

**An Evaluation of the Medical Marijuana Legislation's (MML)
Impact on the Crime Rate of Colorado**

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About the Author

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Abstract

The purpose of this explanatory research is to evaluate the impact of medical marijuana legalization (MML) in Colorado on crime. Specifically, does legalization lead to a decline in crime rates associated with marijuana (property crimes, burglary, larceny/theft, violent crimes, robbery, driving under the influence) in comparison to the national crime rate? This study used existing aggregated data (national crime rates, state of Colorado crime rates) and interrupted time series regression to examine the effect of MML on violent crimes, property crimes, and DUI for alcohol arrests. Overall findings indicate that MML significantly reduced two types of crime – burglary and robbery. For violent crime, property crimes, and DUI, the effect was neutral (neither increasing nor decreasing crime).

CHAPTER ONE - INTRODUCTION

The challenges of defendants' experiences in fighting charges and possible convictions of marijuana possession and possession of a controlled substance.

Scenario – Marijuana Possession

Dylan was an all-star athlete, a military dependent and recent graduate of a Department of Defense (DOD) high school overseas. During the summer break, he visited his grandmother in California and was surprised to receive her trusty old Buick as a graduation gift. Dylan was super excited, as the car finally gave him the independence he was seeking while he decided his next step in life. The car had only one mechanical problem. The car's left taillight would intermittently stop working due to faulty wiring. He eagerly took the car to an auto-body shop where a mechanic replaced the wiring and bulb, demonstrating that the fault had been corrected.

Stop-and-Frisk

Dylan resumed his summer plans and drove to south Texas to visit family. On a clear warm evening in the small Texas town of San Benito, Dylan and a friend headed out for a night at the basketball courts. While in route to the city park he was stopped by a police officer. Unbeknownst to Dylan his taillight had stopped working, and that was the reason for the officer pulling him over. Dylan safely pulled the car over to the right side of the road and sat anxiously wondering why he had been stopped. After a few minutes the officer approached the vehicle and asked that they step out of the car. The occupants vacated the vehicle as the officer requested. Once both teenagers were out of the car Officer Garcia asked for Dylan's driver's license and registration. The officer asked a few questions, "Who is the owner of the car?" Dylan quickly replied, "I am the owner, officer." He then asked Jeremy (Dylan's friend) his age. Jeremy disclosed that he was 16 years old. Jeremy was instructed to leave the area and go home directly. Jeremy attempted to take a backpack from the vehicle and was directed to leave the backpack in

place. Jeremy departed and went directly home. Dylan was asked if the car could be searched, to which he consented. Officer Garcia methodically searched the car for a few minutes. He sat in driver's seat and he pulled out the ashtray to show Dylan that there were the endings of marijuana joints, commonly called roaches. The roaches were among the cigarette butts and what appeared to be residue of marijuana. Dylan was surprised as he does not smoke. The officer then picked up Jeremy's backpack and proceeded to search it. He found a bottle of prescription Adderall (used to treat attention deficit hyperactivity disorder) in the front pocket. Dylan was asked if the drugs were his and if he planned on selling them, to which he replied, "Officer, that is not my backpack." Officer Garcia replied, "You just said you are the owner of the car and this backpack is in your car." Dylan was read his rights, taken into custody, and subsequently charged with possession of marijuana (less than 2 grams) and 28 counts of possession of a controlled substance with intent to distribute. The criminal charges against him could result in a possible sentence of 15 years in jail.

Defendant's Plea

The next morning Dylan appeared before a judge and pleaded not guilty to the charges filed against him. He was released on \$7,000 bail until the case could go to trial. During the following year Dylan paid for bond fees (\$700), attorney's fees (\$3,500), and five trips back to south Texas from San Antonio for arraignment hearings and court hearings (\$1,500), three of which were cancelled due to the judge or lawyer not showing up in court at the last moment. It took the court 14 months to schedule the case for trial, during which time Dylan had to pay an additional \$500 to remain on bond at the beginning of the second year. He was offered legal representation three days before the scheduled trial date, but he declined as he already hired legal representation.

During the trial evidence was presented that explained the marijuana residue in the ashtray. His grandmother had a prescription for medicinal use of marijuana in California and that was where the residue derived. The prescription was produced but found inadmissible as evidence because Texas law prohibits medical marijuana. The Adderall was a legal prescription that belonged to Jeremy and his medical records were subpoenaed to prove that fact in court. The District Attorney; however, refused to drop the charges for marijuana possession. Dylan was found guilty and given the option to serve up 30 days in jail or be placed on probation for a year. Dylan chose to take probation for a year. During the year that he was on probation he had to pay \$75 for a drug rehab course, \$80 a month to the probation officer and submit to monthly urine analysis (all test results were negative), complete 24 hours of community service, and pay \$1,500 in court fees and the \$150 citation for the faulty taillight. The faulty taillight was the reason for the stop, but in the end Dylan paid fees and costs totaling \$8,810.00. He was restricted from leaving Texas for over 26 months while the case was pending and while he was on probation.

Probation

Keep in mind that if Dylan had failed to meet any of the court-ordered requirements of his probation within that year he would have faced serving up to 6 months in jail. All this happened as a result of a faulty taillight and less than two grams of marijuana residue in an ashtray. The defendant's costs have been described in detail, but they do not cover what it cost the city to process this one case through over two years of court proceedings. If the costs to the city government were reviewed, the finding would reveal more costs that are not tracked. Officer Garcia initially processed the police report. The police report was assigned to Detective Aleman to complete an investigation. Once the investigation was complete, she had to present the case

before a panel to get approval to proceed to trial. In the five court dates that followed during the first year, the District Attorney, Detective Aleman, and Officer Garcia had to be present at each court date. This includes the three court dates that were cancelled at the last minute. These are paid hours that are not tracked as part of the cost of that one charge of possession of marijuana (less than 2 grams).

Second-Order Effects

Dylan later attempted to sign up for the U.S. Army, following in his parent's footsteps. The recruiter informed him that he would have to get his criminal record expunged before he could sign up for military service. Through the process of finding out what is required to get his record expunged, he learned he would have to wait at least 12 months after probation to apply. He would also have to obtain the services of an attorney and pay for his criminal record to be expunged. After expunging his record the marijuana possession charges would still be visible to any federal agency (including the U.S. Army). This is just one case in which the defendant was charged and convicted of marijuana possession. The case turned out in his favor primarily because Dylan had the means to pay for legal representation. Dylan was afforded an opportunity to either stay in jail short-term (30 days) or go on probation, which came at a very high monetary cost. What costs are governments at all levels absorbing as a result of the War on Drugs?

Drug crimes have seen a widespread increase and continue to rise. It is important to put this idea into context; it is not comparable to epidemics such as plagues or pandemics that have struck in history. Epidemics such as the bubonic plague, the Irish famine, and AIDs have claimed millions of lives. The definition of "widespread increases" rather is based on the number of arrests and more specifically the disproportionate number of arrests that are made due to marijuana in the criminal justice system. The arrests include the number of inmates that are in

prison as a result of marijuana-related crimes and their cost in comparison to all other crimes. According to Atkins and Mosher, “We devote considerably more attention to marijuana, given that this substance continues to dominate the United States’ drug war in terms of number of arrests” (2007, 4).

Amendment XX Adoption

In November 2000, Colorado adopted Amendment XX that allows for the use of medical marijuana by adults age 21 and above who are approved by the Colorado Department of Public Health & Environment and a primary physician (2015). This new policy opened a way to answer many questions that had been closed due to federal prohibition. Previously speculated medical benefits of cannabis can now be openly tested to measure their efficacy in treating approved medical conditions. The criminal justice system can begin to see a reduction in possession charges; a decrease in drug sale charges as dispensaries are established; and they can measure if crimes of robbery, larceny, theft, burglary, and driving under the influence are affected by the new MML policy in Colorado.

According to Anderson et al., “Medical Marijuana Laws (MML) remove state-level penalties for using, possessing and cultivating medical marijuana” (2013, 333). The American College of Physicians (ACP) published position statements that support a review of the current schedule classification of marijuana. The ACP encourages and supports the scientific findings regarding marijuana’s safety and its capacity to produce a desired effect. The efficacy and safety of drugs is determined by the Food and Drug Administration prior to approval for medical use. Marijuana has not been put through stringent scientific research to be designated as a schedule 1 drug or to be placed on the list of controlled substances. Medical benefits of marijuana use are some of the main arguments and indicators for legalization. According to Danovitch,

“Marijuana’s potential medical benefits merit a re-assessing of its scheduling status by the FDA, but the possible health benefit is not well served if the FDA’s responsibility to scientifically ascertain safety and efficacy is altogether circumvented” (2013, 107). State governments have adopted amendments to allow the use of cannabis for medicinal purposes; however, the states are still governed federally by the Controlled Substances Act. State governments continue to progress toward legalizing marijuana, citing the failure of the prohibition (Anderson et al., 2013, 336).

The prohibition of marijuana occurred in 1937 when the Marijuana Tax Act was passed. As a result of open use of drugs in the 1960s President Nixon adopted a policy that is still in effect today: the War on Drugs. The War on Drugs made marijuana a schedule 1 drug, the most restricted category of drugs. Since its designation marijuana has never been removed from the schedule 1 drug list. This designation has resulted in a huge rise in costs for the War on Drugs. The Drug Enforcement Agency (DEA) reports that marijuana investigations continue to be high on their priority list. Arrests and convictions for drug possession and use have gone up continuously in the last 40 plus years. As long as marijuana remains a schedule 1, drug the trend of allocating resources of law enforcement and costs will continue to increase at about half a billion dollars a year (Shepard and Blackley, 2007, 404).

