



Daily cannabis use, cannabis use disorder, and any medical cannabis use among US adults: Associations within racial, ethnic, and sexual minoritized identities in a changing policy context

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ABSTRACT

Differences in cannabis use patterns among racial, ethnic and sexual minoritized identity subgroups have been attributed to marginalized identity stressors. However, associations at the intersection of these minoritized identities remain underexplored in a changing medical cannabis law (MCL) context. We estimated medical cannabis and daily cannabis use, and cannabis use disorder (CUD) by intersecting racial, ethnic and sexual minoritized identity subgroups. We included 189,800 adults in the 2015–2019 National Survey on Drug Use and Health identifying as non-Hispanic white, non-Hispanic Black, or Hispanic and self-reported heterosexual, gay/lesbian, or bisexual sexual identity. We estimated the adjusted odds of past-year: (a) any medical cannabis, (b) daily cannabis use (*i.e.*, 300 + days/year), and (c) DSM-5-proxy CUD by sexual identity, stratified by race and ethnicity. Cannabis measures were higher among sexual minoritized groups than heterosexual adults across racial and ethnic subgroups. Bisexual adults had higher odds of any medical cannabis use than their heterosexual counterparts: non-Hispanic white (6.4% vs. 1.8%; aOR = 2.6, 95% CI = [2.5–3.5]), non-Hispanic Black (4.1% vs. 1.7%; aOR = 2.7, 95% CI = [1.6–4.5]), and Hispanic adults (5.3% vs. 1.8%; aOR = 2.6, 95% CI = [1.9–3.3]). We found heterogeneous associations with state MCL status across subgroups stratified by race and ethnicity. Bisexual adults in MCL states had higher odds of any medical cannabis use among non-Hispanic white (aOR = 2.0, 95% CI = [1.4–2.9]) and Hispanic (aOR = 3.6, 95% CI = [1.2–10.2]) adults compared to their non-MCL counterparts, but this was marginal among non-Hispanic Black bisexual adults (aOR = 1.6, 95% CI = [1.0–2.6]). Studies should assess intended and unintended cannabis policy effects among racial, ethnic, and sexual identity subgroups.

1. Introduction

Cannabis use in the United States (US) has increased among adults since 2002, and particularly since 2007 (Hasin et al., 2015; Hasin et al., 2019; Mauro et al., 2018). While many individuals may use cannabis without negative health consequences, daily cannabis use and medical cannabis use are associated with cannabis use disorder (CUD) (Compton et al., 2009; Han et al., 2018). In addition, CUD is associated with co-occurring substance use and psychiatric disorders (Hasin et al., 2016), but treatment among people with CUD is decreasing (Askari et al.,

2021). Negative outcomes related to cannabis use are often concentrated among marginalized groups, including racial, ethnic and sexual minoritized (e.g., lesbian/gay or bisexual) groups. For example, compared to non-Hispanic white adults, monthly cannabis use and past-year CUD were lower among Hispanic adults and higher among non-Hispanic Black adults overall, but when restricting to adults who used cannabis, CUD was higher among racial and ethnic minoritized groups compared to non-Hispanic white adults (Wu et al., 2016). Compared to their heterosexual counterparts, sexual minoritized women report higher cannabis use (Schuler et al., 2019) and higher CUD (Philbin et al.,

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2019). While research has examined cannabis use among sexual minoritized adolescents by racial and ethnic group (Zhang and Wu, 2017), less is known about intersecting disparities among adults (Schuler et al., 2020; Schuler et al., 2019).

Cannabis use and CUD disparities can be understood through the minority stress model, which hypothesizes that people are impacted by prejudice and discrimination due to their minoritized status, leading to increased risk of poor mental health outcomes and substance use (Meyer, 2003). Intersectionality theory (Crenshaw, 1989, 1991) posits that multiple social identities (e.g., race, ethnicity, sexual identity) overlap to shape how privilege and systems of oppression (e.g., racism, homophobia) contribute to population health outcomes, including substance use (Bauer, 2014; Bowleg, 2012; Parent et al., 2013). A recent study reported higher prevalence of any past-year cannabis use among sexual minoritized versus majority women across racial and ethnic groups, and heterogeneous patterns across men, underscoring the need to understand drivers of these intersecting yet divergent patterns (Schuler et al., 2020). In addition to highlighting disparities, identifying potential structural drivers of subgroup differences in medical cannabis use, daily cannabis use, and CUD is an important step towards health equity (Bauer, 2014).

Current research has identified associations between medical cannabis laws (MCL) and cannabis use overall and by sociodemographic characteristics, including associations with racial and ethnic minoritized groups (Martins et al., 2021) or sexual minoritized identities and gender (Philbin et al., 2019). However, work has yet to explain how MCL may contribute to disparities in cannabis use and CUD among subgroups of adults at the varying intersections of racial, ethnic and sexual identity minoritized statuses. Studying potential differences by MCLs across subpopulations is a social justice concern, as access to medical cannabis may not reach all individuals equitably. Heterogeneous state-level MCLs can include a range of provisions that permit cannabis use for medical purposes, such as provisions allowing home cultivation, dispensaries, or requiring patient registries (Chapman et al., 2016; Pacula et al., 2015). MCLs have been associated with increases in adult cannabis use (Martins et al., 2016), including daily use (Mauro et al., 2019). Cannabis use prevalence is higher among sexual minoritized adults living in MCL states than in non-MCL states (Philbin et al., 2019), especially among bisexual women. Self-reported cannabis use for medical purposes has also increased overall, particularly in states with MCL, though the odds of cannabis use for medical purposes in Black or Hispanic adults did not appear to differ from non-Hispanic white adults (Han et al., 2018). However, some studies indicate that most people who access medical cannabis through dispensaries or report having a medical cannabis card are non-Hispanic white (Bonn-Miller et al., 2014; Kim et al., 2018). Patterns of cannabis use outcomes among sexual minoritized adults within racial and ethnic minoritized subgroups may be heterogeneous when examined by MCL status.

This study estimated the prevalence of medical cannabis use, daily cannabis use, and CUD among adults with intersecting racial, ethnic, and sexual minoritized identities. We examined associations both overall and among people who used cannabis in the past year using a large, nationally representative, community-based sample of adults in the US from 2015 to 2019. We hypothesized that bisexual adults would have higher prevalence of medical cannabis, daily cannabis and CUD across racial and ethnic groups than their heterosexual counterparts. From an intersectionality perspective, we expected groups with various intersecting minoritized identities to report different cannabis use patterns than their white, heterosexual counterparts. As patterns may differ based on diverse cannabis policy context (e.g., living in a state with MCL), which could lead to differential access to medical cannabis, we explored differences in cannabis outcomes comparing people in states with and without MCLs. Building on past literature (Mauro et al., 2021; Philbin et al., 2019), we hypothesized cross-sectional differences in outcomes by MCL status, particularly higher medical cannabis use in states with MCL, and expected that the magnitude of association would

differ by intersecting racial, ethnic, and sexual minoritized identities.

