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Medical marijuana laws and medical and non-medical prescription stimulant use among a nationally representative sample of US Adults: Potential spillover effects by sexual identity and gender

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Abstract

Background: Medical marijuana laws (MMLs) can impact marijuana and opioid use, but the relationship between MMLs and other drugs, such as prescription stimulants, remains unexamined. Because lesbian, gay and bisexual (LGB) individuals report higher levels of prescription stimulant use than heterosexuals, we explored the relationship between MMLs and past-year medical and non-medical stimulant use by sexual identity and gender.

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Methods: We pooled 2015-2017 National Survey on Drug Use and Health data for adults (n=126 463), and used survey-weighted multinomial logistic regression to estimate odds of past-year (a) medical prescription stimulant use, (b) non-medical prescription stimulant use and (c) non-medical versus medical stimulant use. We stratified by gender, adjusted for sociodemographic characteristics, and tested the interaction between MML state residence and sexual identity.

Results: Bisexual men had higher medical (6.4% versus 4.1%; aROR=1.93[1.29-2.88]) and nonmedical stimulant use 6.6% versus 2.4%; aROR=2.23[1.44-3.44]) than heterosexual men. Bisexual women had higher non-medical stimulant use (6.8% versus 1.6%; aROR=1.54[1.23-2.93]) than heterosexual women. Female (aROR=0.70[0.62-0.78]) and male (aROR=0.74[0.66-0.82]) heterosexuals in MML states had lower odds of medical stimulant use than in non-MML states. Bisexual men in MML states had lower odds of medical (aROR=0.36[0.21-0.61]) and non-medical stimulant use (aROR=0.48[0.29-0.81]) than bisexual men in non-MML states. Similar patterns emerged for bisexual women's non-medical use (aROR=0.57[0.40-0.81]).

Conclusion: Prescription stimulant use was higher in non-MML states for most LGB subgroups. MMLs may differentially impact stimulant use, primarily for bisexual men and women. States enacting MMLs should consider potential impacts on drugs other than marijuana, especially among LGB populations.

Keywords

Medical Marijuana Laws; prescription stimulant use; non-medical stimulant use; Lesbian, gay, bisexual; social epidemiology; sexual orientation

Background

The role of medical cannabis laws (MCLs) as a structural driver of substance use other than cannabis is a topic of ongoing debate (Flexon et al., 2019; Shover et al., 2019; Wen et al., 2015; Wen & Hockenberry, 2018). By June 2020, 34 states had enacted MCLs and 11 states and Washington D.C. had legalized recreational cannabis (National Conference of State Legislatures, 2020). The passage of MCLs has been associated with an overall increased prevalence of cannabis use (Cerdá et al., 2018; Martins et al., 2016; Wen et al., 2015), but the impacts of MCLs are not uniform. MCLs have differential impacts based on an individual's age: adults (26+) living in an MCL state have higher past-month prevalence of cannabis use compared to those in non-MCL states, including medical and non-medical use (Martins et al., 2016; C. M. Mauro et al., 2019; Wen et al., 2015). However, a meta-analysis found no association between MCLs and cannabis use among adolescents (Sarvet et al., 2018). There are also differences by gender: while past-month and past-year daily cannabis use increased from 2004-2013 among both males and females ages 26+, among those 18-25 there was an increase in past-year daily cannabis use post MCL enactment for males but not for females (C. M. Mauro et al., 2019).

Research is now expanding upon the relationship between MCLs and cannabis use to explore whether MCLs are associated with other substance use. For example, a study of MCLs and alcohol use found an association in frequency of binge drinking among those aged 21 or above, but no relationship for drinking behaviors among those ages 12-20 (Wen