This research is compelling for two reasons. First, the federal government has designated marijuana as a schedule 1 drug based on no objective scientific inquiry, instead taking an ideological position. This study seeks to analyze the impact by identifying a relationship between MML and crime rates. This is a preliminary inquiry as the impacts of the law are not fully known. Unknown information includes reduction in crime rates, revenue generated by sales, averted prison costs, and tax revenue benefits due to MML. The nature of the problem and how

Colorado dealt with MML is very organized. Colorado assigned a task force and directed them to use standard operating procedures previously used during the control of alcohol sales and prohibition. The task force has dealt with issues that include licensing, taxation, ordinance, and prohibition procedures.

Research Purpose

Colorado is the first state to adopt an amendment for both medical and recreational cannabis legalization. The success or failure of legalization is observed by local, state, and federal governments in the United States. Foreign countries that are considering legalizing marijuana are also paying close attention. One measure of success would be a drop in crime.

The purpose of this research is to determine if MML in Colorado leads to a decline in rates for crimes associated with marijuana (property crimes, burglary, larceny/theft, violent crimes, robbery, and driving under the influence). The data (Colorado crime rate and national crime rates) are gathered before and after implementation of medical legalization to determine its impact. Hypotheses about the influence of medical marijuana legalization and crime are developed and tested using interrupted time series regression.

The stakeholders in this situation are the governments worldwide that are looking at the state of Colorado to see the influence of marijuana legalization on crime. On the federal level, stakeholders want to know if marijuana should continue to be a schedule 1 drug. Citizens of states that choose to legalize marijuana for medicinal use gain considerably if marijuana use or possession is decriminalized. The federal government still follows implementation of prohibition policy. It unofficially gave consent by staying out of the way while Amendment XX was implemented by the Task Force and all procedures associated with implementation of the

amendment were worked out as long as effective measures of control were used throughout the process.

If medical marijuana had been legal in the state of Texas when Dylan was stopped for a faulty taillight and marijuana residue was found in the ashtray, the outcome would have been completely different. Evidence from the grandmother's doctor supporting the claim that the marijuana residue was present legally for the grandmother's medical needs would have been allowed into the court record and marijuana possession would be a non-issue. Instead, Dylan was charged with possession of marijuana and given probation for a year. He now has a record that precludes him from serving in the military and further restricts access to educational loans and benefits.

Chapter Summaries

Chapter Two presents a review of the literature. This chapter outlines marijuana prohibition history and crime, discusses legalization/decriminalization as a policy change for regulation of medical marijuana in the United States. This chapter also explores medical benefits, revenue targets, and unfairly enforced law to highlight the extent and seriousness of the topic. The hypotheses are also developed.

Chapter Three discusses the setting for the research project, the state of Colorado. It reviews the MML that was enacted in 2000 by discussing the political climate and details of the law. This chapter also provides information on crime trends for the state. Chapter Four operationalizes the hypotheses and describes the methodology used to address the research question. The research method selected is an interrupted time series with comparison group analysis. The existing data used to evaluate crime rates and unemployment rates are reviewed

therein. Statistical analysis is possible because the existing data are entirely quantitative in nature. The test used to measure the impact of the policy is also described in this chapter.

Chapter Five presents the results of the statistical procedures. The results are summarized in tabular form and then interpreted in the text. Chapter Six summarizes the conclusions drawn from the results in Chapter Five. This final chapter includes suggestions for future research and conclusions. By conducting an interrupted time series comparison group analysis with crime rate and employment data obtained from the Federal Bureau of Investigation (FBI) and the Department of Labor, this study sought to examine the relationship between MML and crime rates in violent crimes, property crimes, and DUI. This chapter communicates how this study provides an opportunity to fill gaps in the existing body of research, as there have been few opportunities.

CHAPTER TWO – LITERATURE REVIEW

U.S. marijuana prosecutions severely damage thousands of young lives every year and are cruel, unnecessary, and, probably, criminogenic. (Stephen B. Duke, 2012, 1312)

PURPOSE

The purpose of this chapter is to introduce the literature on marijuana policy in the United States. In addition, a set of hypotheses that address questions about the role of medicinal marijuana legalization and its relationship with crime is developed. The literature on the relationship between crime and the use of medicinal marijuana are examined in order to develop fruitful hypotheses. The hypotheses answer the questions about the role of relaxing marijuana prohibition and its influence on crimes associated with marijuana. These crimes include robbery, burglary, larceny and theft, and driving under the influence in Colorado in comparison to the national crime rates.

Historical Background and Contemporary Setting

Prohibition of illegal substances in the United States dates back to the 1900s, when Chinese-Americans were denied their opium by a group of Protestant missionaries. This action led the way to prohibiting other substances including alcohol, tobacco, heroin, cocaine, and marijuana. According to Stephen B. Duke, “The apex of the movement was the adoption of alcohol prohibition in 1920” (2010, 83). The Federal Bureau of Narcotics (FBN) was the government agency that enforced the prohibition policies and was separated in 1930 and a drug enforcement agency known as the Bureau of Narcotics and Dangerous Drugs was created.

In 1933 the alcohol prohibition was repealed and Harry Anslinger, the bureau chief of the Bureau of Narcotics and Dangerous Drugs started a campaign against marijuana. This campaign

culminated with the passage of “the Marijuana Tax Act of 1937 [which] effectively outlawed the drug throughout the United States” (Duke, 2010, 84). Over time other countries that viewed drugs as dangerous or of potential danger to the health and safety of their residents began to adopt drug prohibition as well. According to Duke, presently “180 nations have signed the treaties and their protocols, making drug ‘control’ a global phenomenon” (2010, 84).

Marijuana use became popular in the United States in the 1960s. President Nixon is given credit for creating the War on Drugs as it was under his administration that drugs became a major issue during presidential campaigns, increasing focus on drug networks in South America and Mexico (Issit and Finley, 2014, 2). In the 1970s public opinion and political will were slowly leaning toward legalization and decriminalization. “President Nixon’s Shafer Commission recommended reclassifying and decriminalizing in 1974” (Duke, 2012, 1303). Several states took the initiative and decriminalized possession of less than one ounce. In a message to Congress, President Jimmy Carter recommended decriminalization. Then President Ronald Reagan took office and he strongly favored increasing criminalization and furthered the cause by supporting Nancy Reagan’s “Just Say No” campaign. In 1988, the Drug Enforcement Agency’s Chief, Judge Francis Young ruled that cannabis is safe and medically useful. He advocated for a schedule change but was overruled.

Currently over 20 states have legalized the medical use of marijuana with differing levels of regulation. In 2000, Colorado voters approved Amendment XX allowing the sale and distribution of medical marijuana. On “November 6, 2012, Colorado voters approve initiatives (Amendment 64) legalizing use and possession of small quantities of marijuana making it the first state to legalize recreational marijuana” (Duke, 2012, 1302).

The main reason states seek to adopt MML is for the medicinal relief of symptoms and therapeutic properties of the plant. “Proponents argue that marijuana is both efficacious and safe and can be used to treat the side effects of chemotherapy as well as the symptoms of AIDS, multiple sclerosis, epilepsy, glaucoma, and other serious illnesses” (Anderson, et al., 2013, 334). In addition, prohibition is very costly to enforce and has led to “increased crime rates, expanded prison population and has strained the nation’s economy” (Issit and Finley, 2014, 1). The War on Drugs had similar results with huge growth in the prison population and persecution of ethnic minorities. The War on Drugs and prohibition are expensive and take up a large part of tax revenues without significant results.

According to Shepard and Blackley, “At the federal level, spending for drug enforcement (including interdiction and intelligence) rose from \$1.5 billion in 1981 to over \$12 billion by 2002. The annual cost of marijuana law enforcement alone is estimated to cost 7.7 billion a year” (2007, 404). In their article, Shepard and Blackley highlight that state and local law enforcement agencies have assumed many of the responsibilities to slow down the flow of drugs into the country and the community. On a daily basis police agencies interject by arresting and charging defendants with steep penalties in the form of fines; apprehension of personnel and private property; and imprisonment of anyone caught buying, selling, or making drugs. “These policies have resulted in large and growing economic costs for the public sector with substantial increases in resources used by federal, state, and local governments for drug control and police agencies, prosecution and imprisonment drug education and treatment, and research pertaining to drug control” (Shephard and Blackley, 2007, 403-404). In an effort to find other options for law enforcement agencies to regulate and keep order, state governments have elected to control drug

crimes through reducing the penalties. “The prohibition policies are not effective” and “only stop about 10% of illegal drugs from reaching the United States” (Issit and Finley, 2014, 2).

Concerns of Marijuana Use

Public health and safety are a concern of governments in the legalization of marijuana. There is fear that legalization/decriminalization will increase marijuana use substantially. According to Duke, the concerns were identical in the Netherlands and Portugal when they decriminalized, yet there was not a substantial gain in marijuana use in either country as a result legalization/decriminalization (2010, 87-88). The following are reasons for restrictions public health and safety, and impact on youth:

Public Health

Danovitch identified measures that can be taken to safeguard the public’s health if marijuana is legalized (2013, 106-107). Of primary concern are three groups in the population: 1) youth, 2) pregnant or breastfeeding women, and 3) individuals at high risk for mental illness. As a result, marijuana, like alcohol, is legalized with restrictions, qualifications, or alternative measures. These measures include the following:

1. Restrictions on marijuana use and possession by individuals less than 21 years of age.
2. Prohibition from operating heavy machinery, to include cars, while intoxicated.
3. Regulation of commerce from the manufacture and sale of marijuana to guarantee control from safety to zoning (dispensaries have to follow zoning requirement and stay clear of schools).