2. Methods

2.1. Data source

We obtained data from the 2015–2019 National Survey on Drug Use and Health (NSDUH) public-use files. The NSDUH is an annual cross-sectional household survey that assesses substance use and mental health in nationally representative samples of non-institutionalized civilians ages 12 and older in all 50 states and the District of Columbia. Data were collected via face-to-face household interview using computer assisted interviewing and audio computer assisted survey instruments (ACASI) to maximize participant privacy in reporting sensitive information. The weighted interview response rates among adults ranged from 64.2% to 68.4% (Substance Abuse and Mental Health Services Administration, 2016, 2017, 2018, 2019, 2020).

2.2. Sample

We pooled 282,768 observations across the five years, adding a year indicator. We excluded all adolescents ages 12–17 ($n = 68,263$), as they were not asked about sexual identity. We excluded adults who responded “don’t know” or refused to answer the sexual identity question ($n = 3,994$). We further excluded $n = 20,609$ adults who reported their race and ethnicity as something other than non-Hispanic white, non-Hispanic Black, or Hispanic (e.g., non-Hispanic Asian, multi-racial adults) due to limited power to examine associations within intersecting sexual identities. The final analytic sample included 189,800 adults in the US from 2015 to 2019. Sensitivity analyses were conducted among people reporting past-year cannabis use ($N = 40,765$).

2.3. Measures

Past-year daily cannabis use and CUD (DSM-5 proxy): Participants were asked if they had ever used cannabis or hashish and if so, how recently. People reporting any past-year cannabis use were asked the number of days used in the last year. Daily/near-daily cannabis use (“daily cannabis”) was defined as reporting at least 300 days of cannabis use in the past year. Past-year CUD was operationalized as a binary (yes/no) variable that served as a DSM-5 proxy for CUD, created using DSM-IV criteria for CUD except craving, as done previously (Compton et al., 2019; Levy et al., 2021; Askari et al., 2021).

Past-year medical cannabis: Any medical cannabis use (“medical cannabis”) indicated that any of the cannabis used in the past year was recommended by a doctor or other health care professional (yes/no), regardless of whether an individual lived in a state where medical use was permitted.

Sexual Identity: Sexual identity was assessed by asking, “Which of the following do you consider yourself to be?” Responses included “Heterosexual, that is straight”, “Lesbian or gay”, or “Bisexual”, as we excluded people who answered refused/“don’t know” from the sample.

Racial and ethnic minoritized subgroups: Race and ethnicity was categorized as non-Hispanic white, non-Hispanic Black, and Hispanic any race. We excluded individuals who were non-Hispanic people of color who identified as multiracial or other races due to small sample sizes.

MCL status: Based on the respondent’s state of residence and year of interview, the NSDUH included an indicator that assigned each participant an MCL status (yes/no) based on the presence or absence of a medical cannabis law in their state that year. In 2015–2017, the status reflected whether a state’s MCL had taken effect, based on an interpretation of the MCL; in 2018–2019, the status reflected whether states that passed an MCL through legislation or voter initiative, even if it had not yet taken effect. As state indicators were not available in the public use data, we could not harmonize the measure across years.

Sociodemographic characteristics included age categories (18–25;

26–34; 35–49; 50+), gender (male; female), annual household income (<\$20,000; \$20,000–\$49,999; \$50,000–\$74,999; \$75,000 or more), population density (large metro; small metro; non-metro), and year.

2.4. Analytic strategy

We first described survey-weighted sociodemographic characteristics of adults by race, ethnicity, and sexual identity minoritized subgroups. Yearly NSDUH sampling weights, which accounted for selection probability, non-response, and population distribution, were divided by five to account for the pooled surveys. We estimated the prevalence of daily cannabis, CUD, and medical cannabis by racial, ethnic, and sexual identity minoritized subgroup, and computed design-adjusted Rao-Scott chi-squared tests of independence. Second, we estimated the adjusted odds of daily cannabis, CUD, and medical cannabis stratified by race and ethnicity and comparing sexual identities using survey-weighted logistic regression models, both overall and among adults reporting past-year cannabis use. These models adjusted for sociodemographic characteristics but not for state MCL status. Third, we added an indicator for MCL and an interaction term between sexual identity and MCL state residence to explore the association between each outcome by MCL within sexual identity stratified by racial and ethnic minoritized group. We then ran sensitivity analyses among people reporting past-year cannabis use. All survey-weighted logistic regression models adjusted for age, gender, annual household income, population density, and year. Statistical analyses were conducted in SAS 9.4 (SAS Institute Inc, 2014). The Columbia University Institutional Review Board approved this study (IRB-AAAS4624).

3. Results

Sociodemographic characteristics within each racial, ethnic and sexual identity minoritized subgroup are reported in Table 1. About 5% of individuals within each racial and ethnic group identified as a sexual minoritized group. Most non-Hispanic white (i.e., 56.4–63.6%) and Hispanic (i.e., 65.8–76.1%) adults resided in an MCL state, while 48.0–52.8% of non-Hispanic Black adults lived in an MCL state (see Supplemental Table 1 for unweighted sample sizes). Any past-year cannabis use prevalence by race, ethnicity, sexual identity, and MCL status are presented in Fig. 1.

Weighted prevalence measures of daily cannabis use, CUD-DSM-5-proxy, and medical cannabis use were associated with sexual identity in bivariate design-based chi-squared tests stratified by racial and ethnic minoritized group (Table 2). Sexual identity minoritized groups had higher odds of past-year daily cannabis, CUD-DSM-5-proxy, and medical cannabis use than their heterosexual counterparts, adjusting for age, gender, annual household income, urbanicity, and year (Table 2). For example, bisexual adults had higher odds of any medical cannabis use than their heterosexual counterparts among non-Hispanic white (6.3% vs. 1.8%; adjusted odds ratio [aOR] = 2.6, 95% confidence interval [CI] = [2.5, 3.5]), non-Hispanic Black (4.1% vs. 1.7%; aOR = 2.7, 95% CI = [1.6–4.5]), and Hispanic adults (5.3% vs. 1.8%; aOR = 2.6, 95% CI = [1.9–3.3]). Differences by sexual minoritized identity were smaller in magnitude among adults reporting past-year cannabis use (Supplemental Table 2).

Weighted prevalences of daily cannabis, CUD (DSM-5 proxy), and medical cannabis by racial, ethnic, and sexual minoritized identity and

Table 1
Selected sociodemographic characteristics by racial, ethnic, and sexual minoritized identity among US adults, National Survey on Drug Use and Health 2015–2019.

