

The relationship between anti-LGBTQ+ legislation and HIV prevention among sexual and gender minoritized youth

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Conflicts of Interest and Source of Funding: The authors have no conflicts of interest to declare. This work was supported by the National Institutes of Health (UG3/UH3 AI133676, UG3/UH3 AI AI169631, T32 AI 070114). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Abstract:

Objective: Estimate the longitudinal associations of state-level anti-LGBTQ+ policies and county-level politics with individual HIV prevention outcomes among sexual and gender minoritized (SGM) youth.

Design: Keeping it LITE-1 prospectively enrolled 3,330 SGM youth and young adults (ages 13-34) at increased risk of HIV throughout the United States from 2017-2022.

Methods: Semiannual surveys collected self-reported HIV prevention measures (current PrEP use, weekly PrEP adherence, HIV/STI testing in the past 6 months). Geolocation was linked with state-level LGBTQ+ policy data and county-level election data. Generalized linear models with GEE estimated the single and joint longitudinal associations for 2 exposures [state-level policy climate (more discriminatory vs. less discriminatory) and county-level political majority (Democratic/swing vs. Republican)] with each outcome.

Results: Among participants living in a state with more discriminatory laws, those in a Democratic/swing county had a 6-percentage point increase in PrEP use (95% CI: 0.02, 0.09)

PrEP) were not widely available[16–18]. Furthermore, many of these studies were cross-sectional and examined limited policies, such as state-level marriage equality[19], or outcomes, such as awareness of PrEP’s existence[16]. Despite their limitations, these studies provide preliminary evidence that anti-LGBTQ+ policies impact HIV dynamics.

Anti-LGBTQ+ laws may possibly interfere with HIV prevention by increasing proximal stigma (e.g., internalized or interpersonal stigma) or by decreasing healthcare access. For example, anti-LGBTQ+ laws (i.e., structural stigma) may perpetuate internalized stigma, which has been associated with many poor HIV-related outcomes[20–23]. Additionally, legislation can directly and indirectly affect healthcare access, such as religious freedom laws allowing employers to decline PrEP coverage[6]. Regardless of the potential mechanisms, there is currently a lack of knowledge on the association between *recent* and *relevant* anti-LGBTQ+ policies and HIV prevention among SGM youth.

In the US, the political climate can differ drastically within a state, highlighting the importance of local politics. Half of LGBTQ+ Americans live in a Republican-majority state[7]. Still, even though these states are more likely to have anti-LGBTQ+ policies[7], many SGM Americans cannot or do not want to move[24]. Importantly, many SGM youth reside in areas within these conservative states that have local LGBTQ+ protections (e.g., city-wide non-discrimination ordinances), even if those protections do not exist state-wide[24]. Additionally, the structural stigma from these state and local laws does not act in isolation on SGM youth. Instead, youth encounter multiple, overlapping forms of stigma due to deeply embedded power structures (e.g., homophobia, racism, HIV-related stigma)[25]. This concept of interlocking stigma (i.e., intersectional stigma) hinges upon intersectionality[26,27], which provides a lens to examine how power structures create social inequities.

Given the unprecedented wave of anti-LGBTQ+ legislation, preliminary evidence of such legislation’s impact on HIV dynamics[15–18], and suboptimal PrEP use among SGM youth, there is a need to quantify the association between anti-LGBTQ+ policies and HIV prevention. We therefore used a national sample of SGM youth and young adults to estimate the single and joint associations between two exposures (state-level anti-LGBTQ+ political climate and county-level politics) and individual-level HIV prevention outcomes. We then examined whether state-level anti-LGBTQ+ political climate and county-level politics reinforce ethno-racial PrEP inequities[1].

Methods

Design

A cohort of SGM youth and young adults[28] was linked to state-level policy data[7] and county-level election results[29,30]. Details are below.

Keeping it LITE-1

Keeping it LITE-1 was a national, longitudinal cohort study that prospectively enrolled 3,444 SGM youth and young adults ages 13-34 from 2017-2019, and followed participants through 2022[28]. Participants were recruited via social media and LGBTQ+ dating apps using community sampling.

Eligible participants were: 1) ages 13-34, 2) living in the US, 3) HIV negative or received an HIV diagnosis in the past six months, and 4) identified as a cisgender man, transgender person, or non-binary person. Adults were eligible if they had sex with a partner who was assigned male at birth in the past six months, and at least one of the following was true: 1) they had a bacterial sexually transmitted infection (STI), 2) they had condomless anal sex with that partner, or 3) that partner was living with HIV. Minors were eligible with any of the above criteria or if they had oral sex with a person assigned male at birth in the past six months. Transgender minors were eligible regardless of sexual activity given the high HIV incidence in this population[31].

Participants completed online surveys at baseline and every six months, totaling 10 possible surveys over five years. Surveys collected sociodemographic information, geolocation, sexual behavior, and PrEP use. HIV status was verified using self-test kits. All participants provided written informed consent; ethical approval was obtained from the Cook County Health Institutional Review Board (Chicago, Illinois).

Policy data

The Movement Advancement Project (MAP) is an independent non-profit conducting rigorous research on LGBTQ+ equity[32]. MAP consolidates policy information to provide a publicly available, comprehensive list of anti-LGBTQ+ laws that is updated in real time[7]. Longitudinal state-level MAP data was linked with LITE-1 geolocation. To our knowledge, there is no robust database of local-level LGBTQ+-related legislation, so publicly available county-level election results [29,30] were used as a proxy for local anti-LGBTQ+ policies. This decision was supported by high collinearity between MAP's state-level data and state-level election results in this study. We therefore hypothesized that local-level election results would also be highly correlated with local-level anti-LGBTQ+ legislation. County-level election data were thus linked with county geolocation from LITE-1.

Current study

In addition to the criteria above, this current study was restricted to participants not living with HIV (because the outcomes were prevention-focused) and not residing in Puerto Rico (because the political parties in this territory differ). Only data from the first five visits was used due to attrition. Participants were censored at their first missed visit because the statistical methods in this analysis do not allow for intermittent censoring[33]. However, only four participants (<1%) had intermittent missingness, resulting in five censored visits out of >11,000.

