Decriminalization and Disparities:
Do changes to marijuana policy decrease racial disparities in arrest rates?

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Abstract: Advocates of marijuana possession decriminalization and legalization have argued that these policies will help reduce wide racial disparities in the US criminal justice system between black and white people. I examine whether these policies reduced these racial disparities between 2009 and 2016. I use Uniform Crime Reporting data on arrest totals and ACS population data to calculate arrests rates in 51 cities across the United States for all offense categories, marijuana offenses, and quality-of-life offenses. I then use a difference-in-differences methodology to compare changes in similar cities arrest rates. I find that marijuana possession decriminalization reduces marijuana arrest rates but does not significantly impact racial disparities in arrests. I also find that there is no impact of marijuana possession legalization on marijuana arrest rates, although it may increase quality-of-life arrests. These findings indicate that while marijuana possession decriminalization and legalization may reduce mass incarceration, they may not be effective tools for addressing racial inequities in the United States criminal justice system.

INTRODUCTION

Racial disparities are pervasive in the U.S. criminal justice system. In the U.S., there are large racial disparities between black and white people in arrest rates, convictions, and incarceration. Black men are nearly 7 times more likely to be incarcerated than white men.[1] While disparities in arrest rates exist for most offenses, they are particularly pronounced for marijuana arrests. Between 2001 and 2010, a black person was 3.73 times more likely to be arrested for marijuana possession than a white person, even though black people and white people use marijuana at similar rates.[2] During this time period, in over 96% of counties with more than 30,000 people in which at least 2% of residents are black, black people were arrested at higher rates than white people for marijuana possession.[3] Advocates of marijuana possession decriminalization and legalization have argued that these policies will help reduce racial disparities in the U.S. criminal justice system.[4]

In the last decade an increasing number of cities and states have decriminalized or legalized marijuana possession. Multiple cities and states have decriminalized marijuana possession in the last 15 years, and between 2012 and 2017 eight states and Washington D.C. legalized marijuana possession.[5] This raises the question of whether these policies have been effective at reducing racial disparities in the criminal justice system.

While we might expect that changes in marijuana policy would impact marijuana arrests, it is unclear whether they will impact racial disparities in arrest rates for other types of crimes. By looking at arrests in multiple different offense categories, we can better understand whether marijuana possession decriminalization and legalization impacts only marijuana arrests, or if it also impacts other offense categories. One possible outcome of marijuana possession decriminalization and legalization is that police follow a "broken windows" strategy, where they emphasize arresting people for minor crimes to prevent more serious crime. Historically, police departments that have utilized these strategies have implemented them most heavily in neighborhoods with higher percentages of black residents, leading to racial disparities in arrest rates.[6] However following marijuana decriminalization and/or legalization, police are no longer able to arrest people for possession of small amounts of marijuana. They may instead increase their arrest rates for other non-violent quality-of-life offenses such as drunkenness, disorderly conduct, or vagrancy.

Existing research has explored how arrest rates have been transformed in individual states that have changed marijuana polices, and has compared arrest rates by racial demographic group in multiple states that have legalized marijuana.[7] Recent research in Washington state found that relative disparities in marijuana arrest rates actually increased following marijuana possession legalization.[8]

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[1] Vogel, M., Porter, L.C. Toward a Demographic Understanding of Incarceration Disparities: Race, Ethnicity, and Age Structure. J Quant Criminol 32, 515–530 (2016). https://doi.org/10.1007/s10940-015-9265-6

[2] "The War on Marijuana in Black and White." The War on Marijuana in Black and White. ACLU, June 2013. https://www.aclu.org/files/assets/aclu-thewaronmarijuana-rel2.pdf.

[3] Ibid.

[4] From Prohibition to Progress. Drug Policy Alliance, February 14, 2018. http://www.drugpolicy.org/sites/default/files/dpa_marijuana_legalization_report_feb14_2018_0.pdf.

[5] From Prohibition to Progress. Drug Policy Alliance, February 14, 2018. http://www.drugpolicy.org/sites/default/files/dpa_marijuana_legalization_report_feb14_2018_0.pdf.

[6] "The Civil Rights Implications of "Broken Windows" Policing in NYC and General NYPD Accountability to the Public". United States Commission on Civil Rights. March 2018. https://www.usccr.gov/pubs/2018/03-22-NYSAC.pdf.

