

Bridging substance use policy research and implementation science

State opioid and cannabis laws & chronic pain



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<https://vivo.weill.cornell.edu/display/cwid-emm4010>

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Introduction

Bridging policy research and implementation science

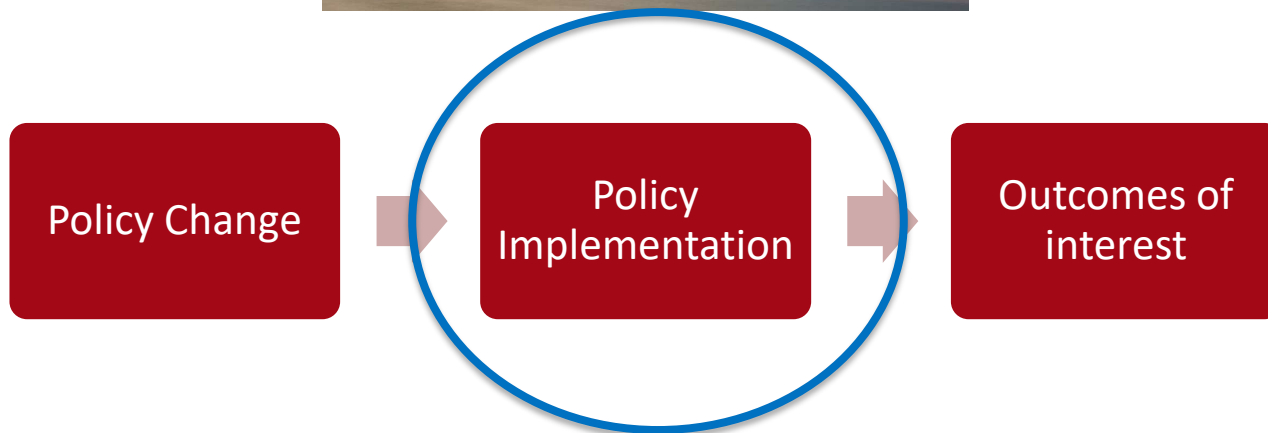
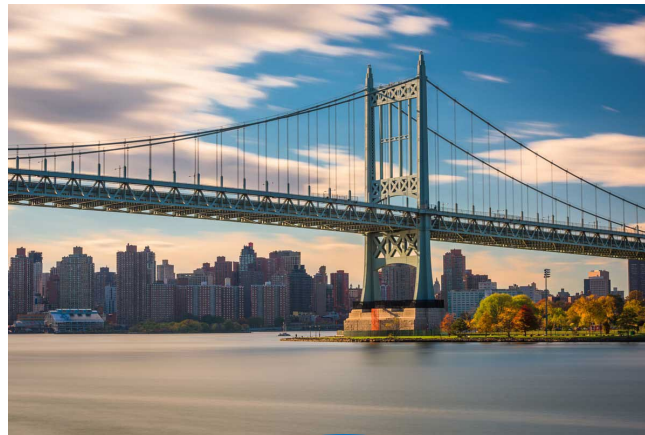


Image: <https://yourbrooklynguide.com/bridges-in-new-york-city/>

Objective

Present two mixed-methods studies designed to integrated consideration of policy implementation into quantitative policy evaluations.

- Completed study on state opioid prescribing laws
- In-process study on state medical cannabis laws

McGinty *et al.* *Implementation Science* (2018) 13:37
<https://doi.org/10.1186/s13012-018-0719-8>

Implementation Science

STUDY PROTOCOL

Open Access

Protocol: mixed-methods study to evaluate implementation, enforcement, and outcomes of U.S. state laws intended to curb high-risk opioid prescribing



Emma E. McGinty*, Elizabeth A. Stuart, G. Caleb Alexander, Colleen L. Barry, Mark C. Bicket and Lainie Rutkow

McGinty *et al.* *Implementation Science* (2021) 16:2
<https://doi.org/10.1186/s13012-020-01071-2>

Implementation Science

STUDY PROTOCOL

Open Access

Protocol: mixed-methods study of how implementation of US state medical cannabis laws affects treatment of chronic non-cancer pain and adverse opioid outcomes

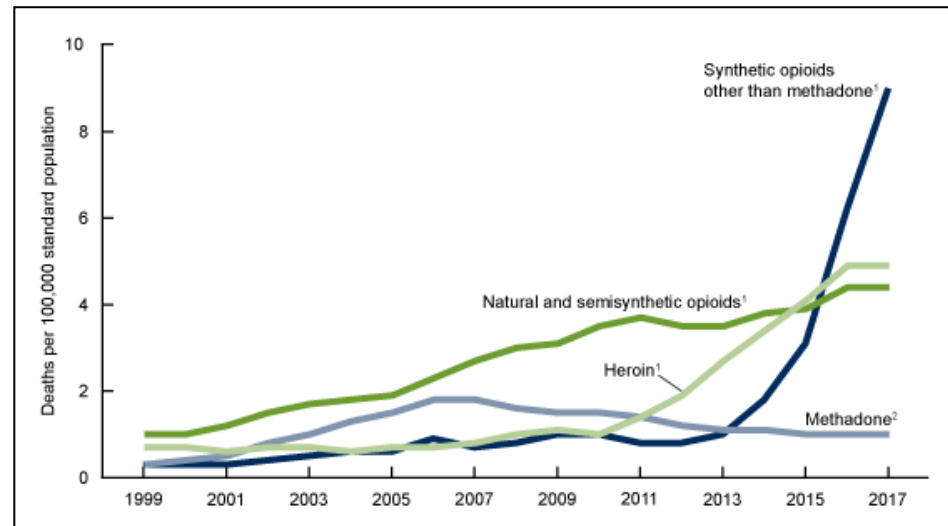
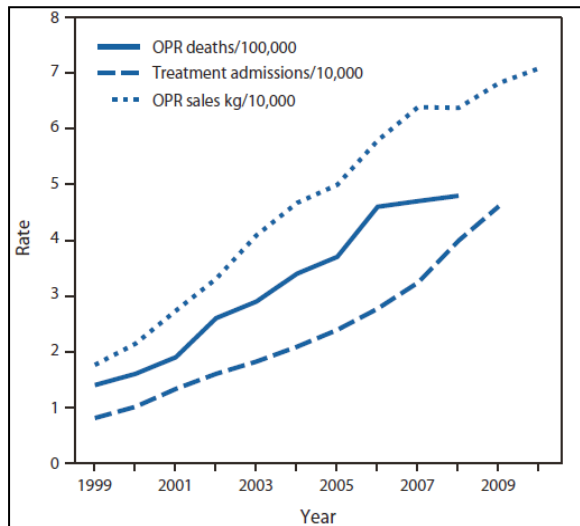


Emma E. McGinty^{1*}, Kayla N. Tormohlen¹, Colleen L. Barry¹, Mark C. Bicket², Lainie Rutkow¹ and Elizabeth A. Stuart¹