Measures

Primary exposure: state-level policies

The primary exposure was the state-level anti-LGBTQ+ policy climate. MAP's State Equality Index summarizes the LGBTQ+-related policy environment for each state, Washington D.C., and several territories[34]. To create the index, MAP assigns each piece of state legislation points based on whether it is harmful (negative scores) or protective (positive scores) towards the LGBTQ+

community (Table S1, <http://links.lww.com/QAD/D215>). States are then assigned to an ordinal category using the *percentage* of possible points awarded: 1) negative (<0%), 2) low (0 – <25%), 3) fair (25 – <50%), medium (50 – <75%), high (75 – 100%). We used time-varying MAP scores (2017-2021) that preceded the primary outcomes by six months. The distribution of MAP scores was examined in preliminary work; a naturally occurring cut point was observed at the 50% MAP score. We therefore dichotomized scores into either less discriminatory (>50% points) or more discriminatory (<50% points; reference) for ease of interpretation and given the sample’s non-normal distribution.

Secondary exposure: county-level politics

County-level politics (time-varying) was defined as the political majority in a county (Democratic, Republican, or swing) from publicly available election results[29,30]. This was defined as the political affiliation of the candidates who received the most votes in a county for the election coinciding with the timing of the primary exposure – either the 2016 (US congressional, senate, presidential), 2018 (US congressional, senate), or 2020 (US congressional, senate, presidential) election. If all races in an election were won by the same party, then the variable was coded to that party. If multiple parties won, then the variable was coded as “swing.” Only 4.6% of participants resided in “swing” counties, creating positivity concerns for statistical models. We therefore collapsed the “swing” and Democratic categories. This also allowed us to isolate the effect of living in a Republican county, given that these areas are more likely to have anti-LGBTQ+ policies. The county-level politics variable was thus coded as 1-Democratic/swing and 0-Republican.

Outcomes

The primary outcomes, PrEP use, HIV/STI testing, and PrEP adherence, were all time-varying and were self-reported every six months in LITE-1. PrEP use was defined as a self-report of current daily oral PrEP use (yes/no). Recent HIV/STI testing (yes/no) was defined as a self-report of any HIV or STI testing in the past six months. PrEP adherence was defined as a self-report of taking PrEP every day in the past week (yes/no) and was restricted to PrEP users.

Covariates

State-level covariates were identified from a directed acyclic graph[35] and obtained from publicly available datasets. State-level race and ethnicity was defined as the percentage of a state identifying as non-Hispanic White (0-100%) from the National Center for Health Statistics’ annual estimates (2017-2021)[36]. State-level wealth was operationalized as the percentage of people below the federal poverty line in each state using annual data (2017-2021) from the American Community Survey (0-100%)[37]. The percentage of LGBTQ+-identifying adults in a state was obtained from the Williams Institute (0-100%; 2015-2017)[38,39]. State-level religiosity was defined as the percentage of a state identifying as “very religious” in a nationally representative 2017 survey (0-100%)[40]. Covariates were time-varying and aligned with the timing of the exposures except for the percentage of LGBTQ+ adults and religiosity. To our knowledge, rigorous, time-varying estimates are not available for these covariates, so time-invariant measures were used. Other variables included self-reported individual-

level race and ethnicity (non-Hispanic White, non-Hispanic Black, Latine, or another racially minoritized group (those identifying as Asian, American Indian or Alaska Native, Native Hawaiian or another Pacific Islander, multiracial, or another ethnic or racial group beyond those above)) as a crude proxy for ethno-racism.

Analysis

First, we estimated the prevalence of each outcome for each possible combination of state-level policy climate and county-level politics (Table 2). We then used generalized linear models (GLMs) with generalized estimating equations (GEEs) to estimate longitudinal, population average prevalence differences (PDs) and 95% confidence intervals (CIs) for the following individual and joint associations: 1) PD₁₀ vs. 00, 2) PD₀₁ vs. 00, and 3) PD₁₁ vs. 00. The first subscript corresponds to the primary exposure (1= less discriminatory climate, 0=more discriminatory climate), and the second subscript corresponds to the secondary exposure (1=Democratic/swing county, 0=Republican county). Separate models were run for each outcome, and each included an interaction term between county-level politics and state-level political climate. Associations were evaluated by primarily considering the magnitude of the effect estimate, and the 95% CIs were a measure of precision. However, we acknowledge that imprecision often results from a finite sample size, so we primarily focused on evaluating substantively meaningful point estimates[41].

We report both unadjusted (Table 3) and adjusted (Table 4) estimates, with adjusted estimates in text. We included both to isolate the associations of interest (adjusted estimates) while also acknowledging that the covariate set contains proxies for deeply embedded power structures, such as structural racism and poverty, that in reality cannot be “adjusted away”[42] (unadjusted estimates). To examine whether these laws perpetuate ethno-racial inequities in HIV prevention, we stratified the analyses by individual race and ethnicity. Stratified estimates are only reported for PrEP use as models for HIV/STI testing and PrEP adherence did not converge. To address attrition, inverse probability of censoring weights[33] reweighted the final sample to all eligible participants at baseline (N=3,330). Analyses were conducted using R version 4.3.1 (R Foundation for Statistical Computing).

Results

Demographics

Overall, 11,821 people screened for LITE-1, 5,526 (46.7%) were eligible to participate, and 3,444 (62.3%) enrolled. Of those, 3,330 (96.7%) were HIV negative at baseline and were eligible for this current analysis, resulting in 11,809 visits (Figure 1). At baseline, most participants were cisgender men (75.6%), non-Hispanic White (53.9%), not using PrEP (77.9%), and resided in large metro areas (57.4%) (Table 1). The median age was 24 (IQR: 21,28). The Midwest was the most represented region (48.9%), but there was geographic diversity: 13.9% of participants resided in the Northeast, 23.5% in the South, and 13.9% in the West.