et al., 2015). While work focused on the volume of opioid prescriptions indicated a potential relationship (Flexon et al., 2019; Liang et al., 2018; Wen & Hockenberry, 2018), research on MCLs and opioid-related outcomes (e.g., frequency of use, overdose) found no causal relationship among the general population (Segura et al., 2019; Shover et al., 2019). The relationship between MCLs and prescription opioid use may be driven by individual-level substitution or provider prescribing patterns (Flexon et al., 2019; Wen & Hockenberry, 2018). In the context of existing mixed evidence of the associations between MCL and prescription opioids, it is possible that MCLs could contribute to differences in other prescription drug use, such as prescription stimulants, through similar mechanisms. For example, a study among people who use cannabis found that 80% substituted cannabis for prescription drugs and 33% for illegal substances (Lucas et al., 2016). Some medical providers have also argued before a congressional drug policy subcommittee that cannabis should be used to treat attention deficit hyperactivity disorder (ADHD); a small number of providers recommend and prescribe cannabis to treat ADHD (Strohbeck-Kuehner et al., 2008; Subcommittee on Criminal Justice, Drug Policy and Human Resources, 2004). Despite the fact that mechanisms between MCLs and alcohol and opioids may also be relevant to MCLs and other substances, the relationship between MCLs and other prescription drug classes—such as prescription stimulants—remains unexplored.

Stimulant use has increased over the last decade in the United States (US). From 2006-2016, the overall number of stimulant prescriptions doubled from 24.42 to 48.18 metric tons (Arria & DuPont, 2018; Piper et al., 2018). Approximately 16 million adults used a prescription stimulant in the past year: 5 million reported non-medical use and 400,000 met criteria for a prescription stimulant use disorder (Arria & DuPont, 2018; Weyandt et al., 2013). Stimulants are the third most common class of prescription drug used non-medically, behind opioids and benzodiazepines (McHugh et al., 2015). Potential consequences of non-medical prescription stimulant use are well established: contrary to media narratives suggesting that non-medical prescription stimulant use can enhance academic performance (Arria & DuPont, 2018; Lakhan & Kirchgessner, 2012; Partridge et al., 2011), it is associated with lower academic achievement (Arria et al., 2008; McCabe et al., 2005). Non-medical prescription stimulant use is also associated with increased use of other substances including cannabis, cocaine, hallucinogens, and opioids (Arria et al., 2008; Arria & DuPont, 2010; Teter et al., 2003), as well as drug dependence (National Institute on Drug Abuse, 2018) and related negative consequences (Lakhan & Kirchgessner, 2012; Raymond, n.d.).

Moreover, research has begun to explore whether MCLs differentially impact certain subpopulations, particularly those with higher baseline levels of substance use. LGB individuals report higher levels of substance use than heterosexual individuals (Corliss et al., 2010). In the 2015 National Survey on Drug Use and Health (NSDUH), LGB individuals were over twice as likely as heterosexuals to report past-year non-medical prescription stimulant use (Medley et al., 2016). Patterns of non-medical stimulant use differ within the LGB community with bisexuals, particularly bisexual men, reporting the highest prevalence (Corliss et al., 2010; Kecojevic et al., 2015). In a study of college students, bisexuals reported the highest prevalence of non-medical use of prescription stimulants (31.3%), followed by lesbian women (20.2%) and gay men (15.7%)—contrasting the 13.8% prevalence in the overall sample (Shadick et al., 2016). Some studies find that sexual

minority men are more likely to report lifetime non-medical prescription stimulant use than use of any other prescription drug (Kelly et al., 2013; Li & Mustanski, 2018). The majority of stimulant-related research, however, has focused on illegal stimulant use (e.g., cocaine and methamphetamine) and gay/bisexual men (Frosch et al., 1996; Halkitis et al., 2005). As a result, prescription stimulants have received less attention, even though their use disproportionately impacts the LGB community. Lastly, stimulants have increasingly been taken in conjunction with other drugs, including opioids (Hughes et al., 2016). This suggests that understanding patterns of medical and non-medical prescription stimulant use is crucial in combating multiple drug epidemics, including polydrug use (Dembosky, n.d.; Fawcett, 2018; Philbin & Mauro, 2019; Wei et al., 2018).

Research has found an association between MCLs and cannabis outcomes for LGB individuals (Philbin, Mauro, Greene, et al., 2019), as well as MCLs and prescription opioid use for LGB individuals (P. M. Mauro, Philbin, et al., 2020). Studies have yet to examine whether MCLs are associated with medical and non-medical prescription stimulant use, particularly among LGB individuals whose stimulant use is higher than heterosexuals (Bose et al., 2018; Kelly et al., 2013; Li & Mustanski, 2018). To the best of the authors' knowledge, no published work has explored whether MCLs are associated with prescription stimulant use for individuals overall, including among LGB individuals. The present study aims to estimate differences in the association between MCLs and medical and non-medical prescription stimulant use by sexual identity and gender. We discuss pathways through which MCLs may impact prescription stimulant use and how these pathways might differ for LGB individuals. Finally, we argue that policy makers must carefully consider how MCLs influence the use of substances other than cannabis and how these laws may impact LGB individuals who are at elevated risk for substance use.