Background

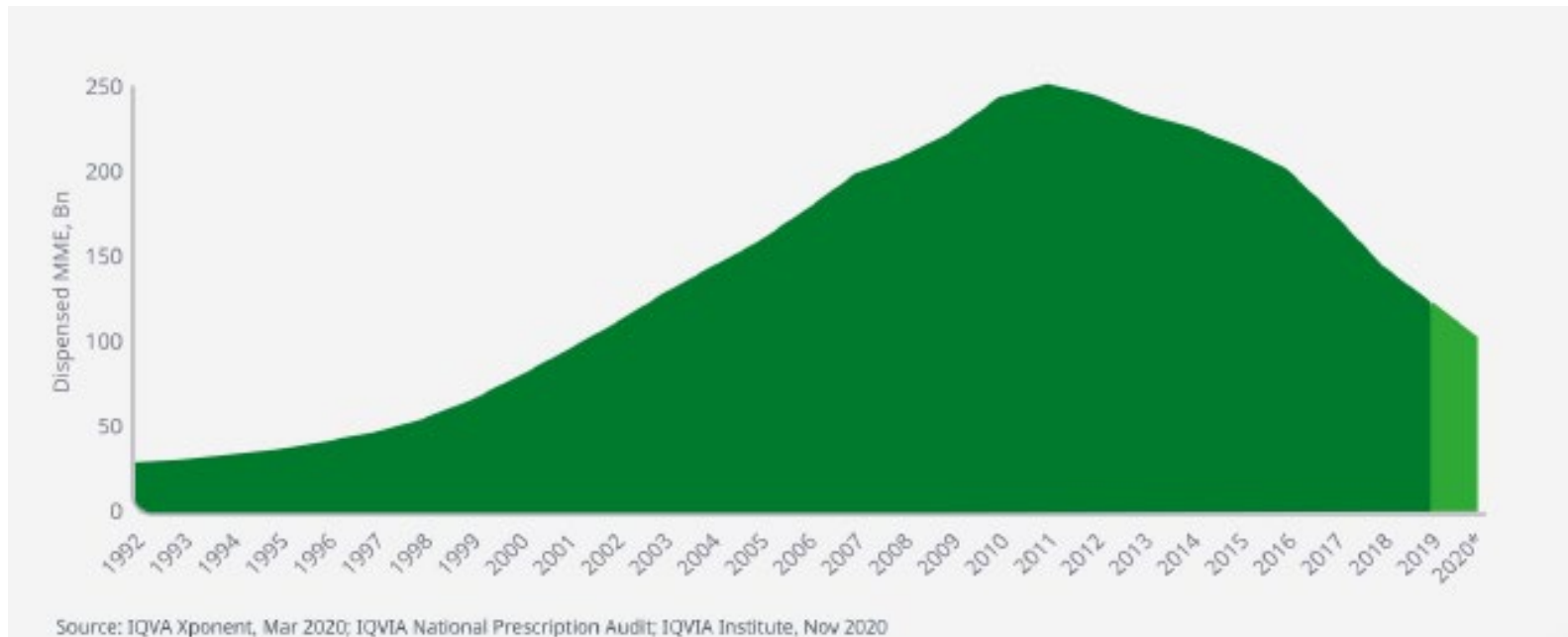
High volume of opioid prescribing was a key driver of the ongoing U.S. opioid crisis



<https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

Background

Downward trend in opioid prescribing starting in 2011-2012:



<https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

Background

In the 1990s & 2000s, opioid were commonly prescribed for chronic noncancer pain



Research Questions

Quantitative: Did state opioid prescribing and/or medical cannabis laws influence prescription opioid or guideline-concordant non-opioid pain treatment among people with conditions that commonly lead to chronic noncancer pain?

Qualitative: [If yes] How? [If no] Why not?



Prior Evidence

Opioid prescribing laws: One study (Lin et al) found that mandatory PDMP query laws had no effects on receipt of opioid or non-opioid analgesics among people with chronic noncancer pain.

Medical cannabis laws: Studies in general population samples suggested reduced use of prescribed opioids and non-opioid analgesics attributable to medical cannabis laws. No studies in people with chronic pain.

Current Addiction Reports (2021) 8:538–545
<https://doi.org/10.1007/s40429-021-00397-1>

CANNABIS (A MCRAE-CLARK AND B SHERMAN, SECTION EDITOR)



The State of the Evidence on the Association Between State Cannabis Laws and Opioid-Related Outcomes: a Review

Kayla N. Tormohlen¹ · Mark C. Bicket² · Sarah White¹ · Colleen L. Barry³ · Elizabeth A. Stuart¹ · Lainie Rutkow¹ · Emma E. McGinty¹

Methods limitations:

- Policy endogeneity – state laws enacted at or around the same time
- Lack of longitudinal cohorts
- Bias related to treatment effect heterogeneity in TWFE diff-in-diff

Lin HC, Wang Z, Boyd C, et al. Associations between statewide prescription drug monitoring program (PDMP) requirement and physician patterns of prescribing opioid analgesics for patients with non-cancer chronic pain. *Addict Behav.* 2018;76:348-54



State Opioid Prescribing Laws

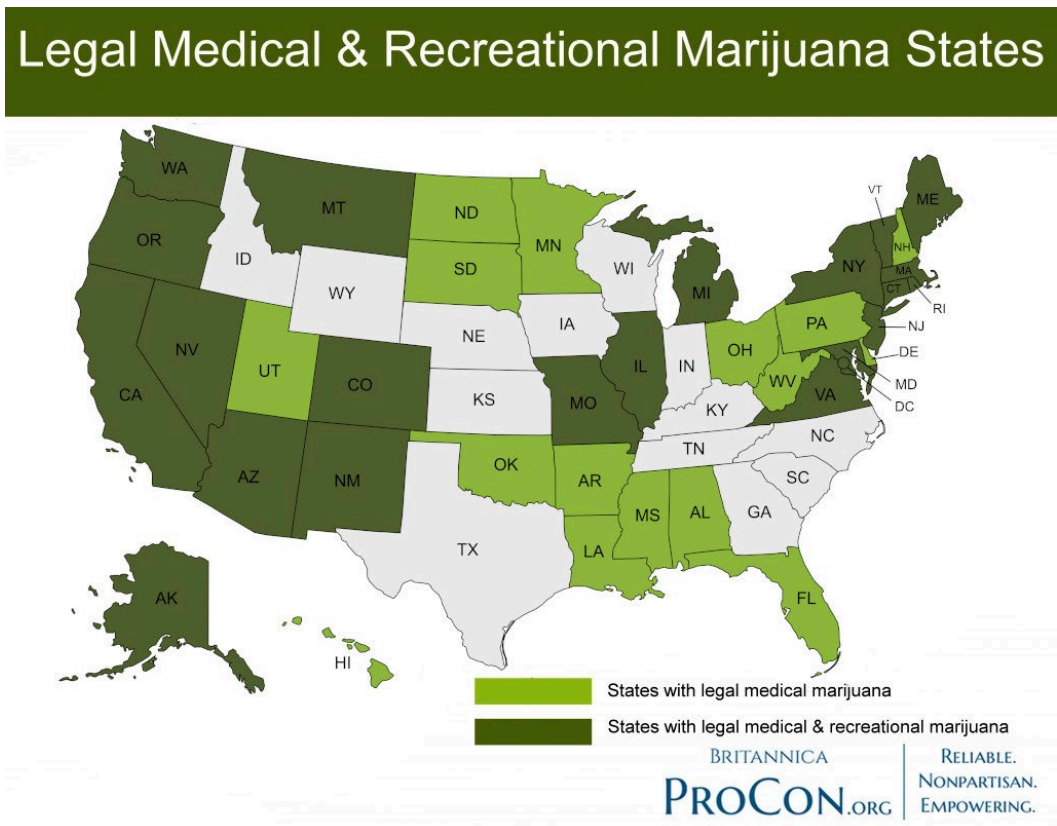
State Laws Designed to Curb High-Risk Opioid Prescribing	
State Laws: Definition and Example	States with Law as of October 2022
Mandatory PDMP Enrollment Law: Requires prescribers to gain access to the PDMP through a registration process. <u>Example</u> : CO requires every practitioner with a current federal Drug Enforcement Administration (DEA) registration to register for a user account with the PDMP.	22
Mandatory PDMP Query Law: Requires prescribers to query the PDMP prior to prescribing opioids. <u>Example</u> : IN requires PDMP query at the outset of an opioid treatment plan and at least annually thereafter.	33
Pill Mill Law: Requires oversight and regulation of pain management clinics. <u>Example</u> : TX requires pain clinics to be owned by physicians with unrestricted licenses and to be certified with and undergo inspections by the state.	11
Opioid Prescribing Cap Law: Limits the duration or dosage of prescription opioids. <u>Example</u> : NY imposes a 7-day limit on initial opioid prescriptions for acute pain.	38