Thirty-nine percent of participants (1,294/3,330) lived in states with more discriminatory anti-LGBTQ+ legislation while 61.1% (2,036/3,330) lived in states with less discriminatory legislation

(Table 1). Individual characteristics in these groups were similar except for race (59.7% vs. 50.2% non-Hispanic White), ethnicity (15.8% vs. 22.2% Latine), and PrEP use (16.5% vs. 25.6%, respectively). However, there was considerable geographic variation between the two groups, including region (52.9% vs. 4.9% residing in the South), urbanicity (34.0% vs. 72.2% in large metro areas), and county-level politics (32.1% vs. 4.9% in Republican counties). Longitudinal variation in MAP scores is presented in Figure S1, <http://links.lww.com/QAD/D215>.

PrEP use

PD_{01 vs. 00}: Compared to participants in a Republican county and a state with more discriminatory laws, those in a Democratic/swing county and a state with more discriminatory laws had a 6-percentage point increase in PrEP use (PD: 0.06; 0.02, 0.09; Table 4). This increase was more pronounced among Black participants (PD: 0.11; 0.03, 0.19) and those belonging to another racially minoritized group (PD: 0.16; 0.09, 0.23) but was attenuated for White and Latine participants (PD: 0.04; 0.00, 0.09 and PD: 0.00; -0.08, 0.09, respectively).

PD_{10 vs. 00}: Overall, those in a Republican county but a state with less discriminatory laws saw a 5-percentage point increase in PrEP use compared to those in a Republican county and a state with more discriminatory laws (PD: 0.05; -0.02, 0.11; Table 4). This association was similar among all ethnic-racial subgroups except for participants belonging to “another racially marginalized group.” In this group, there was a 14-percentage point increase in PrEP use (PD: 0.14; 0.06, 0.21).

PD_{11 vs. 00}: Participants in Democratic/swing counties within less discriminatory states had a 10-percentage point increase in PrEP use compared to those in Republican counties within more discriminatory states (PD: 0.10, 0.06, 0.14; Table 4). Among Black participants or those belonging to another racially minoritized group, there was a 20-percentage point increase in PrEP use (PD: 0.20; 0.13, 0.27 and PD: 0.20; 0.14, 0.25, respectively).

Testing

Living in a Democratic/swing county and a state with less discriminatory anti-LGBTQ+ policies was associated with a five-percentage point increase in HIV/STI testing compared to residing in a Republican county and a state with more discriminatory policies (PD: 0.05; 0.00, 0.09; Table 4). The prevalence of HIV testing was similar for those in a Democratic/swing county within a more discriminatory state and in a Republican county within a less discriminatory state, both relative to living in a Republican county within a more discriminatory state (Table 4).

Adherence

PrEP users in Democratic/swing counties within more discriminatory states did not have higher PrEP adherence compared to those in Republican counties within more discriminatory states (PD: -0.02; -0.10, 0.06; Table 4). There was no observed joint association between state and local politics and adherence (PD: -0.02; -0.11, 0.07). PrEP users in both Republican counties and states with less discriminatory laws may have higher PrEP adherence compared to those in Republican counties within in states with more discriminatory laws (PD: 0.05; -0.10, 0.21).

Discussion

This study was one of the first to examine how structural stigma, in the form of anti-LGBTQ+ legislation, influences HIV prevention among SGM youth and young adults. We found that living in states with less discriminatory anti-LGBTQ+ policies and in Democratic/swing counties were each independently associated with increased PrEP use. Those who lived in both states with less discriminatory policies and Democratic/swing counties were most likely to use PrEP compared to either of these alone and were more likely to have recently tested for HIV or STIs. Our findings provide preliminary evidence that anti-LGBTQ+ policies may contribute to low PrEP coverage in youth.

The associations between state-level policies, county-level politics, and PrEP use were amplified among Black participants and those belonging to another racially minoritized group, suggesting that anti-LGBTQ+ policies may have even more deleterious effects among marginalized ethno-racial groups and reinforce existing inequities. PrEP use lags considerably for people of color[1], even though marginalized racial groups experience a disproportionately higher HIV risk[10]. Future work should examine how the intersection of homophobia, ethno-racism, and other stigma co-occurs at multiple levels and influences HIV dynamics. Doing so is essential to design interventions that address structural inequities and curb HIV transmission[43].

The joint association between state-level policies, local-level politics, and PrEP use indicates that living in a state with less discriminatory anti-LGBTQ+ legislation *and* a Democratic county was associated with the highest PrEP use. The singly exposed estimates of PrEP use were nearly identical. This suggests that county and state LGBTQ+ protections may impact PrEP use similarly, highlighting the importance of local politics at a time when states are introducing a record-breaking number of laws[4]. Approximately half of LGBTQ+ Americans reside in conservative states[7], and many cannot or do not wish to leave those states. Instead, many SGM youth in conservative states are leaving rural areas for “oasis cities” within those same states[24,44]. Relocating locally may be more desirable or feasible for SGM youth while impacting PrEP use similarly. Importantly, this study included college-aged participants, so longitudinal changes in the LGBTQ+ policy climate may have been externally driven, but may also have been due to youth relocating to environments with less discriminatory policies and increased PrEP access.

State-level policies and county-level politics were not separately associated with HIV/STI testing, but they were jointly associated. In the US, HIV testing is most prevalent among ethno-racial minoritized groups, and is most common in the Northeast, South, and West[45]. These demographics intuitively align with the populations who have disproportionately borne the country’s HIV burden. Therefore, historical need may influence testing more strongly than politics. The country’s Ending the HIV Epidemic (EHE) initiative has also identified jurisdictions in need of increased HIV prevention resources[46], resulting in over 1.7 million EHE-funded HIV tests in 2021[47]. The majority of jurisdictions are in the South[46] and in states with more discriminatory anti-LGBTQ+ policy climates[7]. Thus, EHE jurisdictions may influence testing irrespective of politics and modify the observed joint association. Additionally, the LITE-1 study provided self-tests which may have impacted these results.