[7] Makin, David A., Dale W. Willits, Guangzhen Wu, Kathryn O. Dubois, Ruibin Lu, Mary K. Stohr, Wendy Koslicki, et al. "Marijuana Legalization and Crime Clearance Rates: Testing Proponent Assertions in Colorado and Washington State." Police Quarterly 22, no. 1 (April 2018): 31–55. https://doi.org/10.1177/1098611118786255.

[8] Firth, Caislin L., Julie E. Maher, Julia A. Dilley, Adam Darnell, and Nicholas P. Lovrich. "Did Marijuana Legalization in Washington State Reduce Racial Disparities in Adult Marijuana Arrests?" Substance Use & Misuse 54, no. 9 (2019): 1582–87. https://doi.org/10.1080/10826084.2019.1593007.

However, there is little research that has compared cities that have decriminalized or legalized marijuana to "control" cities that have not. I use difference-in-differences methods to better understand what changes stem from decriminalization and legalization, and what changes are likely impacted by broader drug use, policing, and crime trends.

BACKGROUND

Marijuana possession legalization and decriminalization overview

I examine the impact of two separate but related policies: marijuana possession legalization, and marijuana possession decriminalization. The implementation of these policies varies by jurisdiction, particularly as decriminalization can be implemented at multiple levels. While only states can legalize marijuana, decriminalization can be implemented at either the state or city level. There are multiple cities that have decriminalized marijuana where marijuana has not been legalized or decriminalized at the state level.

Marijuana possession legalization itself can be a misleading term, as in all cities I study it is still possible to be arrested for possessing above a certain amount of marijuana. In all states that legalized marijuana by the end of 2016, possession of one ounce of marijuana or less was legalized.[9] However there is slight variation in the types of penalties for possessing over one ounce, and there is variation in the amount of marijuana that one can legally possess in their home.[10] Marijuana possession decriminalization varies even more by jurisdiction than legalization. In some cities, marijuana is considered decriminalized, even though police can still cite someone for marijuana possession. I define marijuana possession decriminalization as a policy of no arrest, prison time, or criminal record for the first-time possession of less than an ounce of marijuana for personal consumption.

A key part of these marijuana laws is how police choose to enforce them. I am unable to measure changes in policing tactics that may lead to de-facto decriminalization. In some cities where marijuana possession is not officially legalized or decriminalized, police may prioritize enforcing other types of crime and thus make very few arrests for marijuana sale or possession. There is no good data on which police departments deprioritize marijuana arrests, and thus I am not able to study this aspect of marijuana policing.

The timeline of related aspects of legalization varies as well. All states passed marijuana possession legalization months before legalizing possession. In most states, possession was legalized multiple months before retail sales began, but this timing difference varies. I don't examine the impact of passing legislation or the start of retail sales, both of which likely influence drug use behavior and policing. In addition, in all cities studied, marijuana remains illegal at the federal level. Federal arrests are not included in the UCR data used in this study.

[9] Washington D.C. is the exception to this, as it is legal to possess 2 ounces of marijuana there. However, Washington D.C. is not included in the UCR dataset, and thus this variation does not affect the results studied here.

[10] In Colorado and California you can legally have 6 plants in your home, while in Massachusetts you can legally have 10 ounces

Hypothesized impacts of marijuana possession legalization and decriminalization

I hypothesize that both legalization and decriminalization of marijuana possession has decreased total marijuana arrest rates and black marijuana arrest rates. While there are likely other factors that influence marijuana arrest rates, such as marijuana use, policing tactics, and the prevalence of other types of crime, I expect that legalization and decriminalization will both significantly reduce marijuana arrest rates. I also hypothesize that both the legalization and decriminalization of marijuana possession has decreased racial disparities in total arrest rates between white and black people. This is because nationwide black marijuana arrest rates are higher than white ones, and thus a decrease in marijuana arrests would likely have a larger impact on black arrests.[11] It is important to note that disparities are calculated as ratios of black to white arrest rates. Thus, we would expect ratios only to change if black and white arrests are not reduced in the same proportion to their starting values.

I also hypothesize that the legalization of marijuana possession increased racial disparities in arrest rates in other non-violent, quality-of-life offense categories. This is due to the expectation that some police agencies operate under a "broken windows" strategy, where they emphasize arresting people for minor crimes to prevent more serious crime. These arrests often occur in neighborhoods with higher percentages of black residents, leading to racial disparities in arrest rates.[12] As police are no longer able to arrest people for possession of small amounts of marijuana, they may instead increase their arrest rates for other non-violent quality-of-life offenses such as drunkenness, disorderly conduct, or vagrancy.

