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Abuse in the Continua: HIV Prevention and Care Outcomes and Syndemic Conditions Associated with Intimate Partner Violence Among Black Gay and Bisexual Men in the Southern United States

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Abstract

Intimate partner violence (IPV) has been implicated in HIV acquisition and worse HIV outcomes. Limited research focuses on the experiences of Black gay and bisexual men. Using data from cross-sectional surveys in Baltimore, Maryland, and Jackson, Mississippi, we analyzed the association between IPV victimization and HIV-related outcomes among 629 adult Black gay and bisexual men, among whom 53% self-reported a negative result at last HIV test. 40% of participants reported lifetime physical, sexual, and/or psychological IPV victimization, and 24% past-year victimization. Recent and lifetime IPV were associated with recent clinical diagnosis of STI (adjPrR: 1.44; 95%CI: 1.08–1.92) and ART medication interruptions (adjPrR: 1.59; 95%CI: 1.25–2.01), respectively. Physical IPV was inversely associated with current PrEP use (adjPrR: 0.35; 95%CI: 0.13–0.90). Recent IPV was independently correlated with depression symptomatology (adjPrR: 2.36; 95%CI: 1.61–3.47) and hazardous alcohol use (adjPrR: 1.93; 95%CI: 1.42–2.61), with evidence of interactions. IPV-HIV relationships were intersected by internalized stigma, housing instability, poverty, and lack of insurance. Tailored IPV services are urgently needed for comprehensive HIV services for Black gay and bisexual men in the U.S.

Keywords Gay or bisexual · Black or african american · Intimate partner violence · HIV · Depression · Hazardous alcohol use · Syndemic

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Introduction

Changing the trajectory of HIV incidence among gay and bisexual men is a priority of the United States (US) Ending the HIV Epidemic (EHE) Strategy.[1] As of 2018, 67% of new HIV diagnoses were among gay and bisexual men with highest burden among Black gay and bisexual men (37% of diagnoses among gay and bisexual men), particularly affecting those residing in the South.[2, 3] Extant research has demonstrated that disparities in HIV incidence among Black gay and bisexual men, relative to other gay and bisexual men, are not a product of differences in sexual behaviors, but have been associated with disassortative mixing in sexual networks, unknown partner HIV status, disparities in access to and uptake of HIV prevention, care, and other health services, and social and structural determinants of health, including racism and homophobia.[4–13] Within these analyses, violence victimization, including intimate and non-partner violence (IPV and NPV, respectively) in

childhood and adulthood emerged as correlates of worse HIV and other health outcomes.

While the epidemiology of violence victimization—and to an extent, perpetration—are well characterized in the US and globally, research efforts have predominantly focused on cisgender women in heterosexual relationships. In the US, The National Intimate Partner and Sexual Violence Survey (NISVS) began collecting and reporting experiences among gay and bisexual men in 2010. Estimates from that survey suggested that 26% and 37% of gay and bisexual men (or, 708,000 and 711,000 people nationwide), respectively, experienced some form of lifetime rape, physical violence and/or stalking by an intimate partner.[14] 11% of gay men were impacted physically, socially, or psychologically by IPV; estimates of impact among bisexual men were not reported due to the small sample size.[14] Small samples have also led to the suppression of in-depth analyses, including stratified analyses by race and ethnicity.[14].

Estimates from subnational surveys in social sciences and HIV research have filled these gaps to a limited extent, estimating the prevalence of IPV victimization among gay and bisexual men to range from 12 to 78% depending on sampling method, target population, and method to measure IPV.[15, 16] Prior research and reviews have provided strong evidence of the syndemic relationships between IPV victimization and HIV, depression, substance use, stigma, and condom use among gay and bisexual men, as well as between IPV perpetration and substance use.[17–21] Syndemics have been defined as "the concentration and deleterious interaction of two or more diseases or other health conditions in a population, especially as a consequence of social inequity and the unjust exercise of power."[22–25] For Black gay and bisexual men, social inequity may be conceptualized through an intersectional lens, in recognition that social categories such as race, ethnicity, and sexual orientation may intersect to affect individual experiences via systems of power and oppression including but not limited to racism, homophobia, and biphobia.[9–11, 26–30] While limited research has focused on experiences and outcomes of IPV among Black gay and bisexual men, limited extant data suggest high prevalence of IPV victimization and increased risk of HIV incidence among Black gay and bisexual men, relative to men who did not report IPV.[19, 31, 32].

Understanding IPV experiences and the relationship between IPV, syndemic conditions, and HIV for populations most affected by the HIV epidemic is critical to informing comprehensive HIV prevention and care interventions. To that end, this analysis aimed to estimate the prevalence of IPV and relationships with syndemic conditions, including mental health, substance use, HIV prevention and care outcomes among Black gay and bisexual men in two southern cities prioritized in the US EHE Strategy.[1].

Methods

Data were collected under an initiative to evaluate *ACCELERATE!*, an ongoing community-led HIV prevention and care initiative among Black gay and bisexual men in two southern cities. The evaluation used a parallel mixed-methods approach, two cross-sectional surveys, qualitative data collection with Black gay and bisexual men and community leaders, and collection of process indicators associated with *ACCELERATE!* programs. Equivalent study methods were implemented across both rounds of surveys to ensure comparability of data collected at each timepoint. Data for this analysis are drawn from the cross-sectional surveys.