Methods

Data source and sample

We obtained public use data from the 2015-2017 NSDUH, an annual cross-sectional survey that draws a national sample of the non-institutionalized civilian population of the United States, ages 12 and older. The NSDUH is designed to assess substance use, mental health, and other behaviors. Data collection occurred via face-to-face household interviews using computer assisted interviewing and audio computer assisted survey instruments (ACASI) to maximize privacy for potentially sensitive questions. The weighted interview response rates for 2015-2017 among adults ranged from 66.3%-68.4% (Bose et al., 2018). Additional details of the sampling methods and survey techniques for the 2015-2017 NSDUH can be found elsewhere (Substance Abuse and Mental Health Services Administration, 2018).

We pooled 170319 observations across the three years and included a survey year indicator. We excluded individuals who lacked valid sexual identity data, which included those ages 12-17 (n=41579) and adults who responded 'don't know' or otherwise refused to answer (n=2277). The final analytic sample included 126463 individuals ages 18 and older with non-missing sexual identity.

Measures

Outcomes—Any past-year medical or non-medical use of prescription stimulants: Participants were asked if they used prescription stimulants (e.g., Adderall, Ritalin, Dextroamphetamine) in the past 12 months; those who answered yes were asked if they had used prescription stimulants other than what the doctor had directed (i.e., non-medical use). A three-level categorical variable was created to reflect no past-year use, past-year medical use only (i.e., exclusively medical use), or past-year non-medical use of prescription stimulants (i.e., any non-medical use, whether or not they used medically). Due to the wording of the question, we could not differentiate people who used non-medically only from those who used both medically and non-medically.

Exposure—Sexual Identity: Sexual identity was assessed by asking, “Which of the following do you consider yourself to be?” response categories included: “Heterosexual, that is straight”, “Lesbian or gay”, “Bisexual”, “Don’t know”, and “Refuse to answer”. Those who selected “don’t know” or otherwise refused to answer were excluded from our sample.

Moderator—Residence in an MCL state: Participants were coded as living in an MCL state if their state of residence had a law approving medical cannabis use before the interview date, otherwise the participant was coded as living in a non-MCL state. This binary indicator was available in the public-use data file but due to confidentiality concerns, state of residence was not available.

Covariates—Past-year cannabis use: Participants were asked if they had ever used cannabis and, if so, how recently. Past-year cannabis use included any use in the last 12 months.

Sociodemographic covariates: age (i.e., 18-25, 26-34, 35-49, 50+), race/ethnicity (i.e., non-Hispanic White, non-Hispanic Black, Hispanic/Other), gender (i.e., male/female), annual household income (i.e., <\$20,000, \$20,000-\$49,999, \$50,000-\$74,999, \$75,000 or more), population density (i.e., large metro, small metro, non-metro), and survey year (indicator variables for survey years 2015-2017).

Data Analysis

We first described prevalence of past-year medical and non-medical use of prescription stimulants by sexual identity, gender, and MCL status, which were weighted to derive nationally representative estimates. NSDUH sampling weights accounted for selection probability, nonresponse, and population distribution, and were divided by three to account for the pooling of three years of NSDUH data. Second, we used weighted multinomial logistic regression to examine the relationship between past-year medical and nonmedical use of prescription stimulants and sexual identity, adjusting for relevant socio-demographic covariates listed above. Models estimated the past-year odds of (i) exclusive medical prescription stimulant use versus no prescription stimulant use; (ii) any non-medical prescription stimulant use versus no prescription stimulant use; and (iii) any non-medical prescription stimulant use versus exclusive medical use among those who reported any past-year stimulant use. Finally, we examined whether MCL state status moderated the

association between sexual identity and medical and non-medical use, adding an interaction term between sexual identity and MCL state status. To examine gender differences in these relationships, we repeated the analyses stratified by gender. Statistical analyses were conducted in SAS 9.4 (Cary, NC) and adjusted for the NSDUH complex survey design. These analyses were deemed non-human subjects and thus exempt by the [blinded for review] Institutional Review Board.