State Cannabis Laws

37 U.S. states have active medical cannabis law programs as of February 2023.

21 U.S. states have recreational cannabis laws as of February 2023.



<https://medicalmarijuana.procon.org/legal-medical-marijuana-states-and-dc/>

Objective

Present two mixed-methods studies designed to integrated consideration of policy implementation into quantitative policy evaluations.

- Completed study on state opioid prescribing laws
- In-process study on state medical cannabis laws

Research Questions:

What are the effects of mandatory PDMP enrollment, mandatory PDMP query, pill mill, and opioid prescribing cap laws on patterns of opioid and non-opioid pain treatment among a patients with chronic non-cancer pain conditions?

How did law implementation contribute to those effects (or lack thereof)?

Chronic non-cancer pain conditions: low back pain, headache, fibromyalgia, arthritis, neuropathic pain

Methods

Quantitative Study: Augmented synthetic control analyses of 13 state laws' effects on fatal opioid overdose and opioid prescribing patterns.

Qualitative Study: 114 qualitative interviews characterizing implementation and enforcement of 13 state opioid prescribing laws

- Mandatory PDMP enrollment laws
- Mandatory PDMP query laws
- Pill mill laws
- Opioid prescribing cap laws

Mixed-Methods Component: Use qualitative data to interpret state-specific quantitative analysis results.

Methods

Augmented Synthetic Control Approach

Study designed to address the problem of inability to disentangle effects of state laws implemented at or around the same time.

Treatment states: States that implemented one of the four laws of interest, and no other laws of interest or potentially confounding laws, in a four-year period: 2 years pre-, 2 years post-law (each Tx state has its own 4-year study period).

Control pool states: States that implemented no laws of interest or potentially confounding laws during a treatment state's 4-year study period AND had the exact same underlying opioid prescribing law environment as the treatment state, minus the law of interest in the treatment state, for the entire 4-year period (each Tx state has its own control pool).

Potentially confounding laws: Voluntary PDMP, doctor-shopping, physical exam, and pharmacy ID laws



Methods

Treatment state:

- Ohio implemented a pill mill law July 1, 2011. Ohio implemented no other opioid Rx laws of interest or confounding laws from 7/1/09-6/30/13.
- For the entire 4-year period, Ohio had voluntary PDMP, physical exam, and doctor-shopping laws in place.

Selection of “Control Pool” States

- States with no pill mill law during the study period
- No potentially confounding laws enacted during the study period
- Identical state opioid law environment as treatment state for the entire study period (voluntary PDMP, physical exam, doctor-shopping laws)

Treatment and Control Pool States			
Pill Mill Law State	Effective Date	Study Period	Control Pool States
Ohio	July 1, 2011	7/1/09-6/30/13	AL, AZ, CO, ID, IN, IA, IL, LA, MA, MI, MO, NC, NV, NY, ND, OK, PA, RI, SC, VA, WY



Methods

Treatment and Control Pool States:

State Law	Law Date	Study Period	Comparison States ¹
Opioid Prescribing Cap Law			
Delaware	4/1/17	4/1/15-3/31/19	AL, IA, KS, MT, MS, ND, NM, OR, TN, WY
Kentucky	7/1/17	7/1/15-6/31/19	AL, IA, KS, MS, MT, ND, NM, OR, WY
New York	7/22/16	8/1/14-7/31/18	AL, IA, KS, MS, MT, ND, OR, WY
Ohio	8/31/17	9/1/15-8/31/19	AL, IA, KS, MS, MT, ND, NM, OR, WY
Pill Mill Law			
Mississippi	3/1/11	3/1/09-2/28/13	AL, AZ, CO, IA, ID, IL, IN, LA, MI, MO, NC, NV, NY, ND, OK, PA, RI, SC, VA, WY
Ohio	7/1/11	7/1/09-6/30/13	AL, AZ, CO, ID, IN, IA, IL, LA, MA, MI, MO, NC, NV, NY, ND, OK, PA, RI, SC, VA, WY
Texas	9/1/10	9/1/08-8/31/12	AL, AZ, CO, CT, ID, IL, IN, LA, MA, MI, MO, NC, NV, NY, OK, PA, RI, SC, TN, VA, WV, WY
Mandatory PDMP Query Law			
New York	8/27/13	9/1/11-8/31/15	AK, AZ, CA, CO, IA, FL, LA, KS, MO, MI, MN, NC, ND, OR, SD, UT, WA, WY
Oklahoma	11/1/15	11/1/13-10/31/17	FL, GA, IA, KS, KY, LA, MI, MO, MS, MT, ND, NE, NM, OR, SD, TN, WV, WY
Pennsylvania	6/30/15	7/1/13-6/30/17	FL, GA, IA, KS, KY, LA, MI, MO, MS, MT, ND, NE, NM, OR, SD, TN, WV, WY
Virginia	7/1/15	7/1/13-6/30/17	FL, GA, IA, KS, KY, MI, MO, MS, MT, ND, NE, NM, OR, SD, TN, WV, WY
Mandatory PDMP Enrollment Law			
Colorado	1/1/15	1/1/13-12/31/16	AK, AZ, FL, IA, KS, KY, LA, MI, MO, MS, MT, NC, ND, NE, NM, OR, SC, SD, TN, UT, WA, WY
Idaho	7/1/14	7/1/12-6/30/16	AK, CA, AZ, DE, FL, IA, KS, KY, LA, MI, MN, MO, MT, NC, ND, NE, OR, SC, SD, UT, WA, WV, WY



Methods

Data

- IBM MarketScan commercial claims data – 350 commercial payers, approximately 25% of individuals with commercial insurance and their families in the U.S.
- Legal mapping to identify state laws (Westlaw)

Sample

- Continuously enrolled adults aged 18+ diagnosed with arthritis, low back pain, headache, fibromyalgia, or neuropathic pain in the pre-law period (two outpatient claims or one inpatient discharge diagnosis).
N=1,976,355
- People with cancer diagnoses were excluded

Methods

Opioid Prescribing Measures, Per State-Month

- % of individuals receiving any opioid prescription
- Average days' supply per-person
- Average MME per person, per month
- % of people with any opioid prescription ≤ 7 , ≤ 30 days' supply
- % of people with any opioid prescription ≥ 50 , ≥ 90 MME

Guideline-Concordant Non-Opioid Pain Treatment, Per State-Month

- % of individuals with chronic non-cancer pain receiving:
 - Any guideline-concordant non-opioid prescription pain medication
 - Any guideline-concordant procedure