State policies and local politics were not separately or jointly associated with PrEP adherence. However, the adherence measure was limited by the study's remote design[28], so future work should measure adherence biologically. Additionally, adherence may be influenced by more proximal factors than policy. Compared to the study's other outcomes (PrEP use and testing), adherence may be more behaviorally driven for youth (e.g., remembering to take a pill everyday)[48] or influenced by more proximal stigma (e.g., internalized stigma)[49]. Conversely, PrEP use and testing may be driven by structural barriers, such as healthcare access and structural stigma, disproportionately impacting racially minoritized YGSM.

This study was strengthened by using MAP's State Equality Index[7] and by its large sample size, longitudinal design, and geographic variability. Despite these strengths, there was likely measurement error because the outcomes were self-reported. LITE-1 was a remote cohort designed to capture real-world HIV risk[28], so there were no biological adherence measures. Adherence may have been overreported, but we do not expect that this was differential by exposure status. Testing for HIV and other STIs was combined into a single measure for this study, but SGM youth may have different motivations for accessing these tests or may experience different levels/forms of testing-related stigma. Additionally, the state-level policy measure does not reflect the degree to which these laws were enforced, especially since legislation is often more strongly enforced against marginalized groups[50]. Our study only included passed anti-LGBTQ+ legislation, as no current database captures introduced legislation. Additionally, we used county-level politics as a crude proxy for county-level LGBTQ+ policy climate because, to our knowledge, there are no robust databases of local-level LGBTQ+ politics. There was likely substantial heterogeneity within groups; however, it was essential to include this measure given the importance of local politics. Lastly, given the study's sampling design, different inclusion criteria by age, and geographic distribution, this analysis may not generalize to all US SGM youth and young adults at risk of HIV.

Conclusion

In a sample of SGM youth and young adults, living in states with less discriminatory anti-LGBTQ+ policies or in Democratic/swing counties was each associated with increased PrEP use, and together, doubled the magnitude of this association. These relationships were more pronounced among marginalized ethno-racial groups. PrEP use lags considerably among youth and people of color, and these findings provide preliminary evidence that anti-LGBTQ+ policies may exacerbate these gaps. Future studies should examine the effects of specific legislation and identify potential causal pathways to pinpoint intervention areas and protect SGM youth.

Acknowledgments: The authors thank the LITE-1 study team and all study participants. All authors substantially contributed to the study. SH and ALF conceptualized and designed the original LITE-1 study. NK designed this current study with input from SR, BP, LHW, SH, JSA, and AP. NK, AP, and BP conducted data analysis. NK wrote the study paper, and all authors edited and contributed to the interpretation of the findings.

References

- 1 Centers for Disease Control and Prevention. Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas, 2020. HIV Surveillance Supplemental Report; 2022. <https://www.cdc.gov/hiv/library/reports/hiv-surveillance/vol-27-no-3/index.html>
- 2 Gallup Inc. LGBTQ+ Identification in U.S. Now at 7.6%. Gallup. 2024. <https://news.gallup.com/poll/611864/lgbtq-identification.aspx> (accessed 18 Mar2024).
- 3 Roundup of Anti-LGBTQ+ Legislation Advancing In States Across the Country. Human Rights Campaign. 2023. <https://www.hrc.org/press-releases/roundup-of-anti-lgbtq-legislation-advancing-in-states-across-the-country> (accessed 26 Oct2023).
- 4 Human Rights Campaign. 2021 State Equality Index. HRC Foundation; 2022. <https://www.hrc.org/resources/state-equality-index> (accessed 8 Sep2022).
- 5 Human Rights Campaign. National State of Emergency for LGBTQ+ Americans. Human Rights Campaign. <https://www.hrc.org/campaigns/national-state-of-emergency-for-lgbtq-americans> (accessed 26 Oct2023).
- 6 Martínez A, Martínez-Beltrán S. A Texas judge rules coverage of anti-HIV medicine violates religious freedom. NPR. 2022. <https://www.npr.org/2022/09/08/1121690478/a-texas-judge-rules-coverage-of-anti-hiv-medicine-violates-religious-freedom> (accessed 12 Sep2022).
- 7 Movement Advancement Project. Movement Advancement Project | Snapshot. https://www.mapresearch.org/democracy-maps/ratings_by_state (accessed 26 Jul2022).
- 8 Hatzenbuehler ML, Pachankis JE. **Stigma and Minority Stress as Social Determinants of Health Among Lesbian, Gay, Bisexual, and Transgender Youth: Research Evidence and Clinical Implications.** *Pediatr Clin North Am* 2016; **63**:985–997.
- 9 Link BG, Phelan JC. **Conceptualizing stigma.** *Annual Review of Sociology* 2001; **27**:363–385.
- 10 Sullivan PS, Johnson AS, Pembleton ES, Stephenson R, Justice AC, Althoff KN, *et al.* **Epidemiology of HIV in the USA: epidemic burden, inequities, contexts, and responses.** *The Lancet* 2021; **397**:1095–1106.
- 11 Turpin RE, Rosario A, Wang MQ. **Victimization, depression, and the suicide cascade in sexual minority youth.** *Journal of Mental Health* 2020; **29**:225–233.
- 12 Liu M, Cai X, Hao G, Li W, Chen Q, Chen Y, *et al.* **Prevalence of Intimate Partner Violence Among Men Who Have Sex With Men: An Updated Systematic Review and Meta-Analysis.** *Sex Med* 2021; **9**:100433.