Characteristic	Overall	Non-Hispanic white (N = 127,556)			Non-Hispanic Black (N = 26,477)			Hispanic (N = 35,767)		
	Unwt. N (wt col. %)	Heterosexual Wt col % (95% CI)	Gay/Lesbian Wt col % (95% CI)	Bisexual Wt col % (95% CI)	Heterosexual Wt col % (95% CI)	Gay/Lesbian Wt col % (95% CI)	Bisexual Wt col % (95% CI)	Heterosexual Wt col % (95% CI)	Gay/Lesbian Wt col % (95% CI)	Bisexual Wt col % (95% CI)
<i>Unweighted N (wt row %)</i>	189,800 (100.0)	118,876 (95.2)	2,602 (1.9)	6,078 (2.9)	24,451 (94.5)	693 (2.1)	1,333 (3.4)	33,168 (94.5)	870 (2.1)	1,729 (3.4)
Female	101,502 (51.5)	50.8% (50.3–51.3)	44.6% (41.0–48.3)	71.6% (70.2–73.0)	53.9% (53.1–54.7)	52.1% (46.8–57.5)	77.4% (73.0–81.2)	49.5% (46.7–50.4)	37.9% (2.6–43.2)	66.8% (62.6–70.9)
Age category										
18–25	60,851 (13.7)	10.9% (10.7–11.1)	16.0% (14.6–17.3)	36.1% (34.8–37.5)	15.5% (15.0–16.0)	25.7% (22.3–29.2)	37.8% (33.8–41.8)	18.3% (17.8–18.9)	27.7% (23.7–31.7)	41.9% (38.4–45.4)
26–34	38,452 (15.6)	13.5% (13.2–13.8)	18.4% (16.3–20.6)	27.3% (25.7–28.9)	17.0% (16.3–17.6)	31.7% (26.9–36.5)	28.2% (25.2–31.2)	20.1% (19.4–20.9)	26.2% (21.6–30.8)	26.7% (23.4–30.0)
35–49	50,043 (24.3)	22.8% (22.4–23.1)	22.3% (20.3–24.4)	20.4% (18.8–22.0)	26.0% (25.3–26.7)	21.7% (17.1–26.3)	19.5% (15.5–23.6)	30.3% (29.4–31.1)	25.6% (20.6–30.3)	18.5% (15.7–21.2)
50+	40,454 (46.4)	52.8% (52.2–53.4)	43.2% (39.6–46.9)	16.1% (14.0–18.2)	41.5% (40.6–42.4)	20.8% (15.4–26.2)	14.4% (10.3–18.5)	31.3% (30.0–32.5)	20.5% (15.7–25.2)	12.9% (8.5–17.2)
Income										
<\$20,000	36,966 (16.0)	11.9% (11.6–12.2)	16.4% (14.5–18.3)	21.9% (20.1–23.6)	28.6% (27.6–29.7)	34.3% (30.2–38.3)	37.9% (34.2–41.6)	21.4% (20.7–22.2)	20.6% (16.0–25.3)	27.2% (23.8–30.6)
\$20,000–\$49,999	59,628 (29.8)	26.5% (26.1–26.9)	28.2% (25.8–30.5)	32.5% (30.8–34.2)	35.1% (34.2–36.0)	33.2% (28.9–37.5)	35.1% (31.7–38.5)	38.5% (37.4–39.6)	31.0% (27.3–34.8)	39.6% (36.3–42.9)
\$50,000–\$74,999	30,106 (16.2)	16.8% (16.5–17.1)	17.1% (15.0–19.2)	15.6% (14.2–16.9)	14.1% (13.5–14.8)	13.2% (10.8–16.4)	10.3% (8.2–12.5)	15.4% (14.7–16.0)	14.8% (11.2–18.4)	11.6% (9.5–13.7)
\$75,000 +	63,100 (38.0)	44.7% (44.1–45.3)	38.3% (35.6–40.9)	30.1% (28.4–31.7)	22.1% (21.1–23.1)	19.3% (14.6–23.9)	16.6% (13.0–20.2)	24.8% (23.7–25.8)	33.6% (27.9–39.1)	21.6% (27.9–39.1)
Population density										
Large Metro	84,574 (54.5)	48.6% (47.8–49.4)	58.5% (55.6–61.5)	51.3% (49.4–53.1)	65.7% (64.3–67.1)	74.7% (70.6–78.8)	71.8% (68.2–75.4)	68.7% (67.9–69.6)	74.3% (69.6–79.0)	69.6% (65.8–73.5)
Small Metro	67,400 (30.8)	33.3% (32.6–34.0)	30.1% (27.8–32.3)	33.9% (32.0–35.8)	24.1% (22.8–25.4)	18.9% (15.0–22.9)	23.5% (20.0–26.9)	25.6% (24.8–26.5)	21.2% (17.3–25.0)	24.8% (21.1–28.5)
Nonmetro	37,826 (14.7)	18.1% (17.6–18.6)	11.4% (9.4–13.4)	14.8% (13.3–16.3)	10.2% (9.4–10.9)	6.3% (4.6–8.1)	4.7% (3.4–6.0)	5.6% (5.2–6.0)	4.5% (2.5–6.5)	5.5% (4.2–6.9)
Reside in an MCL State	110,335 (57.2)	56.4% (55.8–57.0)	63.6% (60.9–66.3)	61.7% (60.0–63.3)	48.0% (46.6–49.3)	51.7% (43.7–52.9)	52.8% (48.5–57.1)	65.8% (64.9–66.7)	76.1% (71.7–80.5)	69.4% (65.8–73.1)

Notes: MCL = Medical Cannabis Laws; wt. %=survey weighted percentage using NSDUH weights; col. = column. Adult sample (N = 189,800) includes Non-Hispanic white (N = 127,556), Non-Hispanic Black (N = 26,477,888), and Hispanic (N = 35,767) adults.