Methods

Augmented Synthetic Control Analyses

- Compare changes in outcome measures pre/post law in Tx states to changes in outcomes in a weighted group of comparison states, or “synthetic control”
- Vector of state-specific weights that minimizes the mean squared prediction error between pre-law trends in the outcome of interest and covariates in the treatment and control pool states
 - Covariates:
 - Individual: sex, age, co-morbid mental health diagnoses, substance use diagnoses, Elixhauser co-morbidity index
 - State: % Black, % Hispanic, % employed, % below FPL, % with no post high-school degree
- Augmented with a ridge regression outcome model including the same covariates above + state fixed-effects
- **Single states analyses, state-month is unit of analysis**



Methods

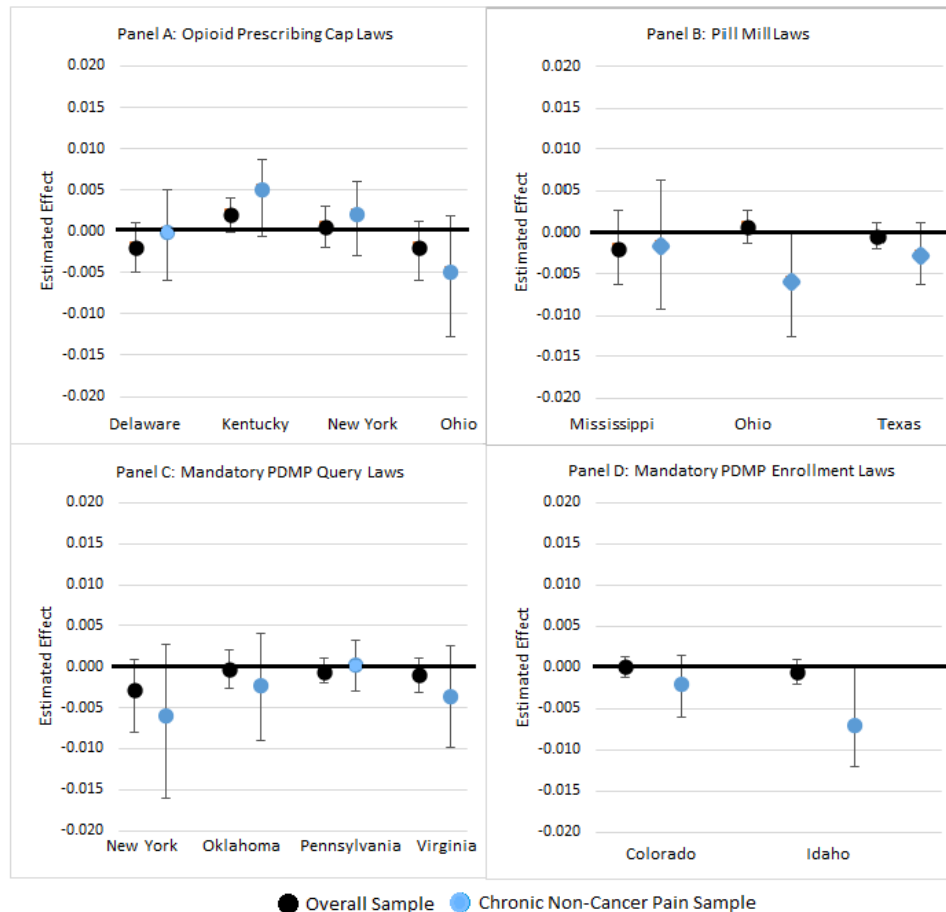
Qualitative Methods

In-depth qualitative case studies characterizing law implementation in each of the 13 treatment states (N=114 interviews with implementation leaders in 2019), interview domains guided by CFIR

- Implementation timing: delays, ramp-up?
- Implementation strategies, barriers, facilitators?
- Strength of enforcement – proactive, reactive?

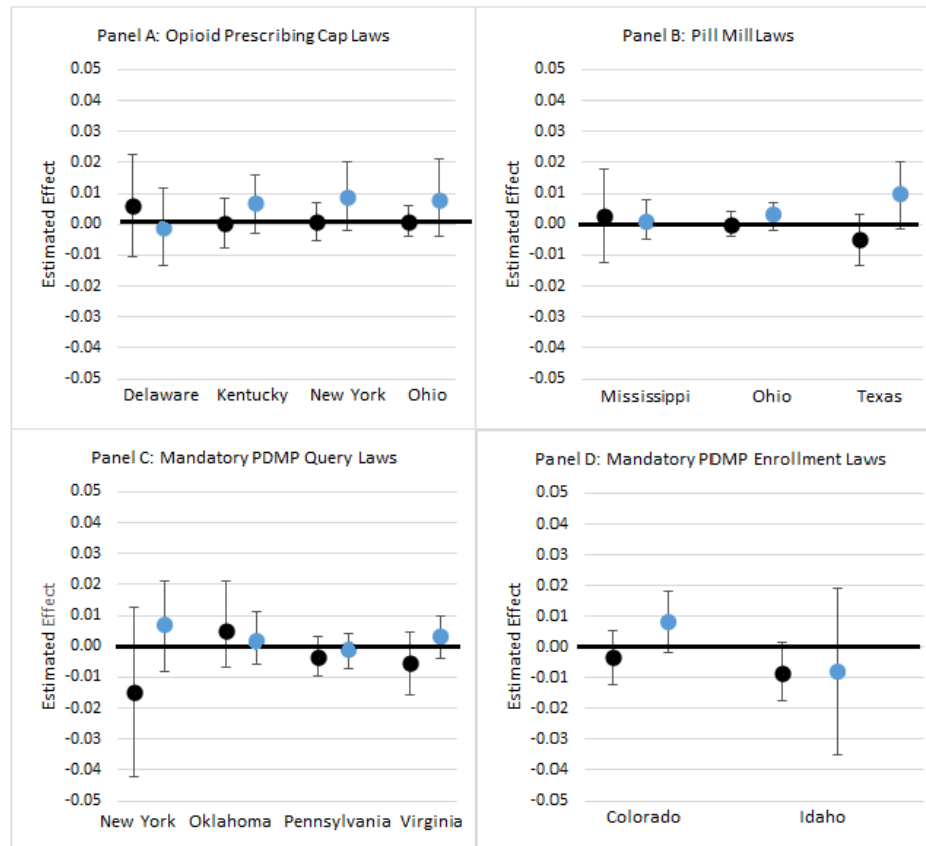
Results

Average effect of a state opioid prescribing cap law on the monthly probability of receiving any opioid prescription



Results

Average effect of a state opioid prescribing cap law on the monthly probability of receiving any guideline-concordant non-opioid Tx among adults with chronic non-cancer pain conditions



- Any guideline-concordant non-opioid pain medication
- Any guideline-concordant procedure

Results

Average effect of a state opioid prescribing cap law on the monthly volume and dose of opioid prescriptions among adults 18+