Setting

The study was implemented in Baltimore, MD and Jackson, MS. Both cities have populations that are predominantly Black yet remain highly segregated. Jackson, based in the Deep South, is known to have a conservative state government, experience some of the highest levels of poverty in the US, and Black residents continue to experience bias-motivated violence.[33–35] Baltimore, based in the Upper South, is characterized by more progressive local politics, yet this has not translated substantially into reduced racial disparities.[36, 37] Structural disadvantage has fed into multiple health conditions, including high burden and incidence of HIV among Black gay and bisexual men in both cities.[33, 37, 38] In response, community-led organizations have been at the forefront of HIV advocacy, prevention, response, and support programs since the beginning of the epidemic.[34] In 2019, the national EHE strategy prioritized Baltimore and Mississippi amongst other high burden cities and states leading to significant investments for HIV response.[1].

Sample and Recruitment

Eligibility criteria for the cross-sectional surveys in both cities included: aged ≥ 18 years, resident of Baltimore or Jackson metropolitan area, Black or African American race or multiracial including Black or African American, assigned male sex-at-birth and identified as man, and reported sex with another man in the past 12 months. Participants were not required to have attended *ACCELERATE!* activities. Cross-sectional surveys were independent with separate recruitment phases and activities in each round. Participants

were not eligible to participate more than once in each round but could participate in both rounds of data collection.

Both sites used a multi-pronged convenience sampling strategy involving referral by *ACCELERATE!* grantee organizations, peer referral, distribution of flyers at popular social and health venues for Black gay and bisexual men, and outreach at local LGBTQ and HIV-related events. In Baltimore, two peer recruiters with strong social ties to local Black LGBTQ communities, were hired to promote the study and engage potential participants through in-person outreach and communication through social media. In Jackson, incentivized peer referral was incorporated into recruitment methods during the second survey round. Participants received an incentive ($10 gift card) to recruit up to three candidate participants. Participants provided informed consent at each round using verbal consent scripts to minimize collection of identifiers. Reproducible unique identifying codes were created using a combination of letters and digits from participant name, family name, and date of birth to permit identification of duplicate participants and individuals participating in both survey rounds.

Data Collection

All Baltimore participants completed an interviewer-administered, electronic survey that lasted 40–60 min in a private space at the Johns Hopkins School of Public Health. Weekly drop-in data collection evenings were held to provide an open period when candidates could participate in surveys. Participants were provided a $25 gift card as an incentive to survey completion in Baltimore; this was subsequently increased to $50 in January 2018, to match incentives offered by other local studies engaging with the same population. Round 1 surveys were implemented between October 2017 and March 2018 and Round 2 data collection between September 2018 to February 2019.

In Jackson participants completed either an interviewer-administered electronic survey or a computer assisted self-interviewing format. Interviews were primarily conducted at the Jackson Medical Mall in a private space. Due to transportation barriers and/or privacy concerns, some interviews were conducted at the home of the participant or at an agreed upon location that met individual participants' needs. Participants in Jackson were provided with a $50 gift card for survey completion. Round 1 data collection occurred between March and June 2018, and Round 2 in January to May 2019.

Measures

The *ACCELARATE!* Evaluation aimed to explore how the intervention may have impacted the lives of Black gay and bisexual men in both cities. Thus, our survey measures spanned a wide range of individual, interpersonal, health history and healthcare, and structural domains.

Individual measures utilized in this analysis included demographics and internalized stigma. Demographics measured included age, race, ethnicity, sexual orientation, education history, employment status, income, and recent housing instability (past 12 months). Income was measured categorically with the following question: "In the past 30 days, how much money have you received for work?" Responses were collapsed into income above or below ($1000 per month or less) the federal poverty level (FPL). Internalized stigma was measured using an 8-item adaptation of a scale developed by Testa and colleagues (alpha: 0.92).[39] Likert responses were summed with a range of 8–32 and analyzed as a continuous variable, with higher scores representing higher levels of internalized sexual orientation stigma.

Interpersonal characteristics included lifetime and recent intimate partner violence (IPV), emotional support from others, and number of sexual partners in the past 12 months. Measures of intimate IPV were adapted from items used in other research with gay and bisexual men in the United States.[40–42] Lifetime physical, sexual and psychological intimate partner violence were measured using the following three items, respectively: "Have any of your intimate or sexual partners ever hit, kicked, slapped, punched, or otherwise physically hurt you? Have any of your intimate or sexual partners ever physically forced or coerced you to have sex or perform sexual acts that you did not want to? Have any of your intimate or sexual partners ever insulted, criticized, threatened or yelled at you in any way? Examples may include: using slurs, calling you names, criticizing your sexual performance, asking you to act more masculine, threatening to out you, or threatening to harm other people you care about." For each positive response to a lifetime IPV measure, a question was displayed to ask if that form of violence had occurred within the last 12 months. A composite dichotomous variable was created for lifetime IPV based on at least one positive response to any of the three lifetime measures. This process was repeated for past-year IPV victimization. Negative responses to all lifetime IPV measures were classified as "No" within lifetime and recent IPV composite variables. Emotional support was measured using a four-item scale developed by Krause (alpha: 0.90).[43] Responses were summed with a range of 4–16 and collapsed into a binary variable at the median value of 12, with higher scores representing higher social support. Number of sexual partners was measured with one item that asked about the number of male sexual partners within the last 12 months. Reponses ranged from 1 to 100 and were collapsed

into a categorical indicator with 3 levels: 1–2 partners, 3–5 partners, and 6 or more.

Health and healthcare history included hazardous alcohol use, recent depression symptoms, lifetime and recent clinical diagnosis of a sexually transmitted infection (past 12 months), history of HIV testing and last result, current use of pre-exposures prophylaxis among those with a recent negative HIV test, and lifetime antiretroviral treatment interruptions among those with a positive HIV test, and healthcare empowerment. Hazardous alcohol use was measured using the 3-item AUDIT-C scale (KR-20: 0.77). Responses were scored and dichotomized at a cut-off of 4 or more, indicative of potentially hazardous alcohol use among men.[44] Depression symptoms in the past 2 weeks were measured using the Patient Health Questionnaire-2 (KR-20: 0.67), a two-item screener that was scored and dichotomized. A score of 3 or higher was classified as indicative of major depression symptoms.[45].