4. Standardization and monitoring of labeling so that so that quantity, strength, and constituents are known, and used as a warning label to pregnant and breastfeeding women. (Danovitch, 2013, 106-107).
5. Initiation of an education program which ensures the public is educated about the health risks and benefits of marijuana.
6. Initiation of treatment programs should be more readily available if legalization is implemented because it works. Although there are no known cases of overdose from marijuana, users can abuse marijuana.

Restrictions, qualifications, and alternative measures can help place control tools in effect, much like alcohol restrictions, and at the same time provide an opportunity for appropriate uses of medicinal marijuana. “In study after study, decade after decade, researchers have found no reliable evidence that marijuana is a serious threat to the health of a normal, adult user” (Duke, 2010, 84). The state of Colorado is leading the way in shaping public policy that takes decades of health lessons gained from regulating alcohol and tobacco and applying it to the medicinal marijuana legalization.

Public Safety

In public safety, the concern is not simply the three groups previously identified in public health (youth, pregnant or breastfeeding women, and individuals at high risk for mental illness). The primary concern is the entire population, and as a result marijuana, like alcohol, is legalized with restrictions, qualifications, or alternative measures. These measures include the following:

1. Driving under the influence is prohibited.
2. Restrictions on marijuana use and possession by individuals less than 21 years

of age.

3. Prohibition from operating heavy machinery, to include cars, while intoxicated.
4. Regulation of commerce from the manufacture and the sale of marijuana to guarantee control from safety to zoning(dispensaries have to follow zoning requirement and stay clear of schools).
5. Standardization and monitoring of labeling so that so that quantity, strength and constituents are known, and used as a warning label to pregnant and breastfeeding women. (Danovitch, 2013, 106-107).
6. Initiation of an education program which ensures the public is educated about the health risks and benefits of marijuana.
7. Initiation of treatment programs should be more readily available if legalization is implemented because it works. Although there are no known cases of overdose from marijuana, users can abuse marijuana.

In addition there is a physical security and safety concern for the public because of the threat of violence through crime. In a 2012 study, by Kepple and Freisthier examined the ecological effects of dispensaries in a cross-sectional study in and around Denver, CO. This study looked at public safety from a physical security perspective. Legalization is contested because it would lead to more crime over time because of an increase in the number of marijuana users. “They would engage in predatory crimes to support their habits” (Morris et al., 2014, 1). While “routine activity theory purports, that crime occurs in places with suitable target, motivated offender, and lack of guardianship” (Kepple and Freisthler, 2012, 523), the study found that after applying the routine activity theory there was a negative association with crime or no relationship when the dispensaries are located in areas that are heavily populated and

guardianship and security measures are in place. In a 2014 study by Morris et al., they examined the correlation between marijuana use and criminal behavior using the evidence from the State Panel Data (1990-2006). They found a positive correlation between marijuana use and criminal and aggressive behavior, but not violent behavior. Thus if the possession and sale of marijuana were legal, the relationship between marijuana and crime might disappear. The study examined violent and property crimes which are Part One offenses. As was expected based on the crime trends of the time (1990-2006), rates of the seven crimes examined went down. More interesting is that in the states that passed medical marijuana legalization the crime rates dropped more steeply after legalization was passed. The study's findings go completely against the argument that legalization will cause an increase in violent and property crime and pose a danger to public safety and health. Medical marijuana legalization is not a great safety concern, nor is it correlated with crime increase, but rather it has been shown to decrease crime more steeply in the states that have passed MML.

Impact on Youth

A major concern of legalizing medicinal marijuana is losing control of cannabis and its availability to children. It is the only threat that can derail the entire process of medical marijuana legalization. The effects of marijuana in young people are different, as their brains are in the developmental stage affecting educational accomplishment, adjustment, and socialization. "Among people who first start smoking marijuana before the age of eighteen, the incident of addiction is substantially higher" (Danovitch, 2013, 99). Of particular concern is that "chronic increases in stimulation of the brain's cannabinoid system can lead to morphologic and physiological changes especially during adolescence" (Danovitch, 2013, 102). This indicates that

there are long-term effects to the use of marijuana. Danovitch (2013) further discussed concern for mental health as heavy marijuana use can increase the likelihood of anxiety and depression, has the potential to cause psychosis, and may be a risk factor for the development of psychotic disorders.

Addressing Drug Abuse and Addiction

“Marijuana is sometimes characterized as being harmless and other times characterized to be very harmful” (Danovitch, 2013, 92). The main psychotropic component in marijuana is tetrahydrocannabinol (THC); however, there are up to 60 cannabinoids that are related to THC whose effects are not fully understood. Danovitch presents lines of evidence that support the validity of marijuana addiction.

- 1) Those who are addicted to marijuana attest to having symptoms that include not being able to stop when desired.
- 2) The use of marijuana causes inauspicious results in their lives.
- 3) They continuously seek medical help because they want to stop and those who do stop experience withdrawal symptoms similar to nicotine withdrawal.

The problem with the argument that marijuana is bad for a person’s health is that the risks are not so great that a total ban is merited. In comparison with alcohol and cigarettes, most of the problems associated with marijuana use are true for both those substances as well, yet they are not banned. In addition, it is possible to die from alcohol overdose and cigarettes are linked to many forms of cancer that do kill a person. This is not the case with marijuana, as most users do not chain smoke marijuana. There has never been a fatal overdose attributed to marijuana despite its extremely widespread use, and the reason for that is because it is virtually impossible to

fatally OD on marijuana (Atkins and Mosher, 2007, 2). If we use alcohol and cigarette use as a yardstick, there are health risks associated with marijuana, just not enough to merit strict, punitive regulation.

According to Atkins and Mosher, “note how legal drug use varies across a variety of socio-demographic factors. As with illegal drugs, the use and abuse of legal drugs is much more common in late adolescence and early childhood” (2007, 200). Gender plays a role in who is more likely to use and abuse most forms of legal and illegal drugs; women are more prone to abuse most forms of legal and illegal drugs. “Drug use also varies significantly by race/ethnicity, but similar to the situation with illegal drugs, whites are among the most likely to use and abuse legal drugs” (Atkins and Mosher, 2007, 200). Age plays a role among those who test positive for marijuana use, and youths are more inclined to report delinquent and aggressive behavior. “Illegal drug use was much more likely among urban populations, but rural populations and small towns were as or nearly as likely to report the use of many legal drugs” (Mosher and Atkins, 2007, 200). There is health risks associated with marijuana; however, consideration should be given to other factors because the health risks alone are not sufficient to merit strict, punitive regulation.

Prohibition

Drug prohibition should rest on some objective valuation of its impact on individuals and public health. Earlywine notes, “These arguments sooner or later boil down to something about ethics, principles or morality” (2010, 194). If the law is approached from a moral perspective, then the courts should return to prosecuting for marital affairs and same-sex contact. Not too long ago those acts were prosecuted for the same reason: they were deemed immoral. Marijuana was not

prohibited based on its dangers. The primary argument against legal cannabis is that its use is characterized or believed to be wrong or immoral despite its medical benefits. Morality should not override medical benefits as justification to regulate. The criminal justice system does not provide criminal punishment for every immoral act, suggesting that morality does not justify government sanctions. According to Earlywine, “This [morality] argument is quite convoluted. Links between cannabis use and crime are actually quite tenuous” (2010, 198). In order for it to be a crime there has to be contact with the illicit drug market, but if sales or possession were not a crime, the expected outcome logically is that those crimes would drop.

Prohibition is the current policy of the federal government under the Marijuana Tax Act of 1937. Enforcing this policy has had some unforeseen consequences that include economic and social costs, trends in arrests, mandatory minimum sentencing policies, and ancillary policies that deny welfare and student aid. The focus on marijuana takes away police attention from serious crimes. As a result of this added attention to drug enforcement at the individual level, the number of police officers on payroll has gone up 2.5 times faster than the population, yet the clearance rate of investigations that are closed has steadily decreased (Duke, 2013, 1310).