DATA

Uniform Crime Reporting Arrest Data

I use data from Uniform Crime Reports (UCR) to measure the number of arrests in cities in the U.S. The UCR is a nationwide, cooperative program managed by the FBI that collects monthly and yearly law enforcement data from police agencies. Over 14,000 police agencies report data to the UCR. I use the Arrests by Age, Sex, and Race Summarized Yearly data series from 2009 to 2016.[13] These data provide information on the number of arrests reported by police agencies on 43 offenses, including marijuana possession and marijuana sale. UCR also breaks down the number of arrests by gender, age, and race of the person arrested.[14] I use 2009 to 2016 data as no states legalized marijuana prior to 2012 and the vast majority of cities had not decriminalized it in 2009, and the 2016 data is the most recent UCR data available. I also combine both juvenile and adult data to calculate arrest rates for people of all ages.

I examine total arrests and arrests of two types of offense categories: marijuana arrests and quality-of-life arrests. Marijuana arrests include possession and sale of marijuana. As decriminalization and

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[11] "The War on Marijuana in Black and White." The War on Marijuana in Black and White. ACLU, June 2013. https://www.aclu.org/files/assets/aclu-thewaronmarijuana-rel2.pdf.

[12] "The Civil Rights Implications of "Broken Windows" Policing in NYC and General NYPD Accountability to the Public". United States Commission on Civil Rights. March 2018. https://www.usccr.gov/pubs/2018/03-22-NYSAC.pdf.

[13] I downloaded the UCR Arrests by Age, Sex, and Race Summarized Yearly data series from the National Archive of Criminal Justice Data, which is managed by the Inter-University Consortium for Political and Social Research (ICPSR), a research center of the Institute for Social Research (ISR) at the University of Michigan. Files can be downloaded here: https://www.icpsr.umich.edu/icpsrweb/NACJD/series/57

[14] 2015 data is not available in the Arrests by Age, Sex, and Race Summarized Yearly series, but 2015 monthly data is available in the Arrests by Age, Sex, and Race, monthly reports series, which contains the same information on a monthly level. I use this data series to calculate yearly figures for 2015.

legalization only legalizes marijuana possession, not sale, I examine marijuana possession arrests separately from combined marijuana possession and sale arrests to check for effect heterogeneity. I define quality-of-life arrests as arrests for crimes of vandalism, liquor laws, drunkenness, disorderly conduct, vagrancy, suspicion, and curfew/loitering.

There are hundreds of agencies that do not report data to the UCR at all or did not report data for one or more years between 2009 and 2016. I thus was not able to include these agencies in this study. UCR data counts one arrest for each separate instance in which a person is arrested, cited, or summoned for an offense. As people can be arrested more than once during a year, the UCR arrest numbers show the total number of arrests, not the total number of individuals arrested.[15]

One difficulty of using UCR dataset is the fact that people can be arrested for multiple crimes at the same time, which the UCR defines as a "multiple-offense situation." In "multiple-offense situations", if at least one offense is a Part I offense, then only the most serious offense is recorded in the UCR data.[16] As marijuana is not a Part I offense, if someone is arrested for a Part I offense and is also cited for marijuana possession, the marijuana possession is not recorded in the UCR data. If someone is arrested for marijuana possession and an offense that is not a Part I offense, such as shoplifting, then both the marijuana possession and shoplifting offenses are recorded.[17]

Another limitation of the UCR dataset is that it does not identify non-Hispanic Latino/a as a distinct racial group. Thus, most arrests of Latino/a people are categorized as white arrests. While the UCR does include an ethnicity variable to identify Hispanic and non-Hispanic arrests which could potentially be used to separate white and Latino/a arrests, most agencies do not collect data for this field. To be able to compare across agencies, I do not use this ethnicity variable. We can thus expect that a portion of arrests categorized as white in UCR are actually of Latino/a people. This leads to inflated white arrests, particularly in areas with large Latino/a populations. This indicates that racial disparities in arrest rates between black and white people are actually larger than calculated in this study. This is potentially corroborated by the fact that I observe lower than average total arrest rate disparities in cities in California and New Mexico, two states with large Latino/a populations.

