or divorce (38%), emotional neglect (31%) and household substance misuse (27%) being the most common. The most common syndemic comorbidities were depressive symptoms (46%), at least one STI in the past year (46%), adult sexual violence (40%), misuse of at least one drug in the past 6 months (37%), severe/extreme PTSD (28%) and harmful drinking (23%).

The two-class solution had the best fit (see online supplemental appendix, table B). The CP of each syndemic comorbidity is shown in figure 1. Although women in class 1 had some probability for comorbidities, the majority (59%) had only one morbidity—an STI in the past year. In comparison, nearly half of the women in class 2 (41%) had multiple comorbidities, including an STI in the past year, substance misuse in the past 6 months, depressive symptoms in the past week, severe/extreme PTSD in the past month and adult sexual victimisation. Class 2 women were likely to be harmful drinkers (CP: 0.36), misuse substances (CP: 0.53), have depressive symptoms (CP: 0.85), have severe/extreme PTSD (CP: 0.63), have experienced adult sexual violence (CP: 0.68) and have had at least one STI in the past year (CP: 0.41).

Table 1 placed women in the latent class with the highest probability of membership and compared women by their sociodemographic and sociostructural characteristics, ACEs and syndemic comorbidities using the χ² statistic. Compared with class 1 (ie, past-year STI), significantly more women in class 2 (ie, syndemic comorbidities) identified as a sexual minority (22% vs 10%,
The study used LCA to characterise a syndemic in a sample of black women at risk for HIV and examine the associations between ACEs and latent class membership. Our findings show that women were categorised into either a past-year STI latent class (class 1) or a syndemic comorbidities latent class (class 2)—comprising substance misuse, mental health conditions, sexual violence and STIs. Women in class 2 were significantly more likely to report sociostructural inequities (e.g., housing instability and sexual minority status) and ACEs than those in class 1. Our findings have implications for integrated HIV interventions that address sociostructural inequalities and childhood trauma experiences.

Our study adds to research on syndemics among black women at risk for HIV in the USA. Women in class 1 had high levels of past-year STIs, which has important implications given that black women have greater HIV incidence rates and STI prevalence than white women. Women in class 1 also reported sociostructural inequities such as IPV and substance use, which likely impede their ability to negotiate safe sexual encounters. However, women in class 2 reported significantly more substance misuse, sexual violence and harmful drinking, which likely impede their ability to negotiate safe sexual encounters. Women in class 2 reported significantly more substance misuse, sexual violence and harmful drinking, which likely impede their ability to negotiate safe sexual encounters.
heterosexual women, which is consistent with recent research highlighting disparities in smoking, heavy episodic drinking and marijuana use observed among black lesbian/gay and bisexual women compared with their counterparts. This noteworthy finding provides support for future research to elucidate the underlying mechanisms and development of tailored interventions accounting for sexual identity and race and ethnicity to reduce the risk of comorbidities in this marginalised population.

Our findings also contribute to literature establishing links between sociostructural factors and overlapping adverse mental health outcomes, substance misuse and HIV risk among cisgender heterosexual and sexual minority black women. When comparing the sociostructural factors associated with class membership, we found class 2 women were more likely to report sexual minority status and current housing instability, which aligns with syndemic theory. Sociostructural factors, such as poor access to social services, transportation and childcare, were barriers to PrEP adoption among black women. Our findings are consistent with other studies linking stress experienced by racial, gender and sexual minorities due to stigma, prejudice and discrimination to adverse physical and mental health outcomes. Establishing the connection between the sociostructural context and syndemics is crucial to understanding how these factors influence individual HIV risk and prevention behaviours. Delivery models are needed that consider the multitude of sociostructural factors affecting the health of black women who are at risk for HIV. These findings support holistic HIV prevention measures targeting sociostructural health determinants, such as housing.

Figure 2  Venn diagram of syndemic comorbidities among class 2 members by ACE score category (n=94). ACE, adverse childhood experience.
instability and sexual minority stigma, to reduce syndemic risk among women.13

Another key finding was the significant dose–response association between ACEs and class 2 membership. This finding aligns with the life-course perspective; traumatic childhood events can shape health trajectories later in life. This study adds to the extant literature on ACEs and health by demonstrating a significant association between ACEs and syndemic comorbidities. Findings support incorporating assessments for ACEs and their lingering effects into the trauma-informed care that is both timely and contextually comprehensive.34 Findings also highlight the need for comprehensive interventions to prevent childhood trauma and abuse.35 A recent, integrated intervention addressing current sexual risk behaviours and childhood trauma showed promise in pilot testing, reducing episodes of unprotected sex, alcohol use and likelihood to be in a violent relationship following the intervention.36 The women in class 2 of our study might benefit from similar interventions that attend to sociostructural factors such as housing,10 sexual or gender minority stigma, and discrimination,33 or a combination of the two.

Our study had some important limitations. Our sample size was modest for using LCA, but close to the recommended sample size for similar models given our effect size and statistical power.37 Nevertheless, further research with larger sample sizes are needed to account for limited power on associations, and thus measure the synergy among comorbidities, a characteristic of syndemics defined by syndemic theory. Our cross-sectional analysis cannot determine the temporal relationship between ACEs, sociostructural factors and syndemic development. Longitudinal studies with larger sample sizes would allow us to examine the potential causal effects of ACEs on syndemic development among black women. Although we noted an overlap between ACEs and current experiences with violence, we could not determine the added impact of current experiences of violence on ACEs in this study. Furthermore, because women were recruited from STI clinics, the majority of women in both latent classes unsurprisingly reported at least one STI in the past year. Lastly, our study findings may not be generalisable to black women who do not seek care at STI clinics or those from rural environments or other racial and ethnic groups.

In conclusion, our study demonstrates the need for a holistic perspective, especially when working with black women who are usually affected by multiple traumas and stressors. As outlined by syndemic theory, this includes the various risks from different health behaviours and burdens and the often-overlooked social inequities and sociostructural factors outside of black women’s control. Our findings also support the need for integrated, trauma-informed interventions specifically designed for black women that address lingering health effects of childhood trauma. Though more research is required to contextualise our findings among black women better, a comprehensive approach that accounts for past trauma and multiple health and social stressors may help reduce the synergistic burden of their interactions.

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Key messages

- Adverse childhood experiences (ACEs) and syndemic comorbidities were highly prevalent among black women.
- Sociostructural barriers to health, such as unstable housing and identifying as bisexual or gay, were significantly associated with membership in the syndemic latent class.
- Reporting ACEs were significantly associated with an increased likelihood of membership in the syndemic latent class.
- Findings suggest the need for an integrated and trauma-informed approach to address social inequity and lingering health effects of childhood trauma.

REFERENCES

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Competing interests

None declared.

Patient consent for publication

Not applicable.

Ethics approval

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Data are available on reasonable request. Data may be available on request.

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ORIGINAL RESEARCH


Cunnardi CB, Caetano R, Jilolicy S. Socioeconomic predictors of intimate partner violence among white, black and Hispanic couples in the United States 2002;17:377–89.


Tsuyuki K, Al-Altis NA, Campbell JC, et al. Adverse childhood experiences (ACEs) are associated with forced and very early sexual initiation among black women accessing publicly funded STD clinics in Baltimore, MD. Plos One 2019;14:e0216279.