Results

Past-year medical and nonmedical use of prescription stimulants by sexual identity

Sample characteristics are described in Table 1. The prevalence of past-year medical prescription stimulant use was 4.5% among heterosexuals, 7.0% among gays/lesbians, and 7.4% among bisexuals; non-medical prescription stimulant use was 1.9% among heterosexuals, 4.5% among gays/lesbians and 6.8% among bisexuals (Supplement table 1). Medical prescription stimulant use was higher among women than men (range 4.9%-7.9%) but non-medical use was higher among heterosexual and gay men (Figure 1). Bisexual women reported the highest prevalence of medical (7.9%) and non-medical prescription stimulant use (6.8%) across all subgroups.

Compared to heterosexual men, bisexual men were more likely to report medical stimulant use (adjusted odds ratio (aROR)=1.93, 95% Confidence Interval (CI)=1.29-2.88), as were gay men (aROR=1.48, 95%CI=1.01-2.19). Bisexual men (aROR=2.23, 95%CI=1.44-3.44) and women (aROR=1.54, 95%CI=1.23-2.93) reported more non-medical prescription stimulant use than their heterosexual counterparts. Among people who reported past-year medical use of prescription stimulants, bisexual women reported higher non-medical use than heterosexual women (aROR=1.34, 95%CI=1.01-1.80) (Table 2).

Prescription stimulant use by gender, sexual identity, and state MCL status

Different patterns emerged after stratifying by gender, sexual identity and state MCL status (Figure 2). Medical prescription stimulant use was lower in MCL states versus non-MCL states for heterosexual men (3.7% versus 4.6%) and women (4.2% versus 5.7%). Bisexual men's medical stimulant use prevalence was 4.2% in MCL states versus 9.9% in non-MCL states: among women, it was 7.3% versus 8.6%. Among bisexual men, non-medical prescription stimulant use was 5.6% in MCL states versus 8.1% in non-MCL states; for bisexual women it was 6.0% versus 7.9%.

Both female (aROR=0.70, 95%CI=0.62-0.78) and male (aROR=0.74, 95%CI=0.66-0.82) heterosexuals in MCL states had lower odds of past-year medical stimulant use than in non-MCL states. Bisexual men in MCL states had lower odds of past-year medical stimulant use (aROR=0.36, 95%CI=0.21-0.61) than bisexual men in non-MCL states.

Female (aROR=0.79, 95%CI=0.68-0.92) and male (aROR=0.82, 95%CI=0.72-0.93) heterosexuals in MCL states had lower odds of past-year non-medical prescription stimulant use than those in non-MCL states. Similar patterns emerged for bisexual women (aROR=0.57, 95%CI=0.40-0.81) and bisexual men (aROR=0.48, 95%CI=0.29-0.81).

MCL moderated the relationship between sexual identity and prescription stimulant use for bisexual versus heterosexual men, but not for other gender/sexual identity subgroups. The relative odds of any past-year medical or non-medical prescription stimulant use (vs. none) comparing bisexual men in MCL versus non-MCL states was significantly different from that for heterosexual men in MCL versus non-MCL states.

Discussion

To our knowledge, this is the first study to explore medical and non-medical prescription stimulant use among LGB individuals living in MCL and non-MCL states. Bisexual and gay men reported higher medical prescription stimulant use than heterosexual men, but there were no differences by sexual identity among women. Bisexual adults reported significantly higher nonmedical prescription stimulant use than their heterosexual counterparts, which supports previous work (Kelly et al., 2013; Li & Mustanski, 2018). Non-medical prescription stimulant use differed by gender: gay/lesbian women had much lower prevalence of non-medical stimulant use than gay men, while bisexuals had similar prevalence regardless of gender. While we observed a negative association between state MCL status and medical and non-medical prescription stimulant use among heterosexuals and bisexuals, there was no association among gay/lesbian adults. This finding builds on previous work that found a cross-sectional association between MCLs and medical and recreational cannabis use among LGB individuals (Philbin, Mauro, Greene, et al., 2019), and MCLs and prescription opioid use among LGB individuals (P. M. Mauro, Philbin, et al., 2020).