Analysis

To maximize power to detect associations with IPV victimization, data from Round 1 and Round 2 surveys were combined. *ACCELERATE!* did not specifically target IPV, thus we assumed that there would be no temporal impact on IPV and that it would be appropriate to combine the datasets. This was confirmed by statistical comparison of IPV over time across the two sites, in which no differences were detected (Appendix 1). Based on a review of autogenerated unique IDs (derived from a combination of name and other defining characteristics), age, location, and HIV status, we identified 68 participants who completed both survey rounds. For these participants, only data from Round 2 (most recent) were included in the analytic sample. Missingness was low (< 1%) for all measures used in this analysis, with the exception of internalized stigma (7%) and income/federal poverty level (4%). Given that missingness was less than 10% across measures, we did not apply imputation methods.

Descriptive analyses were conducted to assess participant characteristics within the study sample by study site. We also identified differences in the proportion of participants who experienced recent IPV as it relates to participant experiences, using chi-squared tests and T-tests to detect statistical differences. We calculated transition matrices for the subsample (n = 68) of participants who contributed data to both survey rounds to identify the proportion of participants who reported past-12 month IPV in Rounds 1 and 2, and to identify the proportion who newly reported IPV, i.e. reported no IPV in Round 1 but reported IPV in Round 2.

We used regression modeling to identify demographic, social, and interpersonal correlates of recent IPV

victimization (dependent variable) based on prior research evaluating correlates of IPV.[46] We then separately modelled the associations between recent IPV (independent variable) and dependent syndemic variables including depression symptoms and hazardous alcohol use, as well as HIV outcomes including PrEP use (restricted to participants who report a negative result at their most recent HIV test) and ART treatment interruptions (restricted to participants who report a positive result at their most recent HIV test), while controlling for other confounders. Because ART treatment interruption was measured with a lifetime recall, we assessed the relationship between lifetime IPV and treatment interruptions. These models were informed by prior evidence of the syndemic relationships between IPV victimization and HIV outcomes, depression, substance use, stigma, and other prevention behaviors among gay and bisexual men.[17–21].

We used Poisson regression models with robust variance estimation to calculate prevalence ratios and 95% Confidence Intervals (95%CI). Variables with p-values less than 0.05 in the bivariate models were selected for inclusion in the final multivariable models. For models focused on syndemic outcomes, we tested for interactions between recent violence and other possible syndemic health conditions in the model.[47] Specifically, the model evaluating the relationship between IPV and hazardous alcohol use included an interaction term for IPV and depression symptoms while the model assessing the outcome of depression symptomatology included an interaction term for recent IPV and alcohol use. In these models, the continuous variables for depression symptom and alcohol use scores were used. When the interaction was significant at p < 0.05, we calculated the joint effect of combination of recent IPV and the syndemic condition (e.g., the joint effect of recent IPV and increased depression scores on hazardous alcohol use). In cases when the interaction was not significant, such as HIV outcomes, the interaction was dropped from the model. We assessed for multi-collinearity using variance inflation factor (VIF) tests and removed collinear variables where multicollinearity was identified. All final models with IPV and syndemic conditions as the dependent variable had a VIF less than 1.07.

To assess the independent effects of specific forms of violence, final multivariable models were rerun with separate indicators for psychological, physical, and sexual violence replacing the composite IPV variable (Appendices 3–4). These models did not include interaction terms given the number of violence measures included in each model. VIF scores for all models were less than 1.40. Statistical analyses were conducted using Stata 15 (College Station, TX). Guidelines by the American Statistical Association on the use of p-values in combination with an assessment of

magnitude, directionality, and plausibility, were followed to draw study inferences.[48].

Ethical Review

The research protocol was reviewed and approved by Institutional Review Boards at Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland and University of Mississippi Medical Center in Jackson, Mississippi.

Results

A total of 629 unique participants completed Round 1 and Round 2 surveys, including 337 participants in Baltimore, MD and 292 in Jackson, MS. Table 1 displays participant characteristics and experiences by site. Across the entire sample, 3% identified as multi-racial, with the vast majority identifying as Black or African American only and 1% reporting Latinx/Hispanic ethnicity. Two-thirds of

participants identified as gay or same-gender loving. The only sociodemographic difference between participants in the two sites was related to the proportion who reported income below the federal poverty level (FPL), which was higher in Jackson. Notably, incomes below the FPL were high in both cities: 58% in Baltimore and 67% in Jackson, and differences could be attributed to higher missingness in Baltimore (5%) compared to Jackson (3%) for this variable.

Frequency of IPV Experiences

Prevalence of IPV was high. Overall, 40% of the sample reported at least one form (psychological, physical, or sexual) of lifetime IPV. Lifetime, but not recent, experiences of IPV were different by site (Baltimore 45.7% vs. Jackson 33.7%, p = 0.002). Appendix 2 displays an analysis of lifetime and recent IPV victimization among participants stratified by site. Almost one-quarter (23.9%) of participants reported any recent IPV, with no difference across site. Multiple forms of IPV victimization were common, with 20%

Table 1 Participant demographic, interpersonal and health outcomes among Black gay and bisexual men in Baltimore, Maryland and Jackson, Mississippi