State Laws	Mean Days' supply	% with Rx \geq 7 days' supply	Mean MME/day	% with Rx \geq 50 MME/day
Overall Sample Estimated Effect (95% CI)				
Prescribing Cap Law				
Delaware	0.32 (-1.27, 1.89)	0.01 (-0.06, 0.06)	0.81 (-2.95, 4.31)	-0.01 (-0.14, 0.02)
Kentucky	0.14 (-0.63, 0.90)	0.004 (-0.02, 0.03)	1.11 (-0.24, 2.80)	-0.001 (-0.02, 0.02)
New York	-0.21 (-0.74, 0.33)	-0.03 (-0.05, 0.003)	-0.40 (-2.63, 1.84)	-0.01, (-0.02, 0.01)
Ohio	0.32 (-1.27, 1.89)	0.01 (-0.05, 0.06)	0.81 (-2.95, 4.31)	-0.01 (-0.04, 0.02)
Pill Mill Law				
Mississippi	-0.39 (1.14, 0.39)	-0.01 (-0.04, 0.03)	-3.73 (-7.54, 0.56)	-0.03 (-0.06, 0.01)
Ohio	-0.10 (-0.46, 0.27)	-0.004 (-0.02, 0.01)	-4.70 (-10.50, 0.42)	-0.01 (-0.03, 0.002)
Texas	-0.12 (-0.59, 0.36)	0.003 (-0.01, 0.02)	-1.97 (-3.14, 3.01)	-0.04 (-0.06, 0.01)
PDMP Query Law				
New York	-0.002 (-0.52, 0.51)	-0.01 (-0.03, 0.004)	-0.45 (-5.68, 4.78)	0.01 (-0.01, 0.03)
Oklahoma	0.41 (-0.39, 1.13)	0.01 (-0.01, 0.04)	-2.17 (-6.01, 1.70)	-0.02 (-0.04, 0.02)
Pennsylvania	0.38 (-0.45, 1.23)	0.01 (-0.02, 0.04)	1.01 (-1.41, 3.61)	0.01 (-0.01, 0.03)
Virginia	-0.39 (-1.31, 0.60)	-0.01 (-0.05, 0.03)	-0.56 (-2.70, 1.59)	-0.01 (-0.03, 0.01)
PDMP Enrollment Law				
Colorado	0.01 (-0.58, 0.57)	-0.01 (-0.03, 0.02)	-1.81 (-5.45, 2.50)	-0.01 (-0.04, 0.01)
Idaho	0.68 (-0.30, 1.64)	0.02 (-0.01, 0.05)	-4.81 (-17.80, 6.58)	0.01 (-0.02, 0.04)



Results

Average effect of a state opioid prescribing cap law on the monthly volume and dose of opioid prescriptions among adults 18+ with chronic non-cancer pain conditions

State Laws	Mean Days' supply	% with Rx \geq 7 days' supply	Mean MME/day	% with Rx \geq 50 MME/day
Overall Sample Estimated Effect (95% CI)				
Prescribing Cap Law				
Delaware	0.08 (-1.49, 1.72)	0.004 (-0.05, 0.06)	3.05 (-2.85, 8.16)	0.03 (-0.01, 0.07)
Kentucky	0.07 (-0.94, 1.04)	0.01 (-0.02, 0.04)	0.96 (-1.44, 3.12)	0.01 (-0.02, 0.04)
New York	-0.003 (-1.06, 1.04)	-0.03 (-0.07, 0.01)	-1.43 (-6.10, 3.12)	-0.01 (-0.04, 0.01)
Ohio	-0.06 (0.92, 0.80)	-0.03 (-0.08, 0.01)	-0.47 (-2.45, 1.51)	-0.02 (-0.05, 0.01)
Pill Mill Law				
Mississippi	0.02 (-0.03, 0.06)	-0.002 (-0.03, 0.03)	-3.47 (-7.79, 1.16)	-0.04 (-0.08, 0.01)
Ohio	0.01 (-0.01, 0.03)	-0.01 (-0.02, 0.01)	-1.91 (-4.74, 0.27)	-0.02 (-0.04, 0.001)
Texas	0.15 (-0.52, 0.82)	0.01 (-0.02, 0.04)	-0.06 (-3.14, 3.01)	-0.03 (-0.06, 0.01)
PDMP Query Law				
New York	-0.42 (-1.34, 0.52)	-0.01 (-0.04, 0.02)	3.72 (-0.89, 8.09)	0.02 (-0.01, 0.06)
Oklahoma	0.10 (-0.80, 0.99)	0.001(-0.02, 0.03)	-1.49 (-5.5, 2.91)	-0.01 (-0.04, 0.01)
Pennsylvania	-0.07 (-0.56, 0.44)	-0.01 (-0.06, 0.04)	1.24 (-2.49, 5.17)	0.01 (-0.02, 0.04)
Virginia	-0.28 (-1.38, 0.83)	-0.02 (-0.06, 0.03)	-1.10 (-3.91, 1.82)	-0.01 (-0.04, 0.02)
PDMP Enrollment Law				
Colorado	0.004 (-0.39, 0.37)	-0.01 (-0.04, 0.02)	-2.05 (-6.59, 2.51)	-0.02 (-0.05, 0.01)
Idaho	0.57 (-0.74, 2.05)	0.02 (-0.02, 0.07)	4.90 (-9.35, 19.6)	0.02 (-0.02, 0.05)

Sensitivity Analyses

- Standard difference-in-differences
- Analyses examining whether laws' effects changed over time (e.g., ramp up due to implementation)
- Stratified analysis by chronic pain condition
- Analyses limited to people who used prescription opioids in the pre-law period
- Analyses excluding states that changed their cannabis laws during the study period

Qualitative Results

Drug and Alcohol Dependence 213 (2020) 108107



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Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep



Full length article

Implementation and enforcement of state opioid prescribing laws

Elizabeth M. Stone^{a,*}, Lainie Rutkow^a, Mark C. Bicket^b, Colleen L. Barry^a, G. Caleb Alexander^c,
Emma E. McGinty^a



- State leaders reported no implementation/enforcement delays or ramp-up effects (unlike first-generation PDMP laws, these laws did not require new infrastructure)
- Common implementation barriers across laws:
 - Laws' complexity (especially for prescribing cap laws)
 - Insufficient health IT infrastructure
- Sources of variation in implementation/enforcement:
 - Targeted education of implementers varied across states
 - Proactive versus passive enforcement varied across states



Limitations

- Limited post-law period (2 years)
- Study was designed to isolate the independent effects of state laws, but laws may also have additive/multiplicative effects
- We do not capture potentially important sources of variation across the same type of law, e.g., criminal penalties in pill mill laws
- Outcome measures indicate patterns in care delivery but do not capture clinical appropriateness, pain management
- We do not examine overdose due to inability to disentangle effects of opioid prescribing laws with naloxone access laws
- Unit of analysis is state-month; may be underpowered to detect effects, though point estimates are near zero



Discussion

- Results suggest that secular trends related to changing standards in pain medicine may be driving declines in opioid prescribing, as opposed to state laws
- Findings do not support the narrative that state opioid prescribing laws have significantly reduced dose or duration of opioid prescriptions among patients with chronic non-cancer pain
- While there was some variation in key implementation/ enforcement domains across states, this did not correlate with variation in laws' effects on outcomes
- Null findings may be driven by exemptions in state opioid prescribing laws and/or implementation and enforcement challenges, which are well-documented in qualitative research, including in the qualitative component of this study.

Objective

Present two mixed-methods studies designed to integrated consideration of policy implementation into quantitative policy evaluations.

- Completed study on state opioid prescribing laws
- In-process study on state medical cannabis laws

Motivation

Multiple ecological studies suggest that implementation of state medical cannabis laws may reduce opioid-related morbidity mortality.

The hypothesized  :

People substitute cannabis in place of opioids for pain management.

