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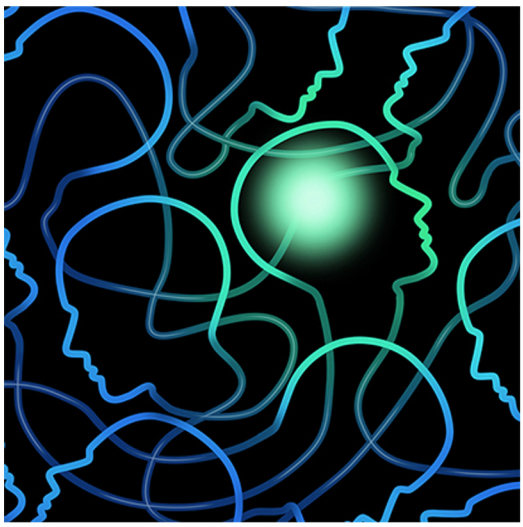

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Drug Abuse: Revealing the Impacts through Science

In this edition of the Journal, our feature article is by Siskiyou County, CA Sheriff-Coroner Col. Jon E. Lopey, Sr., BA, MJM, FBINA, (USA-Ret) entitled *Colorado's Decriminalization of Marijuana: A Forecast for Justice System Administrators*. Col. Lopey provides a comprehensive analysis of research on the impacts and effects experienced as a result of the marijuana legalization movement, especially in Colorado, and its negative implications to all of the citizens of the U.S.

We are pleased to include a highly significant reprint from the journal Traffic Injury Prevention, entitled *Delays in DUI blood testing: Impact on cannabis DUI assessments* by Ed Wood, DUID Victim Voices, Morrison, CO; Ashley Brooks-Russell, Community and Behavioral Health, Colorado School of Public Health, University of Colorado Denver, Aurora; and Phillip Drum, Kaiser Permanente, Oakland, CA. These researchers share the important information they learned from their detailed examination of DUI cases in Colorado and Washington.

Finally, in her excellent commentary, *Treating Heroin Addiction in Florida*, Nancy L. Hamilton, MPA, CAP, CCJAP, executive director of Operation PAR in Pinellas Park, FL, succinctly outlines the history of the heroin epidemic, the reality of heroin addiction today and the "…effective evidence-based medical treatments that have helped millions to reach recovery."

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COMMENTARY

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Delays in DUI blood testing: Impact on cannabis DUI assessments

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ABSTRACT

Objective: This study examined the time from law enforcement dispatch to the first blood draw in cases of driving under the influence (DUI) vehicular homicide and a subset of DUI vehicular assault cases in Colorado in 2012. Laboratory toxicology results were also examined to understand the implications of delays in blood draws in cases of driving while under the influence of marijuana's delta-9-tetrahydrocannabinol (THC).

Methods: Colorado court records were reviewed and information regarding charges, presence of alcohol and/or drugs, time of law enforcement contact and blood draw, crash location, and other contextual factors were identified. The distributions of first blood draw times were studied by charge and by responding law enforcement agency. Toxicology data from a different cohort of DUI traffic arrests in Colorado and Washington were examined to determine the proportion of blood tests for THC that were above specified legal limits in those states.

Results: The average time from law enforcement dispatch to blood draw in cases of vehicular homicide and vehicular assault was 2.32 h (SD $\pm$ 1.31 h), with a range of 0.83 to 8.0 h and a median of 2.0 h. Data from DUI traffic arrests found that between 42 and 70% of all cannabinoid-positive traffic arrests tested below 5 ng/ml THC in blood, which is the legal limit in Colorado and Washington.

Conclusion: Given the current delays to blood testing in cases of arrests for vehicular homicide and vehicular assault in Colorado, many blood tests are unlikely to confirm that drivers who are impaired from smoking marijuana have THC levels above established legal limits.

