Supplementary Table 1. Included Studies

	Reference	Setting Legal change	Study design, dates [Comparison group or condition]	Sampling approach Sample size	Outcomes	Effects	Quality
1.	Adam 2017	Belgium, Portugal Cannabis decriminalization	Controlled before-and-after, 1996-2010 [Austria, Germany, Greece, Ireland, Italy, Netherlands, Spain, Sweden]	Convenience sampling 89 treatment units	*Addiction treatment utilization:* # of first-time drug treatment clients reporting cannabis as primary indication, per reporting treatment unit	No significant effect of decriminalization. *B*= 2.66, *SE*=8.72, *P*=0.770	13
					Prevalence of use, decriminalized/regulated drug(s): past-year cannabis use	No significant effect of decriminalization. *B* = 1.88, *SE*=1.77, *P*=0.310	
2.	Allshouse 2016	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2013; 2014	Population-based; Admin record data N=743	*Prevalence of use, decriminalized/regulated drug(s)*: self-reported cannabis use during pregnancy	No significant effect of RCL (from 4.5% to 7.5%, *p*=0.06)	A *
					Prevalence of use, decriminalized/regulated drug(s): cannabis-positive urine screen during pregnancy	No significant effect of RCL. Adjusted prevalence difference = 0.03, *P*=0.99.	
3.	Anderson 2013	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1990-2010	Convenience sampling *Study A*: 8,271 cannabis purchases *Study B*: 1071 fatalities	*Price of drugs*: median price of cannabis in state and year	9.8% decrease in price of high-quality cannabis, controlling for state-specific time trends. Lagged models indicate price reductions not significant until 4th year after MCL. Effects on price of low-quality cannabis largely statistically insignificant.	11
					Accidents, motor vehicle: traffic fatality outcomes per 100,000; primary outcome is total fatalities.	No significant change in fatalities, controlling for state-specific time trends. In lagged models, MCL associated with 8-13% fatality reductions in years 1-4, with reduction attenuated and no longer significant after 5 years, controlling for state-specific time trends.	

4.	Anderson 2014	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1990-2007 [States that did not implement MCL]	Population-based; Admin record data	*Mental health conditions, suicide, or self-harm*: annual suicide rates per 100,000 among individuals 15+	No difference in suicide rate overall. Reduction among males, (log) rate difference =0.047* (95% CI: –0.089, –0.005). By age, significant reductions among males from 20-39 and among females >=60.	16
5.	Anderson 2018	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1992-2015	Population-based; Admin record data N= 1224 state-years	*Accidents, other*: Workplace fatalities by state from the Bureau of Labor Statistics	No difference in fatality rate overall. Reduction among those aged 25-44 only. Adjusted rate ratio = 0.805 (95% CI: 0.662, 0.979).	15
6.	Anderson 2015	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1993-2011	Population-based; School-based survey N=862,695	*Prevalence of use, decriminalized/regulated drug(s)*: past 30 day use	No significant effect of MCL: % difference, combined national and state YRBS = -0.007, SE=0.011, p>0.05.	15
					Frequency of use, decriminalized/regulated drug(s): used ≥ 10 times in past 30 days	No significant effect of MCL: % difference, combined national and state YRBS = -0.004, SE=0.006, p>0.05.	
					Actual availability of decriminalized/regulated drug(s): offered, sold, or given an illegal drug on school property in past year	MCL associated with reduction in availability, % difference, combined national and state YRBS = -0.020, SE=0.008, p<0.05;	
7.	Arredondo 2018	Mexico Decriminalization of all drugs	Repeated cross-sectional study, 2009-2014	Population-based; Admin record data	*Criminal justice involvement*: Monthly number of drug possession arrests per precinct.	Decriminalization law not associated with arrests, Beta for ln(possession arrests)=0.187, SE=0.151, p>0.05.	14
					Crime (non-drug): Violent crime arrests (injuries, robbery, homicides)	Law not associated with arrests, b=0.001, SE=0.090, p>0.05.	

					Crime (non-drug): Non-violent arrests (theft, possession of stolen car)	Law not associated with arrests, b=-0.043, SE=0.071, p>0.05.	
8.	Aydelotte 2017	United States Legal regulation of cannabis for recreational use (RCL)	Controlled before-and-after study, 2009-2015 [8 similar states without MCL or RCL]	Population-based; Admin record data N=60,737	*Accidents, motor vehicle*: Annual number of motor vehicle crash fatalities	RCL not associated with crash fatalities, adjusted difference in difference coefficient: +0.2 (95% CI: -0.4, +0.9).	15
9.	Bachhuber 2014	United States Legal regulation of cannabis for medical use (MCL)	Interrupted time series study, 1999-2010	Population-based; Admin record data	*Overdose or poisoning, other drug*: opioid analgesic overdose mortality rate	MCL associated with reduced mortality, adjusted percentage change in annual rate= -24.8% (95% CI: -37.5, -9.5), p = .003.	16
10.	Banerji 2017	United States Legal regulation of cannabis for recreational use	Repeated cross-sectional study, 2011-2015	Population-based; Admin record data N=777 exposures	*Overdose or poisoning, decriminalized/regulated drug*: cannabis calls to poison control center	Apparent increase (from 86 in 2011 to 231 in 2015); no statistical tests reported.	A *
					Overdose or poisoning, other drug: synthetic cannabinoid calls to poison control center	Apparent decrease (100 in 2013 and 17 in 2014); no statistical tests reported.	
11.	Bell 2015	United States Legal regulation of cannabis for medical use (MCL) and recreational use	Repeated cross-sectional study, 2008-2014	Population-based; Admin record data N=29	*Accidents, other*: hydrocarbon burns referred to the University of Colorado Hospital	Before MCL (Jan 2008-Aug 2009): 0 cases During MCL (Oct 2009-Dec 2013): 19 cases During recreational legalization (Dec 2013-Aug 2014): 12 cases No statistical tests reported.	11
12.	Bjordal 2015	United States Legal regulation of cannabis for recreational use	Repeated cross-sectional study, 2013-2014	Population-based; Admin record data N=245 exposures	*Overdose or poisoning, decriminalized/regulated drug*: Cannabis calls to poison control center (p.694)	Apparent increase (from 158 in 2013 to 245 in 2014); no statistical tests reported.	A *

13.	Blachly 1976	United States Cannabis decriminalization	Uncontrolled before-and-after study, 1970; 1975	Convenience sampling N=627 admissions	*Health services utilization*: % of drug abuse admissions to Dammasch State Hospital due to cannabis	Prevalence from 6.7% (1970) to 2.5% (1975); no statistical tests reported.	8
14.	Boyle 2014	United States Cannabis decriminalization	Repeated cross-sectional study, 2011-2013	Population-based; Admin record data N=11 incidents	*Accidents, other*: explosions of gases related to hash oil manufacturing	Two events in 2 years prior, nine events in 7 months post-decriminalization (before legal sales); no statistical tests reported.	A *
15.	Bradford 2018	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2010-2015	Population-based; Admin record data N=132.6 million physician-drug-year observations	*Prescription drug use*: total number of daily opioid dose prescriptions filled (in millions)	MCL associated with fewer daily doses filled in states with active dispensaries (-3.742 million, 95% CI: -6.289, -1.194) and in states with home cultivation (-1.792 million, 95% CI: -3.532, -0.052). Results also varied by type of opioid.	18
16.	Bradford 2016	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 2010-2013 [States without a medical marijuana law at a given time]	Population-based; Admin record data N= 588,808-2,496,608	*Prescription drug use*: among Medicaid Part D enrollees, average daily doses filled annually per physician for FDA-approved drugs treating conditions that cannabis may be used to treat (anxiety, depression, glaucoma, nausea, pain, psychosis, seizures, sleep disorders, spasticity)	MCL associated with statistically significant ($p<0.05$) reductions in daily doses filled for 7 of 9 conditions (difference-in-difference coefficients from -265 daily doses for depression to -1826 for pain), no significant effects for glaucoma or spasticity.	17
					Costs, health care: estimated annual change in Medicaid Part D spending (program and enrollee)	Estimated prescription drug cost savings from 2010-2013 attributed to MCL = $515,194,125.	