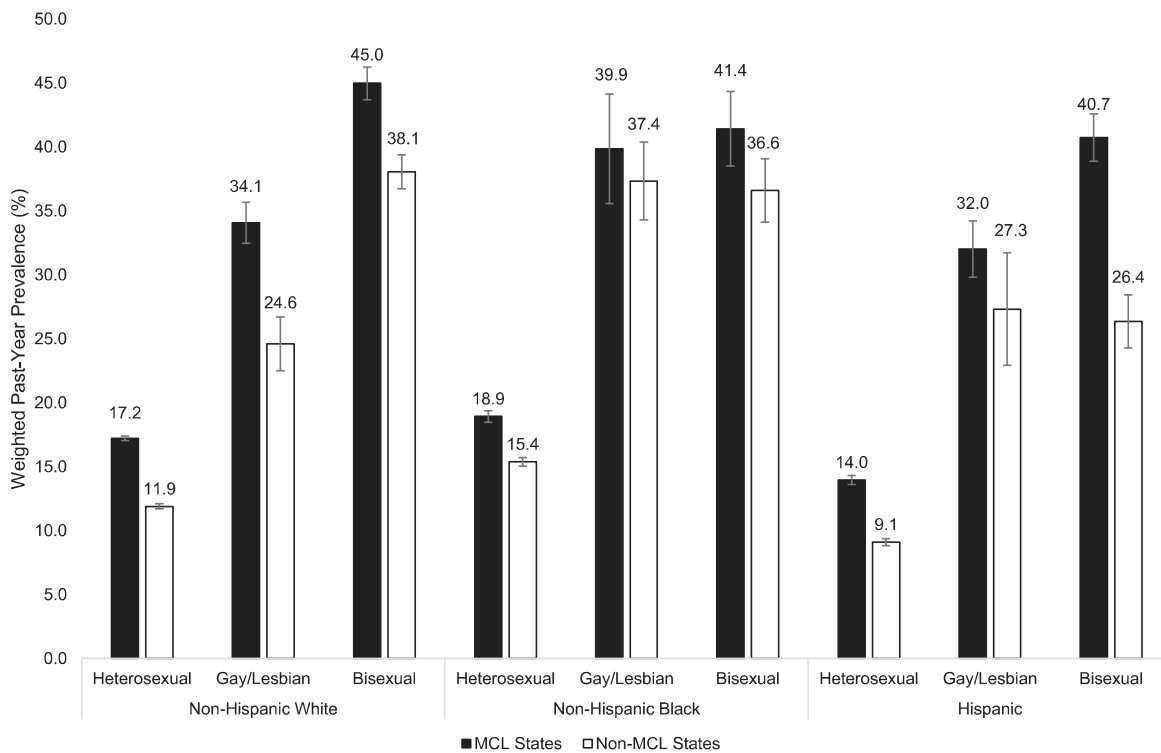


Fig. 1. Past-year cannabis use by racial, ethnic, sexual minoritized identity, and MCL state status among US adults, National Survey on Drug Use and Health 2015–2019 (N = 189,800) Notes: MCL = Medical Cannabis Laws; percentages are survey weighted based on the NSDUH weights.

state MCL status are shown in [Table 3](#). Exploratory findings indicate that relative to their counterparts in non-MCL states, non-Hispanic white heterosexual and gay/lesbian adults in MCL states generally had higher daily cannabis and CUD, as did Hispanic heterosexual adults. For example, bisexual adults in MCL states had higher odds of any medical cannabis use among non-Hispanic white (aOR = 2.0, 95% CI = [1.4–2.9]) and Hispanic (aOR = 3.6, 95% CI = [1.2–10.2]) adults compared to their non-MCL counterparts, but this was marginal among non-Hispanic Black bisexual adults (aOR = 1.6, 95% CI = [1.0–2.6]). There were no statistical differences in daily cannabis or CUD by MCL status among non-Hispanic Black lesbian, gay or bisexual adults. There was a positive interaction between MCL and gay/lesbian identity for daily cannabis ($\beta = 0.53$, $p = 0.03$) and medical cannabis ($\beta = 0.76$, $p = 0.02$) among non-Hispanic white people and a negative interaction between MCL and bisexual identity for medical-cannabis ($\beta = -0.67$, $p = 0.01$) among non-Hispanic Black adults. There was no moderation of CUD by MCL status in any subgroup. Medical cannabis was positively associated with MCL state residence across racial, ethnic, and sexual minoritized identity subgroups, though associations had wide confidence intervals due to small unweighted cell sizes, as NSDUH does not oversample sexual minoritized individuals. Patterns were similar when analyses were limited to people reporting past-year cannabis use, though confidence intervals were wider in this smaller sample ([Supplemental Table 3](#)).

4. Discussion

In this nationally representative sample of US adults from 2015 to 2019, we calculated daily cannabis use, CUD, and medical cannabis use among adults with intersecting racial, ethnic, and sexual minoritized identities. Compared to their same race and ethnicity heterosexual counterparts, sexual minoritized adults reported higher cannabis-related outcomes overall, though differences were smaller among people reporting past-year cannabis use. Patterns of cannabis use among

heterosexual adults were consistent with previous studies estimating effects by race and ethnicity. For example, CUD prevalence was 1.3% for non-Hispanic white and 2.4% among non-Hispanic Black adults in a previous study from 2005 to 2013 ([Wu et al., 2016](#)), and ranged from 2.3 to 3.6% among heterosexual adults in our sample 2015–2017. However, our study detected important heterogeneity within racial and ethnic groups when disaggregating by sexual minoritized identity. For instance, CUD prevalence was higher among non-Hispanic white gay/lesbian and bisexual adults than among heterosexual adults. Our results also found distinct associations by racial, ethnic, and sexual minoritized identity for different cannabis-related outcomes, including daily use and CUD. Results highlight the value of incorporating an intersectional lens to study issues related to health equity rather than looking at more homogenous comparisons of a singular identity or dimension ([Bauer, 2014](#)), especially to inform tailored interventions and services.

Our findings extend recent evidence of a higher prevalence of any past-year cannabis use comparing gay/lesbian and bisexual adults to their heterosexual counterparts within each racial and ethnic group ([Schuler et al., 2020](#)). Specifically, we found that sexual identity minoritized adults had higher medical cannabis, daily cannabis, and CUD within each racialized subgroup. While this study is an important step towards disaggregating cannabis use patterns across minoritized group, we relied on self-identified categories of race or ethnicity that were combined in public-use data. For example, the NSDUH combined anyone identified as “Hispanic” into one category, regardless of other racial identity information, masking Hispanic minoritized subgroup heterogeneity. Cultural values linked to lower cannabis use or other substance use behaviors ([Escobedo et al., 2018](#); [Unger et al., 2004](#)) may mitigate some of the stressors influencing cannabis use among marginalized subgroups ([Feinstein and Dyar, 2017](#)). Future studies should further explore within-group differences to inform tailored interventions when clinically indicated.

Study findings have important clinical implications for preventive medicine clinicians who may increasingly encounter people who use

Table 2
Past-year daily cannabis use, CUD, and any medical cannabis use among US adults by sexual minoritized identity stratified by racial and ethnic minoritized group, National Survey on Drug Use and Health 2015–2019.

Minoritized subgroup	Daily cannabis use		CUD-DSM 5*		Any medical cannabis use	
	Wt. % (95% CI)	aOR (95% CI)	Wt. % (95% CI)	aOR (95% CI)	Wt. % (95% CI)	aOR (95% CI)
Hispanic						
Heterosexual	2.3 (2.1–2.4)	1.0 (Ref)	2.5 (2.3–2.8)	1.0 (Ref)	1.8 (1.6–2.1)	1.0 (Ref)
Gay/Lesbian	8.0 (5.5–10.6)	3.0 (2.1–4.4)	6.4 (4.7–8.1)	2.8 (2.3–3.4)	5.1 (3.4–6.8)	2.4 (1.6–3.5)
Bisexual	10.1 (7.9–12.1)	3.8 (3.1–4.8)	9.6 (8.0–11.3)	1.9 (1.4–2.6)	5.3 (4.0–6.7)	2.6 (1.9–3.3)
Non-Hispanic Black						
Heterosexual	3.6 (3.3–3.9)	1.0 (Ref)	3.6 (3.3–3.8)	1.0 (Ref)	1.7 (1.5–1.8)	1.0 (Ref)
Gay/Lesbian	10.8 (8.3–13.4)	2.4 (1.9–3.1)	10.2 (6.9–13.6)	2.5 (1.9–3.3)	5.3 (2.6–8.0)	2.3 (1.6–3.2)
Bisexual	10.4 (8.1–12.8)	2.6 (2.0–3.5)	11.0 (8.4–13.6)	2.2 (1.5–3.1)	4.1 (2.9–5.4)	2.7 (1.6–4.5)
Non-Hispanic white						
Heterosexual	2.9 (2.8–3.0)	1.0 (Ref)	2.3 (2.2–2.4)	1.0 (Ref)	1.8 (1.6–1.9)	1.0 (Ref)
Gay/Lesbian	6.4 (4.9–7.9)	1.8 (1.4–2.3)	4.4 (3.4–5.4)	1.4 (1.1–1.8)	5.2 (3.6–6.7)	2.6 (1.9–3.4)
Bisexual	11.0 (9.7–12.4)	2.7 (2.3–3.1)	8.9 (8.1–9.8)	2.3 (2.0–2.5)	6.3 (5.3–7.2)	2.9 (2.5–3.5)