Rationale and Evidence that Prohibition is Ineffective

In the United States more than 20 states have passed laws approving MML eliminating prohibition at the state level. The following are some of the circumstances strengthening the argument that prohibition is ineffective.

a. Prohibition by definition forbids something. The current prohibition policy does not prohibit or control the use of marijuana. Marijuana can only be regulated through control or if it is directed via rules or law, but it has to be legal for control to be in place. “Prohibition is

inconsistent with control, because only that which is legal can be regulated by law” (Duke, 2012, 1308). United States laws view prohibition as drug “control,” however; it does not fall in line with control. Marijuana is not currently legal and not controlled by prohibition.

b. “Prohibition damages and sometimes destroys lives” (Duke, 2010, 86). Prison sentences for marijuana ultimately end up scaring and damaging prisoners future, leaving them to struggle to find housing, jobs, and education opportunities. According to Duke, “the most frequent charge for which a person is arrested in the United States is a drug offense [80%]” (2010, 86). Police use a stop-and-frisk tactic that has given way to a pattern of drug arrests that has exponentially increased and is at an all-time high (Duke, 2010, 86).

c. “Prohibition exacerbates racism” (Duke, 2010, 86). The difference in application of the law is a result of unspecific prudence allowed to police by the DEA. Unlike theft or burglary where an entire investigation has to be initiated and warrants issued for searches, the police only need conduct a search of the person and he/she has a case and can make an arrest. Thus officer discretion is greater and opportunities for racist arrests are greater. These types of searches are more common among minorities who do not know to challenge authority in these situations. As noted by Duke, “[In New York city] Blacks and Latinos are arrested for drug offenses at a disproportionately higher rate than whites. Although blacks and Latinos account for no more than 30 percent of the drug using population, they comprise 85% of those who are arrested for marijuana possession” (2010, 86).

d. “Prohibition is extremely costly” (Duke, 2010, 87). Enforcing the current prohibition policy at the different levels of government (local, state, and federal) is accompanied by a huge price tag. The costs are associated with prosecution and imprisonment of persons for offenses related to marijuana violations. According to Duke, “one conservative estimate is \$8 billion per

year for the United States alone, that figure could be drastically larger – as much as \$100 billion, depending on what is counted as a cost” (Duke, 2010, 87). “Approximately, 67% of these funds [enforcement costs] are devoted to spending on supply reduction efforts, law enforcement, interdiction and international programs” (Issit and Finley, 2014, 3).

e. “Prohibition breeds crime and supports criminal organizations” (Duke, 2010, 85). As a result of the demand and drug market in the United States, “Mexican gangsters have murdered more than ten thousand people in the past two years, fighting for territory both among themselves and with government” (Duke, 2010, 85). An example of supporting drug organizations is the opium production in Afghanistan and their terror efforts against governments including the United States. “Ironically, although marijuana has never been shown to trigger violent propensities in its users, the billions earned by suppliers generate a great deal of violence, both in the United States and elsewhere” (Duke, 2010, 86).

f. “Prohibition Impairs International Relations” (Duke, 2010, 87). The countries that consume and produce the drugs play the blame game for producing the illicit drug and for the violence that is attributed to their appetite for the drug. “Not only would the creation of legal drug markets throughout the world allow for an enormous sum of money to be spent more productively, it would also greatly diminish the international blame game and help rid the United States of its reputation as an international bully” (Duke, 2010, 87).

Legalization

As stated earlier, medical benefits of marijuana use are some of the main arguments and indicators for legalization. The state of Colorado approved the use of medical marijuana in 2000. Colorado used MML for over ten years as a stepping stone to recreational marijuana

legalization. Atkins and Mosher contend that, “Because of marijuana’s safety record and medical applications (e.g. glaucoma, migraine headaches, surgical pain, nausea and vomiting, weight loss, movement disorders such as Tourette’s syndrome and seizures), many physicians and practitioners have argued that marijuana should be reclassified as a Schedule II controlled drug (indicating a substance has medical value and is acceptable for medical prescription)” (2007, 116). To date the federal government retains restrictions on marijuana. Marijuana inadvertently may keep users from using harder drugs because it satisfies drug cravings. MML does increase the supply that leads to an increase in demand as was seen in Colorado, where “the registered marijuana users rose from fewer than 10,000 to more than 100,000” (Kamin, 2013, 149). The law is adopted but more importantly it regulates manufacture, sale, potency, and safety, provides some legal protections, and is sold only to registered patients. If proponents of marijuana legalization want to see success, they must focus on the medical benefits and stay away from a policy to smoke it (Joffe et al, 2004, e636). If marijuana can be regulated and some of the restrictions lifted, then some of the crime would go down because the restrictions themselves cause the crime.

Revenue Targeted for Taxation

Drug tax laws were first introduced in 1983 in Arizona and have been adopted by 16 states, “as an additional means of imposing civil penalties on those who sell illegal drugs even if they are not convicted in criminal courts” (Atkins and Mosher, 2007, 224). The manner in which the tax laws were introduced was designed as another penalty. The result of drug prohibition looks almost identical to alcohol prohibition in the 1920s: it has led to a rise in crimes, lost tax revenues, and little effect on consumption. If medicinal marijuana is legalized, it becomes a

commodity and can be openly taxed, a clear revenue generator. Legalizing medical marijuana also allows the government to take a percentage of the revenue through taxes.

“As of Jan 2014, legal marijuana in America is now estimated to be \$1.4 billion industry and expected to grow to \$2.34 billion in 2014” (Barcott, 2014, 1). Conservative estimates on sales of marijuana are at \$33 billion based on a street value of \$185 an ounce and annual consumption of 180 million ounces, according to the Office of National Drug Control Policy (Bernasek, 2014, 1). Colorado implemented a vertically integrated medical marijuana industry to regulate legal pot. In this case, retailers grow and process most of the pot they sell. They control everything from paying taxes to security. The retailers also grow 70% of their own product (Barcott, 2014, 2). Colorado growers and other supporters worried about low prices because cheap pot is bad for the industry, particularly because the state planned to take 25% of the revenues in the form of taxes (Barcott, 2014, 6). There was concern that if the product is taxed too heavily the product would bleed across state lines. Ideally, the industry wanted to keep marijuana priced at what is referred to as the “Goldilocks price.” This price is low enough to starve the black market but high enough to discourage a spike in consumption. It is not about beating the street price, rather reflecting the street price range. In Colorado there is a medicinal marijuana population from which the state collected \$300 million in 2013. With legalization of recreational marijuana, the state is expected to have an additional 500,000 residents buying for recreational purposes (Barcott, 2014, 3). Other studies estimate the sales at upwards of \$70-\$100 billion (Bernasek, 2014, 1). If legalized nationally, there can be a boost to the US Treasury of up to \$9 billion dollars plus additional savings on law enforcement (Bernasek, 2014, 1). Federal and state governments would participate and share the authority to collect revenues from the product during manufacture and distribution.

Law Unfairly Enforced Against Minorities

Prohibition has failed to halt or make a difference in consumption of marijuana. “For evidence look no further than the current size of the marijuana market [conservatively estimated at \$33 billion]” (Bernasek, 2014, 1). Controlling drug trafficking and manufacturing across the United States border has failed, so the government’s policy has turned to reducing demand for marijuana by prosecuting users and recreational distributors. The problem with current prohibition policy is how the policy is enforced. The biggest players in the War on Drugs are criminal organizations and gangsters fighting with the government and each other over territory; however, the government chooses to prosecute the individual drug user and those selling drugs on street corners (Issit and Finley, 2014, 3). Police discretion and stop-and-frisk search practices continue to disproportionately be applied more harshly against Blacks and Latinos. “Racial disparity has gotten worse with time in 2001 it was 192 out of 100,000 arrests for whites and 537 or 100,000 arrests for blacks, by 2010 there was a steady rate of arrests but in blacks arrests per 100,000 had climbed to 716” (Barcott, 2014, 7). This trend is the same in 49 of the 50 states; only Hawaii had similar arrest rates.

Decriminalization is an option that is also available instead of legalizing. This would allow the government to impose civil charges rather than criminal charges for drug use. Instead of locking up prisoners they would be punished with fines. Decriminalization would keep the drug use restrictions in place but not jail people for making a moral choice to use marijuana or harm themselves (Bender et al., 1996, 18). Decriminalization still documents the incident and processes the fines associated with possession of marijuana, while MML removes criminal penalties and has the potential to decrease crimes.

MML reduces real problems associated with the illicit drug market. Under legalization, regulated dispensaries replace street-corner trade. It also allows people to grow their own marijuana thereby reducing street-corner trade. Legalization would also regulate and stabilize marijuana prices as the market responds to supply and demand. Supply would be more stable and the cost would fall. There would no longer be risk of arrests or actual arrests, or the costs of detection. This would expand demand and supply and result in lower equilibrium prices. “Additional research has shown that medical marijuana dispensaries may actually reduce crime within the immediate vicinity of the dispensaries” (Morris et al., 2014, 2). Safety concerns decrease because of improved security measures of dispensaries.

Supporters of MML seek to minimize excessive increases in the number of drug crimes and eventually reduce the number of arrests in every state. “Between 1993 and 2000 the prison population doubled, and over 58% of the new inmates had been arrested for drug offenses” (Issit and Finley, 2014, 3). In their study on state panel data, Morris et al. found “that while marijuana use was related to an increase in drug and property crime, it was not related to an increase in violent crime” (2014, 2) “Once the author removed all types of drug charges from the models, the relationship was no longer significant. Results revealed no evidence that marijuana use was related to an increase in later non-drug arrest, such as arrest for violent crimes” (Morris et al., 2014, 2). Legalization and prohibition make for an odd situation, as consuming illegal marijuana is a crime and therefore contributes to crime statistics. The lifting of the restrictions should cause crime to diminish because smoking marijuana would no longer be a crime. If use of marijuana were no longer a crime, crimes associated with marijuana use should also fall.

Crime Rates Associated with Marijuana

Since the 1960s, research shows that drug crimes have steadily risen in the United States.

Between 1984 and 1992, for example, there were over 12 million arrests on marijuana charges despite self-report surveys and other measures indicating that the use of marijuana remained constant during that period (Atkins and Mosher, 2007, 203). In 2010, the FBI reported 1,638,846 people were arrested for drug violations; 46% of the arrests were attributed to marijuana possession (Duke, 2013, 1311).