17.	Bradford 2017	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 2007-2014 [States without MCL in a given quarter]	Population-based; Admin record data	*Prescription drug use*: average number of daily prescription drug doses dispensed per fee-for-service Medicaid beneficiary for FDA-approved drugs treating conditions that cannabis may be used to treat.	MCL associated with statistically significant ($p<0.05$) reductions in daily doses per beneficiary for 5 of 9 conditions (depression, nausea, pain, psychosis, and seizures). Estimated proportion reductions in dispensed doses ranged from 11% for pain to 17% for nausea.	17
					Costs, health care: estimated annual change in Medicaid fee-for-service spending on prescription drugs with medical cannabis indications	Estimated Medicaid fee-for-service prescription drug cost savings from 2007-2014 attributed to MCL = 2,694.1 million	
18.	Brooks-Russell 2019	United States Legal regulation of cannabis for recreational use	Repeated cross-sectional study, 2013-2015	Population-based; School-based survey N = 26,019 (2013) N = 15,970 (2015)	*Prevalence of use, decriminalized/regulated drug(s)*: lifetime use; past 30-day use.	No significant change in lifetime or past 30-day use following legal regulation.	15
					Prevalence of use, other drugs or alcohol: past 30-day use of cigarettes; past 30-day use alcohol; lifetime non-medical prescription drug use; lifetime cocaine use.	Decrease in past 30-day cigarette use from 2013 to 2015 (12.1 to 8.6%, $p<0.01$). No significant changes in other drug or alcohol use.	
					Perceived harmfulness of decriminalized/regulated drug(s): high vs. low perceived accessibility, wrongfulness, parental disapproval, and harmfulness.	Decrease in high perceived harmfulness (52.9% to 47.7%, $p<0.01$). No significant changes in other perceptions.	
					Frequency of use, decriminalized/legalized drug(s): >20 occasions of use in past 30 days, among those who reported past 30-day use.	Decrease in frequent use among past-30-day users (33.2% to 26.8%, $p<0.01$).	
					Prevalence of use, decriminalized/regulated drug(s): use on school property, among those who reported past 30-day use.	Decrease in use on school property among past-30-day users (5.7% to 4.4%, $p=0.03$).	

19.	Calcaterra 2018	United States Legal regulation of cannabis for recreational use (RCL)	Interrupted time series study, 2009-2015	Population-based; Admin record data N=370,612	*Health services utilization*: cannabis-related hospitalizations	RCL associated with an increase in hospitalizations: adjusted annual rates of inpatient and emergent hospitalizations were 2.4 and 4.3 times higher in 2015 as compared to 2009 (p<0.001). A reduced segmented regression model shows a significant increase in slope post-RCL (b= 1.835, SE=0.218, p< 0.0001).	A *
20.	Cassidy 2015	United States Legal regulation of cannabis for recreational use	Uncontrolled before-and-after study, 2008-2014	Convenience sampling N=13,945	*Prevalence of use, decriminalized/regulated drug(s)*: among substance use treatment clients	Increase from 21.3% in 2008 to 32.8% in 2014 (p<0.001).	A *
					Prevalence of use, decriminalized/regulated drug(s): past-year initiation	No significant change in past-year initiation.	
21.	Cerda 2018	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1991-2015 [States without MCL]	Population-based; School-based survey N=1,179,372	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	Decrease in 8th grade (aOR=0.72; 95% CI: 0.62, 0.84). No significant changes in 10th or 12th.	18
					Prevalence of use, other drugs or alcohol: binge drinking in past two weeks	Decrease in 8th grade (aOR=0.72; 95% CI: 0.65, 0.79). No significant changes in 10th or 12th.	
					Prevalence of use, other drugs or alcohol: past 30-day cigarette use	Decrease in 8th grade (aOR=0.74; 95% CI: 0.66, 0.82) and increase in 12th grade (aOR=1.17; 95% CI: 1.06, 1.29).	
					Prevalence of use, other drugs or alcohol: past 30-day non-medical prescription drug use	Decrease in non-medical prescription opioid use in 8th grade (aOR=0.43; 95% CI: 0.36, 0.52) and increase in 12th grade (aOR=1.42; 95% CI: 1.21, 1.66). Decrease in prescription amphetamine use (aOR=0.71; 95% CI: 0.63, 0.81) and prescription tranquilizer use (aOR=0.83; 95% CI: 0.71, 0.98) in 8th grade only.	
					Prevalence of use, other drugs or alcohol: past 30-day non-cannabis illicit drug use	Decrease in 8th grade only (aOR=0.77; 95% CI: 0.69, 0.86).	

22.	Cerda 2017	United States Legal regulation of cannabis for recreational use (RCL)	Controlled before-and-after study, 2010-2015	Population-based; School-based survey N=253,902	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	Increase in 8th and 10th grade in Washington but not Colorado (difference-in-difference WA vs. non-RCL= 3.2% in 8th grade, p=0.03; 5.0% in 10th, p=0.01).	18
					Perceived harmfulness of decriminalized/regulated drug(s): great or moderate vs. low or no risk	Decreased perceived harmfulness in 8th and 10th grade in Washington but not Colorado (difference-in-difference WA vs. non-RCL= -9.3% in 8th grade, p=0.01; -9.0% in 10th, p=0.02).	
23.	Cerveny 2017	Czech Republic Cannabis decriminalizatio n	Repeated cross-sectional study, 2008; 2012	Population-based; Household survey N=1524	*Age of first use, decriminalized/regulated drug*	No significant effect of decriminalization on hazard of initiation.	13
24.	Choo 2014	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1991-2011 [Matched to state in geographic proximity without MCL]	Population-based; School-based survey N= 11,703,100	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	No significant effect of MCL.	16
25.	Chu 2014	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1988-2008 [Non-MCL state years]	Population-based; Admin record data N=12,157 city-years	*Criminal justice involvement*: adult male cannabis possession arrest rates	No significant effect of MCL.	15
					Criminal justice involvement: ratio of cannabis possession arrests to all arrests among adult males	MCL associated with 9.3-12.1% increase in ratio of cannabis to non-cannabis arrests.	
					Addiction treatment utilization: ratio of cannabis-related to all treatment admissions among adult male non-criminal justice referrals	MCL associated with 9.1-10.5% increase in ratio of cannabis to non-cannabis admissions.	