- 13 Hatzenbuehler ML, Phelan JC, Link BG. **Stigma as a fundamental cause of population health inequalities.** *Am J Public Health* 2013; **103**:813–821.
- 14 Spinner CD, Boesecke C, Zink A, Jessen H, Stellbrink H-J, Rockstroh JK, *et al.* **HIV pre-exposure prophylaxis (PrEP): a review of current knowledge of oral systemic HIV PrEP in humans.** *Infection* 2016; **44**:151–158.
- 15 Bonett S, Meanley S, Elsesser S, Bauermeister J. **State-Level Discrimination Policies And HIV Pre-Exposure Prophylaxis Adoption Efforts In The US.** *Health Affairs* 2020; **39**:1575–1582.
- 16 Oldenburg CE, Perez-Brumer AG, Hatzenbuehler ML, Krakower D, Novak DS, Mimiaga MJ, *et al.* **State-level structural sexual stigma and HIV prevention in a national online sample of HIV-uninfected MSM in the United States.** *AIDS* 2015; **29**:837–845.
- 17 Hatzenbuehler ML, McKetta S, Goldberg N, Sheldon A, Friedman SR, Cooper HLF, *et al.* **Trends in State Policy Support for Sexual Minorities and HIV-Related Outcomes Among Men Who Have Sex With Men in the United States, 2008-2014.** *J Acquir Immune Defic Syndr* 2020; **85**:39–45.
- 18 Forsyth AD, Valdiserri RO. **A State-Level Analysis of Social and Structural Factors and HIV Outcomes Among Men Who Have Sex With Men in the United States.** *AIDS Educ Prev* 2015; **27**:493–504.
- 19 Skinner A, Stein MD, Dean LT, Oldenburg CE, Mimiaga MJ, Chan PA, *et al.* **Same-Sex Marriage Laws, Provider-Patient Communication, and PrEP Awareness and Use Among Gay, Bisexual, and Other Men Who have Sex with Men in the United States.** *AIDS Behav* Published Online First: 11 November 2022. doi:10.1007/s10461-022-03923-y
- 20 Rosengren AL, Lelutiu-Weinberger C, Woodhouse EW, Sandanapitchai P, Hightow-Weidman LB. **A Scoping Review of HIV Pre-exposure Prophylaxis Stigma and Implications for Stigma-Reduction Interventions for Men and Transwomen Who Have Sex with Men.** *AIDS Behav* 2021; **25**:2054–2070.
- 21 Gamarel KE, Nelson KM, Stephenson R, Santiago Rivera OJ, Chiamonte D, Miller RL. **Anticipated HIV stigma and delays in regular HIV testing behaviors among sexually-active young gay, bisexual, and other men who have sex with men and transgender women.** *AIDS Behav* 2018; **22**:522–530.
- 22 Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR, *et al.* **Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis.** *J Int AIDS Soc* 2013; **16**:18640.
- 23 Valverde E, Rodriguez A, White B, Guo Y, Waldrop-Valverde D. **Understanding the Association of Internalized HIV Stigma with Retention in HIV Care.** *J HIV AIDS* 2018; **4**:10.16966/2380-5536.159.

- 24 Allen S. *Real Queer America: LGBT Stories from Red States*. Little, Brown; 2019.
- 25 Arnold EA, Rebhook GM, Kegeles SM. “Triply cursed”: Racism, homophobia, and HIV-related stigma are barriers to regular HIV testing, treatment adherence, and disclosure among young Black gay men. *Cult Health Sex* 2014; **16**:710–722.
- 26 Berger MT. *Workable Sisterhood: The Political Journey of Stigmatized Women with HIV/AIDS*. Princeton University Press; 2010.
- 27 Crenshaw K. **Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics**. *University of Chicago Legal Forum* 1989; **1989**.
- 28 Gleason N, Serrano PA, Muñoz A, French A, Hosek S. **Limited Interaction Targeted Epidemiology of HIV in Sexual and Gender Minority American Adolescents and Adults: Feasibility of the Keeping it LITE Study**. *JMIR Formative Research* 2021; **5**:e30761.
- 29 Pettigrew S. November 2016 general election results (county-level). 2017. doi:10.7910/DVN/MLLQDH
- 30 Massachusetts Institute of Technology Election Data + Science Lab. Home Page | MIT Election Lab. <https://electionlab.mit.edu/> (accessed 24 Feb2023).
- 31 World Health Organization. HIV and young transgender people. ; 2015. https://www.unaids.org/sites/default/files/media_asset/2015_young_transgender_en.pdf (accessed 24 Feb2023).
- 32 Movement Advancement Project | Our Work and Mission. <https://www.lgbtmap.org/our-work-and-mission> (accessed 26 Jul2022).
- 33 Preisser JS, Lohman KK, Rathouz PJ. **Performance of weighted estimating equations for longitudinal binary data with drop-outs missing at random: WEIGHTED ESTIMATING EQUATIONS FOR DROP-OUTS**. *Statist Med* 2002; **21**:3035–3054.
- 34 Movement Advancement Project. Movement Advancement Project | Frequently Asked Questions: Equality Maps & Policy Tally. <https://www.lgbtmap.org/equality-maps/state-policy-tally-faq> (accessed 21 Jul2022).
- 35 Pearl J. **Causal diagrams for empirical research**. *Biometrika* 1995; **82**:669–688.
- 36 Centers for Disease Control and Prevention. Bridged-Race Population Estimates United States, 1990 - 2020. <https://wonder.cdc.gov/wonder/help/bridged-race.html> (accessed 7 Oct2022).
- 37 Bureau UC. American Community Survey (ACS). Census.gov. <https://www.census.gov/programs-surveys/acs> (accessed 10 Oct2022).