Marijuana legalization control systems must survive for other states to move towards national MML. “It has been argued that medicinal marijuana laws may increase crime because the dispensaries and grow houses provide an opportunity for property crime and violent crime to occur, such as burglary and robbery” (Morris et al., 2014, 2). The relationship between medical marijuana dispensaries and violent and property crimes was examined by Kepple and Freisthler in and around Denver in a cross-sectional study. They found “no relationship existed between medical marijuana dispensaries and property and violent crimes” (2012, 528-529 2).

Furthermore; proponents of the War on Drug argue that legalization causes an increase in drug use because the drug is readily available to the public. In countries that decriminalized marijuana, the Netherlands and Portugal, the number of users did not increase (Duke, 2013, 1314). In a study of the state panel data from 1990-2006 which looked specifically at states that adopted MML, the central finding gleaned from the present study was that MML (medical marijuana legalization) is not predictive of higher crime rates and may be related to reductions in rates of homicide and assault (Morris et al., 2014, 4).

A study by Morris et al. showed that, “robbery and burglary rates were unaffected by medical marijuana legislation”(2014, 2), which runs counter to the claim that “dispensaries and

grow houses lead to an increase in victimization due to the opportunity structures linked to the amount of drugs and cash that are present,” (Morris et al., 2014, 2). Recent legalization of recreational marijuana in Colorado has shown that when marijuana is illegal it causes crime due to its restrictions. Logically if the restrictions are taken away there would be fewer laws to break and less crime.

Key to this study is to seek an examination of the relationship between marijuana use and crime.

- 1) Legalization is contested would lead to more long term crime because of an increase of marijuana users. “They would engage in predatory crimes to support their habits” (Morris et al., 2014, 1).
- 2) Positive correlations between marijuana use and criminal behavior include:
 - a. In teens, those who tested positive for marijuana also have a higher referral rate to juvenile court.
 - b. “Marijuana dependence was related to a 280 percent increase in the odds of violence” (Morris et al., 2014, 2).

Morris et al. provide evidence that marijuana use is correlated with an increase in violent or aggressive behavior. Thus if possession and sale of marijuana use were legal, the relationship between marijuana and crime might disappear (2014, 2). If this link were broken through legalization, one would expect crime to fall. Many adult users view marijuana as a powerful drug but not a dangerous drug. Most users lead normal, healthy, and productive lives (Duke, 2010, 84). The government’s view on the dangers of marijuana and the attitudes of users are in contrast to one another. This policy should be reviewed and revised at a minimum to address the

direct contrast between attitudes of the citizens on marijuana and the position of the federal criminal law. Therefore one would expect:

- H1 The legalization of medical marijuana will lead to a decrease in property crimes associated with marijuana.
- H2 The legalization of medical marijuana will lead to a decrease in burglary crime rates associated with marijuana.
- H3 The legalization of medical marijuana will lead to a decrease in larceny/theft crime rates associated with marijuana.
- H4 The legalization of medical marijuana will lead to a decrease in violent crime rates associated with marijuana.
- H5 The legalization of medical marijuana will lead to a decrease in robbery crime rates associated with marijuana.
- H6 The legalization of medical marijuana will lead to a decrease in driving under the influence DUI arrests for alcohol.

In Colorado, residents who can apply for a medical marijuana registration card must do so through the Colorado Department of Public Health. Certain conditions must be met before a person can apply, these include:

- 1) Applicant must be a current resident of Colorado. Proof of identity and residency are required with application.
- 2) Applicants must currently receive treatment for a qualifying medical condition. Currently the medical conditions included are cancer, glaucoma, HIV or AIDS positive, severe chronic or debilitating disease that cause cachexia, persistent muscle spasms, seizures, severe nausea or pain.
- 3) Applicant must have a valid physician-patient relationship and be examined by said physician.
- 4) Applicants must complete and submit the application packet.

- 5) Applicants must apply for and be registered through the Department of Public Health & Environment to receive a medical marijuana card and purchase from the medical marijuana dispensaries. The state has put restrictions in place for personnel that qualify for medical marijuana (Colorado Department of Public Health & Environment, 2015).

According to Morris et al., “Most researchers who have examined the relationship between marijuana and crime report that these laws do not have an effect on violent crime” (2014, 2). “The author argued that the association between marijuana use and crime appears to exist because of its illegality. Thus, if the possession and sale of marijuana was legal the relationship between marijuana and crime might disappear” (Morris et al., 2014, 2). “If cannabis was taken out of the war on drugs it would leave about 40 million drug users to the other drugs a number too small when the costs and suffering of drug control and prohibition are considered” (Room et al., 2010, IX).

There have been many studies on the relationship between marijuana and crime, but a link between medical marijuana and the use of other substances or criminal activity has not been substantiated (Anderson et al., 2013, 334). There is a debate about whether marijuana and alcohol are substitutes or complement for one another among users. Anderson et al., examined the relationship between MML and traffic fatalities by exploring the effects of MML (2013, 334), in the states that adopted such laws. “The first year after coming into effect, the legalization of medical marijuana is associated with an 8-11 percent decrease in traffic fatalities” (Anderson et al., 2013, 334). The study found that when smoking marijuana and a driver has a positive blood alcohol content (BAC) there is a 13.2 decrease in fatalities (Anderson et al., 2013, 359). Anderson et al. report, “We find that the legalization of medical marijuana is associated

with reduced alcohol consumption, especially among young adults” (2013, 359). The decrease is attributed to users substituting alcohol with marijuana. Further, since marijuana consumption is normally done at home and not in a public bar, there is less travel after use. In addition, Anderson et al., speculate “Perhaps because drivers under the influence of tetrahydrocannabinol (THC), the primary psychoactive substance in marijuana, engage in compensatory behaviors such as reducing their velocity, avoiding risking maneuvers, and increasing their following distances,” fatalities fall (2013, 336). Among states that have adopted medical marijuana laws there has been a drop in fatalities due to the substitution of alcohol with marijuana and a reduction of drivers under the influence. This is not meant to imply that driving under the influence of marijuana is safer, but simply that because marijuana is normally smoked at home and not in a bar or restaurant like alcohol there is less travel after use and less likelihood of a crash (Anderson et al., 2013, 359).

Legalization of medical marijuana will lead to a decrease in robbery, burglary, larceny and theft, and driving under the influence crime rates. Morris et al. in their results from a fixed effects regression model, show that when compared to states that had not adopted MML, the states that adopted MML showed a decrease in crime rates for robbery, burglary, and larceny (2014, 3). It is important to note that if medical marijuana is legalized and restrictions loosened, the association with violent (robbery), non-violent (DUI), and property crimes (burglary/larceny) would decrease.

Legalizing medical marijuana allows for an opportunity to evaluate the impact of prohibition on a state’s crime rate. If medical marijuana is legalized and thus regulated, it will reduce rates for any crimes associated with marijuana possession. It is hypothesized that MML would have a positive impact on the state’s crime rates. Under the current policy of medical

marijuana legalization and recreational marijuana legalization, Colorado can help social scientists reach conclusions in crime rates as a result of legalization.

PRELIMINARY CONCEPTUAL FRAMEWORK¹

This study investigates the relationship between marijuana legalization and crime rates to better understand the MML impact. Since consumption of marijuana is associated with increased crime rates, it is hypothesized that the adoption of MML will lead to a decrease in crimes associated with marijuana that include robbery, burglary, and trespassing, larceny and theft, and driving under the influence (DUI) in Colorado in comparison to the national crime rates.

¹ For more information on developing conceptual frameworks in public administration, see Shields and Rangarajan, 2013; Shields and Tajalli, 2006; and Shields, 1998.

Table 2.1: Integrating the Conceptual Framework with the Supporting Literature

Title: Medical marijuana legalization (MML) and crime rates	
Purpose: To determine if medical marijuana legalization (MML) in Colorado leads to a decline in crime rates for violent crimes, property crimes and non-violent crimes associated with marijuana (robbery, burglary/trespassing, larceny/theft, driving under the influence) in comparison to the national crime rates.	
Hypotheses	Sources
H1 The legalization of medical marijuana will lead to a decrease in property crimes associated with marijuana.	(Barcott, 2014), (Bender et al., 1996), (Duke, 2013/2010), (www.FBI.gov , 2014), (FBI UCR), (Morris et al., 2014), (Atkins /Mosher, 2007), (Room et al., 2010)
H2 The legalization of medical marijuana will lead to a decrease in burglary crime rates associated with marijuana.	(Barcott, 2014), (Bender et al., 1996), (Duke, 2013/2010), (www.FBI.gov , 2014), (FBI UCR), (Morris et al., 2014), (Atkins /Mosher, 2007), (Room et al., 2010)
H3 The legalization of medical marijuana will lead to a decrease in larceny/theft crime rates associated with marijuana.	(Barcott, 2014), (Bender et al., 1996), (Duke, 2013/2010), (www.FBI.gov , 2014), (FBI UCR), (Morris et al., 2014), (Atkins/Mosher, 2007), (Room et al., 2010)
H4 The legalization of medical marijuana will lead to a decrease in violent crime rates associate with marijuana.	(Anderson, et al., 2013), (Duke, 2013/2010), (www.FBI.gov , 2014), (FBI UCR),
H5 The legalization of medical marijuana will lead to a decrease in robbery crime rates associated with marijuana.	(Barcott, 2014), (Bender et al., 1996), (Duke, 2013/2010), (www.FBI.gov , 2014), (FBI UCR), (Morris et al., 2014), (Atkins/Mosher, 2007), (Room et al., 2010)
H6 The legalization of medical marijuana will lead to a decrease in driving under the influence arrests (DUI) for alcohol.	(www.FBI.gov , 2014), (FBI UCR), (Kepple and Freisthler, 2012) (Morris et al., 2014)

Medical marijuana laws exist in other states, but the actual effects of these policies on crime are limited and to some degree unknown. Over twenty states have followed suit to date, adopting, medical marijuana laws with the argument that marijuana can be used for its medical benefits. As more states pass MML legislation the demand is expected to grow. This should lead to long-term medical benefits as well as benefits to the crime rates and reduced cost to the prison system.