26.	Couper 2014	United States Cannabis decriminalization	Repeated cross-sectional study, 2009-2013	Convenience sampling N=25,719	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*: prevalence of THC in blood toxicology results from suspected impaired driving cases in Washington State	Increased prevalence of active THC after decriminalization (24.9% vs. 19.1%, p<0.05).	9
27.	Donnelly 1995	Australia Cannabis decriminalization	Repeated cross-sectional study, 1985-1993	Population-based; Household survey N= 2257 to 3500	*Prevalence of use, decriminalized/regulated drug(s)*: lifetime cannabis use	No significant interaction between survey year and state: lifetime use did not increase at a significantly greater rate in South Australia (decriminalized).	15
					Perceived availability of decriminalized/regulated drug(s): been offered cannabis	No significant interaction between survey year and state.	
					Attitudes towards use, decriminalized/regulated drug(s): would take cannabis if offered by a trusted friend	Proportion reporting willingness to try increased from 10% in 1985 to 18% in 1991 in South Australia, significant positive interaction between survey year and state (p<0.05).	
					Prevalence of use, decriminalized/regulated drug(s): weekly use of cannabis	No significant interaction between survey year and state.	
28.	Donnelly 2000	Australia Cannabis decriminalization	Repeated cross-sectional study, 1985; 1988; 1991; 1993; 1995	Population-based; Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: lifetime use	Greater increase in lifetime use in South Australia (decriminalized) than the rest of Australia (test for trend, p<0.05).	11
					Prevalence of use, decriminalized/regulated drug(s): weekly use	Rate of change for South Australia not significantly different from rest of the country.	
29.	Dutra 2018	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2008-2015	Population-based; Household survey N= 91,123 to 10,1973	*Mental health conditions, suicide, or self-harm*: state prevalence of serious mental illness	Liberal MCL associated with 0.2% increase in state prevalence of mental illness (b=0.002, SE=0.001, p=0.015). No significant effect of restrictive MCL.	17

30.	Estoup 2016	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2010-2015	Convenience sampling N=262	*Mental health conditions, suicide, or self-harm*: # of reported psychological, behavioral, relational consequences of cannabis use	RCL associated with increased negative consequences of use, mediated by increased perceived harmfulness (*b* for indirect effect=3.73; 95% CI=0.33, 9.55).	11
					Perceived harmfulness of decriminalized/regulated drug(s): # of cons of continued cannabis use endorsed in decisional balance matrix	RCL associated with increased perceived harmfulness.	
					Frequency of use, decriminalized/legalized drug(s): # of times used in past 3 months	No significant effect of RCL.	
31.	Feige 2008	China Legal regulation of opium	Repeated cross-sectional study, 1801-1902	Unspecified	*Actual availability of decriminalized/regulated drug(s):* Quantity of opium exports (number of chests per capita)	No significant effect of legal regulation.	16
					Price of drugs: Price of opium at the scales in India	No significant effect of legal regulation.	
32.	Félix 2017	Portugal Decriminalization of all drugs	Controlled before-and-after study, 1990-2010 [13 EU countries and Norway]	Convenience sampling	*Price of drugs*: price data from (1) EU country reports to the Commission on Narcotic Drugs and (2) the European Monitoring Center for Drugs and Drug Addiction	Drug prices increased in Portugal following decriminalization, but difference-in-difference and synthetic control analyses indicate no statistically significant change in slope of drug prices.	14
33.	Gonçalves 2015	Portugal Decriminalization of all drugs	Repeated cross-sectional study, 1999-2010	Population-based; Admin record data	*Costs, health care*: combined direct costs of (1) drug treatment, prevention and harm reduction and (2) hospital treatment for hepatitis and HIV	12% increase over first 5 years following decriminalization, 9% over first 11 years.	13

					Costs, non-health care: combined indirect costs of lost income and production due to (1) drug addiction treatment and (2) drug-related death.	37% reduction over first 5 years following decriminalization, 29% over first 11 years.	
					Costs, non-health care: combined direct costs of social rehabilitation and legal system costs related to drugs	17% reduction over first 11 years.	
					Costs, non-health care: indirect costs of lost income and production of individuals arrested for drug-related crimes	5% reduction over first 5 years following decriminalization, 24% over first 11 years.	
34.	Gorman 2007	United States Legal regulation of cannabis for medical use (MCL)	Interrupted time series study, 1994-2002	Convenience sampling	*Prevalence of use, decriminalized/regulated drug(s)*: prevalence of positive cannabis urine screen among arrestees.	No significant effect of MCL on positive cannabis tests in CA or OR.	12
					Health services utilization: proportion of emergency department visits in which cannabis was mentioned in CA, WA, and CO DAWN sites	No significant effect of MCL on ED visits mentioning cannabis.	
35.	Grant 2018	United States Legal regulation of cannabis for medical use (MCL)	Cohort study, 1998-2012	Convenience sampling N=1359	*Prevalence of use, decriminalized/regulated drug(s)*: use in last 30 days of substance use case management program	Participants exiting case management after MCL were more likely to report past 30-day use (AOR = 2.1, $p < 0.0001$).	12
					Prevalence of use, other drugs or alcohol: # of days of use, in past 30 days, of alcohol or drugs	Participants exiting case management after MCL used alcohol ($b = 0.48$, SE=0.24, $p < 0.05$), illicit methadone ($b = 0.67$, SE=0.22, $p < 0.005$), and other opioids ($b = 0.52$, SE=0.15), $p < 0.01$) more frequently than the pre-MCL cohort.	
36.	Grucza 2018	United States	Controlled before-and-after study,	Population-based;	*Criminal justice involvement*: arrest rates for cannabis	Arrest rates decreased by 75% among youth (95% CI: -0.89, -0.44) and 78% among adults (95% CI: -0.89, -0.52).	18

		Cannabis decriminalization	2007-2015 [States without decriminalization, legal regulation, or change in penalties related to cannabis]	School-based survey N= 622,848	possession among minors (18 or under) and adults		
					Prevalence of use, decriminalized/regulated drug(s): past 30-day use	Decriminalization was not significantly associated with use.	
					Frequency of use, decriminalized/regulated drug(s): frequency of past 30-day use	Decriminalization was not significantly associated with frequency of use.	
37.	Grucza 2015	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1990-2010 [States without MCL]	Population-based; Admin record data N=662,993	*Mental health conditions, suicide, or self-harm*: suicide deaths	MCL not significantly associated with suicide rate overall, or when stratified by sex.	16
38.	Harper 2012	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 2002-2009 [States without MCL]	Population-based Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use among adolescents	*Reanalysis of Wall 2011 (#106) Difference-in-difference estimates indicate no significant effects of MCL, after accounting for state-level covariates and measurement error.	15
					Perceived harmfulness of decriminalized/regulated drug(s): perceived riskiness of monthly use among adolescents	No significant effects of MCL.	
39.	Harpin 2018	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2013-2014	Population-based; School-based survey N=11,931 to 12,240	*Prevalence of use, decriminalized/regulated drug(s)*: lifetime and past 30-day use	No significant change after RCL.	13
					Mode of use, decriminalized/regulated drug(s): smoking vs. other modes, among past-month users	No significant change after RCL.	
					Perceived harmfulness of decriminalized/regulated drug(s): high versus low	No significant change after RCL.	

					perceived harmfulness and wrongfulness of use		
					Perceived availability of decriminalized/regulated drug(s): high versus low perceived ease of access	Post-RCL year associated with high perceived access, (AOR= 1.21, 95% CI: 1.09, 1.34).	
40.	Hasin 2017	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1991-1992; 2001-2001; 2012-2013 [late MCL states, never MCL states]	Population-based; Household survey N=118,497	*Prevalence of use, decriminalized/regulated drug(s):* past-year use	MCL associated with greater increase in past-year use (difference-in-difference coefficient=1.4 percentage points, SE=0.5, p=0.004). Results varied by state and early vs. late MCL adoption.	17
					Substance use disorder or diagnosed dependence: DSM-IV Cannabis Use Disorder in past year	MCL associated with greater increase in CUD (difference-in-difference coefficient=0.7, SE=0.3, p=0.03).	
41.	Hasin 2015	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1991-2014	Population-based; School-based survey N=1,098,270	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	No significant effect of MCL overall, but interaction with grade: reduced use among 8th graders post-MCL (AOR=0.73, 95% CI: 0.63, 0.84), but not 10th or 12th graders.	18
42.	Hasin 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1991-1992; 2001-2002; 2012-2013	Population-based Household survey	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*	Prevalence of cannabis-impaired driving increased more in states that passed MCL, but not significantly so (p=0.07).	A *
					Driving under the influence or with detectable concentration,: driving under the influence of alcohol	No significant effect of MCL.	
43.	Hoyte 2015	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2007-2014	Population-based; Admin record data N= 42 fatalities	*Accidents, motor vehicle*: THC-positive motor driver fatalities in Denver County, CO	Fatalities increased from 0.28/month from July 1, 2007 to Dec 31, 2008 to 0.5/month from 2009-2012 to 0.56/month from Jan 1, 2013 to June 30, 2014 (post-RCL). No statistical tests reported.	A *