Notes: CUD-DSM-5*: cannabis use disorder (DSM-5 proxy); wt %: survey weighted percentage based on the NSDUH weights; All weighted chi-squared tests were statistically significant ($p < 0.05$; chi-square) with comparisons of sexual identity within race/ethnicity. Models among all adults ($N = 189,800$) includes Non-Hispanic white ($N = 127,556$), Non-Hispanic Black ($N = 26,477,888$), and Hispanic ($N = 35,767$) adults. **Bold** indicates $p < 0.05$ in a survey-weighted logistic regression stratified by race/ethnicity and adjusted for age, gender, annual household income, urbanicity, and survey year.

medical cannabis. Medical cannabis use has been previously associated with higher cannabis use frequency and use of non-combustible formulations (Fedorova et al., 2021; Lanckenau et al., 2017). However, the majority of people who encounter the healthcare system report not discussing their drug use with healthcare providers, including people with CUD (Mauro et al., 2020). Therefore, efforts to de-stigmatize and support drug-related discussions with providers may be warranted as more states enact cannabis policies. Future studies could extend our findings to assess reasons for use, including potential pain and other co-occurring health indications, that could further inform clinical encounters. In addition, findings were observed in the context of decreasing CUD treatment trends across age groups (Askari et al., 2021) and higher perceived need for substance use disorder treatment more among sexual minoritized adults, particularly bisexual women (Krasnova et al., 2021). However, less than one in five specialty substance use treatment facilities reported specific programs designed for people who identified as lesbian, gay, bisexual, or transgender in 2016 (Williams and Fish, 2020). Tailored services to address clinical concerns related to CUD in subgroups of adults may be needed to mitigate the potential harms associated with CUD.

In exploratory analyses, medical cannabis use was higher in states with MCL than those without MCL, including among all heterosexual adults, sexual minoritized non-Hispanic white and Hispanic adults, but not non-Hispanic Black gay/lesbian adults. Daily cannabis use and CUD were also higher among all subgroups in MCL states than in non-MCL states. This builds on a recent cross-sectional study that found higher medical cannabis prevalence for bisexual women overall, but a smaller difference comparing bisexual to heterosexual women in states with and without MCLs (Philbin et al., 2019). Wide confidence intervals among gay/lesbian adults were the result of small subgroup sizes, even after pooling five years of nationally representative data. Our ability to detect associations among other racial, ethnic, and sexual minoritized identity subgroups may have been limited due to smaller subgroup sample sizes, especially when restricting to people reporting past-year cannabis use.

Studying associations with MCLs is important in the evolving policy landscape: as of May 2022, 37 states and DC had MCLs and 18 states had recreational cannabis laws (National Conference of State Legislatures, 2021). Public policy evaluation should employ an intersectional lens to improve health outcomes and assess equitable adoption and execution (Hankivsky et al., 2014; Turan et al., 2019). As policy can affect individuals with various social identities differently (Hatzenbuehler, 2014; Hatzenbuehler, 2016; Hatzenbuehler et al., 2014; Hatzenbuehler and Pachankis, 2016; Pachankis et al., 2017; Philbin et al., 2019), the unique impact of social and structural stressors due to one’s intersecting racial, ethnic, and sexual minoritized identities could lead to differences in policy effects (Bauer, 2014; Bowleg, 2012). The multiple overlapping stigmas that non-Hispanic Black sexual minoritized adults face (e.g., racism, sexual orientation-related discrimination) may limit their access to medical cannabis due to stigma and medical mistrust (Bonn-Miller et al., 2014; Brenick et al., 2017; Eaton et al., 2015; Haug et al., 2017; Quinn et al., 2019). As fewer non-Hispanic Black adults lived in states with MCLs, differential exposure to MCL could perpetuate the concentration of negative social and economic consequences associated with cannabis use in Black communities, such as cannabis-related arrests that disproportionately affect non-Hispanic Black individuals (ACLU, 2013; Alexander, 2012). Access to relevant services among people who use cannabis medically (and with a medical recommendation) may remain a challenge without explicit efforts to engage individuals who are marginalized in the health care system (Valencia et al., 2017). Explicit anti-racist policy efforts should ensure that groups that have been disproportionately negatively affected by punitive cannabis policy (e.g., increases in disparities in cannabis arrests for non-Hispanic Black adults compared to non-Hispanic white adults) (Firth et al., 2019) are able to reap the potential benefits and safeguards afforded by changing cannabis policy.

Table 3
Past-year daily cannabis use, CUD, and any medical cannabis use among US adults by medical cannabis laws and sexual minoritized identity, stratified by racial and ethnic minoritized group, 2015–2019.