CONCLUSION

In conclusion, the state of Colorado adopted a medical marijuana law over 14 years ago and recently became the first state to legalize recreational marijuana. The medical marijuana laws have been in place long enough to evaluate the effects of this policy. It is hypothesized that medical marijuana legalization would have a positive impact on the state's crime rate (property crime, violent crime, DUI). Many states have adopted medical marijuana laws and have been in place for several years, but no analysis of medical marijuana laws effect on crime is available in the literature. The next chapter focuses on the research setting. The state of Colorado offers an opportunity to evaluate the impact of medical marijuana laws on crime rates.

CHAPTER THREE – SETTING

PURPOSE

The purpose of this chapter is to review Colorado’s policy environment. “In 2000, Colorado voters approved an amendment to the state constitution providing an affirmative defense to a charge of marijuana possession for approved medical marijuana patients and their designated caregivers” (Kamin, 2013, 147). The passage of Amendment XX allowed patients with a diagnosed condition to obtain a doctor’s recommendation so they may benefit from use of medicinal marijuana. This chapter examines information on MML, crime trends for the state, and reviews the political climate that led to the 2000 Colorado MML. The implementation of the law was initially lax as most physicians set up delivery services or discreet retail locations (Sensible Colorado, 2012, 1). There was no initial control on distribution of medical marijuana. The Colorado Department of Public Health & Environment (CDPHE) made an informal rule barring physicians from providing medical marijuana to more than five patients. This informal policy was challenged and the department was sued by Sensible Colorado. The court ruled that physicians could provide medical marijuana to any number of patients who had a valid medical need. The medical marijuana industry was slowly controlled to its current stricter state in order to implement the follow-on adoption of Amendment 64, the recreational marijuana law passed in 2012 (Karim, 2013, 149). The CDPHE controls who can apply for and receive a Medical Marijuana Registry Identification Card. The goal is to approve and provide a card to a patient while working in conjunction with their primary care physician for certain medical needs. MML was not based on age but rather on medical need of a patient. The implementation of the law made it quasi-legal. This made the medical marijuana law (MML) effective on crime rate because it was not just restricted by age but rather available to all age groups. Case in point: had

the law applied primarily to the elderly as a result of their failing health, the effects would not be as visible. It was the law's widespread applicability to other age groups that allowed it to impact crime rates.

Drug-Related Crimes in Colorado

Research has shown that drug charges in the United States are on the rise. "Today more people are arrested for marijuana offenses than are arrested for violent crimes" (Duke, 2013, 1303). This has been the trend in Colorado as state officials have legalized marijuana but the law is still in violation of federal drug laws. "Between 1933 and 2000 the prison population doubled, and over 58% of the new inmates had been arrested for drug offenses" (Issit and Finley, 2014, 3). The War on Drugs has been a losing battle.

The issue of drug-related crimes is not limited to adults who wish to use marijuana as a recreational drug; it applies to patients of all ages who have diagnosed medical needs to use medicinal marijuana. Of particular interest for Colorado was that since 1990 crimes related to marijuana use and possession such as property crimes (burglary/larceny/theft) and violent crimes (robbery) crime rates had dropped in some cases by 50% by 2000 (Uniform Crime Report). This finding led to the political support for legalizing marijuana among constituents.

Colorado Medical Marijuana Legalization (MML) law

In 2000, Colorado approved Amendment XX. Initially, "a physician could only have five patients under their care" was intended to prevent wide-scale marijuana distribution (Karim, 2013, 148). This limit was overturned in 2007 and then again in 2009. The limit was voted on again and finally passed with a vote of six to three rejecting any limit on the number of patients any single physician could service. This led to de facto legalization because of more widespread

availability. The sale of any marijuana remained a serious federal offense. Despite this federal law, many dispensaries opened shop in Denver and throughout Colorado. “The total number of dispensaries that opened is not known but the number of patients rose from 10,000 to over 100,000 in fifteen months” (Karim, 2013, 149). Ease of eligibility for medical marijuana use made it easy for significant number of citizens to have access to marijuana via legalization.

Even after legalization there have been bills introduced that would put the dispensaries out of business and limit physicians to five patients, essentially doing away with the existing for-profit model. MML in Colorado was criticized because control measures were not regulated as heavily and it was viewed as a for-profit industry. In 2010, “Colorado passed SB 1284, a modified version of the industry bill which created a way state-wide apparatus for licensing of the marijuana industry” (Karim, 2013, 151).

In summary, although MML was initially adopted as a medical benefit, the primary motivation of the legislature later became to increase revenue to cover budget shortfalls and cover prison costs associated with drug crimes (Karim, 2013, 150). The next chapter focuses on the methodology used to evaluate the impact of this policy on the crime rates of the state.

CHAPTER FOUR – METHODOLOGY

PURPOSE

This chapter discusses the methodology used to test the hypotheses about the relationship between crime and legalization of medical marijuana. Hence, it explains the design and statistical techniques used to answer the research questions and shows how the hypotheses are operationalized*. The independent and dependent variables are defined and the source of data is identified.

DESIGN

The research design selected for this applied research project is an interrupted time series analysis with a comparison group – an explanation and formal hypotheses design**. This design uses interrupted time-series analysis with a comparison group to test the impact of MML on the crime rate.

Interrupted time-series analysis with comparison group is a strong design as it eliminates the resulting bias when one observation is made. This model is further strengthened by the observations over a period of time. In this instance, this design is appropriate because there is sufficient historical data available on crime rates, both property and violent crimes, in Colorado and nationwide.

The state of Colorado is the treatment group in this study. The treatment is the adoption of policy for MML in Colorado. Medical marijuana legalization was enacted in November 2000. The program went fully into effect in 2001.²

² * For other Texas State ARPs that use explanatory research see De La Cerda (2010); Huang (2009); Oaks (2005); Pearson (2002).

** For other Texas State University ARPs that use interrupted time series analysis see De La Cerda (2010); Holder (2009); Oaks (2005).

The U.S. crime rate is used to compare the same type of crimes in the state of Colorado and was selected as the comparison group because a medical marijuana legalization policy does not exist at the federal level.

The research design is schematically shown in Figures 4.1 and 4.2. The letter “X” in the figures represent the year MML went into effect in Colorado, “t” is the treatment group (Colorado), and “C” is the untreated comparison group (national crime rate). Letters “t-11” through “t-1” and “t-6” through “t-1” are observation times 11 years and 6 years (DUI arrests) before treatment, where as “t+1” through “t+12” are observation times following the treatment. There are two designs because property and violent crimes data are available from 1990 and DUI data are only available starting in 1995.

Figure 4.1: Schematic Research Design For Property and Violent Crimes

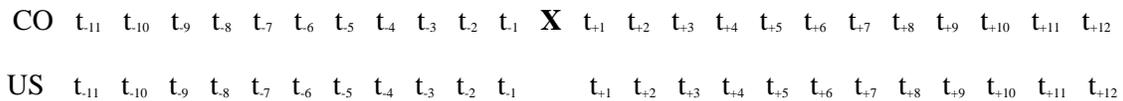
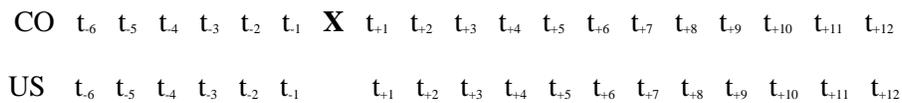


Figure 4.2: Schematic Research Design For DUI



OPERATIONALIZATION OF THE VARIABLES

There are three types of crimes examined in this study:

1. Property crimes
2. Violent crimes
3. Driving under the influence (DUI) arrests

Overall property crimes cover burglary and larceny/theft, while violent crime includes robbery. The overall violent crime rate also includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault of which we take a closer look at robbery.

Together all crimes studied account for six hypothesis that include a review of crime rates in overall property crimes, burglary, larceny/theft, overall violent crimes, robbery, and DUI. These crimes form the dependent variables of this study. Table 4.1 illustrates the operationalization of these both dependent and independent variables of this study. The independent variables used in the analysis include:

- A. Time variable (T) which is a counter representing time intervals.
- B. Dummy (D) variable that represents the level of change after the program went into effect.
- C. Program (P) variable that represents change of trend of the intervention group from before to after the program went into effect (post-pre).
- D. Countries (group) dummy variable that represents the two groups.
- E. Difference in trends before the program (product of countries (group D) x time (year A)).
- F. Difference in short-term impact after the program is in effect (product of countries (group D) x change of level (Dummy B)).
- G. Difference in program impact (product of countries (group D) x change of trend (Program C) or US (post-pre) – CO (post-pre)).
- H. A variable for the unemployment rate in the state of Colorado and the national unemployment rate.

