



THE OHIO STATE UNIVERSITY
MORITZ COLLEGE OF LAW

**DRUG ENFORCEMENT
AND POLICY CENTER**

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POLICY BRIEF

**The Impact of Recreational Marijuana
Laws on Marijuana Use Disorder
during “Treat and Release” Visits to
Hospital Emergency Departments,
2017-2020**

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I. WHAT IS MARIJUANA USE DISORDER?

While occasional marijuana use by adults has not been associated with significant problems, frequent and early use is associated with marijuana use disorder— a continued problematic pattern of use despite negative consequences that causes significant distress or impairment in functioning.^{1, 2} In 2021, the federal government estimated that 5.8% of Americans aged 12+ years—approximately 16 million people—had marijuana use disorder.³ People with MUD have a higher likelihood of interpersonal, financial, legal, and health-related problems.⁴ MUD has been linked to a variety of specific adverse outcomes: delinquency and criminal activity, motor vehicle accidents, decline in social functioning, unemployment and low income, lower educational attainment, overdose injuries, suicide, impaired respiratory function among smokers, adverse pregnancy outcomes, schizophrenia and other psychoses, and cognitive impairments in learning, memory, and attention.^{5, 6}

II. STATES' LEGALIZATION OF RECREATIONAL MARIJUANA

As of Apr. 24, 2023, 22 states plus the District of Columbia have legalized marijuana for recreational use. State marijuana policies influence people's use of the drug. For example, residents of states with more liberal marijuana policies, have a higher prevalence of early marijuana initiation,⁷ marijuana use, and MUD.^{8,9,10,11} Even so, few studies have examined states' policy environments' relationship with marijuana-related emergency department (ED) utilization.

¹ National Academies of Sciences, Engineering, and Medicine. The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research. Washington (DC): The National Academies Press; 2017.

² Sherman BJ, McRae-Clark AL. Treatment of cannabis use disorder: current science and future outlook. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*. 2016 May;36(5):511-35.

³ Center for Behavioral Health Statistics and Quality. Results from the 2021 National Survey on Drug Use and Health: Detailed tables. Rockville (MD): Substance Abuse and Mental Health Services Administration; 2022.

⁴ Gutkind S, Fink DS, Shmulewitz D, Stohl M, Hasin D. Psychosocial and health problems associated with alcohol use disorder and cannabis use disorder in US adults. *Drug Alcohol Depend*. 2021 Dec 1;229:109137.

⁵ Connor JP, Stjepanović D, Le Foll B, Hoch E, Budney AJ, Hall WD. Cannabis use and cannabis use disorder. *Nat. Rev. Dis. Primers*. 2021 Feb 25;7(1):16.

⁶ National Academies of Sciences, Engineering, and Medicine. The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research. Washington (DC): The National Academies Press; 2017.

⁷ Taylor M, Cousijn J, Filbey F. Determining risks for cannabis use disorder in the face of changing legal policies. *Curr. Addict. Rep*. 2019 Dec;6:466-77.

⁸ Budney AJ, Borodovsky JT. The potential impact of cannabis legalization on the development of cannabis use disorders. *Prev. Med*. 2017 Nov 1;104:31-6.

⁹ Budney AJ, Sofis MJ, Borodovsky JT. An update on cannabis use disorder with comment on the impact of policy related to therapeutic and recreational cannabis use. *Eur Arch Psychiatry Clin Neurosci*. 2019 Feb 1;269:73-86.

¹⁰ Cerdá M, Mauro C, Hamilton A, Levy NS, Santaella-Tenorio J, Hasin D, Wall MM, Keyes KM, Martins SS. Association between recreational marijuana legalization in the United States and changes in marijuana use and cannabis use disorder from 2008 to 2016. *JAMA Psychiatry*. 2020 Feb 1;77(2):165-71.

¹¹ Aletraris L, Graves BD, Ndung'u JJ. Assessing the impact of recreational cannabis legalization on cannabis use disorder and admissions to treatment in the United States. *Curr. Addict. Rep*. 2023 Apr 10:1-2.