ACS City Data

I use American Community Survey (ACS) data in conjunction with the UCR data to calculate arrest rates and control for other factors that might influence arrests. As the outcomes I study are arrest rates and arrest rate disparities, I use 2009 to 2016 5-year ACS population estimates to calculate arrest rates by offense and race for each city, which is the unit of observation. These population estimates are at the ACS "places" geography level. "Places" are defined as a "concentration of a population", and mostly include incorporated areas with active governments and police agencies.[18] The ACS estimates the total population and the total number of black and white people in each of these "places", which I use to calculate arrest rates for each city. It is important to note that these yearly ACS estimates are subject to sampling error. This error is likely large in cities with small black populations. I thus do not include cities that have black populations estimated to be below 2% of

[15] "The War on Marijuana in Black and White." The War on Marijuana in Black and White. ACLU, June 2013. https://www.aclu.org/files/assets/aclu-thewaronmarijuana-rel2.pdf.

[16] Part I offenses include: (1) Criminal Homicide, (2) Forcible Rape, (3) Robbery, (4) Aggravated Assault, (5) Burglary, (6) Larceny Theft (except Motor Vehicle Theft), (7) Motor Vehicle Theft, and (8) Arson. Seriousness of offense is determined by the UCR Hierarchy Rule, which lists a hierarchy of offenses by seriousness. For full list see: https://ucr.fbi.gov/additional-ucr-publications/ucr_handbook.pdf

[17] "The War on Marijuana in Black and White." The War on Marijuana in Black and White. ACLU, June 2013. https://www.aclu.org/files/assets/aclu-thewaronmarijuana-rel2.pdf

[18] To read more about ACS "place" definitions, see here: https://www2.census.gov/geo/pdfs/reference/GARM/Ch9GARM.pdf

the total population in my analysis. I also use 2009 to 2016 ACS data to calculate control variables such as the estimated poverty rate of each city.

I calculate arrest rates per 1,000 by dividing the number of arrests in the UCR data for that city's police agency by the number of people in each city, then multiplying by 1,000. I calculate total arrest rates, as well as arrest rates for black and white people, using the ACS population data by race and the UCR arrests by race data. The size of the jurisdiction of each police agency and the size of the ACS defined "places" might not perfectly match. This likely introduces some error into these arrest rates. Arrest rates might be under-estimated if the jurisdiction of the city's police agency is smaller than the ACS "places" size, or may be over-estimated if the police agency jurisdiction is larger than the ACS "places" size. I also calculate black and white arrest rate per 1,000 disparities by dividing the black arrest rate by the white arrest rate to get a ratio. This means that if the disparity is greater than 1, black people have a higher likelihood of being arrested than white people.

Policy variable coding

I run all regressions testing the impact of two separate policy variables: whether marijuana possession was legalized in the state where the city is in, and whether marijuana was decriminalized at the city level or in the state where the city is in. I code my policy variables of whether marijuana possession has been decriminalized or legalized in multiple different ways to account for variation in when the policy went into effect. Information about whether a city had decriminalized marijuana was difficult to find for a small number of cities in my sample, so there is some uncertainty regarding the coding of this policy variable. The UCR data that I use to calculate my outcome variables is summarized by year, but policy related to marijuana possession can change any day within the year. For example, one city may decriminalize marijuana on January 1st and one city might decriminalize marijuana on December 31st. While both cities may technically have decriminalized marijuana in the same year, one city had a different policy for almost an entire year. To account for this, I code my policy variables by calculating the fraction of the year that the policy was in place. For example, when coding my variable of legalization, a 0 equals no legalization in that year, a 1 equals legalization for the entire year, and a 0.5 would represent a city that legalized halfway through that year on July 1st. I use this same procedure for coding both legalization and decriminalization policy variables. To check whether my results are sensitive to this coding, I also run my regressions with two separate methods of coding my policy variables. For one method I code as 1 any legalization/decriminalization within the year, and for the other I code as 1 if marijuana was legalized/decriminalized for the entire year.

METHODS

I use a difference-in-difference design to investigate the causal effects of marijuana possession decriminalization and legalization. Difference-in-difference relies on the parallel trends assumption that trends in the outcome variable in areas that adopted the policy would have been parallel with "control areas" if the policy had not been adopted. To help satisfy this assumption, I narrow my sample to agencies policing cities with populations over 250,000 in 2009, my initial year of data. I also do not include cities where black people make up less than 2% of the population. I run a regression to further determine "common support" cities that had similar likelihoods of decriminalizing marijuana (either at the city level, or by virtue of being in a state that decriminalized or legalized marijuana) by the end of 2016. The regression uses the log of the total population, the percent of people with a high school diploma or higher, the percent of non-citizens, and the percent of people living below the federal poverty line to calculate the likelihood of marijuana being

decriminalized in that city by 2016. By only analyzing cities within this common support range, I help ensure that these cities do not have vastly different demographic characteristics that may influence their choice of decriminalization or legalization.