Minoritized subgroup and MCL status	Daily cannabis use		CUD-DSM 5*		Any medical cannabis use	
	Wt. % (95% CI)	aOR (95% CI)	Wt. % (95% CI)	aOR (95% CI)	Wt. % (95% CI)	aOR (95% CI)
Hispanic						
<i>Heterosexual</i>						
No MCL	1.4 (1.2–1.6)	1.0 (Ref)	1.9 (1.7–2.2)	1.0 (Ref)	0.5 (0.3–0.6)	1.0 (Ref)
MCL	2.7 (2.5–3.0)	2.1 (1.7–2.5)	2.9 (2.5–3.2)	1.5 (1.3–1.8)	2.6 (2.2–2.9)	6.0 (4.1–8.9)
<i>Gay/Lesbian</i>						
No MCL	4.8 (0.6–9.1)	1.0 (Ref)	7.0 (2.1–11.8)	1.0 (Ref)	1.0 (0.0–2.2)	1.0 (Ref)
MCL	9.1 (6.2–12.0)	1.9 (0.7–5.0)	6.3 (4.8–7.8)	0.8 (0.3–1.7)	6.4 (4.2–8.6)	6.5 (1.9–22.4)
<i>Bisexual</i>						
No MCL	7.7 (4.7–10.6)	1.0 (Ref)	7.5 (4.3–10.7)	1.0 (Ref)	2.1 (0.0–4.1)	1.0 (Ref)
MCL	11.0 (8.5–13.5)	1.6 (1.0–2.4)	10.6 (8.8–12.3)	1.5 (0.9–2.4)	6.7 (5.0–8.6)	3.6 (1.2–10.2)
Non-Hispanic Black						
<i>Heterosexual</i>						
No MCL	3.0 (2.7–3.3)	1.0 (Ref)	3.1 (2.8–3.4)	1.0 (Ref)	0.8 (0.7–1.0)	1.0 (Ref)
MCL	4.4 (3.8–4.6)	1.4 (1.2–1.6)	4.1 (3.8–4.4)	1.3 (1.1–1.5)	2.6 (2.2–2.9)	3.2 (2.5–4.1)
<i>Gay/Lesbian</i>						
No MCL	12.1 (8.5–15.7)	1.0 (Ref)	11.1 (6.1–16.1)	1.0 (Ref)	2.6 (0.3–5.0)	1.0 (Ref)
MCL	9.7 (5.9–13.4)	0.8 (0.4–1.4)	9.4 (4.9–14.0)	0.9 (0.4–2.0)	7.8 (2.8–12.7)	3.3 (1.0–10.4)
<i>Bisexual</i>						
No MCL	9.9 (6.0–13.9)	1.0 (Ref)	10.8 (6.9–14.6)	1.0 (Ref)	3.2 (2.1–4.3)	1.0 (Ref)
MCL	10.9 (8.2–13.6)	1.1 (0.7–1.8)	11.2 (8.2–14.3)	1.0 (0.6–1.6)	5.0 (3.1–6.8)	1.6 (1.0–2.6)ⁱ
Non-Hispanic white						
<i>Heterosexual</i>						
No MCL	2.1 (2.0–2.3)	1.0 (Ref)	1.9 (1.7–2.0)	1.0 (Ref)	0.6 (0.5–0.7)	1.0 (Ref)
MCL	3.6 (3.4–3.7)	1.8 (1.6–1.9)	2.6 (2.5–2.7)	1.5 (1.4–1.6)	2.6 (2.4–2.9)	4.5 (3.8–5.3)
<i>Gay/Lesbian</i>						
No MCL	3.2 (1.8–4.7)	1.0 (Ref)	3.5 (2.3–4.6)	1.0 (Ref)	0.9 (0.4–1.4)	1.0 (Ref)
MCL	8.2 (6.1–10.4)	3.0 (1.8–4.9)ⁱ	5.0 (3.6–6.4)	1.7 (1.1–2.5)	7.6 (5.2–10.0)	9.6 (5.1–17.9)ⁱ
<i>Bisexual</i>						
No MCL	9.5 (7.6–11.4)	1.0 (Ref)	7.8 (6.5–9.1)	1.0 (Ref)	4.0 (2.8–5.1)	1.0 (Ref)
MCL	12.0 (10.0–13.9)	1.3 (0.9–1.8)	9.6 (8.4–10.9)	1.3 (0.9–1.6)	7.7 (6.4–9.0)	2.0 (1.4–2.9)

Notes: CUD-DSM 5* = cannabis use disorder DSM-5 proxy measure; MCL = Medical Cannabis Laws; aOR = adjusted odds ratio. Models all adults in the 2015–2019 National Survey on Drug Use and Health (N = 189,800) includes Non-Hispanic white (N = 127,556), Non-Hispanic Black (N = 26,477,888), and Hispanic (N = 35,767) adults, and excludes other race/ethnicity groups. Models adjusted for age, gender, annual household income, population density, and survey year, and included an interaction term between MCL and sexual identity; **bold** indicates a statistically significant interaction between MCL and sexual identity.

4.1. Study limitations and strengths

The NSUDH did not over-sample people identifying as sexual minoritized subgroups, resulting in small unweighted cell sizes for certain subgroups (e.g., Hispanic gay/lesbian adults in non-MCL states), even when pooling all available public-use data in 2015–2019. While we were able to distinguish different patterns of cannabis use by racial, ethnic, and sexual minoritized identities, we were underpowered to detect differences among other racial and ethnic minoritized subgroups (e.g., Asian adults and individuals with multiple racial or ethnic identities) or by other important sociodemographic characteristics (e.g., gender, age). Future surveys should oversample sexual minoritized groups to overcome these limitations through an intersectional lens, especially when examining policy effects among marginalized groups (Philbin et al., 2022). In stratifying the sample by racial and ethnic minoritized subgroup, we did not test differences in the associations across racial and ethnic groups, and instead, we focused on reporting within-racial and ethnic minoritized group associations. The CUD proxy measure did not fully capture DSM-5 criteria for CUD, which may have underestimated the prevalence of CUD across groups. Due to data limitations in the public-use data files, we were not able to account for state-level differences, assess relationships with recreational cannabis laws, or test MCL effects before/after policy implementation. The NSUDH redefined the MCL public use variable in 2018, changing from after MCL had taken effect (2015–2017 NSDUH) to after the MCL was passed (2018–2019 NSDUH). By pooling all years 2015–2019 to increase our sample size, especially for smaller intersectional subgroups, this pooling introduced measurement error into our policy exposure, which could bias associations towards the null. Relying on existing measures to conduct this secondary data analysis could lead to residual confounding that should be addressed in future studies. Individual-level data with state-level identifiers should be used in future studies to test policy effects over time, and whether these differentially affect marginalized groups. Despite these limitations, our study had many strengths, including using a large nationally representative sample of adults to study the relationship between intersecting identities and cannabis use in a changing cannabis policy context. Future studies that oversample by sexual minoritized identity and have more years of data with state-level indicators should estimate policy effects among people with these various intersectional identities across age groups using other analytic approaches (e.g., multi-level models).

5. Conclusion

In this study, we estimated differences among sexual minoritized groups by racial and ethnic minoritized subgroups in daily cannabis use, CUD, and any medical cannabis use. Cannabis-related measures were higher in sexual minoritized adults across racial and ethnic minoritized subgroups. While we had limited power in certain substrata by state MCL status, medical cannabis use was higher in MCL states across all non-Hispanic white and Hispanic subgroups as well as non-Hispanic Black heterosexual adults. Future studies should test differential impacts of MCLs on marginalized groups, particularly racial, ethnic, and sexual minoritized adults. The intended (e.g., access to medical cannabis) and unintended consequences (e.g., changes in CUD) of these laws for racial, ethnic, and sexual minoritized groups should be closely monitored.