Box 1: ICD-10-CM Codes for MUD

F12.1 Cannabis abuse F12.10 uncomplicated F12.11 in remission
F12.12 Cannabis abuse with intoxication F12.120 uncomplicated
F12.121 delirium
F12.122 with perceptual disturbance F12.129 unspecified
F12.15 Cannabis abuse with psychotic disorder F12.150 with delusions
F12.151 with hallucinations F12.159 unspecified
F12.18 Cannabis abuse with other cannabis-induced disorder F12.180 Cannabis abuse with cannabis-induced anxiety disorder F12.188 Cannabis abuse with other cannabis-induced disorder F12.19 with unspecified cannabis-induced disorder
F12.2 Cannabis dependence F12.20 uncomplicated F12.21 in remission
F12.22 Cannabis dependence with intoxication F12.220 uncomplicated
F12.221 delirium
F12.222 with perceptual disturbance F12.229 unspecified
F12.23 with withdrawal
F12.25 Cannabis dependence with psychotic disorder F12.250 with delusions
F12.251 with hallucinations F12.259 unspecified
F12.28 Cannabis dependence with other cannabis-induced disorder F12.280 Cannabis dependence with cannabis-induced anxiety disorder
F12.288 Cannabis dependence with other cannabis-induced disorder F12.29 with unspecified cannabis-induced disorder
F12.98 Cannabis use, unspecified with other cannabis-induced

III. NEW STUDY: RELATIONSHIP BETWEEN RECREATIONAL MARIJUANA LEGALIZATION AND MARIJUANA USE DISORDER AMONG “TREAT AND RELEASE” EMERGENCY DEPARTMENT VISITS

A new study makes several unique contributions. First, the study adds to what is known about the legalization-ED relationship in the United States by extending research on this topic beyond a single-state sample. We used data from four states—Colorado, Oregon, Maryland, and Rhode Island. Additionally, instead of examining marijuana-related ED visits, which have been the focus of previous research, we examined the prevalence of MUD, a disorder that is known to be associated with adverse consequences.

IV. METHODOLOGY

The primary data sources were the State Emergency Department Databases (SEDD), which are repeated cross-sections of all-payer data that are part of the Healthcare Cost and Utilization Project (HCUPS), a family of healthcare databases developed through a federal-state partnership and sponsored by the U.S.

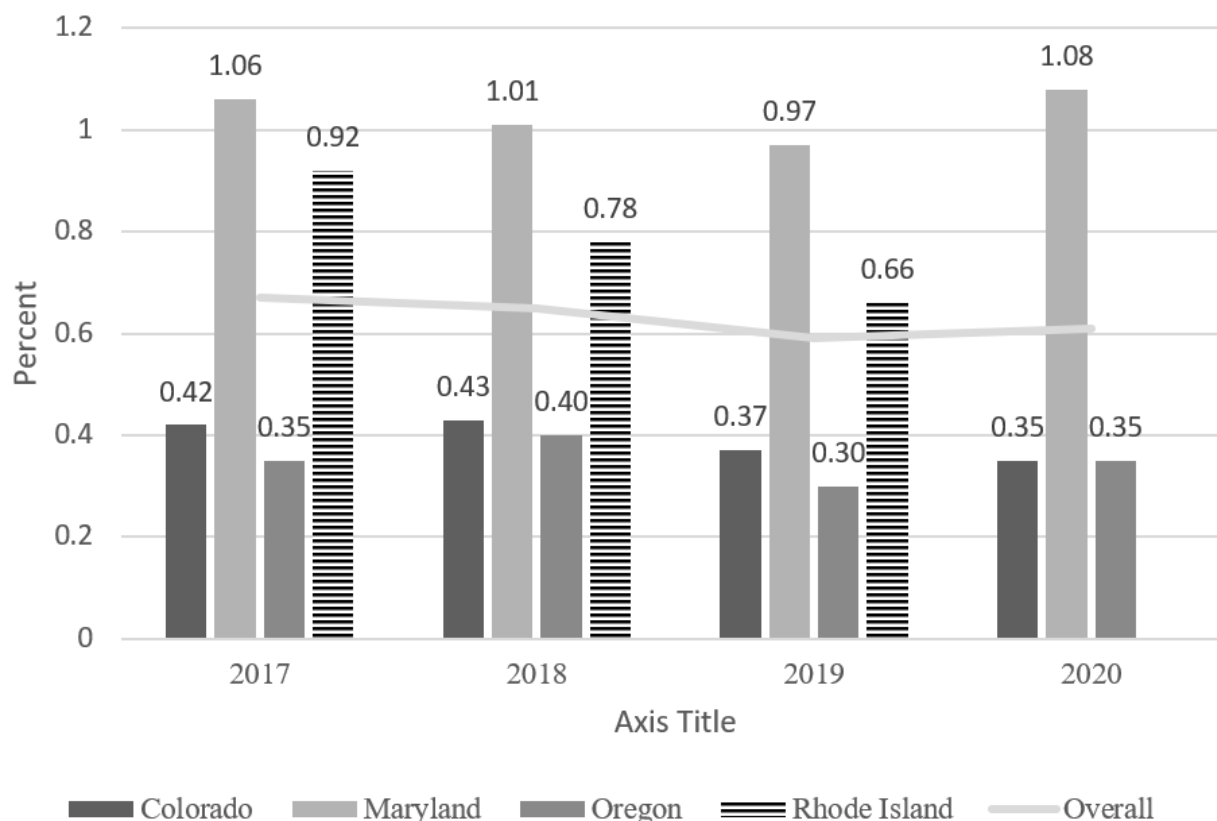
Department of Health and Human Services, Agency for Healthcare Research and Quality (AHRQ).¹² SEDD data include discharges from all hospital-affiliated “treat and release” ED visits—ED visits that did not result in a hospital admission. Four years of SEDD data (2017-2020) from three states (CO, MD, OR) were used along with three years of SEDD data from Rhode Island (2017-2019). ED records for all adult patients (12+ years of age) who resided in one of the four states being studied were included.