Table 4.1: Operationalization of the Hypotheses

Dependent Variable*	Definitions	Measurement
H ₁ Overall property crimes H ₂ Burglary H ₃ Larceny/theft H ₄ Violent crimes H ₅ Robbery	Yearly amount of arrests for property crimes, burglary, larceny/theft, violent crimes, and robbery.	Number of crimes per 100,000 population per year.
H ₆ DUIs	Yearly number of arrests for DUI of alcohol	Number of arrests per year
Independent Variable *	Definitions	Measurement
A. Year (Time)	Year counter for both the intervention and comparison group	A counter from 1-46 representing years 1990 to 2013
B. Change of level (Dummy)	Level of change after the program went into effect	0 = Before MML went into effect (before 2001) 1 = After MML went into effect (after 2000)
C. Change of trends (Program)	Change of trend of the intervention group from before to after the program went into effect.	0=All periods before 2001 1, 2, 3, etc. = serial counter for each year after 2000.
D. Countries (Group)	Dummy variable that represents the two groups	0 = intervention group (CO) 1 = comparison group (US)
E. Difference in trends before program	Product of countries x year	D*A
F. Difference in short-term impact	Product of countries x change of level	D*B
G. Difference in program impact	Product of countries x change of trends	D*C
H. Unemployment	800 geographical areas per 60,000 household eligible for Current Population Survey (CPS)	Unemployment rate per 110,000 persons.

* Data Source: FBI Uniform Crime Report (UCR), Persons Arrested Section IV Tablets 29, 69; Department of Labor (DOL) Unemployment Statistics

DATA COLLECTION AND SOURCES

The study uses existing aggregated statistics as its data source. The Federal Bureau of Investigation (FBI) Uniform Crime Reports, Tables 29 and 69, along with Department of Labor unemployment reports were used as the data source, because they provide crime rates, persons arrested, and unemployment rates by year.

The Uniform Crime Report is the focal point and resource for law enforcement executives, criminal justice students, researchers, members of the media, and the public. The program was first established in 1929. In 1930, the FBI was tasked to collect, publish, and

archive crime statistics. The FBI produces four publications that include Crime in the United States, National Incident-Based Reporting System, Law Enforcement Officers Killed and Assaulted, and Hate Crimes produced from data received from 18,000 law enforcement agencies at city, university/college, county, state, tribal, and federal levels. Uniform Crime Report is normally measured by number of crimes per 100,000 and published annually for both each state and the national crime rate.

The Bureau of Labor Statistics (BLS) of the U.S. Department of Labor is the principal federal agency for measuring labor market activity, working conditions, and price changes in the economy. The Bureau's primary mission is to collect, analyze, and disseminate essential economic information to support public and private decision-making. The BLS has been providing support to public and private organizations since 1884. Every month approximately 110,000 samples are selected for a survey and of those 60,000 are called via phone to represent the population as a whole. The sample is not a total count; each month one-fourth of the households in the sample are changed so those selected will not be selected again for 8 months and then never again after a second survey. The Labor Force Statistics includes the National Unemployment Rate (Current Population Survey – CPS).

STATISTICS

The statistical technique chosen to evaluate an interrupted time-series with comparison group is regression analysis, which will determine if there is a relationship between MML and rates of property crimes (burglary and larceny), violent crime (robbery) and DUI. If there is a relationship between the two variables, the regression will describe the direction of the relationship. The next chapter focuses on the interpretation of the results from the regression analysis.

CHAPTER FIVE – RESULTS

PURPOSE

This chapter presents the results of the regression analysis (interrupted time-series analysis with comparison group) which tested the hypotheses about the relationship between MML and rates of property crimes, burglary, larceny/theft, violent crimes, robbery, and driving under the influence.

REGRESSION ANALYSIS

The regression analysis provides the most insight on the relationship between MML and crime rates. The results for the interrupted time-series comparison group are presented in tabular and narrative forms. Table 5.1 shows the result for each type of crime of the analysis. This chapter includes comparison of crime rates in Colorado and the United States and interpretation of all time-series analysis.

Hypotheses:

- H1 The legalization of medical marijuana will lead to a decrease in property crimes associated with marijuana.
- H2 The legalization of medical marijuana will lead to a decrease in burglary crime rates associated with marijuana.
- H3 The legalization of medical marijuana will lead to a decrease in larceny/theft crime rates associated with marijuana.
- H4 The legalization of medical marijuana will lead to a decrease in violent crime rates associated with marijuana.
- H5 The legalization of medical marijuana will lead to a decrease in robbery crime rates associated with marijuana.
- H6 The legalization of medical marijuana will lead to a decrease in driving under the influence arrests (DUI) for alcohol.

Table 5.1: Comparison of Crime Rates in Colorado and the United States

	Property Crimes	Burglary	Larceny/Theft	Violent Crime	Robbery	DUI
A. Year	-195.47**	-56.95**	-129.82**	-27.23**	-3.83**	1186.19
B. Change of Level	613.23**	125.55**	265.99**	60.35*	10.75	-4226.63
C. Change of Trends	35.17	35.49**	22.76	23.22**	1.87	328.94
D. US/Colorado	-517.29*	61.06	-835.09**	206.30**	178.77**	1424637.20**
E. Diff. in Trends Before Program	48.62*	3.72	64.46**	-.23	-9.96**	4609.45
F. Diff. in Short Term Impact	-538.42*	-104.74*	-293.49*	-63.70	-.21	19161.73
G. Diff in Program Impact	27.73	12.84*	-15.55	-5.55	8.96**	-18420.31
H. Unemployment Rates	9.85	-1.15	16.08	-1.39	-.01	-2591.43
Constant	5824.25**	1265.46**	4069.32**	624.01**	118.20**	28428.67
R Square	.96	.97	.96	.96	.97	.99
F	145.12**	215.85**	138.37**	118.25**	208.98**	1175.37**

* Significance at $p < .05$

** Significance at $p < .01$

Table 5.1 summarizes the findings of this study. The first three coefficients in this table refer only to the trends in Colorado, without adjustments for the national trends. Coefficients for the independent variables E through G, on the other hand, show differences in the crime trends between Colorado and that of the overall U.S. Each of these coefficients is discussed in the following paragraphs. It is worth noting that coefficients for the independent variable G in Table 5.1 are of special importance. These coefficients will help us to pass judgment on our hypotheses. These coefficients indicate difference-in-differences. In other words, each coefficient of this variable shows the difference between post-pre change in Colorado and post-pre change in the U.S. (adjusted for the state of economy). The coding scheme for the analysis of data was set up in such a way that positive significant coefficients indicate the post-pre crime rate changes in the U.S. are higher than the post-pre changes in crime rates in Colorado. Conversely, negative significant coefficient signs for the independent variable G show that the U.S. post-pre changes in crimes are lower than in Colorado.

The independent variable 'Unemployment Rates' is used as a covariate to adjust our findings for the variations in economic conditions in Colorado and the U.S. The following sections will examine important coefficients in Table 5.1 and take position on supporting or not supporting the hypotheses of this study.

H₁: Overall Property Crimes

The regression results for the overall property crimes show that property crimes were in decline ($B = -195.47$) in Colorado during the years before the medical marijuana legalization went into effect in 2001. When this trend is compared to the national trend for the same period (variable E), we noticed that Colorado property crimes were declining at a faster rate than the national rate ($US = 48.62 - 195.47 = -146.85$). Coefficient for the variable C ($B = 35.17$) shows the difference of the trends between the post implementation of the program and the years prior to 2001 for the state of Colorado ($post\ trend = -195.47 + 35.17 = -160.30$). The results do not show a significant slowing of the downward trend in property crimes after the program went into effect in Colorado. It should be noted this change of trends only compares the pre and post trends for Colorado without accounting for the overall trends in the nation.

A coefficient of particular interest to our study is represented by the variable G. Coefficient for this variable will help us to assess the impact of Colorado's medical marijuana legislation on crime rates. This coefficient of $B = 27.73$ for the variable G is not significant. The coefficient indicates that difference in post-pre national decline in property crimes was not significantly different from that of Colorado. In short, Colorado's medical marijuana legislation seems to have had no significant effect on lowering the overall property crime rate when the pre-

post declines are compared to the national trends. Our results, therefore, not support the first hypothesis of this study.

H₂: Burglary

The regression results for burglary crimes show that burglary crimes were in decline ($B = -56.95$) in Colorado during the years before the medical marijuana legalization went into effect in 2001. When this trend is compared to the national trend for the same period (variable E), we noticed that Colorado burglary crimes were not significantly declining at a faster rate than the national rate ($US = 3.72 - 56.95 = -53.23$). Coefficient for the variable C ($B = 35.49$) shows the difference of the trends between the post implementation of the program and the years prior to 2001 for the state of Colorado ($post\ trend = -56.95 + 35.49 = -21.46$). The result shows significant slowing of the downward trend in burglary crimes after the program went into effect in Colorado. It should be noted that this change of trends only compares the pre and post trends for Colorado without accounting for the overall trends in the nation. Difference in trends before the program (3.72) is not significant: the conclusion is that there was no difference between the two slopes before the policy went into effect. Difference in short-term impact (-104.74) indicates there were 104 fewer crimes in the U.S. compared to Colorado.

A coefficient of particular interest to our study is represented by the variable G. Coefficient for this variable will help us to assess the impact of Colorado's medical marijuana legislation on crime rates. This coefficient of $B = 12.84$ for the variable G is significant at α less than .05. The coefficient indicates that difference in post-pre national decline in the burglary crimes was significantly different than that of Colorado. In short, Colorado's medical marijuana legislation seems to have had significant effect on lowering the burglary crime rate when the

post-pre declines of Colorado are compared to the national trends. Colorado's increase in crime was significant at a lower rate when compared to the U.S. Our results, therefore, support the second hypothesis of this study.