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driving under the influence of drugs (DUID); marijuana-impaired driving; vehicular homicide

Introduction

The Federal Bureau of Investigation reports that there were over 1.1 million driving under the influence (DUI) arrests in 2013 (Federal Bureau of Investigation 2013). States routinely use blood tests to confirm the presence or absence of alcohol and/or drugs suspected of causing driving impairment. Some states have zero tolerance drug laws to convict impaired drivers of driving under the influence of drugs (DUID) if any traces of specified drugs are present in the driver's blood (Walsh 2009). Other states have established *per se* limits of drug levels, beyond which a driver is defined as being DUID *per se* (Walsh 2009). With the legalization of recreational marijuana, Colorado instituted a permissible inference level for THC of 5 ng/ml in whole blood and Washington established a 5 ng/ml *per se* limit in blood if drawn within 2 h of the incident (Colorado Revised Statutes 2015; Revised Code of Washington 2014).

Alcohol is metabolized at a linear rate. This fact may be used by forensic toxicologists to backward-extrapolate what the blood alcohol content was at the time of arrest when multiple blood determinations are available. Marijuana's intoxicant delta-9-tetrahydrocannabinol (THC) is more problematic. THC's primary metabolite is nonpsychoactive 11- nor-9-carboxy-THC (THC-COOH; Couper and Logan 2004) and is not a reliable marker for impairment because it can be detected in blood for hours or even days after signs of impairment disappear. It can be detected in urine even longer, depending on the habits and body mass of the marijuana user. Prior studies have demonstrated that the body's metabolism of THC is dramatically nonlinear (Huestis et al. 1992; Toennes et al. 2008). The blood level of THC is determined by its initial dose, the metabolic rate, and the redistribution of THC from the blood to and from the body's fat stores. This latter effect is why, even though the estimated metabolic half-life of THC ranges from hours to days (Huestis 2007), the blood concentration can drop 90% within the first hour after smoking marijuana (Huestis et al. 1992; Toennes et al. 2008).

The combination of the nonlinear metabolism of THC and the highly variable and rapid decline of THC in the blood means that there is no accepted method to extrapolate backward from the time of blood draw to the time of police contact to determine the relevant THC blood level, as can be done with alcohol. Thus, if there is a delay in collecting a blood sample, THC levels in the tested blood can be substantially lower than when the incident or arrest occurred (Hartman and Huestis 2013). The time needed to draw blood for a charge of DUID has been reported to be up to 90 min in a Swedish study (Jones et al. 2008) and up to 3 h in a French study (Biecheler et al. 2008). DUI laws in the United States typically require biological samples taken in evidence to support a DUI charge be drawn within two hours of a DUI arrest or incident (Colorado Revised Statutes 2015; Revised Code of Washington 2014). If that is not possible, laws may permit results from multiple blood samples to be used to extrapolate backward

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Associate Editor Kathy Stewart oversaw the review of this article.

to estimate the blood content of an intoxicant at the time of the DUI arrest or incident, which is possible for alcohol but not for THC.

The first purpose of this brief report is to identify the time required to obtain blood draws from DUID suspects in Colorado in cases of vehicle homicide (VH) and vehicle assault (VA). We report the time from law enforcement dispatch to the first blood draw and discuss the data in relationship to the blood clearance rate of THC. The second purpose is to examine results from toxicology laboratories in Colorado and Washington that provide blood testing services in cases of traffic arrests to determine the proportion of blood tests for THC that are above specified legal limits and the implications of these findings for state policies and practices regarding marijuana-impaired driving.

Methods

Data

Court records

Court case records were requested from the Colorado State Judicial Branch for all charges of VH or VA for cases filed in 2012. The Colorado State Judicial Branch provided information on VH, VA, and DUI charges and convictions. There were 246 defendants, 35 of whom received VH charges and 211 of whom received only VA charges.

Next, either the entire court file or the Register of Actions and Affidavit of Probable Cause was reviewed for each case in which there was a VH-DUI charge or a VA-DUI charge that had been pled down to a lesser charge. All 29 of the 35 cases where VH defendants charged with DUI were studied. Of the 211 VA defendants, 178 were also charged with DUI. Due to the large number of VA-DUI charges, it was not practical to examine all VA-DUI charges. A subset of all VA-DUI charges ($n = 37$, 21%) that were pled down to a lesser felony level was selected to support a separate research program that is still in progress.