CRedit authorship contribution statement

Pia M. Mauro: Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Morgan M. Philbin:** Conceptualization, Writing – review & editing. **Emily R. Greene:** Data curation, Software, Formal analysis, Visualization. **José E. Diaz:** Writing – review & editing. **Melanie S. Askari:** Writing – review & editing. **Silvia S. Martins:** Conceptualization, Writing – review & editing,

Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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References

- ACLU, 2013. The war on marijuana in black and white. https://www.aclu.org/sites/default/files/field_document/1114413-mj-report-rfs-re11.pdf.
- Alexander, M., 2012. *The new Jim Crow: mass incarceration in the age of colorblindness*, Revised ed. New Press, New York.
- Askari, M.S., Keyes, K.M., Mauro, P.M., 2021. Cannabis use disorder treatment use and perceived treatment need in the United States: Time trends and age differences between 2002 and 2019. *Drug Alcohol Depend.* 229, 109154.
- Bauer, G.R., 2014. Incorporating intersectionality theory into population health research methodology: challenges and the potential to advance health equity. *Soc. Sci. Med.* 110, 10–17.
- Bonn-Miller, M.O., Boden, M.T., Bucossi, M.M., Babson, K.A., 2014. Self-reported cannabis use characteristics, patterns and helpfulness among medical cannabis users. *Am. J. Drug Alcohol Abuse* 40, 23–30.
- Bowleg, L., 2012. The problem with the phrase women and minorities: intersectionality—an important theoretical framework for public health. *Am. J. Public Health* 102, 1267–1273.
- Brenick, A., Romano, K., Kegler, C., Eaton, L.A., 2017. Understanding the Influence of Stigma and Medical Mistrust on Engagement in Routine Healthcare Among Black Women Who Have Sex with Women. *LGBT Health* 4, 4–10.
- Chapman, S.A., Spetz, J., Lin, J., Chan, K., Schmidt, L.A., 2016. Capturing Heterogeneity in Medical Marijuana Policies: A Taxonomy of Regulatory Regimes Across the United States. *Subst. Use Misuse* 51, 1174–1184.
- Compton, W.M., Han, B., Jones, C.M., Blanco, C., 2019. Cannabis use disorders among adults in the United States during a time of increasing use of cannabis. *Drug Alcohol Depend.* 204, 107468.
- Compton, W.M., Saha, T.D., Conway, K.P., Grant, B.F., 2009. The role of cannabis use within a dimensional approach to cannabis use disorders. *Drug Alcohol Depend.* 100, 221–227.
- Crenshaw, K., 1989. Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine. University of Chicago Legal Forum, *Feminist Theory and Antiracist Politics*, p. 1989.
- Crenshaw, K., 1991. Mapping the Margins: Intersectionality, Identity, and Violence Against Women of Color. *Stanford Law Rev.* 43, 1241–1300.
- Eaton, L.A., Driffin, D.D., Kegler, C., Smith, H., Conway-Washington, C., White, D., Cherry, C., 2015. The role of stigma and medical mistrust in the routine health care engagement of black men who have sex with men. *Am. J. Public Health* 105, e75–e82.
- Escobedo, P., Allem, J.P., Baezconde-Garbanati, L., Unger, J.B., 2018. Cultural values associated with substance use among Hispanic emerging adults in Southern California. *Addict. Behav.* 77, 267–271.
- Fedorova, E.V., Ataiants, J., Wong, C.F., Iverson, E., Lankenau, S.E., 2021. Changes in Medical Cannabis Patient Status before and after Cannabis Legalization in California: Associations with Cannabis and Other Drug Use. *J. Psychoactive Drugs* 1–11.
- Feinstein, B.A., Dyar, C., 2017. Bisexuality, minority stress, and health. *Curr. Sex Health Rep.* 9, 42–49.
- Firth, C.L., Maher, J.E., Dille, J.A., Darnell, A., Lovrich, N.P., 2019. Did marijuana legalization in Washington State reduce racial disparities in adult marijuana arrests? *Subst. Use Misuse* 54, 1582–2157.
- Han, B., Compton, W.M., Blanco, C., Jones, C.M., 2018. Trends in and correlates of medical marijuana use among adults in the United States. *Drug Alcohol Depend.* 186, 120–219.
- Hankivsky, O., Grace, D., Hunting, G., Giesbrecht, M., Fridkin, A., Rudrum, S., Ferlatte, O., Clark, N., 2014. An intersectionality-based policy analysis framework: critical reflections on a methodology for advancing equity. *Int. J. Equity Health* 13, 119.