The high prevalence of non-medical prescription stimulant use among LGB individuals, particularly bisexuals, is consistent with the minority stress model. This model posits that sexual identity related disparities stem from stressors sexual minorities face as a result of a heteronormative culture (e.g., discrimination, rejection, identity concealment victimization, harassment and maltreatment) (Meyer, 2003). These stressors, in turn, may increase risks for poor mental health and substance use among sexual minorities (Meyer, 2003). Since LGB individuals experience depression, psychological distress and suicidal ideation at higher rates than heterosexuals (Cochran et al., 2003; Lewis, 2009), substance use may be a coping mechanism to deal with stigma and related stress. Across states, our findings support the notion that minority stress is a multi-dimensional experience, and that the intersection of sexual identity and gender play a crucial role in the drivers of stimulant use. While beyond the scope of this paper, it is possible that bisexual individuals may face particular strain due to “double discrimination” from both the heterosexual and sexual minority communities (Feinstein & Dyar, 2017; Friedman et al., 2014; Roberts et al., 2015; Schuler et al., 2019). Previous research on cannabis and opioid use among LGB individuals has highlighted the need for additional support and programs tailored for bisexual women. Our study builds on that work by highlighting the need to incorporate additional supports for gay and bisexual men when the substance in question includes stimulant use.

Several factors may contribute to the observed patterns of medical and non-medical prescription stimulant use by state MCL status. First, MCL states may have other common characteristics that existed prior to MCL enactment compared to non-MCL states, including

lower rates of medical and non-medical prescription stimulant use (Piper et al., 2018). Second, MCL states may share other political characteristics which may impact prescription stimulant use. For example, while beyond the scope of these data, MCL states might have different stimulant prescribing regulations that may drive prescribing patterns and thus the amount of prescription stimulants in circulation. In 2016, half of the states above the median in per capita (mg/person) of amphetamine prescriptions were non-MCL states, while only one-third of states that were below the median in prescriptions were non-MCL states (Piper et al., 2018). This suggests that non-MCL states may have a higher volume of prescriptions, which could in turn be associated with diversion and non-medical prescription stimulant use (Fischer et al., 2010).

The relationship between MCLs, prescription stimulant use, and bisexual identity is also of note. Similar to previous research (Bose et al., 2018; Medley et al., 2016), bisexuals had higher stimulant use than both their heterosexual and gay/lesbian peers. This may, in part, be driven by the aforementioned minority stress hypothesis (Goldbach et al., 2015; Lea et al., 2014; Lehavot & Simoni, 2011; Mereish et al., 2017). Gay/lesbian women had lower prevalence of non-medical prescription stimulant use and were a smaller percentage of the general population than bisexual women. This may make differences by MCL state status harder to detect due to power limitations. Our findings suggest that living in an MCL modified the relationship between sexual identity and prescription stimulant use, particularly when comparing bisexual men to heterosexual men. Specifically, the magnitude of the protective association between using prescription stimulants in MCL vs non-MCL states was stronger among bisexual versus heterosexual men. Lower prescription stimulant use in MCL states could be due to unique stressors faced by bisexual individuals living in non-MCL states which, historically, have been more politically conservative (Philbin, Mauro, Santaella-Tenorio, et al., 2019) and with higher reported levels of sexual identity-based discrimination (Hatzenbuehler, 2014). Past-year medical prescription stimulant use was higher in non-MCL states, which suggest a higher volume of prescriptions in circulation; increased prescriptions are associated with diversion and nonmedical use (Fischer et al., 2010). Of note, there were no differences in age distribution between bisexual men or women in MCL versus non-MCL states.

While beyond the scope our study, provisions in MCLs that described which conditions are covered under the law could be related to changes in prescription stimulant use. As of October 2018, cannabis was not indicated in any MCL state for ADHD treatment (Leafly, 2018). However, an analysis of online forums that discussed cannabis and ADHD found that 25% of comments reported cannabis to be therapeutic for ADHD treatment compared to 8% that believed it to be harmful (Mitchell et al., 2016). Nascent research suggests that some providers—and individuals—are using cannabis instead of prescription stimulants to self-medicate for ADHD (Cooper et al., 2017; Loflin et al., 2014; Mitchell et al., 2016). In addition, content analysis of online ADHD forums found that three times as many individuals viewed cannabis as helpful for treating ADHD compared to harmful (Mitchell et al., 2016). Future changes in which conditions qualify for use of medical cannabis could further impact the effect of MCL on prescription stimulant use.