Motivation

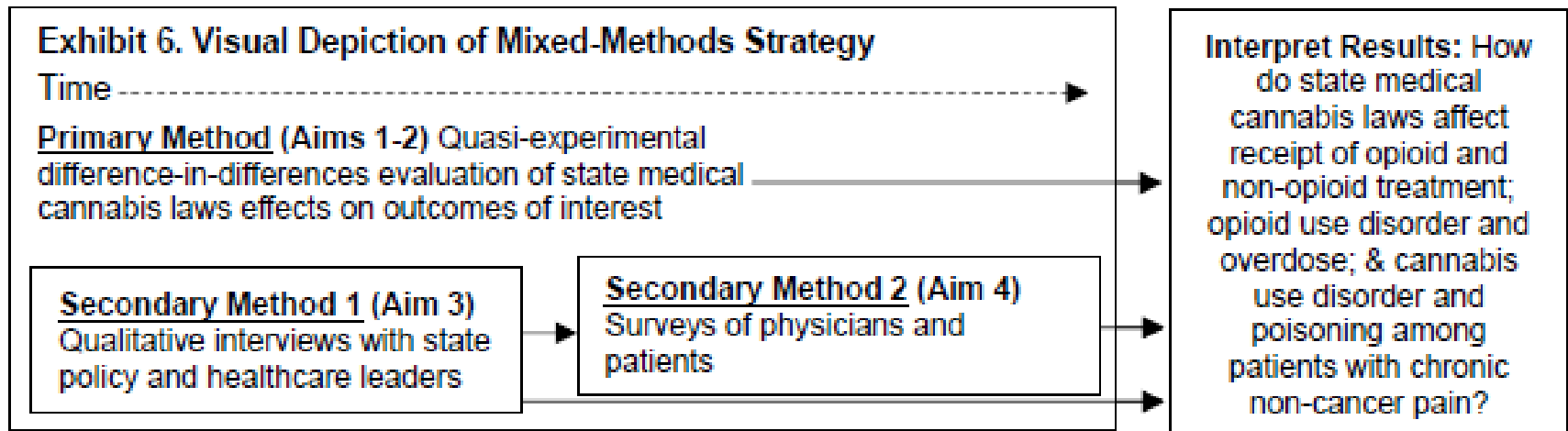
Need to consider implementation:

1. Variation in the implementation of state medical cannabis laws
 1. Policy implementation rules (e.g., statutory provisions contributing to degree of medicalization)
 2. Policy implementation and enforcement strategies (e.g., provider training in use of cannabis for chronic pain?)
2. Triangulation with other data sources – e.g., surveys assessing substitution of cannabis in place of opioids.

Methods

1. In-depth characterization of variation in medical cannabis laws through legal analysis and qualitative interviews.
2. Surveys of:
 1. Representative sample of people with chronic non-cancer pain living in states with active medical cannabis law programs
 2. Representative sample of primary care physicians and pain specialist physicians in medical cannabis law states
 3. Representative sample of providers registered to recommend medical cannabis
3. Quantitative policy evaluation (stacked diff-in-diff, trial emulation approach) using individual-level, longitudinal cohorts of people with chronic non-cancer pain

Methods



Results Summary

1. Lots of variation in policy implementation rules and practices across states (47 interviews completed). Stay tuned. **Role of lawsuits in implementation.**
2. Surveys of a representative sample of people with chronic non-cancer pain living in states with medical cannabis laws: **self-reported cannabis use overall and substitution of cannabis in place of opioids was common (next slides).**
3. Quantitative policy evaluation (stacked diff-in-diff, trial emulation approach) using individual-level, longitudinal cohorts of people with chronic non-cancer pain: **mostly null effects of medical cannabis laws on opioid and non-opioid pain treatment among people with chronic noncancer pain (next slides).**

Survey Methods

- First survey assessing cannabis and other pain treatment use in a representative sample of adults with chronic noncancer pain in states with active medical cannabis programs
- Survey of N=1,661 adults who met criteria for chronic noncancer pain (pain on most or all days in past 6 months) in 36 states and D.C. with active medical cannabis law programs in March-April 2022.
- NORC Amerispeak panel – probability-based online survey panel
- Measured use of medical cannabis, prescription opioids, non-opioid prescription and OTC analgesics, and pain procedures, as well as self-reported substitution.



Research Letter | Substance Use and Addiction

Use of Cannabis and Other Pain Treatments Among Adults With Chronic Pain in US States With Medical Cannabis Programs

Mark C. Bicket, MD, PhD; Elizabeth M. Stone, MSPH; Emma E. McGinty, PhD



Survey Results

Results:

- 31% of adults with chronic non-cancer pain reported having ever used cannabis for pain management; 25.9% in past 12 months, 23.2% past 30 days
- Over 70% of people who had used cannabis for pain management had also used another type of pain treatment

Figure 1. Self-reported Change in the Use of Pain Medications Due to Cannabis Use Among US Adults Aged 18 Years or Older With Chronic Pain in March to April 2022

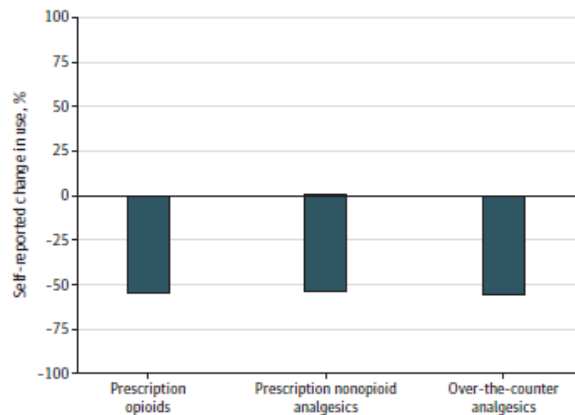
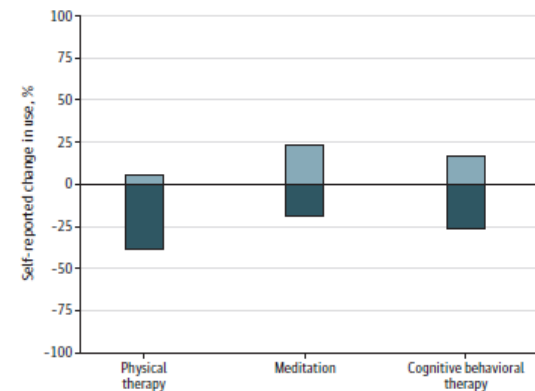


Figure 2. Self-reported Change in the Use of Common Nonpharmacologic Pain Treatments Due to Cannabis Use Among US Adults Aged 18 Years or Older With Chronic Pain in March to April 2022



Survey Results

Over 50% of adults with chronic noncancer pain surveyed reported substituting cannabis in place of opioids or non-opioid Rx pain medications. So, we might reasonably hypothesize that medical cannabis laws lead to reduced use of these medications. **But...**

Policy Evaluation Methods

12 states that implemented medical cannabis laws, defined as opening a dispensary, from 2014-2019:

State	Implementation date ^a	Study Period ^b	Citation
Arkansas	5/11/2019	5/1/2015-4/30/2022	AR Const. Amend. 98, Arkansas Medical Marijuana Amendment of 2016
Connecticut	8/20/2014	9/1/2010-8/31/2017	Conn. H.B. 5389 (2012)
Florida	7/26/2016	8/1/2012-7/31/2019	FL Amendment 2 (2016)
Louisiana	8/6/2019	8/1/2015-7/31/2022	LA S.B. 143 (2015)
Maryland	7/6/2017	7/1/2013-6/30/2020	MD H.B. 1101 (2013)
Minnesota	7/1/2015	7/1/2011-6/30/2018	Minn. S.F. 2470 (2014)
New Hampshire	4/30/2016	5/1/2012-4/30/2019	N.H. H.B. 573 (2013)
New York	1/7/2016	1/1/2012-12/31/2018	N.Y. A06357-E (2014)
North Dakota	3/1/2019	3/1/2015-2/28/2022	N.D. Measure 5 (2016)
Ohio	1/16/2019	2/1/2015-1/31/2022	OH H.B. 523 (2016)
Oklahoma	10/26/2018	11/1/2014-10/31/2021	OK State Question 788 (2018)
Pennsylvania	2/15/2018	2/1/2014-1/31/2021	PA S.B. 3 (2016)



Policy Evaluation Methods

Data

- OptumLabs claims data
- Legal mapping to identify state laws (Westlaw), interviews to confirm implementation dates

Sample

- Continuously enrolled adults aged 18+ overall and a sub-sample diagnosed with arthritis, low back pain, headache, fibromyalgia, or neuropathic pain in the pre-law period (two outpatient claims or one inpatient discharge diagnosis): N=153,374
- People with cancer diagnoses were excluded



Policy Evaluation Methods

Opioid Prescribing Measures, Per State-Month

- % of individuals receiving any opioid prescription
- Average days' supply per-person
- Average MME per person, per month
- % of people with any opioid prescription ≤ 7 , ≤ 30 days' supply
- % of people with any opioid prescription ≥ 50 , ≥ 90 MME

Guideline-Concordant Non-Opioid Pain Treatment, Per State-Month

- % of individuals with chronic non-cancer pain receiving:
 - Any guideline-concordant non-opioid prescription pain medication
 - Any guideline-concordant procedure

Policy Evaluation Methods

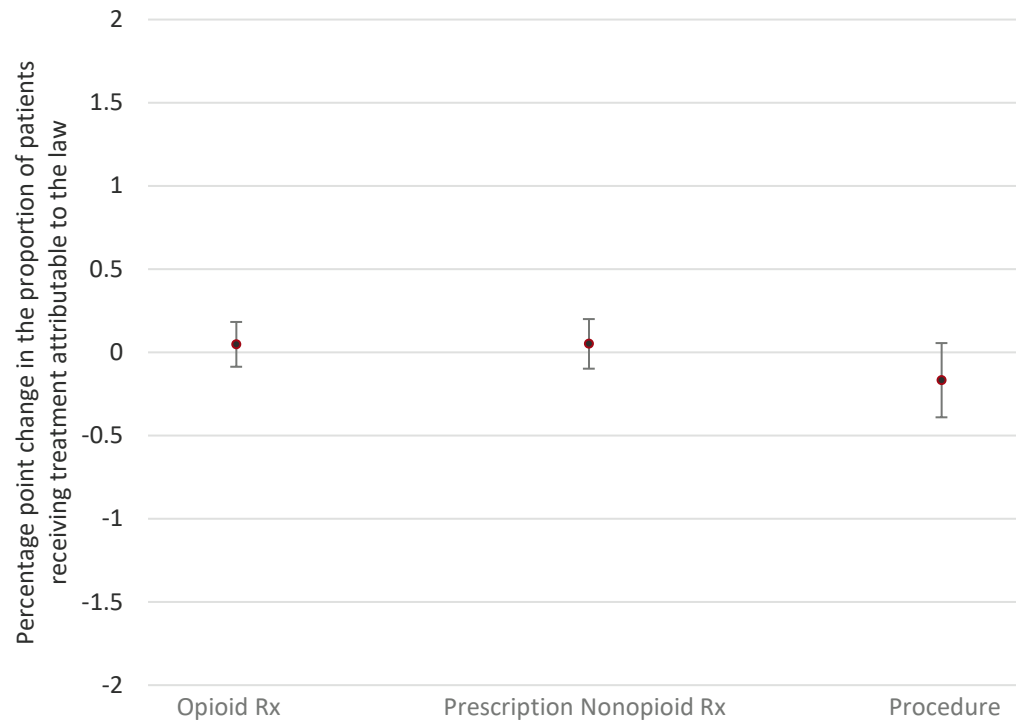
Analysis

- Stacked-difference-in-differences using augmented synthetic control approach.
- 12 state-specific augmented synthetic control models for each outcome.
- Inverse-variance weighted average of state-specific estimates to generate an average effect.
 - Methods innovation to account for the correlation between estimates caused by patients contributing to multiple comparison groups: Seewald NJ, McGinty EE, Schmid I, Tormohlen KN, Stuart EA. Shared Control Individuals in State-Level Health Policy Evaluation. *Arxiv preprint DOI 1017605/OSFIO/6JTBH Available at <https://osfio/6jtbh/>. 2022.*



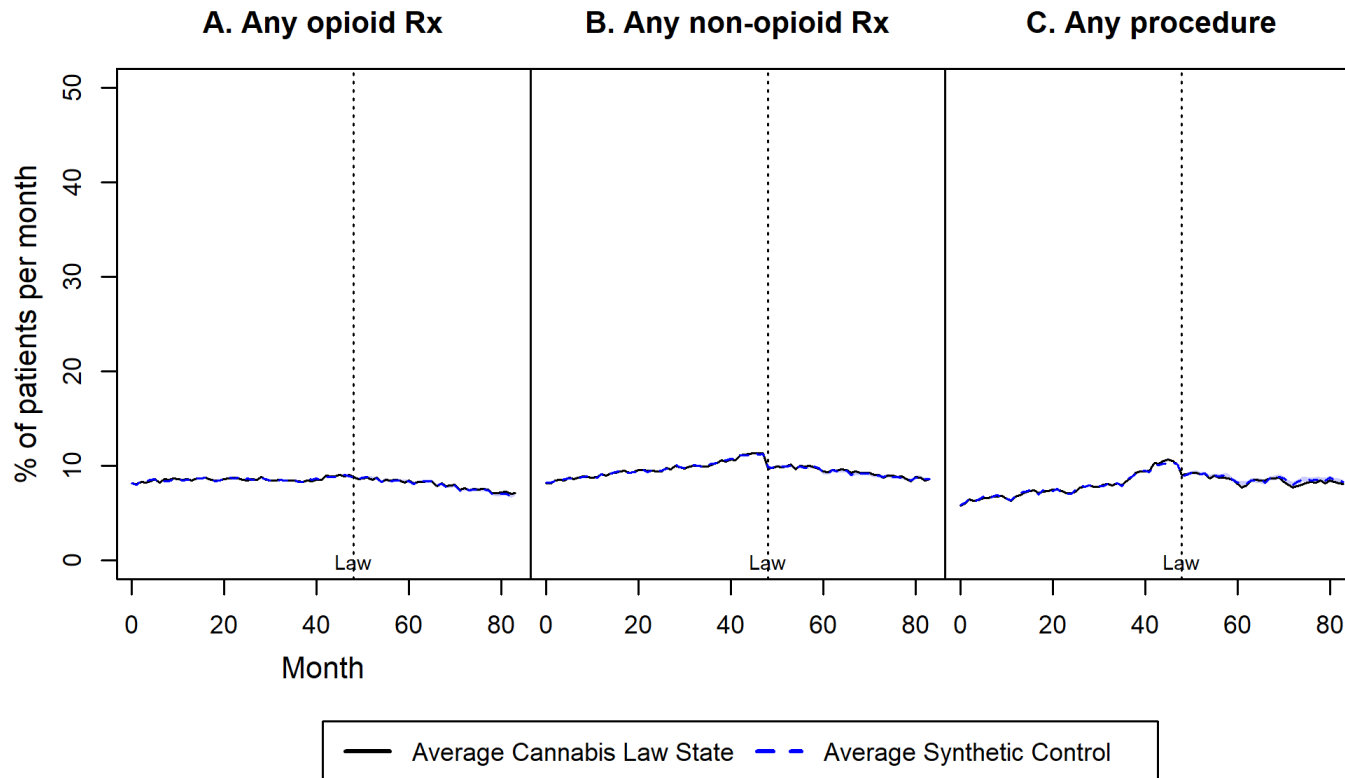
Policy Evaluation Results

Percentage point change in the proportion of chronic noncancer pain patients receiving any opioid prescription, prescription nonopioid pain medication, or pain management procedure, per month, attributable to the state medical cannabis law in its first three years of implementation