I find that there are 51 cities in this common support range, and only analyze these cities in my regressions.[19] Sixteen of these cities decriminalized or legalized marijuana possession by 2016, and 35 did not. These cities had an average population of 666,348 people and had an average poverty rate of 19.63%. These cities have a higher poverty rate and a larger black population than nationwide averages.[20]

Table I: Common support city summary statistics

Statistic	***Mean for common support cities, 2009 - 2016***
Total arrest rate per 1,000	56.30
Total violent arrest rate per 1,000	13.61
Percent black population	19.99%
Percent below federal poverty line	19.63%
Total population	666,348

These common support cities all have significant racial disparities in arrest rates. Table II shows that these disparities are particularly pronounced when looking at marijuana possession arrests, where black people are more than two times more likely to be arrested than white people.

Table II: Common support city arrest rate summary statistics

Statistic	***Mean for common support cities, 2009 - 2016***
White marijuana possession arrest rate per 1,000	2.38
Black marijuana possession arrest rate per 1,000	5.40
White quality-of-life arrest rate per 1,000	9.28
Black quality-of-life arrest rate per 1,000	14.42

I cluster at the state level to mitigate problems of serial correlation. Some states have multiple cities in the common support region – for example, six of the cities are located in California. The outcome variables I study may be correlated with statewide economic conditions, policies, or other factors, and thus clustering helps get accurate standard errors that take this into account.

I also utilize population weights in my regressions. It uses stratified sampling to make inferences about smaller, harder to count populations. I thus use the unweighted sample count of the population as weights in my regressions to get accurate standard errors that account for the different sampling of these populations.

Controls

I control for both state and year fixed effects in my regressions. This controls for average differences across cities and years in any observable or unobservable predictors of arrest rates. While I control for other variables that differ from city to city, controlling for these fixed effects helps

[19] To identify "common support" cities, I only analyze cities that met two criteria: they had to have a higher probability of marijuana being decriminalized in 2016 than the lowest probability city where marijuana possession was decriminalized by 2016, and they had to have a lower probability of marijuana possession being decriminalized in 2016 than the highest probability city were marijuana possession was not decriminalized by 2016. I

[20] 12.7% of all Americans lived below the poverty line in 2016, and black people made up 13.8% of the US population in 2018.

reduce omitted variable bias from the many variables that differ from city to city that I am not able to control for.

To attempt to isolate the effect of marijuana possession legalization and decriminalization, I control for multiple variables. First, I control for the total violent arrest rate, which I calculate using UCR data similarly to how I calculate marijuana arrest rates.[21] I argue that arrests for violent crime are not correlated with marijuana arrests. While violent crime may be correlated with increases in the sale and use of other substances such as heroin, cocaine, or methamphetamines, marijuana is not as addictive as these substances and thus less likely to drive crime.

I also control for the log of the population of each city. The cities in my common support region range in size from 250,000 to 2.2 million. The size of a city likely influences policing resources and policy, drug use behavior, and many other factors that impact both marijuana use and marijuana arrests. Thus, controlling for population helps us ensure that differences in our outcome variables aren't due to city size.

I also control for the percentage of black residents in each city. While I already exclude cities where less than 2% of residents are black, this control helps account for variations in policing and arrest practices that may differ depending on the size of a city's black population. Cities with large black populations may have more neighborhoods that are majority black that have higher rates of policing, which may cause them to have higher overall arrest rates. Finally, I control for the percentage of people living below the federal poverty line. Higher rates of poverty may cause people to supplement income by illegally selling marijuana, which then would impact marijuana sale arrest rates.