- Hasin, D.S., Kerridge, B.T., Saha, T.D., Huang, B., Pickering, R., Smith, S.M., Jung, J., Zhang, H., Grant, B.F., 2016. Prevalence and Correlates of DSM-5 Cannabis Use Disorder, 2012–2013: Findings from the National Epidemiologic Survey on Alcohol and Related Conditions-III. *Am. J. Psychiatry* 173, 588–599.
- Hasin, D.S., Saha, T.D., Kerridge, B.T., Goldstein, R.B., Chou, S.P., Zhang, H., Jung, J., Pickering, R.P., Ruan, W.J., et al., 2015. Prevalence of Marijuana Use Disorders in the United States Between 2001–2002 and 2012–2013. *JAMA Psychiatry* 72, 1235–1242.
- Hasin, D.S., Shmulewitz, D., Sarvet, A.L., 2019. Time trends in US cannabis use and cannabis use disorders overall and by sociodemographic subgroups: a narrative review and new findings. *Am. J. Drug Alcohol Abuse* 45, 623–643.
- Hatzenbuehler, M.L., 2014. Structural stigma and the health of lesbian, gay, and bisexual populations. *Curr. Dir. Psychol. Sci.* 23, 127–132.
- Hatzenbuehler, M.L., 2016. Structural stigma: Research evidence and implications for psychological science. *Am. Psychol.* 71, 742–751.
- Hatzenbuehler, M.L., Keyes, K.M., Hamilton, A., Hasin, D.S., 2014. State-level tobacco environments and sexual orientation disparities in tobacco use and dependence in the USA. *Tob. Control* 23, e127–e132.
- Hatzenbuehler, M.L., Pachankis, J.E., 2016. 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.* 63, 985–997.
- Haug, N.A., Padula, C.B., Sottile, J.E., Vandrey, R., Heinz, A.J., Bonn-Miller, M.O., 2017. Cannabis use patterns and motives: A comparison of younger, middle-aged, and older medical cannabis dispensary patients. *Addict. Behav.* 72, 14–20.
- Kim, J., Coors, M.E., Young, S.E., Raymond, K.M., Hopfer, C.J., Wall, T.L., Corley, R.P., Brown, S.A., Sakai, J.T., 2018. Cannabis use disorder and male sex predict medical cannabis card status in a sample of high risk adolescents. *Drug Alcohol Depend.* 183, 25–33.
- Krasnova, A., Diaz, J.E., Philbin, M.M., Mauro, P.M., 2021. Disparities in substance use disorder treatment use and perceived need by sexual identity and gender among adults in the United States. *Drug Alcohol Depend.* 226, 108828.
- Lankenau, S.E., Fedorova, E.V., Reed, M., Schragger, S.M., Iverson, E., Wong, C.F., 2017. Marijuana practices and patterns of use among young adult medical marijuana patients and non-patient marijuana users. *Drug Alcohol Depend.* 170, 181–218.
- Levy, N.S., Mauro, P.M., Mauro, C.M., Martins, S.S., 2021. Joint perceptions of the risk and availability of cannabis in the United States, 2002–2018. *Drug Alcohol Depend.* 226, 108873.
- Martins, S.S., Mauro, C.M., Santaella-Tenorio, J., Kim, J.H., Cerda, M., Keyes, K.M., Hasin, D.S., Galea, S., Wall, M., 2016. State-level medical marijuana laws, marijuana use and perceived availability of marijuana among the general U.S. population. *Drug Alcohol Depend.* 169, 26–32.
- Martins, S.S., Segura, L.E., Levy, N.S., Mauro, P.M., Mauro, C.M., Philbin, M.M., Hasin, D.S., 2021. Racial and Ethnic Differences in Cannabis Use Following Legalization in US States With Medical Cannabis Laws. *JAMA Netw. Open* 4, e2127002.
- Mauro, C.M., Newswanger, P., Santaella-Tenorio, J., Mauro, P.M., Carliner, H., Martins, S.S., 2019. Impact of Medical Marijuana Laws on State-Level Marijuana Use by Age and Gender, 2004–2013. *Prev. Sci.* 20, 205–214.
- Mauro, P.M., Carliner, H., Brown, Q.L., Hasin, D.S., Shmulewitz, D., Rahim-Juwel, R., Sarvet, A.L., Wall, M.M., Martins, S.S., 2018. Age Differences in Daily and Nondaily Cannabis Use in the United States, 2002–2014. *J. Stud. Alcohol Drugs* 79, 423–431.
- Mauro, P.M., Philbin, M.M., Greene, E.R., Askari, M.S., Martins, S.S., 2021. Medical and Non-Medical Opioid Use at the Intersection of Gender and Sexual Identity: Associations with State Medical Cannabis Law Status in a U.S. National Sample of Adults. *Arch. Sex. Behav.* 50, 3551–3561.
- Mauro, P.M., Samples, H., Klein, K.S., Martins, S.S., 2020. Discussing drug use with health care providers is associated with perceived need and receipt of drug treatment among adults in the United States: We need to talk. *Med. Care* 58, 617–624.
- Meyer, I.H., 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Bull.* 129, 674–697.
- National Conference of State Legislatures. Cannabis review. Accessed 22 March 2022, <https://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx>, 2021.
- Pachankis, J.E., Hatzenbuehler, M.L., Berg, R.C., Fernandez-Davila, P., Mirandola, M., Marcus, U., Weatherburn, P., Schmidt, A.J., 2017. Anti-LGBT and Anti-immigrant Structural Stigma: An Intersectional Analysis of Sexual Minority Men's HIV Risk When Migrating to or Within Europe. *J. Acquir. Immune Defic. Syndr.* 76, 356–366.
- Pacula, R.L., Powell, D., Heaton, P., Sevigny, E.L., 2015. Assessing the effects of medical marijuana laws on marijuana use: the devil is in the details. *J. Policy Anal. Manage.* 34, 7–31.
- Parent, M.C., DeBlaere, C., Moradi, B., 2013. Approaches to research on intersectionality: Perspectives on gender, LGBT, and racial/ethnic identities. *Sex Roles* 68, 639–645.
- Philbin, M.M., Giovenco, D.P., Mauro, P.M., 2022. Commentary on Weinberger et al.: Tobacco and cannabis policies as drivers of nicotine and cannabis co-use: research and measurement implications to move the field forward. *Addiction*.
- Philbin, M.M., Mauro, P.M., Greene, E.R., Martins, S.S., 2019. State-level marijuana policies and marijuana use and marijuana use disorder among a nationally representative sample of adults in the United States, 2015–2017: Sexual identity and gender matter. *Drug Alcohol Depend.* 204, 107506.
- Quinn, K., Dickson-Gomez, J., Zarwell, M., Pearson, B., Lewis, M., 2019. "A Gay Man and a Doctor are Just like, a Recipe for Destruction": How Racism and Homonegativity in Healthcare Settings Influence PrEP Uptake Among Young Black MSM. *AIDS Behav.* 23, 1951–1963.
- SAS Institute Inc, 2014. SAS [computer program]. Version 9.4., Cary, NC.
- Schuler, M.S., Prince, D.M., Breslau, J., Collins, R.L., 2020. Substance Use Disparities at the Intersection of Sexual Identity and Race/Ethnicity: Results from the 2015–2018 National Survey on Drug Use and Health. *LGBT Health* 7, 283–291.
- Schuler, M.S., Stein, B.D., Collins, R.L., 2019. Differences in Substance Use Disparities Across Age Groups in a National Cross-Sectional Survey of Lesbian, Gay, and Bisexual Adults. *LGBT Health* 6, 68–76.
- Substance Abuse and Mental Health Services Administration, 2016. 2015 National Survey on Drug Use and Health: Methodological summary and definitions. Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, Rockville, MD.
- Substance Abuse and Mental Health Services Administration, 2017. 2016 National Survey on Drug Use and Health: Methodological summary and definitions. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Rockville, MD.
- Substance Abuse and Mental Health Services Administration, 2018. 2017 National Survey on Drug Use and Health: Methodological summary and definitions. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Rockville, MD.
- Substance Abuse and Mental Health Services Administration, 2019. Key substance use and mental health indicators in the United States: Results from the 2018 National Survey on Drug Use and Health [HHS Publication No. PEP19-5068, NSDUH Series H-54]. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Rockville, MD.
- Substance Abuse and Mental Health Services Administration, 2020. Key substance use and mental health indicators in the United States: Results from the 2019 National Survey on Drug Use and Health [HHS Publication No. PEP20-07-01-001, NSDUH Series H-55]. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Rockville, MD.
- Turan, J.M., Elafros, M.A., Logie, C.H., Banik, S., Turan, B., Crockett, K.B., Pescosolido, B., Murray, S.M., 2019. Challenges and opportunities in examining and addressing intersectional stigma and health. *BMC Med.* 17, 7.
- Unger, J.B., Baezconde-Garbanati, L., Shakib, S., Palmer, P.H., Nezami, E., Mora, J., 2004. A cultural psychology approach to "drug abuse" prevention. *Subst. Use Misuse* 39, 1779–1820.
- Valencia, C.I., Asaolu, I.O., Ehiri, J.E., Rosales, C., 2017. Structural barriers in access to medical marijuana in the USA—a systematic review protocol. *Syst. Rev.* 6, 154.
- Williams, N.D., Fish, J.N., 2020. The availability of LGBT-specific mental health and substance abuse treatment in the United States. *Health Serv. Res.* 55, 932–943.
- Wu, L.T., Zhu, H., Swartz, M.S., 2016. Trends in cannabis use disorders among racial/ethnic population groups in the United States. *Drug Alcohol Depend.* 165, 181–190.
- Zhang, X., Wu, L.T., 2017. Marijuana use and sex with multiple partners among lesbian, gay and bisexual youth: results from a national sample. *BMC Public Health* 17, 19.