H3: Larceny/Theft

The regression results for larceny/theft crimes show that larceny/theft crimes were in decline ($B = -129.82$) in Colorado during the years before medical marijuana legalization went into effect in 2001. When this trend is compared to the national trend for the same period (variable E), we noticed that Colorado larceny/theft crimes were declining at a faster rate than the national rate ($US = 64.46 - 129.82 = -65.36$). Coefficient for the variable C ($B = 22.76$) shows the difference of the trends between the post implementation of the program and the years prior to 2001 for the state of Colorado ($post\ trend = -129.82 + 22.76 = -107.06$). The results do not show significant slowing of the downward trend in larceny/theft crimes after the program went into effect in Colorado. It should be noted that this coefficient only compares the pre and post trends for Colorado without accounting for the overall trends in the nation. Difference in trends before the program (64.46) shows the coefficient is significant; the conclusion is that there was a difference between the two slopes before the policy went into effect.

A coefficient of particular interest to our study is represented by the variable G. Coefficient for this variable will help us to assess the impact of Colorado's medical marijuana legislation on crime rates. This coefficient of $B = -15.55$ for the variable G is not significant. The coefficient indicates that the difference in post-pre national decline in larceny/theft crimes was not significantly different than that of Colorado. In short, Colorado's medical marijuana the

post-pre-post declines in Colorado is compared to the national trends. Our results, therefore, not support the third hypothesis of this study.

H4: Overall Violent Crimes

The regression results for overall violent crimes show that violent crimes were in decline ($B = -27.23$) in Colorado during the years before the medical marijuana legalization went into effect in 2001. When this trend is compared to the national trend in the same period (variable E), we noticed that Colorado violent crimes were increasing at a faster rate than the national rate ($US = -.23 - 27.23 = -27.46$). Coefficient for the variable C ($B = 23.22$) shows the difference of the trends between the post implementation of the program and the years prior to 2001 for the state of Colorado ($\text{post trend} = -27.23 + 23.22 = -4.01$). The result shows significant slowing of the downward trend in violent crimes after the program went into effect in Colorado. It should be noted that this change of trends only compares the pre and post trends for Colorado without accounting for the overall trends in the nation.

A coefficient of particular interest to our study is represented by the variable G. Coefficient for this variable will help us to assess the impact of Colorado's medical marijuana legislation on crime rates. This coefficient of $B = -5.55$ for the variable G is not significant. The coefficient indicates that difference in post-pre national decline in the violent crimes was not significantly different than that of Colorado. In short, Colorado's medical marijuana legislation seems to have had no significant effect on lowering the overall violent crime rate when the post-pre declines of Colorado are compared to the national trends. Our results, therefore, not support the fourth hypothesis of this study.

H₅: Robbery

The regression results for robbery crimes show that robbery crimes were in decline ($B = -3.83$) in Colorado during the years before the medical marijuana legalization went into effect in 2001. When this trend is compared to the national trend for the same period (variable E), we noticed that overall U.S. robbery crimes were declining at a faster rate than Colorado ($US = -9.96 - 3.83 = -13.79$). Coefficient for the variable C ($B = 1.87$) shows the difference of the trends between the post implementation of the program and the years prior to 2001 for the state of Colorado (post trend = $-3.83 + 1.87 = -1.96$). The results do not show significant slowing of the downward trend in robbery crimes after the program went into effect in Colorado. It should be noted that this change of trends only compares the pre and post trends for Colorado without accounting for overall trends in the nation. Difference in trends before the program (-9.96) is significant; the conclusion is that there was a difference between the two slopes before the policy went into effect.

A coefficient of particular interest to our study is represented by the variable G. Coefficient for this variable will help us to assess the impact of Colorado's medical marijuana legislation on crime rates. This coefficient of $B = 8.96$ for the variable G is significant at α less than .01. The coefficient indicates that the difference in post-pre national decline in the robbery crimes was significantly different than that of Colorado. In short, Colorado's medical marijuana legislation seems to have had a significant effect on lowering the robbery crime rate when the pre-post declines in Colorado are compared to the national trends. Colorado's increase in crime was significant at a lower rate when compared to the U.S. Our results, therefore, support the fifth hypothesis of this study.

H₆: DUI

The regression results for DUI arrests show that DUI arrests were not significantly increasing ($B = 1186.19$) in Colorado during the years before the medical marijuana legalization went into effect in 2001. When this trend is compared to the national trend for the same period (variable E), we noticed that Colorado DUI arrests show no difference from the national DUI arrests ($US = 4609.45 + 1186.19 = 5795.64$). Coefficient for the variable C ($B = 328.94$) shows no difference in the trends between the post implementation of the program and the years prior to 2001 for the state of Colorado (post trend = $1186.19 + 328.94 = 1515.43$). The results do not show a significant increase in the upward trend in DUI arrests after the program went into effect in Colorado. It should be noted that this coefficient only compares the pre and post trends for Colorado without accounting for the overall trends in the nation.

A coefficient of particular interest to our study is represented by the variable G. Coefficient for this variable will help us to assess the impact of Colorado's medical marijuana legislation on crime rates. This coefficient of $B = -18420.31$ for the variable G is not significant. The coefficient indicates that difference in post-pre national decline in the DUI arrests was not significantly different than that of Colorado. In short, Colorado's medical marijuana legislation seems to have had no significant effect on lowering DUI arrests when the pre-post declines of Colorado are compared to that of the national trends. Our results, therefore, not support the sixth hypothesis of this study.

Conclusion

In conclusion, the findings of the regression analysis for interrupted time series with comparison group support previous findings in the literature using data available through the

Federal Bureau of Investigation (FBI) and Department of Labor to forecast the potential impact of the medical marijuana legalization on crime rates for Colorado and the national crime rate for the United States. This study failed to establish a relationship between overall property crimes, larceny/theft, violent crimes, and DUI. The study did establish a relationship between medical marijuana law and burglary and robbery. The findings are crime neutral, granted a relationship was not significant and did not decrease for overall property crimes, larceny/theft, overall violent crimes, or DUI. The overall findings showed that MML's effect was either neutral with respect to the crime rate or in some instances decreased crime. It can be stated confidently that medical marijuana laws did not increase crime rates and in some cases decreased crime. The state is not any worse off in crime by adopting the medical marijuana law and in some cases it is better off for implementing the policy, as evident by decreased crime rates.

If medical marijuana laws were in effect in Texas when Dylan was pulled over, the most he would have been cited for would be a traffic/moving violation. Instead the implications of having residue in the ashtray were far reaching, impacting his criminal record and thus his future. If medical marijuana law affects crime by making it neutral (does not decrease nor increase), there would be no purpose to prosecuting for possession. The conclusion chapter focuses on discussing limitations and suggestions for future research.

CHAPTER SIX – CONCLUSIONS

RESEARCH SUMMARY

The purpose of this research was to evaluate the impact of medical marijuana legalization on crime rates for the state of Colorado. This final chapter includes suggestions for future research and conclusions. By conducting an interrupted time series comparison group analysis with crime rate and employment data obtained from the Federal Bureau of Investigation (FBI) and the Department of Labor; this study sought to examine the relationship between medical marijuana legalization and rates of violent crimes, property crimes, and DUI. This chapter communicates how this study provides an opportunity to fill gaps in the existing body of research, as there have been few opportunities.

The overall regression model achieved significance, the findings revealed a significant relationship for burglary and robbery and the passage of the medical marijuana legalization (Table 6.1). Of course the results are applicable to Colorado only. In addition, there are some limitations to this study. An alternative research design could be applied to better identify the relationship between medical marijuana legalization and crime rates. The results shed light on Dylan's scenario from the perspective that he would not have been processed for possession of marijuana, subsequently placed on probation, and his future detrimentally affected. The state did not allow evidence to support the claim that the roaches in the ashtray belonged to his grandmother, who was the car's previous owner. She had medical clearance through the state of California to use marijuana for medical needs. Taking into account that medical marijuana laws had a neutral effect on crime, the policy would not make crime increase and in some cases decrease. There would be no need to proceed with possession charges if medical marijuana laws were adopted in the state of Texas.

Suggestions for follow-up research to evaluate the impact of recreational marijuana legalization on crime rates flow from these findings. More complete data will be available through the Federal Bureau of Investigation for the state of Colorado and Washington in two years as the data are published. This will enable the examination of the overall legalization of Marijuana for recreational use on crime rates.

Table 6.1: Summary of Findings

Title: Medical marijuana legalization (MML) and crime rates	
Purpose: To determine if medical marijuana legalization (MML) in Colorado leads to a decline in crime rates for violent crimes, property crimes and non-violent crimes associated with marijuana (robbery, burglary/trespassing, larceny/theft, DUI in comparison to the national crime rates.	
Hypotheses	Evidence
H1 The legalization of medical marijuana will lead to a decrease in property crimes associated with marijuana.	No Support
H2 The legalization of medical marijuana will lead to a decrease in burglary crime rates associated with marijuana.	Support
H3 The legalization of medical marijuana will lead to a decrease larceny/theft crime rates associated with marijuana.	No Support
H4 The legalization of medical marijuana will lead to a decrease in violent crime rates associated with marijuana.	No Support
H5 The legalization of medical marijuana will lead to a decrease in robbery crime rates associated with marijuana.	Support
H6 The legalization of medical marijuana will lead to a decrease in driving under the influence arrests (DUI) for alcohol.	No Support

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