RESULTS

Decriminalization

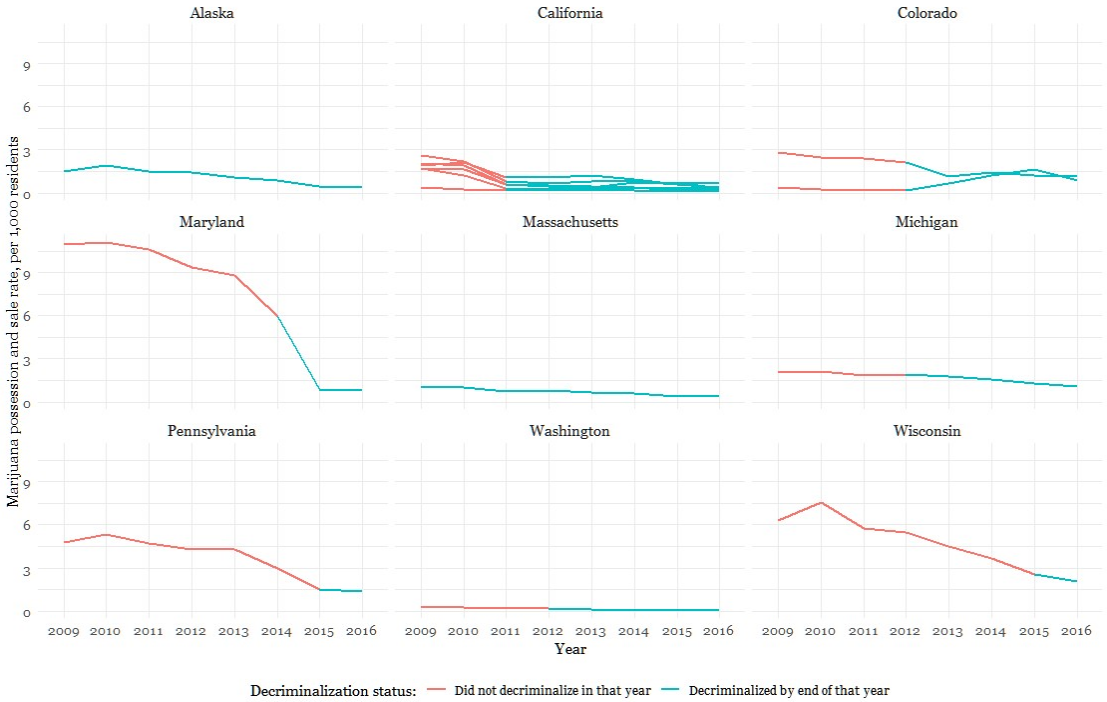
I find that marijuana possession decriminalization reduces marijuana arrest rates. This effect, which can be seen in Table III, is statistically significant both when examining just changes in marijuana possession arrest rates or when examining changes in marijuana possession and sale arrest rates. I find that decriminalization reduces the arrest rate per 1,000 by just under 1 arrest. This is a large decrease, as the mean marijuana possession arrest rate in all common support cities was roughly 2 arrests per 1,000 people.

This effect is more pronounced when examining just black marijuana arrest rates. This effect is statistically significant when examining both marijuana possession and marijuana possession and sales combined. The effect actually slightly increases when including marijuana sales.[22] This indicates that marijuana sale arrests also decreased during marijuana possession decriminalization, even though marijuana sale was still illegal.

[21] I define violent crimes as the following offenses: murder and non-negligent manslaughter, manslaughter by negligence, forcible rape, robbery, aggravated assault, burglary-breaking or entering, larceny-theft, motor vehicle theft, other assaults, and arson.

[22] Results for total marijuana arrest rates and black marijuana arrest rates are all still statistically significant for all three different possible codings of my policy variable explained in the methods section.

Graph I: Marijuana possession and sale arrest rates in cities that decriminalized marijuana possession, grouped by state



While marijuana arrest rates decline, decriminalization does not have a statistically significant impact on disparities in black and white marijuana arrest rates. No results for these disparities were statistically significant.[23] Quality-of-life arrest rates, black quality-of-life arrest rates, black total arrest rates, and total arrest rate disparities between black and white people were also not statistically significantly impacted by decriminalization. This suggests that the arrest rates for blacks and whites declined in equal proportion to their starting values.

I also ran all results using a sample of all cities with a population above 250,000 in my dataset, not restricted to those identified as being within a "common support" region. Results do not vary significantly.