	Baltimore (N = 337)		Jackson (N = 292)		Total (N = 629)		
	n	Col %	n	Col %	n	Col %	p-value
Median age (IQR)	32	(27–48)	27	(23–31)	29	(25–38)	p < 0.001
Race							0.095
Black/African American (only)	322	95.5	286	97.9	608	96.7	
Multi-racial (including Black/African American)	15	4.5	6	2.1	21	3.3	
Latino/Hispanic ethnicity (ref: non-Hispanic)	6	1.8	1	0.3	7	1.1	0.086
Sexual orientation (n = 628)							0.840
Gay/Same-gender loving	232	68.8	194	66.7	426	67.8	
Bisexual	74	22.0	69	23.7	143	22.8	
Other	31	9.2	28	9.6	59	9.4	
Highest level of education completed (n = 628)							0.605
High school or less	209	62.0	173	59.5	382	60.8	
Vocational school/associates degree	68	20.2	57	19.6	125	19.9	
Undergraduate/Graduate degree	60	17.8	61	21.0	121	19.3	
Current employment status (n = 628)							0.157
Unemployed	72	21.4	65	22.3	137	21.8	
Employed part-time	63	18.7	41	14.1	104	16.6	
Employed full-time	135	40.1	138	47.4	273	43.5	
Other	67	19.9	47	16.2	114	18.2	
Income below federal poverty line (ref: above FPL; n = 603)	184	57.5	190	67.1	374	62.0	0.015
Recent housing instability (ref: housing stable; last 12mo)	76	22.6	67	22.9	143	22.7	0.907
Detained in detention center, jail, or prison (lifetime; ref: no)	147	43.6	93.0	32.0	240.0	38.2	0.003
Detained in detention center, jail, or prison (last 12mo; ref: no)	30.0	8.9	27.0	9.3	57.0	9.1	0.859
Result of last HIV test (n = 617)							0.247
HIV-negative	170	50.9	158	55.8	328	53.2	
HIV-positive	164	49.1	124	43.8	288	46.7	
Undetermined	0	0.0	1	0.4	1	0.2	
Depression symptoms (PHQ-2 > = 3; ref < 3; n = 624)	90	26.8	86	29.9	176.0	28.2	0.395
Heavy/hazardous drinking (AUDIT-C > = 4; ref < 4; n = 626)	133	39.5	109	37.7	242	38.7	0.654
Median emotional support scale score (IQR), range 4–16	12	(10–15)	12	(8–16)	12	(9–16)	0.051

Note: Ref: reference category; IQR: Interquartile range

of all participants reporting more than one form in their lifetime and 11% within the last 12 months. Figure 1 displays proportional Venn diagrams of the prevalence and overlapping experiences of lifetime and recent IPV victimization. 6% of participants reported lifetime experiences of all three forms of IPV.

Transition analysis of data from the 68 participants (n = 31 Jackson, n = 37 in Baltimore) who contributed data to both time points provided evidence of IPV stability and incidence over time. Among those who reported any recent IPV at Round 1, 33.3% continued to report any recent IPV at Round 2 (25.0% physical, 100% sexual, and 33.3% psychological). Conversely, 19.6% of those who reported no IPV of any form at Round 1 ultimately transitioned to report some form of physical IPV by Round 2 (6.3% physical, 6.1% sexual, and 17.0% psychological).
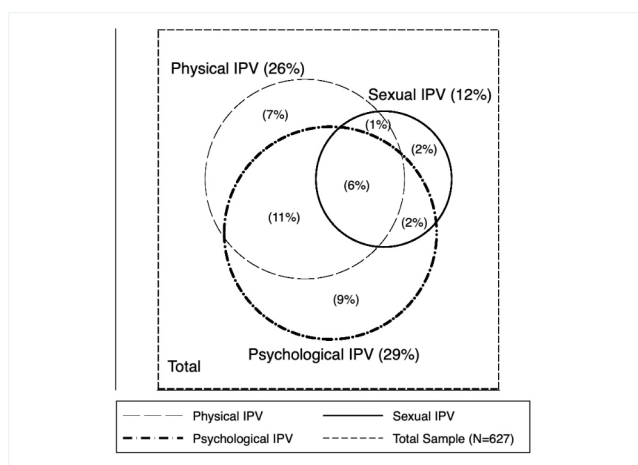
Fig. 1a Proportional Venn diagrams of lifetime (left panel) and recent (last 12 months; right panel) IPV victimization reported by the total sample of Black gay and bisexual men in Baltimore and Jackson
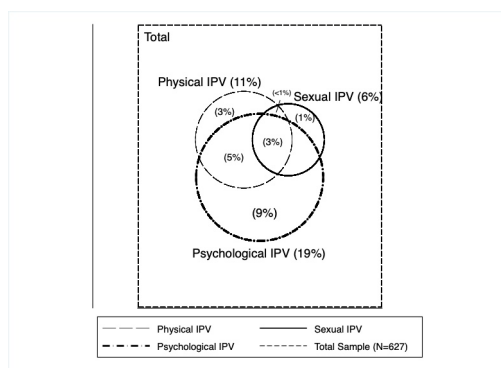
Fig. 1b

Correlates of IPV Victimization

40% (101/251) of participants who reported lifetime IPV did not report experiences of IPV within the last 12 months (Table 2). Participants who reported multi-racial identities, bisexual or other sexual orientation, and recent housing instability were more likely than their peers to report recent IPV. Multivariable regression identified several individual and interpersonal correlates of recent IPV victimization (Table 3). Participants who reported multiracial identities (ref: Black of African American only; adjPrR: 1.74; 95%CI: 1.08–2.81), recent housing instability (ref: Stable housing last 12 mo.; adjPrR: 1.36; 95%CI: 1.02–1.82) were more likely to independently report recent IPV than their peers. Higher internalized stigma scores were also associated with recent IPV—each unit increase in internalized stigma was associated 1.03-fold increase in recent IPV (adjPrR: 1.03; 95%CI: 1.02–1.05). At interpersonal levels, increased numbers of partners in the last 12 months was associated with recent IPV—participants with 6 or more partners were almost twice as likely to report recent IPV than participants who reported 1–2 partnerships (adjPrR: 1.9; 95%CI: 1.34–2.67). A high and inverse association was observed with emotional support and IPV. Participants with social support scores of 12 or higher were 22% less likely to report recent IPV (adjPrR: 0.78; 0.58–1.03) than those with lower emotional support scores. Exchange sex was associated with IPV at bivariate levels but attenuated after controlling for housing instability and was collinear with housing and sexual partnerships, and was thus excluded from the final model.