Cases of MUD were identified using ICD-10-CM codes for marijuana abuse and marijuana dependence (see Box 1); a patient visit was considered a MUD visit if their stated reason for visiting the ED was marijuana abuse or dependence, or they had a documented diagnosis of the same. The overall, annual, and state-level MUD prevalence rates were estimated. The characteristics of the treatment sample (legal states) and control sample (non-legal states) were compared. To estimate the relationship between states’ legal status of recreational marijuana and MUD, multivariate logistic regression analysis was used, controlling for patient characteristics and state-level factors that could influence the outcome.

V. FINDINGS

The sample had 17,434,655 ED visits across the four states. The overall MUD prevalence was 0.63%, and annual rates ranged from 0.67% in 2017 to 0.59% in 2019 (see graph). State prevalence rates were 0.39% (CO), 0.35% (OR), 1.03% (MD), and 0.79% (RI).

Figure 1. Prevalence Rates of MUD Among “Treat and Release” ED Visits by State and Year



¹² HCUP State Emergency Department Databases (SEDD). Healthcare Cost and Utilization Project (HCUP). 2017-2020. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/seddoverview.jsp

The sample varied by state's legal status (Table 1). Compared to ED visits in legal states, a higher proportion of ED visits in non-legal states were from women (56.8% versus 55.7%) and Black non-Hispanics (40.9% versus 5.9%). Similarly, visits in legal states had a higher ratio of substance abuse treatment facilities per million population (76.1 versus 70.6) and a higher percentage of the population with at least a bachelor's degree (40.1% versus 33.0%) than visits to non-legal states. At the same time, a lower percentage of ED visits in non-legal states were from patients living in rural areas (3.2% versus 16.9%). MUD prevalence was higher in non-legal states than in legal states (1.0% versus 0.4%).

Based on results from the logistic regression model, legalizing marijuana for recreational use was associated with nearly a 50% decrease in the adjusted odds of MUD (AOR = 0.49, 95% CI 0.47, 0.52). Other factors were also associated with a decrease in the adjusted odds of MUD—for example, being older, female, Hispanic, private pay or self-pay, having a facility point of origin, or living in a non-metropolitan statistical area (MSA). Being 22-31 years of age, Black, and having a higher median income all increased the adjusted odds of MUD.

Table 1. "Treat and Release" ED Patient Characteristics by State Marijuana Legalization Status