44.	Huber 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1970-2012	Population-based; Admin record data	*Crime (non-drug)*: state violent crime rates (FBI Uniform Crime Reports)	MCL associated with 12.9% reduction in rate (b=-0.129, SE= 0.036, p<0.01).	14
					Crime (non-drug): state property crime rates	MCL associated with 9.2% reduction in rate (b=-0.092, SE= 0.032, p<0.01).	
45.	Hunt 2017	United States Legal regulation of cannabis for recreational use (RCL)	Controlled before-and-after study, 2013;2014 [WA and OR before RCL implementation]	Population-based; Household survey N=5576	*Price of* drugs: consumer-reported price per gram	No statistically significant effects of implementing legal retail cannabis sales in CO and WA on prices paid for recreational or medical purposes, 4-5 months later.	16
46.	Johnson 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1991-2011	Population-based; School-based survey N=715,014	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use among adolescents	MCL associated with decreased odds of past 30-day use (AOR=0.93, 95% CI: 0.86, 0.99). Policy details associated with lower (e.g., years since MCL and liberal provisions) and higher (e.g., voluntary vs. mandatory patient registration) use.	17
					Frequency of use, decriminalized/regulated drug(s): past 30-day heavy use (≥20 times)	MCL not associated with odds of heavy use (AOR=1.00, 95% CI: 0.89, 1.13).	
47.	Jones 2015	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2012; 2014	Unspecified	*Prevalence of use, decriminalized/regulated drug(s)*: THCA-positive meconium specimens from high-risk newborns in Colorado	RCL associated with increase in THCA-positive specimens (from 10.6% to 11.7%) and with increased mean THCA concentrations in positive specimens.	A *
48.	Jones 2018	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2013-2015	Convenience sampling N=1413	*Frequency of use, decriminalized/regulated drug(s)*: Categories from no use to daily use.	No statistically significant difference in use frequency between pre- and post-RCL periods.	10
					Prevalence of use, other drugs or alcohol: Frequency of cannabis use within alcohol use frequency groups	Strength of the relationship between alcohol and cannabis use decreased after RCL (from r=0.54 in Nov 2013 to 0.33 in Mar 2015).	

49.	Kerr DCR 2017	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2012-2016	Population-based; School-based survey N=10,924	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	No significant association between RCL and past 30-day use overall (AOR=1.21, *p*=0.48) but increasing secular trend. RCL associated with increased cannabis use among heavy alcohol users (AOR=1.73, *p*=0.0076).	17
					Prevalence of use, other drugs or alcohol: past 30-day cigarette use	No significant association with RCL.	
					Prevalence of use, other drugs or alcohol: past 30-day heavy alcohol use	No significant association with RCL.	
50.	Kerr WC 2018	United States Legal regulation of cannabis for medical (MCL) and recreational use (RCL)	Repeated cross-sectional study, 1984-2015	Population-based; Household survey N=37,359	*Prevalence of use, decriminalized/regulated drug(s)*: past-year use	No significant association between MCL (home growing or dispensaries) or RCL and past-year use, among both women and men.	17
51.	Kerr DCR 2018	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2008-2016	Population-based; School-based survey N=281,752	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	RCL associated with increased past 30-day use among university students (AOR= 1.29, 95% CI: 1.13, 1.48).	17
					Prevalence of use, other drugs or alcohol: past 30-day tobacco use	RCL associated with decreased tobacco use (AOR= 0.71, *p*=0.0001).	
					Prevalence of use, other drugs or alcohol: past 30-day alcohol use	RCL not associated with alcohol use (*p*=0.59).	
					Prevalence of use, other drugs or alcohol: past 30-day illicit drug use (non-cannabis)	RCL not associated with illicit drug use (*p*=0.78).	
52.	Keyes 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1991-2014	Population-based; School-based survey N=973,089	*Perceived harmfulness of decriminalized/regulated drug(s)*: great or moderate vs. low perceived risk of physical harm due to occasional use	No significant association with MCL in all grades, 10th or 12th, but increased perceived harm in 8th (AOR= 1.21, 95% CI: 1.08, 1.36).	15
					Prevalence of use, decriminalized/regulated drug(s): past 30-day use	Adjusting for perceived harmfulness, significant negative association between	

						MCL and use in 8th grade only (AOR= 0.81, 95% CI: 0.72, 0.92).	
53.	Khatapoush 2004	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1995;1997;1999	Population-based; Household survey N=15,567	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use	No statistically significant change over time in California (MCL state) or other states.	10
					Perceived availability of decriminalized/regulated drug(s)	No statistically significant change over time in California (MCL state) or other states.	
					Prevalence of use, other drugs or alcohol: past-year use of other drugs.	No statistically significant change over time in California (MCL state) or other states.	
54.	Kim, Anderson et al. 2015	United States Cannabis decriminalization	Repeated cross-sectional study, 2008-2009; 2010-2011	Population-based; Admin record data N=2574	*Health services utilization*: emergency department visits for cyclic vomiting	Decriminalization associated with increase in visits (prevalence ratio= 1.92, 95% CI: 1.33, 2.79).	15
55.	Kim, Hall, et al. 2016	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2012-2014	Population-based; Admin record data	*Health services utilization*: cannabis-related emergency department visits	RCL associated with increase in cannabis-related ED visits by Colorado residents (rate ratio; RR=1.46, p>0.001) and non-residents (RR=1.17, p>0.001).	14
56.	Kim, Santaella et al. 2015	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1999-2011	Population-based; Admin record data	*Prescription drug use*: annual opioid sales in morphine-equivalent doses	Adjusting for increasing secular trend, MCL associated with 1% reduction in opioid sales per year of MCL (b=-0.01, p=0.0016).	A *
57.	Kim 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2004-2013	Population-based; Household survey	*Prevalence of use, other drugs or alcohol*: past-month nonmedical use of prescription opioids	No significant difference in prevalence post-MCL for youth, young adults, or adults 26+.	A *