Relationship Between IPV, Mental Health, and Substance Use

Recent IPV was associated with several health outcomes (Table 4). Controlling for other potential confounders, recent IPV was associated with increased prevalence of recent depression symptomatology (Ref: no IPV; adjPrR: 2.36; 95%CI: 1.61–3.47). There was a significant interaction between IPV and alcohol use in the relationship with depression symptomatology. The joint effect of this interaction was a two-fold increase in the prevalence of depression symptomatology with each unit increase in alcohol use when IPV was present (joint effect: adj. PrR: 2.10, 95%CI: 1.51–2.91). Low income, increased internalized stigma, and hazardous alcohol use were also independently associated with depression symptomatology while increased emotional support scores were inversely associated with depression symptomatology.

Recent IPV was associated with hazardous alcohol use (Ref: no IPV; adjPrR: 1.93; 95%CI: 1.42–2.61).

Table 2 Experiences of violence victimization across participant characteristics among Black gay and bisexual men in Baltimore and Jackson

| | Recent experience of violence (last 12 mo.) | | | | | | |
| | None (n = 477) | | Recent IPV (n = 150) | | All (n = 627) | | |
	n	%	n	%	n	%	p-value
Median age (IQR)	30	(25–42)	29	(25–33)	29	(25–38)	0.003
City							0.796
Baltimore	255	53.5	82	54.7	337	53.7	
Jackson	222	46.5	68	45.3	290	46.3	
Race							0.010
Black/African American (only)	466	97.7	140	93.3	606	96.7	
Multi-racial (including Black/African American)	11	2.3	10	6.7	21	3.3	
Latino/Hispanic ethnicity (ref: non-Hispanic)	5	1.0	2	1.3	7	1.1	0.772
Sexual orientation							0.012
Gay/Same-gender loving	332	69.7	93	62.0	425	67.9	
Bisexual	109	22.9	34	22.7	143	22.8	
Other	35	7.4	23	15.3	58	9.3	
Current employment status (n = 626)							0.046
Unemployed	94	19.7	43	28.7	137	21.9	
Employed part-time	75	15.8	29	19.3	104	16.6	
Employed full-time	215	45.2	56	37.3	271	43.3	
Other	92	19.3	22	14.7	114	18.2	
Income below federal poverty line (n = 601; ref: no)	275	60.2	99	68.8	374	62.2	0.064
Highest level of education completed (n = 626)							0.162
High school or less	282	59.2	98	65.3	380	60.7	
Vocational school/associates degree	94	19.7	31	20.7	125	20.0	
Undergraduate/Graduate degree	100	21	21	14.0	121	19.3	
Recent housing instability (last 12mo; ref: no)	92	19.3	49	32.7	141	22.5	p < 0.001
Detained in detention center, jail, or prison (last 12mo; ref: no)	39	8.2	18	12.0	57	9.1	0.155
Result of last HIV test (n = 616)							0.714
Negative	252	53.7	75	51.0	327	53.1	
Positive	216	46.1	72	49.0	288	46.8	
Undetermined	1	0.2	0	0.0	1	0.2	
Lifetime IPV (ref: no)	101	21.2	150	100.0	251	40.0	p < 0.001

Note: Ref: reference category

Table 3 Correlates of recent IPV victimization among Black gay and bisexual men in Baltimore and Jackson (N = 627)

Variable	PrR	95%CI	p-value	adjPrR	95%CI	p-value
Age	**0.98**	**(0.97–0.99)**	**0.002**	0.99	(0.98-1.00)	0.120
Residence in Jackson (ref: Baltimore)	0.96	(0.73–1.28)	0.796			
Multiracial (ref: Black identified)	**2.06**	**(1.29–3.30)**	**0.003**	**1.74**	**(1.08–2.81)**	**0.022**
Bisexual or other orientation (ref: Gay)	1.30	(0.98–1.72)	0.074	--	--	--
Any employment/source of income (ref: unemployed)	**0.70**	**(0.52–0.94)**	**0.018**	--	--	--
Income below federal poverty line	1.34	(0.98–1.82)	0.069	--	--	--
Housing instability, past 12mo (ref: no)	**1.67**	**(1.26–2.22)**	**p < 0.001**	**1.36**	**(1.02–1.82)**	**0.039**
Internalized stigma scale score (continuous)	**1.03**	**(1.01–1.06)**	**0.006**	**1.03**	**(1.02–1.05)**	**0.029**
Emotional support scale score > 12 (ref < = 12)	**0.68**	**(0.51–0.90)**	**0.007**	**0.78**	**(0.58–1.03)**	**0.086**
Number of sexual partners in past 12mo (ref: 1–2)						
3 to 5	1.32	(0.92–1.89)	0.132	1.27	(0.86–1.86)	0.225
6 or more	**2.11**	**(1.52–2.93)**	**p < 0.001**	**1.90**	**(1.34–2.67)**	**p < 0.001**

Note: Variables with p < 0.05 in bivariate analysis included in multivariable model; employment was removed from the final model due to collinearity with housing and number of sexual of partners; Bolded font significant at p < 0.05 in multivariable model