- 38 Conron KJ, Goldberg SK. ADULT LGBT POPULATION IN THE UNITED STATES. ; 2020. <https://williamsinstitute.law.ucla.edu/wp-content/uploads/LGBT-Adult-US-Pop-Jul-2020.pdf> (accessed 7 Oct2022).
- 39 The Williams Institute. Who we are. Williams Institute. <https://williamsinstitute.law.ucla.edu/about/who-we-are/> (accessed 7 Oct2022).
- 40 Gallup Inc. Religiosity by state, 2017. ; 2017.
- 41 Wasserstein RL, Lazar NA. **The ASA Statement on p-Values: Context, Process, and Purpose.** *The American Statistician* 2016; **70**:129–133.
- 42 Swilley-Martinez ME, Coles SA, Miller VE, Alam IZ, Fitch KV, Cruz TH, *et al.* **“We adjusted for race” now what: A systematic review of utilization and reporting of race in AJE and Epidemiology, 2020-2021.** *Epidemiologic Reviews* 2023; :mxad010.
- 43 Rodriguez-Hart C, Boone CA, del Río-González AM, Kutner BA, Baral S, Burns PA, *et al.* **Monitoring Intersectional Stigma: A Key Strategy to Ending the HIV Epidemic in the United States.** *Am J Public Health* 2022; **112**:S350–S355.
- 44 Gates GJ. **Comparing LGBT Rankings by Metro Area: 1990 to 2014.**
- 45 U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Survey Questionnaire. ; 2019. <https://www.cdc.gov/brfss/index.html> (accessed 12 Dec2023).
- 46 Centers for Disease Control and Prevention. Jurisdictions | Ending the HIV Epidemic | CDC. 2022.<https://www.cdc.gov/endhiv/jurisdictions.html> (accessed 12 Dec2023).
- 47 EHE Accomplishments | EHE Progress | Ending the HIV Epidemic in the U.S. Initiative | CDC. 2023.<https://www.cdc.gov/endhiv/ehe-progress/ehe-accomplishments.html> (accessed 12 Dec2023).
- 48 Taddeo D, Egedy M, Frappier J-Y. **Adherence to treatment in adolescents.** *Paediatr Child Health* 2008; **13**:19–24.
- 49 Babel RA, Wang P, Alessi EJ, Raymond HF, Wei C. **Stigma, HIV Risk, and Access to HIV Prevention and Treatment Services Among Men Who have Sex with Men (MSM) in the United States: A Scoping Review.** *AIDS Behav* 2021; **25**:3574–3604.
- 50 Jewett PI, Gangnon RE, Hing AK, Henning-Smith C, Chantarat T, Areba EM, *et al.* **Racial Arrest Disparities in the USA by Rural-Urban Location and Region.** *J Racial Ethn Health Disparities* Published Online First: 31 July 2023. doi:10.1007/s40615-023-01703-5

Figure 1. Visits completed at each timepoint in the Keeping it LITE-1 study

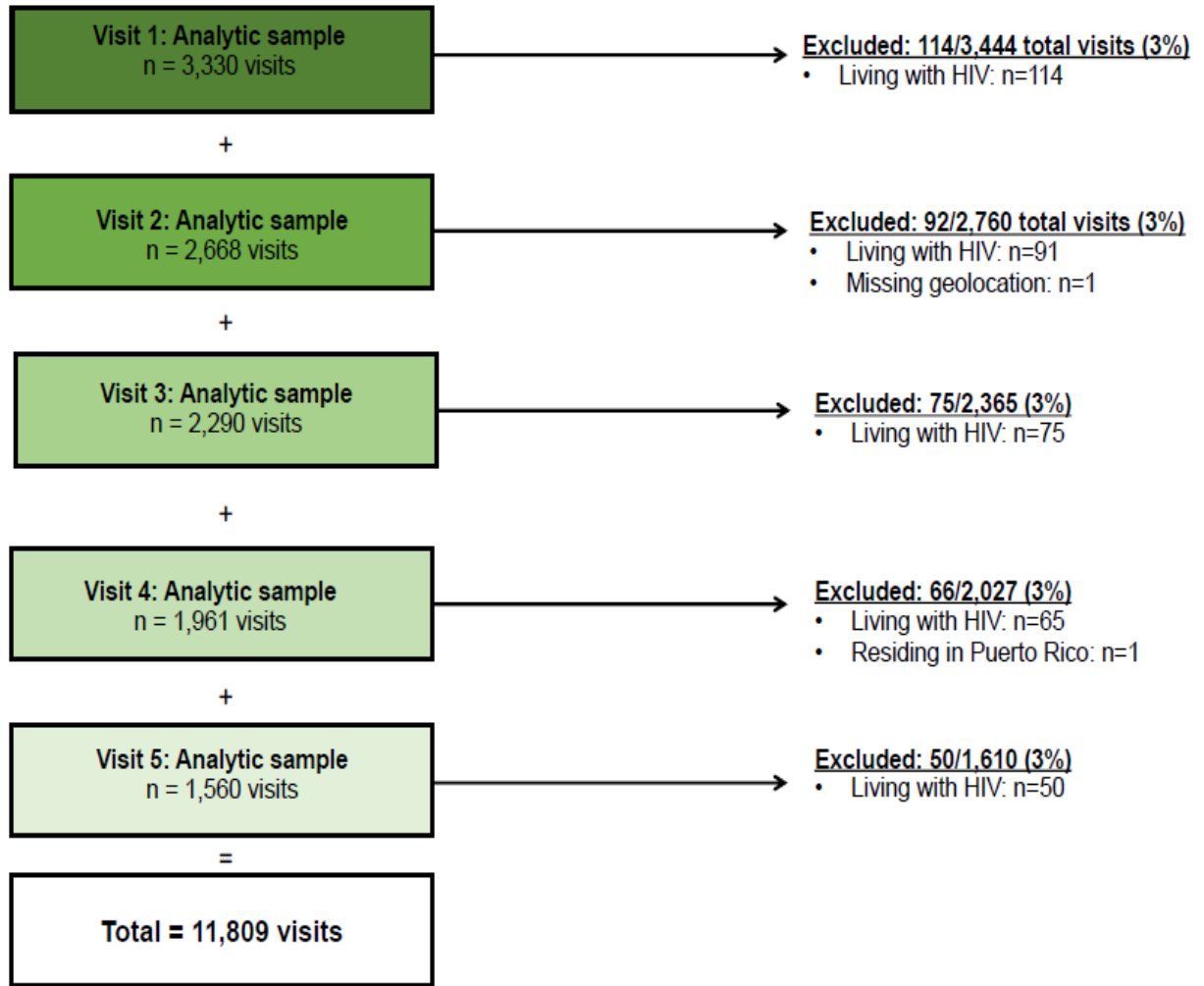


Table 1. Baseline demographic characteristics of sexual and gender minoritized youth and young adults in Keeping it LITE-1, stratified by state-level LGBTQ+ political climate¹ (N=3,330)