58.	Kim, Santaella-Tenorio, et al. 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1999-2013	Population-based; Admin record data N=68,394	*Driving under the influence or with detectable concentration, other drugs or alcohol*: positive opioid tests among driver fatalities in motor vehicle accidents	MCL not significantly associated with opioid presence overall, but with reduction among decedents age 24-40 (AOR post-MCL vs. pre=0.50, 95% CI=0.37, 0.67).	17
59.	Kosterman 2016	United States Legal regulation of cannabis for recreational use (RCL)	Interrupted time series study, 1985-2014	Convenience sampling N=395	*Frequency of use, decriminalized/regulated drug(s)*: past-month frequency among WA parents with any past-year use	Frequency of use increased post-RCL (from 4-6 to 10 times/month, $p<0.05$).	8
					Substance use disorder or diagnosed dependence: meets DSM-IV criteria for cannabis use disorder	No statistically significant change post-RCL.	
					Perceived harmfulness of decriminalized/regulated drug(s): approval and perceived harmfulness of cannabis use	Approval increased and perceived harmfulness decreased following RCL ($p<0.05$).	
60.	Larimer 2015	United States Legal regulation of cannabis for recreational use (RCL)	Cohort study	Unspecified N= 1095	*Frequency of use, decriminalized/regulated drug(s)*: # of times used in past month among 12-17 year olds	No significant change associated with RCL.	A *
					Perceived harmfulness of decriminalized/regulated drug(s): perceived risk due to regular and occasional use	Perceived risk from regular use decreased among males but not females (p for interaction=0.017).	
					Perceived availability of decriminalized/regulated drug(s)	No significant change associated with RCL.	
					Prevalence of use, other drugs or alcohol: number of drinks consumed per week.	RCL associated with increased number of drinks per week ($p<0.01$), beyond time trends.	
61.	Liang 2018	United States Legal regulation of cannabis for	Repeated cross-sectional study, 1993-2014	Population-based; Admin record data	*Prescription drug use*: # of filled opioid prescriptions, dosage of filled prescriptions in morphine-equivalent doses, and related Medicaid spending	MCL not associated not associated with Schedule II opioid use.	15

		medical use (MCL)			for Schedule II opioids (e.g., hydrocodone, oxycodone).		
					Prescription drug use: as above, for Schedule III opioids (e.g. codeine).	MCL associated with reductions in Schedule III opioid prescriptions (-29.6%, 95% CI: -2.4%, -56.7%), doses, and spending.	
62.	Livingston 2017	United States Legal regulation of cannabis for recreational use (RCL)	Interrupted time series study, 2000-2015	Population-based; Admin record data	*Overdose or poisoning*, *other drugs*: deaths with ICD-10 code indicating opioid poisoning	RCL associated with reduction in opioid poisoning deaths, adjusting for comparison state trends (-0.68 deaths per month, 95% CI: -1.35, -0.03).	16
63.	Lo 2015	United States Legal regulation of cannabis for recreational use (RCL)	Uncontrolled before-and-after study, 2013-2015	Convenience sampling N= 2186	*Prevalence of use, decriminalized/regulated drug(s)*: positive cannabinoid screen among high-risk opioid therapy patients	RCL associated with increase in positive THC screens (30% of visits to 36%, *p*=0.0003).	A *
					Opioid therapy compliance: non-compliance (illicit opioids use or non-use of prescription)	RCL not associated with compliance.	
64.	Lynne-Landsman 2013	United States Legal regulation of cannabis for medical use (MCL)	Switching replications study, 2003-2011	Population-based; School-based survey	*Prevalence of use, decriminalized/regulated drug(s)*: lifetime and past-month	MCL not associated with use (1 of 20 planned comparisons significant, expected by chance alone).	15
					Frequency of use, decriminalized/legalized drug(s): daily or weekly use among lifetime users	MCL not associated with frequency (1 of 20 planned comparisons significant, expected by chance alone).	
65.	Martins 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2004-2013	Population-based; Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use	MCL associated with greater past-month use among adults 26+ (AOR=1.24, 95% CI: 1.16, 1.31), but not among ages 12-17 or 18-25.	16
					Perceived availability of decriminalized/regulated drug(s): fairly or very easy to obtain vs. other	MCL associated with greater availability among adults 26+ (AOR=1.11, 95% CI: 1.07, 1.15), but not among ages 12-17 or 18-25.	
66.	Mason 2016	United States	Controlled before-and-after study,	Convenience sampling	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	Post-RCL subject group not significantly associated with use (AOR= 2.80, 95% CI: 0.94–8.34).	13

		Legal regulation of cannabis for recreational use (RCL)	2010-2013 [students completed follow up before RCL]	N= 238	*Prevalence of use, other drugs or alcohol*: use of cigarettes or alcohol vs. cannabis (indicating substitution effect)	Post-RCL subject group significantly less likely to use cigarettes or alcohol versus cannabis (p<0.05).	
67.	Masten 2014	United States Legal regulation of cannabis for medical use (MCL)	Interrupted time series study, 1992-2009	Population-based; Admin record data N=245,495	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*: proportion of fatal-crash-involved drivers (decedents and survivors) who test cannabinoid-positive	Significant policy effect found in 3 of 12 MCL states, with increases of 2.1-6.0 percentage points among all drivers and 4.6-9.6 among fatally injured drivers in CA, HI, and OR (adjusted for changes in testing and national trends). These were step increases rather than upward trends.	14
68.	Mauro 2019	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2004-2013	Population-based; Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use	No significant effect of MCL among men or women aged 12-17 or 18-25, but significant increases for ages 26+ among men (+1.7 percentage points, $p < 0.001$) and women (+ 1.1%, $p = 0.013$).	16
					Frequency of use, decriminalized/legalized drug(s): daily use among past-year users	Significant effect of MCL among men aged 18-25 (+ 2.4%, $p = 0.047$), and both men and women age 26+ (men + 2.8%, $p = 0.014$; women + 3.4 %, $p = 0.003$).	
					Substance use disorder or diagnosed dependence: met DSM-IV criteria for cannabis use disorder	No statistically significant effect of MCL for any age-gender group.	
69.	Mauro 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2004-2013	Population-based; Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use	MCL associated with increased use among adults 26-39 [AOR=1.2, 95% CI: 1.1, 1.3], 40-64 [AOR=1.4, 95% CI: 1.2, 1.5], and 65+ [AOR=2.6, 95% CI: 1.5, 4.6].	A *
					Perceived availability of decriminalized/regulated drug(s)	MCL associated with increased perceived accessibility of cannabis, which partially mediated association between MCL and use.	

70.	Merker 2018	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2012-2017	Convenience sampling N=302	*Prevalence of use, decriminalized/regulated drug(s)*: current use among Inflammatory Bowel Disease patients	Increase in use post-MCL (12.3% to 22.8% of patients, p=0.0008), but no significant increase in reported medical use.	12
71.	Miech 2015	United States Cannabis decriminalization	Repeated cross-sectional study, 2007-2013	Population-based; School-based survey N=320,809	*Prevalence of use, decriminalized/regulated drug(s)*: lifetime, past-year, past 30-day use	[Decriminalization in CA in 2010] 8th and 10th grades: differences in use between CA residents and other states limited to select years, not sustained over time. 12th grade: past-year use higher among CA residents vs. other states in 2010-2013.	12
					Perceived harmfulness of decriminalized/regulated drug(s): great vs. less-than-great perceived risk of regular use	8th and 10th grades: only one significant difference (8th grade in 2012). 12th grade: lower perceived risk among CA residents vs. other states in 2012-2013.	
					Perceived availability of decriminalized/regulated drug(s): easy vs. less-than-easy perceived access	8th and 10th grades: only one significant difference (8th grade in 2011). 12th grade: higher perceived availability among CA residents vs. other states in 2012 only.	
					Attitudes towards use, decriminalized/regulated drug(s): strong disapproval of adult use vs. other	8th and 10th grades: only one significant difference (8th grade in 2012). 12th grade: less strong disapproval among CA residents vs. other states in 2012-2013	
					Attitudes towards use, decriminalized/regulated drug(s): definitely or probably expect to use five years from present (only 12th graders)	12th grade: greater expected use among CA residents vs. other states in 2012-2013.	
72.	Miller 2017	United States Legal regulation of cannabis for	Repeated cross-sectional study, 2005-2015	Population-based; School-based survey	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	RCL associated with increase of 2.0-3.5 percentage points (12-22%), adjusting for linear secular trend [passage of RCL, additional effect of legal store openings not statistically significant].	16