The court records that were reviewed are kept at each district court in the state. Data were extracted from court records regarding the charges, presence of alcohol and/or drugs, time of law enforcement contact and blood draw, crash location, and other contextual factors. The law enforcement agency for each case was also identified as either the local police department or the Colorado State Patrol. Colorado makes a distinction between DUI (driving under the influence means that one is incapable of safe driving) and DWAI (driving while ability impaired means that one is affected to a slight degree by intoxicants). DWAI is a milder offense than DUI and is commonly used in plea bargains. All cases in this study that were charged with DWAI were also charged with DUI.

Laboratory data

Three toxicology laboratories were asked to provide data on blood test results for a different cohort of arrested drivers. The laboratories were the primary forensic labs used to test blood drug and alcohol content in DUI suspects in Washington (Washington State Patrol Forensic Laboratory Services, Seattle, Washington [WSP]) and Colorado (Colorado Department of Public Health and Environment, Denver, Colorado [CDPHE], and Chematox Laboratory, Inc., Boulder, Colorado [Chematox]), 2 states that have legalized the recreational use of marijuana.

The Colorado Multiple Institutional Review Board approved this study.

Measures

Charges

VH and VA can be charged under 2 different prongs in Colorado: DUI or reckless driving. Only VH and VA cases charged under the DUI prong were included in this study ($N = 66$).

Time to first blood draw

Based on the report of law enforcement dispatch time and time of blood draw, the time to first blood draw was calculated in hours, rounded to the second decimal.

Responding agency

The location of the crash determines whether it falls under the jurisdiction of the local police or the state patrol.

Laboratory test results

Laboratories may report "Cannabinoid Positive" when blood-screening results are positive for cannabinoids, including but not limited to THC. A laboratory report of "THC Positive" denotes confirmatory test results that are positive specifically for THC and is a more accurate indicator of likely impairment.

Analysis

We examined the distribution of the time to first blood draw and calculated the mean, standard deviation, and median. We used Student's t test to test for differences in time to test by the charge (VH or VA) and responding agency (local police or state patrol). We examined the proportion of laboratory test results that were above and below the 5 ng/mL blood level standards set by Colorado and Washington.

Results

Time to first blood draw

Blood draws were not done in all cases. Of the 66 cases studied, 49 cases (74%) recorded the time between law enforcement dispatch and the first blood draw. When conducted, the blood sample was tested for alcohol, drugs, or both. When multiple blood draws to enable backward extrapolation of alcohol content at the time of arrest were reported in court records, only the first blood draw time was used for this study, because extrapolation of drug content was not done.

The mean time to first blood draw was 2.32 h (SD $\pm$ 1.31 h), with a range of 0.83 to 8.0 h and median of 2.0 h (see Table 1). Times to first blood draw were slightly longer for VH cases compared to VA cases (2.66 vs. 2.01 h, $P = .08$). There was a significantly longer time to first blood draw for the cases under the jurisdiction of the state patrol compared to local police departments (2.90 vs. 1.91 h, $P < .01$).

Table 1 Time to first blood draw by charge and responding law enforcement agency.

	N	Mean (h)	Test statistic	SD (h)	Median (h)	Range (h)
All	49	2.32		1.31	2.00	0.83–8.00
Charge						
Vehicular homicide	23	2.66		1.57	2.17	1.17–8.00
Vehicular assault	26	2.01	$t = 1.78$, $P = .08$	0.097	1.75	0.83–4.00
Responding agency						
State patrol	19	2.90		1.54	2.50	1.17–8.00
Local police	28	1.91	$t = 2.75$, $P < .01$	0.097	1.67	0.83–5.17

Laboratory data and legal limits for THC

Another source of data is laboratory test results in cases of general DUI arrests. We examined the proportion of blood test results for THC above specified legal limits in Colorado and Washington. Table 2 summarizes laboratory test results for THC provided by 3 different laboratories, 2 in Colorado and one in Washington. Laboratories typically perform an initial screening test for any cannabinoid, including THC-COOH, and, if positive, perform a confirmatory quantitative test specifically for THC and for THC-COOH separately. Data are presented both ways in Table 2. Between 42 and 70% of cannabinoid-positive screening samples were confirmed to be below Colorado and Washington's legal limit of 5 ng/ml THC in blood.