Table III: Regression showing the impacts of marijuana possession decriminalization[24]

Dependent variable	***Coefficient***	***CI (0.95)***
Marijuana possession arrest rate per 1,000	-0.80*	-1.56 – -0.03
Marijuana possession and sale arrest rate per 1,000	-0.93*	-1.69 – -0.17
Black marijuana possession arrest rate per 1,000	-2.56***	-3.98 – -1.15
Black marijuana possession and sale arrest rate per 1,000	-3.17***	-4.73 – -1.61
Marijuana possession arrest rate per 1,000 disparity	0.13	-1.21 – 1.47
Marijuana possession and sale arrest rate per 1,000 disparity	0.25	-0.74 – 1.23
Quality-of-life arrest rate per 1,000	1.26	-1.13 – 3.64
Black quality-of-life arrest rate per 1,000	2.25	-1.32 – 5.82
Quality-of-life arrest rate per 1,000 disparity	0.08	-0.06 – 0.23
Black arrest rate per 1,000	-10.83	-23.07 – 1.41
Total arrest rate per 1,000 disparity	-.036	-0.41 – 0.34

[23] No results were statistically significant for any of the three different possible codings of my policy variable explained in the methods section.
[24] Only includes common support region cities. Decriminalization coded between 0 and 1, using fraction of year method described in methods section.

*** = p<0.05, ** = p<0.01, *** = p<0.001**

Legalization

Results for the impact of marijuana possession legalization differ from decriminalization. As seen in Table IV, I find that marijuana possession legalization does not significantly impact marijuana arrest rates. This effect is not statistically significant both when examining just changes in marijuana possession arrest rates or when examining changes in marijuana possession and sale arrest rates. When examining just black arrest rates results are also not statistically significant. I also find no statistically significant results for changes in marijuana arrest rate disparities.

Unlike decriminalization, I find that marijuana possession legalization does impact quality-of-life arrest rates. They rise by 3.18, a large increase, as the mean quality-of-life arrest rate in the common support cities was 6.62. This rise is even more pronounced when looking just at black quality-of-life arrest rates, as I observe an increase of 6.34 arrests per 1,000. Because of this, I also find a statistically significant increase in quality-of-life arrest rate disparities between black and white people. I do not find that marijuana possession legalization significantly impacts total black arrest rates or total arrest rate disparities between black people and white people.[25]

Table IV: Regression showing the impacts of marijuana possession legalization[26]

Dependent variable	***Coefficient***	***CI (0.95)***
Marijuana possession arrest rate per 1,000	0.19	-0.57 – 0.95
Marijuana possession and sale arrest rate per 1,000	0.17	-0.64 – 0.97
Black marijuana possession arrest rate per 1,000	0.30	-1.59 – 2.20
Black marijuana possession and sale arrest rate per 1,000	0.09	-2.03 – 2.21
Marijuana possession arrest rate per 1,000 disparity	1.54	-2.47 – 5.56
Marijuana possession and sale arrest rate per 1,000 disparity	0.48	-2.65 – 3.62
Quality-of-life arrest rate per 1,000	3.18**	1.43 – 4.93
Black quality-of-life arrest rate per 1,000	6.34***	2.99 – 9.68
Quality-of-life arrest rate per 1,000 disparity	0.34**	0.08 – 0.60
Black arrest rate per 1,000	-1.02	-27.27 – 25.22
Total arrest rate per 1,000 disparity	-0.01	-0.23 – 0.21

*** = p<0.05, ** = p<0.01, *** = p<0.001**

CONCLUSION

Implications for policy

These results imply that marijuana possession decriminalization reduces marijuana arrest rates. This is an expected result of the policy. I observe that this impact is larger for black arrest rates, which is likely because average black marijuana arrest rates are much higher than average marijuana arrest rates across all racial groups. However, this impact appears to be small enough that it doesn't significantly reduce total black arrest rates, or disparities between black and white arrest rates. This indicates that marijuana possession decriminalization doesn't significantly impact disparities in our criminal justice system. While it doesn't increase them, and it may slightly benefit black people more than white people, it fails to systemically change inequities in our criminal justice system.

The impacts of marijuana possession legalization are different from marijuana possession decriminalization. I find that it doesn't significantly impact marijuana arrest rates or disparities in

[25] Results did not vary greatly using the three different possible codings of my policy variable explained in the methods section.
[26] Only includes common support region cities. Decriminalization coded between 0 and 1, using fraction of year method described in methods section.

these arrest rates. One possible reason for this is that in many states that legalized marijuana, large cities had already decriminalized marijuana, or the states themselves had already decriminalized marijuana. Thus, statewide legalization had very little impact on marijuana enforcement.

I find that legalization does increase quality-of-life arrest rates and disparities in these rates. I hypothesized that an increase in these arrest rates could be because police shift their focus from marijuana arrests to these low-level offenses. However, as I don't observe significant decreases in marijuana arrest rates, this is likely not the case. It is more likely that increases in these arrest rates are due to an omitted variable not controlled for in this analysis.