		recreational use (RCL)		N=13,335	*Frequency of use, decriminalized/legalized drug(s)*: past 30-day frequency	RCL associated with increase of 0.5 days per month, adjusting for linear secular trend [passage of RCL, additional effect of legal store openings not significant].	
					Prevalence of use, other drugs or alcohol	RCL passage not associated with changes. In 2015 (legal stores), decrease in tobacco and increase in other illegal drugs, but findings not robust.	
73.	Model 1993	United States Cannabis decriminalizatio n	Controlled before-and-after study, 1975-1978 [States that did not not decriminalize]	Population-based; Admin record data	*Health services utilization:* non-cannabis drug mentions at ER visits	Decriminalization associated with 12% fewer drug mentions at ER visits (b=-0.133, SE=0.053, p<0.01), with stronger effects in initial years.	16
					Health services utilization: cannabis drug mentions at ER visits	Decriminalization associated with 64% more cannabis mentions (b=-0.642, SE=0.112, p<0.01), with stronger effects in later years.	
74.	Morris 2014	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1990-2006	Population-based; Admin record data	*Crime (non-drug)*: rates of violent crime (homicide, rape, robbery, assault)	MCL associated with 2.4% reduction in homicide rate (p<0.01).	16
					Crime (non-drug): rates of property crime (burglary, larceny, auto theft)	No significant association between MCL and property crimes.	
75.	Nappe 2016	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study. 2010-2015	Population-based; Admin record data N=5231 exposures	*Overdose or poisoning, decriminalized/regulated drug*: cannabis exposures reported to the National Poison Data System in Colorado	RCL associated with increase in cannabis exposures (86 in 2011 to 231 in 2015).	A *
76.	Onders 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study 2000-2013	Population-based; Admin record data N= 1969 exposures	*Overdose or poisoning, decriminalized/regulated drug*: cannabis exposures among children <6 reported to the National Poison Data System	MCL associated with increased exposures (rate ratio for post vs. pre-MCL=2.25, 95% CI: 1.45, 3.51). Exposures peaked in the year following RCL.	13

77.	Pacula 2010	United States Cannabis decriminalization and legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1987-2003	Convenience sampling	*Price of drugs*: price per gram paid at the last transaction among arrestees	Decriminalization and MCL associated with higher prices (indicating increased demand). .	13
78.	Pacula 2015	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1992-2011 and 1997-2011 [State-years without MML]	Population-based; Admin record data N=973 Household survey N=112,926	*Addiction treatment utilization*: number of treatment admissions with cannabis as primary indication	MCL associated with 14% reduction in cannabis admissions (difference-in-difference = -0.136, SE=0.067, $p<0.05$). Larger effect size for non-criminal justice referrals. Partially offset by increase in admissions associated with dispensaries.	15
					Prevalence of use, decriminalized/regulated drug(s): past 30-day use	No overall significant association between MCL and use.	
					Frequency of use, decriminalized/regulated drug(s): heavy use (>20 of last 30 days), # of days of use in past 30	No significant association between MCL and frequency of use.	
79.	Parnes 2018	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2013-2015	Convenience sampling N=5241	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	No significant association between RCL and use among CO undergraduates.	12
80.	Phillips 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2011-2014	Population-based; Admin record data N=188,266	*Overdose or poisoning*, *other drugs*: state-level age-adjusted opioid-related mortality rate	MCL associated with 21.7% increase in opioid-related mortality ($p < 0.0001$) but interacted with prescription drug monitoring programs such that rates decreased in states with both policies.	15

81.	Plunk 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2000-2014	Population-based; Household survey N=5,483,715	*Educational outcomes*: high school non-completion	High-school age exposure to MCL not associated with non-completion overall, but with increase in probability of failing to complete conditioned on completing the 12th grade (AOR=1.11, 95% CI: 1.05, 1.17).	16
					Educational outcomes: college non-enrollment among high school graduates	High-school age exposure to MCL associated with college non-enrollment (AOR = 1.09, 95% CI: 1.04, 1.14). Dose-response relationship with years of exposure.	
					Educational outcomes: college non-completion among college entrants aged 25+	High-school age exposure to MCL associated with increase in probability of degree non-completion (AOR = 1.03, 95% CI: 1.01, 1.06).	
					Prevalence of use, decriminalized/regulated drug(s): past-month use	High-school age exposure to MCL not significantly associated with use.	
					Frequency of use, decriminalized/regulated drug(s): daily use (40 or more times/month)	High-school age exposure to MCL not significantly associated with use overall, but among 12th graders only (AOR=1.62, 95% CI: 1.04, 2.54).	
82.	Pollini 2015	United States Cannabis decriminalizatio n	Repeated cross-sectional study Roadside Survey, 2010; 2012 Fatality Analysis Reporting System, 2008-2012	Population-based; Admin record data Roadside Survey, N=379-515 FARS, N=2860	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*: proportion of drivers testing THC-positive in roadside survey	No statistically significant change in THC-positivity following decriminalization.	13
					Driving under the influence or with detectable concentration, decriminalized/regulated drug(s): presence of cannabinoids among fatally injured drivers	Increase in cannabinoid prevalence in 2012 as compared to the pre-decriminalization period (AOR = 1.67, 95% CI: 1.28, 2.18).	
83.	Powell 2018	United States Legal regulation of cannabis for	Repeated cross-sectional study, 1999-2013	Population-based; Admin record data	*Overdose or poisoning, other drugs*: deaths related to prescription opioids and heroin	Existence of MCL not significantly associated with overdose mortality (only active dispensaries associated with reduction in deaths).	15

		medical use (MCL)			*Addiction treatment utilization*: number of treatment episodes related to pain reliever misuse	Existence of MCL not significantly associated with overdose mortality (only active dispensaries associated with reduction).	
					Prevalence of use, other drugs or alcohol: self-reported nonmedical use of pain relievers (National Survey on Drug Use and Health)	No statistically significant association between MCL and use.	
					Prescription drug use: morphine-equivalent doses of opioids distributed to legal medical markets	No statistically significant association between MCL and use over full time period.	
84.	Prue 2014	United States Peyote decriminalization	Repeated cross-sectional study, 1985-2010	Population-based; Household survey N=886,088	*Prevalence of use, decriminalized/regulated drug(s)*: peyote use	Use among American Indians increased from 1% in 1994 (year of American Indian Religious Freedom Act) to 10% in 1999. Use among non-American Indians remained steady <2%.	7
					Age of first use, decriminalized/regulated drug: age at first use of peyote	No significant change in age at first use among American Indians or non-American Indians following decriminalization.	
85.	Ramirez 2017	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2014;2015	Unspecified N=2400	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*: daytime prevalence of cannabis-positive drivers	Statistically significant increase post-RCL (7.8% to 18.9% after one year).	A *
86.	Reith 2015	International Cannabis decriminalization	Controlled before-and-after study, 1980-2012 [Country-years without decriminalization]	Unspecified N=102 countries	*Actual availability of decriminalized/regulated drug(s)*: kg of cannabis seized and number of plants eradicated divided by population in millions	Decriminalization associated with increased plant eradication ($p<0.05$), but not seizures.	10