Table 4 Multivariable models assessing the association between recent IPV and current mental health and substance use outcomes among Black gay and bisexual men in Baltimore and Jackson

	Depression symptomatology (PHQ-2 > = 3)			Hazardous alcohol use symptomatology (AUDIT-C > = 4)		
	adjPrR	95%CI	p-value	adjPrR	95%CI	p-value
Age (continuous)	1.00	(0.99–1.01)	0.871	1.00	(0.99–1.01)	0.462
Bisexual or other orientation (ref: Gay)	1.28	(0.98–1.66)	0.065	--	--	--
Income below federal poverty line (ref: above FPL)	1.36	(0.99–1.72)	0.059			
Housing instability, past 12mo (ref: no)	**1.41**	**(1.07–1.87)**	**0.013**			
Internalized stigma scale score (continuous)	**1.04**	**(1.01–1.06)**	**0.004**	--	--	--
Emotional support scale score > 12 (ref < = 12)	**0.62**	**(0.47–0.81)**	**p < 0.001**	--	--	--
Recent IPV	**2.36**	**(1.61–3.47)**	**p < 0.001**	**1.93**	**(1.42–2.61)**	**p < 0.001**
Alcohol use AUDIT-C score (continuous)	**1.10**	**(1.05–1.16)**	**p < 0.001**			
Recent IPV X Alcohol use score interaction	**0.89**	**(0.82–0.96)**	**0.003**			
Depression symptomatology PHQ2 score (continuous)	--	--	--	**1.14**	**(1.07–1.22)**	**p < 0.001**
Recent IPV X Depression score interaction				**0.80**	**(0.71–0.91)**	**p < 0.001**
Number of sexual partners in past 12mo (ref: 1–2)						
3 to 5	--	--	--	**1.35**	**(1.07–1.70)**	**0.010**
6 or more	--	--	--	**1.34**	**(1.05–1.73)**	**0.021**

Notes: PHQ: Patient Health Questionnaire; AUDIT-C: Alcohol Use Disorder Identification Test-Concise: Ref: reference category; Variables with p < 0.05 in bivariate analysis included in multivariable model; Bolded font significant at p < 0.05 in multivariable model

Associations between IPV and depression symptomatology appeared to be driven by psychological and sexual violence (Appendix 3). There was a significant interaction between IPV and depression symptoms in the relationship with hazardous alcohol use. The joint effect of this interaction was a 1.6-fold increase in the prevalence of hazardous alcohol use with each unit increase in depression symptoms when IPV was present (joint effect: adj. PrR: 1.56, 95%CI: 1.23–1.96). Depression symptomatology and increased numbers of sexual partners were independently associated with hazardous alcohol use (Table 4).

Relationship Between IPV and HIV-related Health Behaviors and Outcomes

Recent and lifetime experiences of IPV were associated with HIV-related health behaviors and outcomes, though with no evidence of interaction between IPV and other syndemic conditions in these models (Table 5). Recent IPV

Table 5 Association between IPV and sexual health outcomes and medication use among Black gay and bisexual men in Baltimore and Jackson

	Recent clinical diagnosis of STI (past 12 months)			Current PrEP use (N = 327)[1]			Lifetime ART medication interruptions (N = 275)[2]		
	adjPrR	**95%CI**	**p-value**	**adjPrR**	**95%CI**	**p-value**	**adjPrR**	**95%CI**	**p-value**
Multiracial (ref: African American only)	--	--	--	--	--	--	1.26	(0.84–1.91)	0.263
Jackson (ref: Baltimore)	**2.17**	**(1.66–2.85)**	**p < 0.001**	**2.50**	**(1.70–3.68)**	**p < 0.001**	--	--	--
Bisexual or other orientation (ref: Gay)	**0.70**	**(0.51–0.96)**	**0.027**	--	--	--	--	--	--
Housing instability (last 12mo)	**1.42**	**(1.06–1.91)**	**0.019**	--	--	--	--	--	--
Recent IPV	**1.44**	**(1.08–1.92)**	**0.012**	0.78	(0.47–1.30)	0.340			
Lifetime IPV	--	--	--	--	--	--	**1.59**	**(1.25–2.01)**	**p < 0.001**
Number of sexual partners in past 12mo (ref: 1–2)									
3 to 5	**1.67**	**(1.14–2.47)**	**0.009**	--	--	--	**1.53**	**(1.16–2.02)**	**0.002**
6 or more	**3.41**	**(2.39–4.85)**	**p < 0.001**	--	--	--	**1.38**	**(1.03–1.83)**	**0.028**
Depression symptomatology (PHQ2 >= 3; ref < 3)	--	--	--	**0.48**	**(0.28–0.84)**	**0.010**			
Insurance (ref: Private)	--	--	--	--	--	--	--	--	--
Public	--	--	--	0.98	(0.70–1.44)	0.903	--	--	--
None	--	--	--	**0.49**	**(0.28–0.86)**	**0.014**	--	--	--

Notes: [1] Analysis restricted to participants self-reporting negative HIV test result at most recent test; [2] Analysis restricted to participants self-reporting a positive result at last HIV test and who responded to treatment measures; PHQ: Patient Health Questionnaire; Ref: reference category; Variables with p < 0.05 in bivariate analysis included in multivariable model; Bolded font significant at p < 0.05.; Employment status, housing (in)stability, and education were also associated with current PrEP use in bivariate analysis but were collinear with recent IPV and omitted from the final model

was associated with a 1.4-fold increase in self-reported past 12-month STI clinical diagnosis (ref: no IPV; adjPrR: 1.44; 95%CI: 1.08–1.92). Recent unstable housing and increased number of sexual partners were associated with reporting a recent STI diagnosis, while bisexual sexual orientation was inversely associated with recent diagnosis of STI.