	More discriminatory (N=1,294)	Less discriminatory (N=2,036)	Overall (N=3,330)
Individual level characteristics	N (%)	N (%)	N (%)
Age			
Median, IQR	24 (21,28)	25 (21,28)	24 (21,28)
Sex assigned at birth			
Female	151 (11.7)	271 (13.3)	422 (12.7)
Male	1,143 (88.3)	1,765 (86.7)	2,908 (87.3)
Primary race and ethnicity			
Black, Non-Hispanic	138 (10.7)	219 (10.8)	357 (10.7)
White, Non-Hispanic	772 (59.7)	1,023 (50.2)	1,795 (53.9)
Hispanic/Latine	205 (15.8)	453 (22.2)	658 (19.8)
Another racially minoritized group	179 (13.8%)	341 (16.7%)	520 (15.6%)
Sexual orientation			
Gay/lesbian	880 (68.0)	1,341 (65.9)	2,221 (66.7)
Bisexual	177 (13.7)	251 (12.3)	428 (12.9)
Straight	12 (0.9)	20 (1.0)	32 (1.0)
Another orientation	225 (17.4)	424 (20.8)	649 (19.5)
Gender identity			
Cisgender man	1,012 (78.2)	1,506 (74.0)	2,518 (75.6)
Transgender man	99 (7.7)	177 (8.7)	276 (8.3)
Transgender woman	23 (1.8)	41 (2.0)	64 (1.9)
Another gender identity	160 (12.4)	312 (15.3)	472 (14.2)
PrEP & PEP status			
On PrEP	213 (16.5)	522 (25.6)	735 (22.1)
On PEP	6 (0.5)	28 (1.4)	34 (1.0)
Not on PrEP/PEP	1,075 (83.1)	1,486 (73.0)	2,561 (76.9)
Rurality²			
Large metro area	440 (34.0)	1,470 (72.2)	1,910 (57.4)
Large fringe metro area	231 (17.9)	300 (14.7)	531 (15.9)

Medium metro area	362 (28.0)	131 (6.4)	493 (14.8)
Small metro area	140 (10.8)	90 (4.4)	230 (6.9)
Micropolitan area	82 (6.3)	30 (1.5)	112 (3.4)
Noncore	39 (3.0)	15 (0.7)	54 (1.6)
County-level political majority³			
Democratic	794 (61.4)	1,868 (91.7)	2,662 (79.9)
Swing	85 (6.6)	69 (3.4)	154 (4.6)
Republican	415 (32.1)	99 (4.9)	514 (15.4)
Geographic region			
Midwest	430 (33.2)	1,199 (58.9)	1,629 (48.9)
Northeast	115 (8.9)	349 (17.1)	464 (13.9)
South	684 (52.9)	99 (4.9)	783 (23.5)
West	65 (5.0)	389 (19.1)	454 (13.9)
State-level characteristics⁴			
Majority political party¹⁰			
Republican	975 (75.3)	0 (0.0)	975 (29.3)
Democrat	0 (0.0)	662 (32.5)	662 (19.9)
Divided	319 (24.7)	1,374 (67.5)	1,693 (50.8)
	Median (IQR)	Median (IQR)	Median (IQR)
% non-Hispanic White⁵	74.5 (54.7,79.5)	61.9 (56.4,61.9)	61.9 (56.1,72.5)
% below federal poverty line⁶	13.6 (12.2,14.1)	12.1 (11.5,12.6)	12.1 (11.8,13.3)
% LGBTQ+ adults⁷	4.0 (3.8,4.3)	4.7 (4.3,5.1)	4.3 (4.1,4.5)
% very religious⁸	39.0 (36.0,44.0)	35.0 (30.0,35.0)	35.0 (35.0,37.0)
% of adults with a Bachelor's degree⁹	30.3 (29.0,31.9)	35.1 (35.0,37.0)	35.0 (30.7,35.1)

¹Using Movement Advancement Project (MAP) state equality scores: more discriminatory (reference) = <0.5 points; less discriminatory = >0.5 points

²Based on county geolocation data, and defined using the National Center for Health Statistics (NCHS) Urban-Rural Classification Scheme for Counties, 2013

³Using county-level election data from US congressional, senate, and presidential races in 2016, 2018, and 2020

⁴Sociodemographic characteristics for each participant’s state of residence (including all 50 states and the District of Columbia)

⁵NCHS annual bridged-race population estimates

⁶American Community Survey annual estimates

⁷Williams Institute estimates

⁸From Gallup Inc.

⁹American Community Survey annual estimates; defined as the percentage of adults ages 25 and older with a Bachelor’s degree

¹⁰From the National Conference of State Legislatures; defined as the combined majority political party of the state legislature and the governor

Table 2. Unadjusted prevalence of PrEP use, HIV/STI testing, and PrEP adherence among sexual and gender minoritized youth and young adults in Keeping it LITE-1 (2017-2022), stratified by state-level anti-LGBTQ+ policy climate and county-level politics¹

	State ² : less discriminatory	State: more discriminatory	State: less discriminatory	State: more discriminatory
	County ³ : Republican	County: Democratic/swing	County: Democratic/swing	County: Republican
	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)
PrEP use (overall)	0.19 (0.14,0.25)	0.21 (0.19,0.23)	0.25 (0.23,0.27)	0.16 (0.13,0.18)
Non-Hispanic White	0.20 (0.13,0.28)	0.20 (0.17,0.23)	0.25 (0.23,0.27)	0.16 (0.12,0.19)
Non-Hispanic Black	0.09 (0.00,0.19)	0.22 (0.16,0.29)	0.28 (0.23,0.34)	0.13 (0.06,0.21)
Hispanic/Latine	0.18 (0.07,0.29)	0.20 (0.15,0.25)	0.23 (0.19,0.26)	0.21 (0.13,0.28)
Another racially minoritized group	0.18 (0.11,0.25)	0.23 (0.17,0.29)	0.24 (0.20,0.28)	0.07 (0.01,0.14)
HIV/STI testing (overall)	0.30 (0.24,0.37)	0.36 (0.34,0.38)	0.40 (0.38,0.42)	0.35 (0.32,0.38)
PrEP adherence (overall)	0.76 (0.64,0.88)	0.69 (0.65,0.73)	0.68 (0.65,0.71)	0.71 (0.64,0.78)