87.	Rodriguez 2016	United States Legal regulation of cannabis for recreational use (RCL)	Cohort study, 2009-2015	Convenience sampling N= 1698	*Prevalence of use, decriminalized/regulated drug(s)*: positive urine toxicology among pregnant young women *Disclosure of use, decriminalized/regulated drug(s)*: agreement between self-reported use and urine toxicology	Increased cannabis-positive screens post-RCL (16.2 to 20.2%, *p*=0.048). Improved agreement post-RCL (kappa = 0.504 vs. 0.191).	A *
88.	Rohda 2017	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2011-2016	Population-based; Admin record data N=29,044 exposures	*Overdose or poisoning, other drugs:* synthetic cannabinoid receptor agonist (SCRA) exposures reported to poison control centers	SCRA exposures declined in WA (175 to 28, *p*=0.017*)* and OR (39 to 14, *p*=0.012) following RCL, but not in all RCL states combined (*p*=0.41).	A *
89.	Rusby 2018	United States Legal regulation of cannabis for recreational use (RCL)	Cohort study, 2014-2016	Population-based; School-based survey N=444	*Prevalence of use, decriminalized/regulated drug(s)*: past 30-day use	RCL not significantly associated with use.	12
					Frequency of use, decriminalized/regulated drug(s): number of days use in past 30	RCL associated with greater number of days of use (ARR=1.26, 95% CI: 1.10, 1.45).	
					Attitudes towards use, decriminalized/regulated drug(s): willingness and intention to use (any vs. none)	RCL not significantly associated with willingness or intention to use.	
90.	Sabia 2017	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study. 1990-2012 [State-years without MML]	Population-based; Household survey N=5,428,399	*BMI*	MCL associated with reduction in BMI (adjusted difference-in-differences for contemporaneous effect = -0.084, SE=0.034, *p*<0.05).	16

91.	Santaella-Tenorio 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1985-2014	Population-based; Admin record data N=1,220,610 deaths	*Accidents, motor vehicle*: age-adjusted traffic fatality rates (all road users)	MCL associated with 10.8% reduction in traffic fatality rates (95% CI = 9.0%, 12.5%).	17
92.	Schmidt 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2014-2013	Population-based; Household survey N=450,300	*Perceived harmfulness of decriminalized/regulated drug(s)*: belief that weekly/ monthly use is "not a great risk"	Living in MCL state not associated with perceived harmfulness. (Secular trend towards greater permissiveness for all outcomes, but no significant effects MCL after control for state fixed effects).	17
					Attitudes towards use, decriminalized/regulated drug(s): belief that parents/ friends don't disapprove of trying cannabis	Living in MCL state not associated with perceived attitudes.	
					Perceived availability of decriminalized/regulated drug(s): belief that cannabis is fairly or very easy to obtain	Living in MCL state not associated with perceived availability.	
93.	Sevigny 2014	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1990-2010 [State-years without MCL]	Convenience sampling N=39,157	*Potency of decriminalized/regulated drug(s)*: concentration of THC in cannabis seized by law enforcement	MCL not significantly associated with potency (adjusted difference in %THC=0.53, p>0.05), but legal dispensaries associated with higher potency.	16
94.	Shah 2018	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2006-2014	Population-based; Admin record data	*Prescription drug use*: opioid use among commercially insured population.	MCL associated with lower odds of any opioid use (AOR=0.95, 95% CI: 0.94, 0.96), chronic opioid use (AOR=0.93, 95% CI: 0.91, 0.95) and high-risk opioid use (AOR=0.98, 95% CI: 0.96, 0.99).	A *
95.	Shepard 2016	United States Legal regulation of cannabis for	Repeated cross-sectional study, 1997-2009	Population-based; Admin record data	*Crime (non-drug)*: property crime (burglary, larceny, and vehicle theft arrests per 1000 residents)	MCL not associated with property crime.	12

		medical use (MCL)			*Crime (non-drug)*: violent crime (assault, homicide, rape, and robbery arrests)	MCL associated with reduction in violent crimes (-0.254 crimes per 1000 residents, SE=0.089, $p<0.05$).	
96.	Shi 2017	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1997-2014	Population-based; Admin record data N= 0.4M to 2.2M records	*Health services utilization*: annual hospitalization rate for cannabis dependence or abuse (ICD-9)	MCL not significantly associated with hospitalizations.	16
					Overdose or poisoning, other drugs: hospitalization rate for opioid pain reliever overdose	MCL associated with reduction in hospitalizations related to opioid overdose (adjusted prevalence difference = −0.13, 95% CI: −0.25, −0.018).	
					Health services utilization: hospitalization rate for opioid dependence or abuse	MCL associated with reduction in hospitalizations related to opioid dependence (adjusted prevalence difference = −0.23, 95% CI: −0.41, −0.068).	
97.	Sokoya 2018	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2012-2015	Convenience sampling N=2164	*Accidents, other*: types of bony facial trauma among patients presenting to two CO hospitals	RCL not associated with significant difference in mechanisms of facial fracture.	12
98.	Steinemann 2018	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 1993-2000; 2001-2015	Population-based; Admin record data N=1578	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*: proportion of fatally injured drivers who were cannabis-positive in HI	MCL associated with increase in THC positivity (5.5% in 1993-2000; 16.3% in 2011-2015, $p<0.001$).	12
					Driving under the influence or with detectable concentration, other drugs or alcohol: proportion of fatally injured drivers who were methamphetamine- or alcohol-positive	MCL not associated with significant difference in positivity rates.	
99.	Stolzenberg 2016	United States Legal regulation of cannabis for	Repeated cross-sectional study, 2002-2003; 2004-2005;	Population-based; School-based survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use among adolescents	Living in MCL state associated with greater use (adjusted coefficient=0.861, SE=0.298, $p<0.01$).	14

		medical use (MCL)	2006-2007; 2008-2009; 2010-2011		*Prevalence of use, other drugs or alcohol*: past-month non-cannabis illicit drug use	No significant association between living in MCL state and use.	
100.	Straub 2017	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2011-2012; 2012-2014; 2014-2016	Population-based; Admin record data N=25,763	*Prevalence of use, decriminalized/regulated drug(s)*: positive urine screen or documented use during pregnancy	No significant change in cannabis-positivity post-RCL.	A *
101.	Suggs 1981	United States Cannabis decriminalization	Uncontrolled before-and-after study, 1977-1979	Population-based; Admin record data N=719	*Criminal justice involvement*: possession arrests and citations for adults and minors in two NE cities	No significant difference in mean monthly arrests following decriminalization.	12
					Criminal justice involvement: possession prosecutions for adults and minors	Significant increase in prosecutions following decriminalization among minors (from mean of 1.92 to 5.75/month, $p<0.05$), but not adults (26.71 to 36.25, $p>0.05$).	
					Criminal justice involvement: defendants representing themselves	Significant increase following decriminalization (from 18.07 to 30.75/month, $p<0.05$).	
					Criminal justice involvement: case dismissal before trial	Significant decrease following decriminalization (from 9.14 to 2.37/month, $p<0.001$).	
102.	Ullman 2017	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 1992-2012 [State-years without MCL]	Population-based; Household survey N=757,677	*Workplace absence*: self-reported absence for medical reasons in the past week	MCL associated with lower probability of absence (b= -0.0013, SE=0.0007, $p<0.10$), with effects concentrated in loosely regulated MCL states, men and people aged 30-49.	16
103.	Urfer 2014	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2011-2014	Convenience sampling N=12,082	*Driving under the influence or with detectable concentration, decriminalized/regulated drug(s)*: Proportion of THC-positive blood samples collected from CO drivers	Increase in THC-positive screens from 2011 (28%) to 2012 (59%) to 2013 (65%), p=0.001. No significant change in first two months of legal cannabis sales.	11