In bivariate analysis, recent IPV was inversely associated with current PrEP use among participants with a past negative HIV test result (ref: no IPV; adjPrR: 0.65, 95%CI: 0.38–1.10), but the strength of the association attenuated with the inclusion of insurance coverage and psychological distress in the model. However, physical violence remained independently associated with reduced PrEP use (Appendix 4; (ref: no physical IPV; adjPrR: 0.35, 95%CI: 0.13–0.90). Lack of insurance and depression symptomatology were also inversely associated with current PrEP use, while residence in Jackson was positively associated with PrEP use.

Finally, lifetime IPV victimization was associated with lifetime ART medication interruptions among participants living with HIV (ref: no IPV; adjPrR: 1.59; 95%CI: 1.25–2.01). Psychological violence appeared to drive associations between IPV and both recent STI diagnosis and lifetime

ART interruptions (Appendix 4). Participants who reported increased numbers of partners in the past 12 months were also more likely to report lifetime treatment interruptions.

Discussion

This research among more than 600 Black gay and bisexual adult men in Baltimore, Maryland, and Jackson, Mississippi, demonstrates high prevalence of lifetime and recent IPV victimization (40% and 24%, respectively), which are as high or exceed those observed among other populations in the US. Transition analyses, though limited to 68 participants, suggests persistence and high incidence of IPV. Our findings support evidence of relationships between IPV and markers of HIV transmission and acquisition risk— including increased STI diagnosis, reduced PrEP uptake, and increased ART interruptions, as well as with syndemic relationships with depression and alcohol use. Interactions between IPV, depression, and alcohol use demonstrate the mutually reinforcing nature of these conditions among Black gay and bisexual men. These findings must be considered

within the broader social and structural contexts to understand the unique challenges that Black gay and bisexual men face regarding experiences of IPV and HIV. Above all, each city has long and pervasive history of racist and homophobic policies within systems that continue to marginalize Black gay and bisexual men and limit access to critical HIV and IPV services. What is well-known in the community is highlighted by study findings,[49] in which IPV-HIV relationships are intersected by structural factors of economic disenfranchisement and homophobia. These factors manifest here as internalized stigma, housing instability, and lack of insurance, which are associated to varying degrees with IPV victimization, depression symptomatology, and recent STI diagnosis.

Our findings contribute to an emerging evidence base specifically focused on Black gay and bisexual men and contextualizes experiences of violence victimization through behavioral, interpersonal, and biologic pathways. [46] Behavioral and interpersonal pathways between IPV and HIV have been largely described for other populations but are reflected in these findings. These often relate to unprotected (condomless or without PrEP) sexual intercourse, such as non-consensual sexual intercourse (physically forced or coerced) with a person who is living with HIV and partner control of methods to prevent and treat HIV, such as control of condom use and antiretrovirals.[50–56] Associations between IPV and STI diagnosis, reduced PrEP use, and lifetime treatment interruptions observed in this analysis may reflect changes in behavior following experiences of violence and/or partner controlling tactics within relationships among Black gay and bisexual men. [41] Because IPV is perpetrated by a partner, experiences of violence tend to be repetitive and may increase opportunities for HIV and STI transmission.[50] The association between IPV and self-reported STI diagnosis in this study also highlight increased risk for HIV acquisition among HIV-negative survivors through physiologic pathways, which may increase further with PrEP non-use.[4, 50].

Behavioral and interpersonal pathways between violence and HIV also include reduced agency to use or negotiate prevention or treatment in abusive relationships or as sequelae to violence; changes in sexual risk behaviors following violence victimization; and non-use of prevention and treatment to mitigate risk of future violence.[50–56] Thus, the association between past-year number of sexual partners in this study may reflect increased risk of exposure to IPV through multiple partners, but may also reflect changes in sexual behavior as a downstream effect of abuse. Adult experiences of IPV may contribute to cumulative lifetime traumatic victimization, including child abuse, community violence, and other NPV, which have been shown to collectively increase behavioral HIV acquisition risk and

treatment outcomes among Black youth and adults.[46, 57–59].

Study findings demonstrated synergistic associations between IPV victimization and depression symptoms and alcohol use. We also found that recent depression symptomatology was negatively associated with current PrEP use. Taken together, IPV may have a direct role in ART and PrEP non-use and non-adherence, as well as an indirect role through mental and behavioral health. Indeed, findings from longitudinal research suggest that mental health may mediate the relationship between IPV and PrEP use.[60, 61] Notably, a study among 281 men aged 50 years and older living with HIV (19% Black) found that IPV was not associated with medication non-adherence, though depression, PTSD, and stimulant use were.[62] Research among Black gay and bisexual men in Baltimore City has also shown that depression is negatively associated with self-efficacy of communicating with peers about men's health issues. [63] This suggests that men with depressive symptoms may have barriers to communicating about HIV prevention and care, as well as IPV, with peers.[63] Interpersonal factors of internalized homophobia and emotional support were found to be associated with IPV in this analysis and may also exacerbate or buffer the effects of IPV on depression, respectively.[40, 60] Critically, these findings exist within contexts in which Black gay and bisexual men in Baltimore City and Jackson, MS consistently report stigmatization at the intersections of the race and sexual identity, with racism and homophobia driving sexual risk-taking as well access to quality and culturally competent services.[30, 64–66].