¹HIV prevention outcomes included: 1) pre-exposure prophylaxis (PrEP; defined as a self-report of current PrEP use (yes/no)), 2) recent HIV/STI testing (defined as a self-report of testing for HIV or

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any other STIs in the past six months (yes/no)); 3) PrEP adherence (defined as a self-report of taking daily oral PrEP every day in the past week (yes/no))

²From Movement Advancement Project (MAP) state equality scores: more discriminatory (reference) = <0.5 points; less discriminatory = >0.5 points

³County-level politics were determined using official results from presidential races (2016, 2020), U.S. senate races (2016, 2018, 2020), and U.S. House races (2016, 2018, 2020) and were coded as Democratic/swing or Republican

Table 3. Unadjusted joint associations of state-level anti-LGBTQ+ legislation and county-level politics with individual-level HIV prevention outcomes among sexual and gender minoritized youth and young adults in Keeping it LITE-1 (2017-2022)^{1,2}

	State ² : less discriminatory	State: more discriminatory	State: less discriminatory	State: more discriminatory
	County ³ : Republican (PD ₁₀ vs. 00)	County: Democratic/swing (PD ₀₁ vs. 00)	County: Democratic/swing (PD ₁₁ vs. 00)	County: Republican (PD ₀₀ vs. 00)
PrEP use (overall)	0.04 (-0.02,0.10)	0.05 (0.02,0.09)	0.09 (0.06,0.12)	0 (ref.)
Non-Hispanic White	0.05 (-0.03,0.13)	0.05 (0.00,0.09)	0.09 (0.06,0.13)	0 (ref.)
Non-Hispanic Black	-0.04 (-0.17,0.08)	0.09 (0.00,0.19)	0.15 (0.06,0.25)	0 (ref.)
Hispanic/Latine	-0.02 (-0.16,0.11)	0.00 (-0.09,0.08)	0.02 (-0.06,0.10)	0 (ref.)
Another marginalized race	0.11 (0.01,0.20)	0.15 (0.07,0.24)	0.17 (0.10,0.24)	0 (ref.)
HIV/STI testing (overall)	-0.04 (-0.12,0.03)	0.01 (-0.03,0.05)	0.05 (0.01,0.09)	0 (ref.)
PrEP adherence (overall)	0.05 (-0.08,0.19)	-0.02 (-0.10,0.06)	-0.03 (-0.10,0.05)	0 (ref.)

¹HIV prevention outcomes included: 1) pre-exposure prophylaxis (PrEP; defined as a self-report of current PrEP use (yes/no)), 2) recent HIV/STI testing (defined as a self-report of testing for HIV or any other STIs in the past six months (yes/no)); 3) PrEP adherence (defined as a self-report of taking daily oral PrEP every day in the past week (yes/no))

²From Movement Advancement Project (MAP) state equality scores: more discriminatory (reference) = <0.5 points; less discriminatory = >0.5 points

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³County-level politics were determined using official results from presidential races (2016, 2020), U.S. senate races (2016, 2018, 2020), and U.S. House races (2016, 2018, 2020) and were coded as Democratic/swing or Republican

Table 4. Adjusted joint associations of state-level anti-LGBTQ+ legislation and county-level politics with individual-level HIV prevention outcomes among sexual and gender minoritized youth and young adults in Keeping it LITE-1 (2017-2022)^{1,2}

	State³: less discriminatory	State: more discriminatory	State: less discriminatory	State: more discriminatory
	County⁴: Republican (PD₁₀ vs. 00)	County: Democratic/swing (PD₀₁ vs. 00)	County: Democratic/swing (PD₁₁ vs. 00)	County: Republican (PD₀₀ vs. 00)
PrEP use (overall)	0.05 (-0.02,0.11)	0.06 (0.02,0.09)	0.10 (0.06,0.14)	0 (ref.)
Non-Hispanic White	0.04 (-0.05,0.13)	0.04 (0.00,0.09)	0.08 (0.03,0.13)	0 (ref.)
Non-Hispanic Black	0.06 (-0.03,0.14)	0.11 (0.03,0.19)	0.20 (0.13,0.27)	0 (ref.)
Hispanic/Latine	0.01 (-0.14,0.15)	0.00 (-0.08,0.09)	0.06 (-0.05,0.17)	0 (ref.)
Another racially minoritized group	0.14 (0.06,0.21)	0.16 (0.09,0.23)	0.20 (0.14,0.25)	0 (ref.)
HIV/STI testing (overall)	-0.04 (-0.12,0.03)	0.01 (-0.03,0.05)	0.05 (0.00,0.09)	0 (ref.)
PrEP adherence (overall)	0.05 (-0.10,0.21)	-0.02 (-0.1,0.06)	-0.02 (-0.11,0.07)	0 (ref.)

¹Adjusted for state-level race/ethnicity, state-level poverty, state-level adult LGBTQ+ population, and state-level religiosity;

²HIV prevention outcomes included: 1) pre-exposure prophylaxis (PrEP; defined as a self-report of current PrEP use (yes/no)), 2) recent HIV/STI testing (defined as a self-report of testing for HIV or any other STIs in the past six months (yes/no)); 3) PrEP adherence (defined as a self-report of taking daily oral PrEP every day in the past week (yes/no))

³From Movement Advancement Project (MAP) state equality scores: more discriminatory (reference) = <0.5 points; less discriminatory = >0.5 points

⁴County-level politics were determined using official results from presidential races (2016, 2020), U.S. senate races (2016, 2018, 2020), and U.S. House races (2016, 2018, 2020) and were coded as Democratic/swing or Republican