104.	Wagner 2016	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2012-2015	Convenience sampling N=34	*Physical health consequences of use, decriminalized/ regulated drug(s)*: Reversible Cerebral Vasoconstriction Syndrome (RCVS) cases secondary to cannabis	Of 18 RCVS cases before RCL, 1 patient used cannabis. Of 16 cases after RCL, 5 used cannabis. No statistical tests reported.	A *
105.	Wall 2016	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2002-2010	Population-based; Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use among adolescents	*Reanalysis of Stolzenberg 2016 (#99) After appropriate adjustment for pre-MCL prevalence, MCL not associated with adolescent use (b = 0.33%; SE= 0.29%, p = 0.25).	18
106.	Wall 2011	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2002-2008	Population-based; Household survey N=23,300	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use among adolescents	Use was significantly higher in MCL states (average of 8.7% vs. 6.9%) but among states that passed MCL from 2004-2008, baseline use (pre-MCL) was already higher than in non-MCL states.	13
					Perceived harmfulness of decriminalized/regulated drug(s): perceived "great risk" of using monthly or more	Perceived harmfulness was significantly lower in MCL states each year (average of 8.7% vs. 6.9%), but among states that passed MCL, baseline perceived risk (pre-MCL) was already lower than non-MCL states.	
107.	Wang 2018	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2005-2015	Population-based; Admin record data N=4202	*Health services utilization:* emergency or urgent care visits with a cannabis-related discharge code or THC-positive urine toxicology among adolescents	Cannabis-related visits increased from 1.8 per 1000 visits in 2009 to 4.9 per 1000 in 2015, following RCL (p<0.0001).	11
108.	Wang 2017	United States Legal regulation of cannabis for medical (MCL) and recreational use (RCL)	Repeated cross-sectional study, 2000-2015	Population-based; Admin record data N=7,432,254	*Health services utilization*: hospitalizations with cannabis-related billing codes	Hospitalizations increased from 274 per 100,000 in 2000 (prior to MCL) to 593 in 2015 (after RCL). Statistically significant 25% increase in 2014 (RCL implementation with legal sales).	14
					Health services utilization: emergency department visits with cannabis-related billing codes	ED visits increased from 313 per 100,000 in 2011 to 478 in 2015, with highest rate in 2014 (554). Statistically significant increase in 2014 (p=0.0005).	

					Overdose or poisoning, decriminalized/regulated drug: cannabis exposure calls to CO poison control centers	Poison control calls increased by 79.9% following RCL implementation in 2014, from 123 to 221 (p=0.0001).	
109.	Wang 2016	United States Legal regulation of cannabis for recreational use (RCL)	Repeated cross-sectional study, 2009-2015	Population-based; Admin record data N=62	*Overdose or poisoning, decriminalized/regulated drug*: children's hospital visits related to cannabis exposure	RCL associated with increased cannabis-related visits (1.2 per 100,000 in 2012-2013 to 2.3 per 100,000 in 2014-2015, p=0.02).	13
					Overdose or poisoning, decriminalized/regulated drug: poison control calls related to cannabis exposure among children 0-9	RCL associated with increased cannabis-related calls in CO (2.7 per 100,000 in 2012-2013 to 5.3 per 100,000 in 2014-2015, p<0.001) and in comparison to rest of the US (34% increase in CO vs. 19% increase in remainder of US, p=0.04).	
110.	Wen 2018	United States Legal regulation of cannabis for medical (MCL) and recreational use (RCL)	Controlled before-and-after study, 2011-2016 [States without MCL or RCL over the study period]	Population-based; Admin record data N=1059 state-quarter observations	*Prescription drug use*: number of opioid prescriptions covered by Medicaid on a quarterly, per-1000-Medicaid-enrollee basis in each state	MCL and RCL associated with reductions in prescriptions of 5.88% (95% CI: -11.55%, -0.21%) and 6.38% (95% CI: -12.20, -0.56%) respectively.	17
111.	Wen 2015	United States Legal regulation of cannabis for medical use (MCL)	Repeated cross-sectional study, 2004-2012	Population-based; Household survey N=593,400	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use; past-year initiation	MCL associated with increase in past-month use among adults 21+ (+1.32%, p<0.05) but not ages 12-20. MCL associated with increased risk of past-year initiation among ages 12-20 only (+0.32%, p<0.05).	17
					Frequency of use, decriminalized/regulated drug(s): daily/almost daily use (>20 days in month); # of days among past-month users	MCL associated with increase in (almost) daily use among adults 21+ (+0.58%, p<0.05) but not ages 12-20.	
					Prevalence of use, other drugs or alcohol: # of drinks in past month; # of binge drinking days; met DSM-IV alcohol use disorder criteria in past year; both cannabis use and	MCL associated with frequency of binge drinking (+0.16 days, p<0.05) and past-month use of both cannabis and alcohol (+1.44%, p<0.01) among adults 21+. No associations with alcohol use among ages	

					binge drinking in past month; use of cannabis and alcohol on same occasion in past month	12-20, or with alcohol use disorders.	
					Prevalence of use, other drugs or alcohol; past-year use of non-medical prescription painkillers, heroin, cocaine	No immediate or lagged associations between MCL and illicit drug use in either age group.	
					Substance use disorder or diagnosed dependence: met DSM-IV cannabis use disorder criteria in past year	Lagged associations between MCL and cannabis use disorder among adults 21+ (+0.25% at 1 year, $p<0.05$) but not among ages 12-20.	
112.	Wen 2019	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 2004-2012 [Non-MCL states]	Population-based; Household survey N=388,200	*Perceived availability of decriminalized/regulated drug(s)*: (very) easy to obtain, among adolescents and young adults	No significant association between MCL and perceived availability among ages 12-17 or 18-25.	16
					Attitudes towards use, decriminalized/regulated drug(s): acceptance of use by other adolescents/young adults; perceived parental acceptance (ages 12-17 only)	MCL significantly associated with lower perceived parental acceptance among ages 12-17 (-0.37%, 95% CI: -0.72, -0.03).	
					Perceived harmfulness of decriminalized/regulated drug(s): no/low health risk of using once or twice per week	MCL significantly associated with higher perceived harmlessness among ages 18-25 only (+4.72%, 95% CI: 0.15, 9.28).	
113.	Williams 2017	United States Legal regulation of cannabis for medical use (MCL)	Controlled before-and-after study, 2004-2013 [State-years without MCL]	Population-based; Household survey	*Prevalence of use, decriminalized/regulated drug(s)*: past-month use	Only loosely regulated MCL associated with higher use, among adults 26+ only (adjusted prevalence difference = +1.46%, 95% CI: 0.33, 2.58).	15
					Frequency of use, decriminalized/legalized drug(s): heavy use in past year (>300 days), among past-year users	Tightly regulated MCL associated with less heavy use, among ages 12-17 only (adjusted prevalence difference = -3.67%, 95% CI: -7.24, -0.11).	
					Substance use disorder or diagnosed dependence met DSM-IV criteria for cannabis use disorder	Loosely regulated MCL associated with lower prevalence of cannabis use disorder, among ages 18-25 only (-0.80%, 95% CI: -1.45, -0.16).	

114.	Williams 2014	Australia Cannabis decriminalization	Controlled before-and-after study, 1998;2001;2004;2007;2010 [state-years without decriminalization)	Population-based; Household survey N=39,087	*Age of first use, decriminalized/regulated drug(s)*: age at initiation	Decriminalization not associated with hazard of cannabis uptake overall but interacts with age such that minors under decriminalization have a 12% higher hazard rate of uptake while adults under decriminalization have an 11% lower hazard rate of uptake ($p<0.01$).	18

*A = abstract; no quality appraisal performed.