While marijuana possession legalization and decriminalization is effective at reducing mass incarceration, these findings indicate that policies other than marijuana possession legalization and decriminalization are needed to reduce racial disparities in arrest rates.

Limitations

One limitation of this study is the relatively small sample size. Most results observed were not statistically significant. Adding more observations to our data might show statistically significant results. Between 2017 and 2019 four states legalized marijuana, yet we do not have UCR data on these years yet. In addition, there are a number of cities that do not have police agencies that report to UCR or have missing years of data. These limitations can potentially be addressed by running this analysis again in a few years with a larger sample size.

Another limitation is the difficulty in accurately assessing arrest rates by racial group, particularly for cities with smaller black populations. All rates are calculated using ACS estimates that are subject to sampling error. In addition, police agency jurisdictions and ACS defined "place" sizes might not match perfectly, introducing some error to these estimates.

The UCR data doesn't include accurate ethnicity data, so the white arrest rates I calculate likely include some Latino/a people in them. This likely reduces the disparities in arrest rates that I found. Removing Latino/a people from the white arrest rate calculations may show that marijuana possession decriminalization and legalization's impacts on arrest rate disparities are significant.

Cities also may have informally decriminalized marijuana prior to the formal decriminalization and legalization that I measure in my policy variable. Police departments may still enforce some marijuana possession offenses, but may have chosen to largely focus resources on other types of offenses. This produces a similar policy as decriminalization, but is unfortunately much more difficult to measure. This may explain why there was relatively little change following legalization and decriminalization in cities studied in Massachusetts, Michigan, and Washington, all of which already had low marijuana possession arrest rates. It is possible that these cities had already informally decriminalized marijuana years prior. Further examination of data from the 2010s may provide more insight into this possibility.

Finally, there is the chance that omitted variable bias impacts these arrest rates. While I attempt to control for factors that might impact these arrest rates, there is still the possibility that factors like substance use or police agency size may impact these rates.

Direction for future research

As more and more cities and states decriminalize and/or legalize marijuana possession, opportunities for further research increase. Future research could study the impacts of marijuana possession legalization at the state level. This study was limited to looking at impacts in large cities and tells us nothing about the impacts of these policies on the average American jurisdiction. The

UCR dataset I used has observations for many small jurisdictions, although the fact that the percentage of agencies reporting to UCR varies greatly by state makes it difficult to compare statewide arrest rates. As more agencies report to UCR and more states legalize marijuana, this type of analysis may become more feasible.

Further research could also focus on the impacts of these policies on smaller jurisdictions. While it may be more difficult to calculate accurate arrest rates in small jurisdictions, there are many more smaller jurisdictions to sample in the UCR data, which may improve the ability to understand whether results are statistically significant or not.

A further analysis of month to month variation in arrest rates would potentially shed additional light on this topic. UCR data is available for many jurisdictions at the monthly level. Analyzing monthly data would allow for a more accurate understanding of the immediate impacts of changes in marijuana possession policy.

Another topic of future research is the study of arrest rates for marijuana sale following the legalization of marijuana retail sales. Given racial disparities in marijuana arrest rates currently, it is possible that the legalization of marijuana retail sales could increase these disparities, particularly if black people don't enter the retail sale market at the same rate as white people. Future research could better inform policies aimed at improving racial equity in the retail sales market, such as Oakland's cannabis equity program.[27]

Further research could focus on the impacts of expungement of marijuana possession crimes. States that have legalized marijuana have adopted different policies for whether and how they expunge the criminal records of people with past marijuana possession convictions. This may impact conviction rates, lengths of sentences for other crimes, or any other outcome related to changes in criminal justice system involvement. It may be hard to study this currently as there are only a few states that have legalized marijuana, meaning the sample of states with differing expungement policies is small. However, as more states legalize marijuana and new UCR data is released, studies in this area may become more feasible.

Finally, the research I conducted corroborates extensive literature that black people are arrested at higher rates for marijuana offenses than white people. Improving understanding of these underlying causes of marijuana-related arrests is another area of future research that will improve our ability to create policy to decrease racial inequities.

[27] For more information on Oakland's work in improving equity in cannabis licensing, see: http://www2.oaklandnet.com/oakca1/groups/cityadministrator/documents/report/oak063627.pdf or https://www.citylab.com/life/2017/04/the-case-for-reparations-paid-in-marijuana/524370/

APPENDIX

Graph II: Marijuana possession and sale arrest rates in cities that did not decriminalize marijuana possession, grouped by state