Characteristic	Not legal for recreational marijuana (MD, RI) (7,217,270; 41.4%)	Legal for Recreational Marijuana (CO, OR) (10,217,385; 85%)	p-value
Age group (%)	n/a	n/a	p<0.01
12-21	12.5%	13.4%	n/a
22-31	19.5%	18.6%	n/a
32-41	16.6%	16.7%	n/a
42-51	14.1%	13.4%	n/a
52-64	18.8%	16.6%	n/a
65+	18.5%	21.4%	n/a
Gender	n/a	n/a	p<0.01
Male	43.2%	44.3%	n/a
Female	56.8%	55.7%	n/a
Race/Ethnicity (%)	n/a	n/a	p<0.01
White non-Hispanic	45.9%	72.5%	n/a
Black non-Hispanic	40.9%	5.9%	n/a
Hispanic	8.8%	15.4%	n/a
Asian or Pacific Islander	1.5%	1.7%	n/a
Native American	0.3%	1.2%	n/a
Other	2.6%	3.2%	n/a
Primary payer (%)	n/a	n/a	p<0.01
Medicare	21.8%	25.1%	n/a
Medicaid	34.1%	36.0%	n/a
Private	30.7%	26.2%	n/a
Self-pay	9.4%	6.4%	n/a
No charge	0.2%	0.8%	n/a

Characteristic	Not legal for recreational marijuana (MD, RI) (7,217,270; 41.4%)	Legal for Recreational Marijuana (CO, OR) (10,217,385; 85%)	p-value
Other	3.8%	5.6%	n/a
Metro status (%)	n/a	n/a	p<0.01
Rural	3.2%	16.9%	n/a
Year	n/a	n/a	p<0.01
2017	28.0%	25.7%	n/a
2018	27.5%	25.9%	n/a
2019	27.0%	25.9%	n/a
MUD (%)	1.0%	0.4%	p<0.01

VI. DISCUSSION AND POLICY IMPLICATIONS

MUD rates among “treat and release” ED visits were significantly lower in legalized states than in non-legal states—a finding that is counterintuitive. The few existing studies on this topic have found higher marijuana-related ED visits—although not MUD visits—post-legalization.^{13,14,15} Even so, there have been studies that have demonstrated a decrease in MUD treatment admissions to publicly funded substance use disorder treatment programs following the legalization of recreational marijuana.^{16,17,18,19}

What might lead to this relationship? The researchers who have found declining MUD admissions to substance use disorder treatment programs following legalization have hypothesized that decreased stigma and increased social acceptability of marijuana use may explain their findings.^{20,21} If, in states that have legalized marijuana, providers are more tolerant of marijuana use and less likely to recognize problematic behavior associated with MUD, they may be less likely to diagnose and document MUD in the medical record. This could account for lower MUD prevalence in the ED in legalized states. If these findings are valid, policymakers could continue to pass recreational marijuana laws without risking the public health and/or safety of “treat and release” ED patients.

¹³ Kim HS, Monte AA. Colorado cannabis legalization and its effect on emergency care. *Ann Emerg Med.* 2016 Jul 1;68(1):71- 5.

¹⁴ O'Brien M, Rogers P, Smith E. A chart review of emergency department visits following implementation of the Cannabis Act in Canada. *CMAJ.* 2022 Jan 1;4(1):13-21.

¹⁵ Wang GS, Hall K, Vigil D, Banerji S, Monte A, VanDyke M. Marijuana and acute health care contacts in Colorado. *Prev. Med.* 2017 Nov 1;104:24-30.

¹⁶ Bourdon JL, Francis MW, Jia L, Liang C, Robinson HI, Gruzca RA. The effect of cannabis policies on treatment outcomes for cannabis use among US adults. *J. Subst. Abuse Treat.* 2021 Dec 1;131:108535.

¹⁷ Mennis J, Stahler GJ, McKeon TP. Young adult cannabis use disorder treatment admissions declined as past month cannabis use increased in the US: an analysis of states by year, 2008–2017. *Addict. Behav.* 2021 Dec 1;123:107049.

¹⁸ Mennis J, Stahler GJ. Adolescent treatment admissions for marijuana following recreational legalization in Colorado and Washington. *Drug Alcohol Depend.* 2020 May 1;210:107960.

¹⁹ Rhee, T.G. and Rosenheck, R.A., 2022. Admissions to substance use treatment facilities for cannabis use disorder, 2000–2017: Does legalization matter? *Am J Addict.* 31(5), pp.423-432.

²⁰ Mennis J, Stahler GJ, McKeon TP. Young adult cannabis use disorder treatment admissions declined as past month cannabis use increased in the US: an analysis of states by year, 2008–2017. *Addict. Behav.* 2021 Dec 1;123:107049.

²¹ Rhee, T.G. and Rosenheck, R.A., 2022. Admissions to substance use treatment facilities for cannabis use disorder, 2000–2017: Does legalization matter? *Am J Addict.* 31(5), pp.423-432.