Across these analyses, the prevalence and associations with housing stability, insurance access, and poverty (62% living below the federal-poverty line) likely reflect the impacts structural racism broadly as well as within epidemics of HIV and IPV.[27, 67] National reports highlight racial inequities in access to PrEP and widening disparities in the HIV epidemic.[68] We found that lack of health insurance remained associated with a 50% reduced probability of PrEP use after controlling for IPV and depression. Notably, Medicaid expansion was not adopted in Mississippi, making PrEP medication and associated services cost-prohibitive for many potential users. Further, manufacturer assistance programs, which should theoretically provide equivalent access to PrEP for people without insurance, have been associated with longer median PrEP initiation times.[69, 70] Recent unstable housing was also independently associated with a 1.4-fold increased prevalence of IPV as well as recent STI diagnosis, after controlling for IPV. Housing instability is a critical structural determinant of IPV and HIV through multiple risk environments, including: engendering engagement in transactional sex to support housing; increasing IPV vulnerability in temporary and insecure housing settings;

and necessitating dependency on abusive partners during periods of financial and housing instability.[41, 67].

Findings should be viewed in light of study limitations. The main study focused on the evaluation of a community-based intervention for Black gay and bisexual men and utilized convenience sampling methods. While we have rich data on lifetime and recent experiences of IPV victimization, we did not collect data on polyvictimization or cumulative violence, perpetration of violence and bidirectional violence, childhood experiences, or access to services after IPV. This study found a strong association between multiracial identity and IPV victimization but may be limited by the small number of participants (n = 21) who identified as multiracial. This association may reflect research that has documented worse mental health, substance use, and increased IPV victimization among multiracial youth relative to all monoracial counterparts that is linked to racial identity conflict and discrimination;[71] increased IPV victimization and mutual victimization among multiracial heterosexual couples, relative to monoracial Black and monoracial White couples;[72] or may simply reflect other unmeasured confounders. We did not find evidence of interactions in models with STI and HIV outcomes (PrEP use and ART interruptions), but this may be due to the limited power of a reduced sample size when restricting analysis to participants with a prior positive or negative HIV diagnosis. Finally, these data are predominantly cross-sectional in nature, though measures of lifetime and past-12 month IPV relative to current health outcomes, provide some temporality. Our limited prospective data suggest high persistence and incidence among the 68 participants with data from both time points. While causality cannot be established, the high burdens of IPV, HIV, and social and structural correlates highlight the need to move beyond demonstration of temporality towards the development and testing of effective combination interventions that include culturally appropriate prevention and victim services for addressing IPV among Black gay and bisexual men.

Our findings coupled with extant literature highlight the need for tailored IPV services within and outsides of comprehensive HIV prevention and care programs Black gay and bisexual men. Behavioral and interpersonal (e.g. social network) interventions are the most frequently tested interventions among Black gay and bisexual men as methods to improve rates of HIV testing, engagement, and retention in the HIV prevention and care continua [73]. However, to our knowledge, few trials have focused on reducing IPV among gay and bisexual men as a component of these interventions. One study has focused on addressing trauma associated with childhood violence through cognitive behavioral therapy (N = 43; 25% Black) and found improved condom use immediately following the intervention, but little impact on PTSD.[74] As implemented in many settings, HIV prevention programs and interventions can integrate screening for IPV and offer linkage to or provide IPV-related services.[75] This, of course, requires development and implementation of IPV and cultural competency training for healthcare professionals and trainees to provide appropriate trauma-informed health to better understand the impact of IPV and support HIV prevention and care, particularly for Black gay and bisexual men. Trauma-informed training programs for HIV care providers to specifically address the needs of gay and bisexual men have already been developed and can be scaled up and tailored within local programs and to racially diverse communities.[76] Couples-based interventions may be adapted to support partner communication and reduce use of violence, as well as facilitate engagement in mental health and/or substance use services—all of which may ultimately promote engagement in HIV prevention and care for male couples.[77, 78] Structural interventions to address housing, financial insecurity, and other conditions that increase the risk environment for HIV and violence are also urgently needed.

Such interventions require support and funding for HIV prevention and anti-IPV programs and research that address the unique challenges of sexual and racial minorities, particularly Black gay and bisexual men in the US. Programs receiving federal funds under the Violence Against Women Act (VAWA, though not yet reauthorized as of the writing of this manuscript), are required to provide services to all survivors regardless of gender identity and sexual orientation.[79] National Housing Opportunities for Persons with HIV/AIDS (HOPWA) also recognize and provide services to address intersections of HIV and IPV.[80] Greater attention to federally funded services are needed to monitor, train, and ensure equitable provision, awareness of, and access to these services across HIV status, gender, race, and sexual orientation. Ancillary services to address IPV can be integrated under Health Resources and Services Administration (HRSA) and Ryan White funding, as well as EHE strategies to address the first three pillars related to HIV testing, care, and prevention.[1] However, while the 2017 HRSA strategy to address IPV and HIV, led by the Office of Women's Health, explicitly mentions high rates of IPV experienced by gay and bisexual men and LGBTQ populations broadly, only one activity (Priority 2.1) includes attention to these populations and solely aims to promote awareness among HRSA employees of the impact of IPV on underserved populations.[81] Finally, prioritization of IPV withing National Institutes of Health (NIH) and other research funding sources can help to provide evidence-based strategies to address the nexus of HIV and IPV. To date, only one NIH solicitation has focused on research and interventions for addressing the relationship between HIV and IPV.[82].

Conclusions

In the context of disproportionately higher rates of HIV, we found Black gay and bisexual men experience alarming levels of IPV and clear associations with HIV and syndemic conditions, which are exacerbated by factors related to structural racism and homophobia. There is an urgent need for trauma-informed, combination HIV prevention, care and treatment programs and policies that address the intersectional, multi-level factors influencing IPV and HIV vulnerability among Black gay and bisexual men in the US.

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