Policy advocates have referred to stimulant use—alongside opioid use—as the ‘fourth wave’ of the opioid epidemic (Manz, 2020). Our findings support the need for multi-level approaches to address prescription stimulant use overall among LGB adults. At a structural level, states should ensure that public health campaigns incorporate information about stimulant use and target LGB individuals, reduce unnecessary stimulant prescriptions to help limit diversion, and offer nonstigmatizing and affordable treatment when clinically indicated. At a community level, harm reduction and medication disposal should be readily accessible. As the majority of adults report not discussing drug use with their providers (P. M. Mauro, Samples, et al., 2020), resources should be offered to providers to support discussions about and screening for stimulant use, as well as potential treatment options.

Strengths and Limitations

While this study is the first of its kind to explore the relationship between MCLs and medical and non-medical prescription stimulant use among LGB adults in the U.S., the study has several limitations. The study was cross-sectional and could not estimate causal effects of MCL or recreational cannabis law enactment on prescription stimulant use. We could not account for other structural factors that might influence prescription stimulant use (e.g., geographic differences, harm reduction availability, prescription regulations, and pre-MCL stimulant prevalence), because the public data included only an indicator of whether NSDUH respondents lived in a state with an MCL, but not the specific state’s name. We were also unable to include potential time lags between MCL enactment and cannabis availability, including regional variations in dispensaries. States that first passed MCLs tend to be more politically liberal (Philbin, Mauro, Santaella-Tenorio, et al., 2019) and may have other related factors in common with each other, for which we could not account. Past-year prescription stimulant use measures were self-reported, which could be affected by recall bias. The NSDUH did not include gender identity measures, so we could not differentiate between transgender and cis-gender individuals. The NSDUH is a household survey and therefore excluded people who might be marginalized (e.g., homeless not in shelters and incarcerated individuals), so findings may not be generalizable to people excluded from the sample. Additionally, the NSDUH first included a sexual identity measure in 2015. We pooled three survey years to increase power, which limited our ability to explore this relationship longitudinally. Finally, the NSDUH only asks individuals 18 and older about sexual identity and does not capture sexual behavior. We were therefore unable to examine these relationships for adolescents or individuals who engage in same-sex sexual behaviors but who do not identify as LGB.

Suggestions for Future Work:

Future work with state indicators could incorporate additional state-level variables in order to account for other state-level differences between MCL and non-MCL states (e.g., prescribing patterns and regulations, LGB-related stigma, and state-level stimulant use differences before MCL enactment). Recent research has challenged the link between MCLs and other substance use (e.g., (Shover et al., 2019)) and highlighted potential alternative drivers that may be associated with substance use patterns above and beyond that of MCLs, including the slower reach of the overdose crisis in Western states, and harm reduction and treatment availability. Future research with state indicators should incorporate additional

state-level variables to test those hypotheses. Additionally, once more NSDUH years with state-level identifiers are accessible, research should explore the association longitudinally, including between recreational cannabis laws and prescription stimulant use. Additional work should examine the potential role of time lags and MCL and stimulant use, and include information on supply side characteristics. Future work should also include providers in order to better understand the role that MCLs may have on prescribing decisions. Additional research should explore the relationships between MCLs and non-prescription stimulants (e.g., methamphetamines and cocaine). Finally, we should continue to examine these relationships within sub-populations with different baseline levels of use (e.g., by age or race/ethnicity) in order to better understand the unique ways that MCLs may impact different populations.