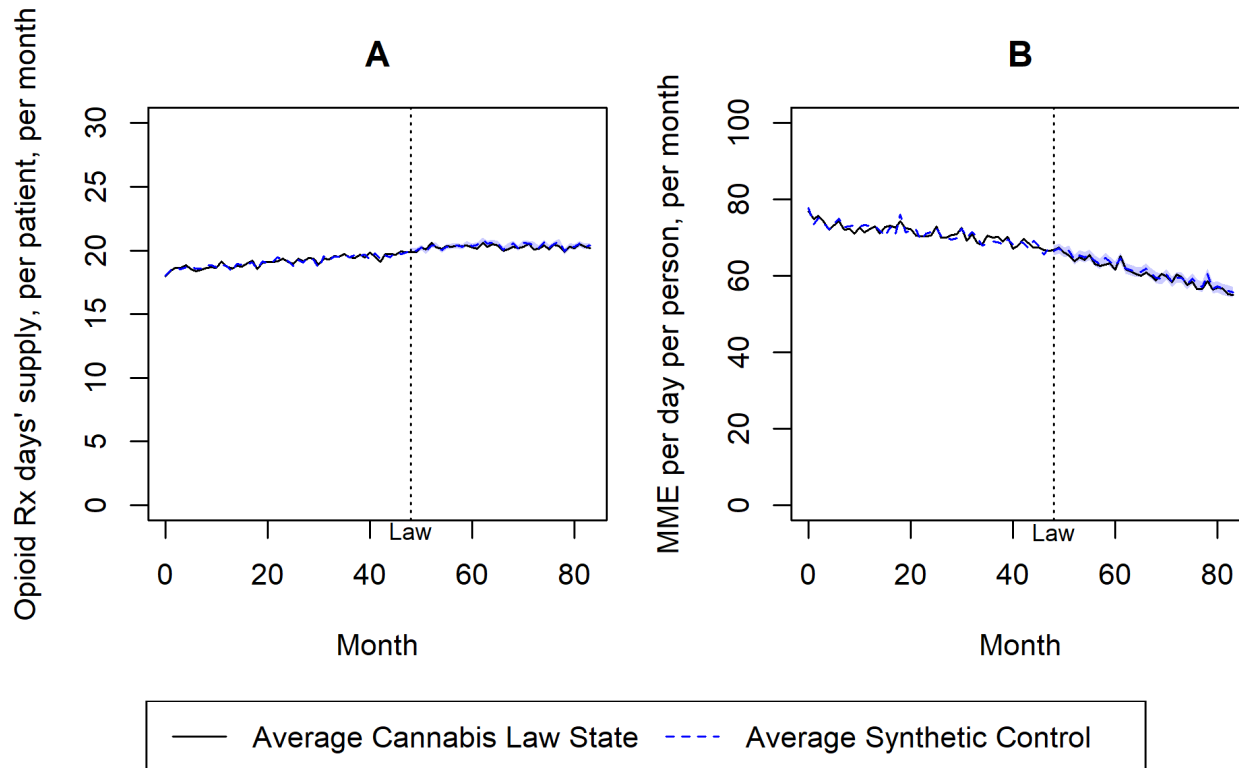
Policy Evaluation Results

Proportion of chronic noncancer pain patients receiving any opioid prescription, prescription nonopioid pain medication, or pain management procedure, per month, in cannabis law and comparison states



Policy Evaluation Results

Volume and dose of opioid prescriptions per patient prescribed opioids, per month, in cannabis law and comparison states.



Policy Evaluation Results

Change in the volume and dose of chronic pain treatments, per patient receiving these treatments, per month, attributable to the state medical cannabis law in its first three years of implementation

Chronic noncancer pain treatment outcome	Change in outcome attributable to the law
Opioid Rx Volume	
Change in the number of opioid Rx, per patient prescribed opioids, per month, attributable to the law (95% CI)	0.01 opioid Rx (-0.003, 0.02)
Change in the number of days' supply of opioid Rx, per patient prescribed opioids, per month, attributable to the law (95% CI)	-0.10 days (-0.30, 0.10)
Change in the proportion of patients prescribed opioids who received any opioid Rx with >7 days' supply, per month, attributable to the law (95% CI)	-1.1 percentage points (-1.90, -0.31)*
Opioid Rx Dose	
Change in MME/day per patient prescribed opioids, per month, attributable to the law (95% CI)	-0.48 MME/day (-1.78, 0.82)
Change in the proportion of patients prescribed opioids with >50 MME/day, per month, attributable to the law (95% CI)	0.31 percentage points (-0.37, 0.98)
Non-Opioid Pain Rx Volume	
Change in the number of non-opioid Rx, per patient prescribed non-opioid pain medications, per month, attributable to the law (95% CI)	-0.01 non-opioid Rx (-0.04 0.02)
Pain Management Procedure Volume	
Change in the number of procedures, per patient who received at least one procedure, per month, attributable to the law (95% CI)	-0.002 procedures (-0.01, 0.01)



Limitations

- Commercially insured sample may not generalize to other groups (though most medical cannabis patients have commercial insurance)
- Unable to observe patient-level substitution of cannabis in place of other pain treatments (though some substitution inherently unobservable)
- Did not assess cannabis laws' effects on clinical appropriateness of pain treatments
- Power limitations

Discussion

- Results do not indicate clinically meaningful changes in receipt of opioid or non-opioid treatment attributable to medical cannabis laws.
- This study does not support the idea that medical cannabis laws can reduce opioid addiction via substitution of cannabis in place of opioid Rx for chronic noncancer pain at the population level.
- Findings are consistent with prospective research (Campbell et al) showing that cannabis use by people with chronic pain was not associated with prescribed opioids.
- Lack of effect may be due in part to clinicians' reluctance to recommend cannabis for chronic pain in face of mixed evidence, absence of clinical guidelines.

Reflections

- Triangulation of different data sources is useful for understanding how implementation might influence policy outcomes
- But it falls short of definitively answering the question: “what implementation structures and strategies need to be in place for this policy to achieve it’s goals (in my context)?”
- Methods innovation is needed, especially around causal inference.

Prevention S
<https://doi.org/>

Effect modification methods for making causal inferences about how policies’ effects on outcomes differ based on implementation structures/strategies



Scaling
at the
Scienc

Causal mediation methods for studying policy implementation mechanisms

Emma E. I
Matthew I
Edward J.

Methods for characterizing uncertainty in systems science models

iller¹.



Thank you!

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