Conclusions

This study demonstrates an association between MCLs and medical and non-medical prescription stimulant use among heterosexuals and bisexuals. The “spillover” effect of MCL enactment on the use of substances besides cannabis should be explicitly tested in future studies that can compare estimates before and after MCL enactment. Contrary to studies assessing MCL effects on cannabis use, we found that prescription stimulant use was lower in MCL than non-MCL states for most gender and sexual identity subgroups. Findings that both medical and non-medical prescription stimulant use differ by gender and sexual identity indicate the need to examine these groups separately to ascertain the unique factors that may affect their substance use patterns. Bisexual individuals, particularly bisexual men, had high rates of medical and nonmedical prescription stimulant use, adding to the growing evidence base that bisexual individuals are a particularly at-risk group for whom structural interventions are needed.

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Highlights:

- Medical marijuana laws are associated with prescription stimulant outcomes
- LGB adults report higher levels of prescription stimulant use than heterosexuals
- Prescription stimulant use was higher in states without medical marijuana laws
- Bisexual adults had particularly high rates of prescription stimulant use

Figure 1.
Past-Year Medical use only and any Non-Medical Use of Prescription Stimulants by Sexual Identity and Gender among US Adults (18+), NSDUH 2015-2017 (N = 126 463)

Figure 2.
Past-Year Medical Use Only and Any Non-Medical Use of Prescription Stimulants by Sexual Identity, Gender, and MCL State among US Adults (18+), NSDUH 2015-2017 (N = 126 463)

Table 1.

Selected sociodemographic characteristics of past year medical and non-medical use of prescription stimulants among US adults (18+) by sexual identity, NSDUH 2015-2017 (N=126 463)

Factor	Overall N (wt col %)	Heterosexual (N=118,222)		Gay/Lesbian (N=2,731)		Bisexual (N=5,510)	
		Wt row % (SE)		Wt row % (SE)		Wt row % (SE)	
		Medical only	Any Non- Medical	Medical only	Any Non- Medical	Medical only	Any Non- Medical
Overall (N, wt row %)		6172(4.5%)	3833 (1.9%)	220 (7.0%)	159 (4.5%)	462 (7.4%)	436 (6.8%)
Sex							
Male	58 815 (48.4%)	4.1% (0.1)	2.4% (0.1)	6.6% (0.7)	5.4% (0.8)	6.4% (0.8)	6.6% (0.9)
Female	67 648 (51.6%)	4.9% (0.1)	1.6% (0.1)	7.4% (1.1)	3.3% (0.5)	7.9% (0.4)	6.8% (0.7)
Age category							
18-25	41 379 (14.2%)	6.8% (0.2)	7.3% (0.2)	9.7% (1.1)	9.4% (1.0)	8.3% (0.6)	9.7% (0.5)
26-34	26 114 (15.9%)	5.6% (0.2)	3.6% (0.2)	9.1% (1.3)	7.3% (1.4)	7.9% (1.0)	7.6% (1.0)
35-49	33 090 (24.7%)	4.9% (0.1)	1.2% (0.1)	6.4% (1.0)	3.8% (1.0)	7.0% (1.0)	4.5% (0.9)
50+	2 588 (45.2%)	3.3% (0.1)	0.3% (0.1)	4.7% (1.1)	0.5% (0.4)	5.0% (1.6)	1.1% (0.6)
Race/Ethnicity							
NH White	77 100 (64.8%)	5.3% (0.1)	2.4% (0.1)	7.1% (0.8)	5.2% (0.7)	8.8% (0.7)	7.7% (0.7)
NH Black	15 888 (11.8%)	2.9% (0.2)	0.6% (0.1)	3.5% (0.8)	3.6% (1.2)	4.1% (1.0)	3.7% (0.8)
Hispanic	21 186 (15.6%)	3.3% (0.2)	1.4% (0.1)	10.1% (1.7)	3.4% (0.8)	5.6% (1.1)	6.6% (1.1)
Other	12 289 (7.8%)	3.0% (0.2)	1.5% (0.1)	5.2% (1.7)	2.3% (0.8)	6.3% (1.1)	5.1% (0.9)
Annual Household Income							
<\$20,000	26 280 (16.8%)	4.9% (0.2)	2.9% (0.2)	8.1% (1.4)	4.3% (1.1)	7.6% (0.9)	6.9% (0.9)
\$20k-\$49.9k	39 996 (29.7%)	4.1% (0.1)	1.6% (0.1)	7.4% (1.4)	4.1% (0.8)	7.7% (0.8)	7.2% (0.7)
\$50k-\$74.9k	38 548 (16.2%)	4.6% (0.2)	1.7% (0.1)	5.0% (1.3)	4.8% (1.4)	6.4% (1.1)	5.3% (1.0)
\$75k +	40 435 (37.3%)	4.7% (0.2)	1.9% (0.1)	7.0% (0.8)	4.7% (0.7)	7.5% (0.8)	6.8% (0.9)
Population Density							
Large Metro	53 653 (53.8%)	4.4% (0.1)	2.0% (0.1)	7.3% (0.7)	4.9% (0.7)	6.5% (0.7)	7.1% (0.6)
Small Metro	62 958 (40.4%)	4.7% (0.1)	2.0% (0.1)	6.3% (0.8)	3.5% (0.6)	8.4% (0.8)	6.4% (0.6)
Rural	9 852 (5.8%)	4.1% (0.2)	1.1% (0.1)	8.1% (3.1)	6.9% (2.4)	10.8% (2.5)	5.5% (2.3)
MCL State Residence							
Yes	67 799 (53.2%)	3.9% (0.1)	2.0% (0.1)	6.7% (0.8)	4.7% (0.6)	6.4% (0.6)	5.9% (0.5)
No	58 664 (46.8%)	5.2% (0.1)	1.9% (0.1)	7.4% (0.7)	4.1% (0.7)	8.9% (0.8)	8.0% (0.7)
Past-Year Cannabis Use							
Yes	25 662 (14.5%)	8.2% (0.2)	10.2% (0.3)	10.2% (1.4)	10.5% (1.4)	8.3% (0.7)	14.5% (1.0)
No	100801 (85.5%)	3.9% (0.1)	0.6% (0.0)	5.7% (0.4)	2.1% (0.4)	6.9% (0.6)	2.2% (0.2)

NH: Non-Hispanic; MCL State Residence = Participant lived in a state that had a Medical cannabis law (MCL) in effect at the time of survey.

Table 2.

Multinomial logistic regression modeling of past year medical and non-medical use of prescription stimulants by sexual identity and gender, moderated by MCL state status, NSDUH 2015-2017 (N=126 463)

	Stimulant Medical Use ONLY Vs. No Past-Year Stimulant Use ^{a,b}		Stimulant Non-Medical Use Vs. No Past-Year Stimulant Use ^{a,b}		Non-Medical Use Vs. Medical Use ONLY ^{b,c}	
	Women aROR (95% CI)	Men aROR (95% CI)	Women aROR (95% CI)	Men aROR (95% CI)	Women aROR (95% CI)	Men aROR (95% CI)
Heterosexual	Ref	Ref	Ref	Ref	Ref	Ref
Bisexual^a	1.15 (0.89-1.47)	1.93 (1.29-2.88)	1.54 (1.23-2.93)	2.23 (1.44-3.44)	1.34 (1.01-1.80)	1.16 (0.66-2.04)
Lesbian/Gay^a	1.06 (0.79-1.44)	1.48 (1.01-2.19)	0.99 (0.51-1.92)	1.52 (0.95-2.43)	0.92 (0.47-1.81)	1.02 (0.52-2.01)
Heterosexual(MCL vs. non-MCL)	0.70 (0.62-0.78)	0.74 (0.66-0.82)	0.79 (0.68-0.92)	0.82 (0.72-0.93)	1.13 (0.96-1.35)	1.11 (0.92-1.34)
Bisexual(MCL vs. Non-MCL)	0.76 (0.54-1.07)	0.36 (0.21-0.61) *	0.57 (0.40-0.81)	0.48 (0.29-0.81) *	0.75 (0.47-1.19)	1.35 (0.66-2.75)
Lesbian/Gay(MCL vs. Non-MCL)	1.07 (0.60-1.92)	0.79 (0.47-1.33)	1.04 (0.48-2.24)	1.00 (0.55-1.82)	0.98 (0.41-2.33)	1.26 (0.55-2.89)

^aReferences: Sexual Identity: Heterosexual, Use: No Past-Year Use

^bModels adjust for survey year, age, race/ethnicity, annual household income, population density, and past year cannabis use

^cReferences: Sexual Identity: Heterosexual, Use: Past-Year Medical Use

* Difference between sexual minority and heterosexual is statistically significantly different by MCL state status