Discussion

Time to test and THC clearance from blood

Due to the complexity of THC clearance from blood, there is no accepted method to extrapolate backward from the time of the blood draw to determine the THC blood level at the time of arrest or a crash, as can be done with alcohol. If there is a delay in collecting a blood sample, THC levels in the blood can be substantially lower than when the arrest occurred. This study used 2 sources of data, court records and toxicology results, to investigate marijuana-impaired driving. In our study of a sample of VH and VA cases, we found that the average time to blood draw was more than 2 h. The high metabolic rate of THC and its rapid sequestration into the body's fat stores mean that blood concentrations can drop below legal levels, and even below laboratories' level of quantification during the typical time delay to acquire a blood sample. This can make the quantitative blood test results both irrelevant and misleading. The tests results are irrelevant because the THC level at the time of the blood draw will not represent the THC level at the time of the arrest and there is no accepted method to extrapolate backward to project the THC concentration at the time of arrest. The results are misleading because the majority of cases, as suggested by the laboratory results we present in this study, would indicate that the driver had a THC level below legal limits, whereas other evidence such as behavioral assessments by the arresting officer may suggest that the driver was driving under the influence.

Although research consistently shows a dramatic drop in THC concentration in blood after smoking (Huestis et al. 2007; Toennes et al. 2008), Huestis has shown a very different, lower, and more gradual concentration profile for THC from marijuana ingested in edible forms. Therefore, laboratory blood tests can more fairly represent the concentration of THC from edibles at the time of arrest than they can for the THC concentration from smoked marijuana. Neither court records nor laboratory data identified how defendants in this study consumed their marijuana. The 2 Colorado laboratories in this study served different law enforcement agencies. One might speculate that the laboratories' differences reported in the percentage of defendants testing below the 5 ng/ml limit could be attributable to differences in how marijuana was commonly consumed in the different markets served by the 2 laboratories. But this is merely speculation, because there are no data to confirm this.

There is an emergent need for further scientific study to determine the effects of driving when the body is exposed to increasingly high levels of THC and the effects of different routes of THC administration.

There are several reasons for delays in blood testing. First, the circumstances during a crash can lead to delays. Officers' first priority is to help victims, not to collect evidence. Even in cases of no victims, logistics will cause time delays. Second, there is a lack of understanding on the part of some law enforcement officials of the need for a rapid blood draw. Third, there is response time, which may be longer in a rural setting, and the time necessary to travel to a suitable site to draw blood. Finally, if the blood draw is involuntary, there is a delay caused by the need to get a warrant. Even in instances of voluntary blood draws, there can be a delay in seeking a warrant for a blood draw due to a lack of understanding of the requirements for a voluntary blood draw. As might be expected with the multiple events with conflicting priorities that occur after a vehicular homicide, the average time to draw a blood sample from a driver involved with a vehicular homicide is longer than in cases of a driver involved with vehicular assault, but that time difference was not statistically significant in this study. However, the mean time difference (0.65 h) does represent a large amount of time that would impact the reported THC value. The state patrol has a higher proportion of its cases in rural areas, more remote from phlebotomy sites than usually found in urban areas, so it may not be surprising that there is a longer delay before blood draws in state patrol cases compared with local police agencies.

Results from laboratory data (Table 2) show that a sizeable proportion of those tested for drug impairment are found to be below the legal limits. These tests are expensive and thus only conducted when behavioral evidence of impairment justifies the expenditure, and yet between 42 and 70% of the cannabinoid-positive drivers arrested on suspicion of driving under the influence of THC tested below state-mandated legal limits.

There are several ways to mitigate the delays in blood testing. In this study, none of the court records indicated that a warrant was needed to collect blood. However, if that were a cause for delay, law enforcement agencies can utilize electronic warrants. Time to obtain a warrant can range from less than 15 min to several hours. Rapid warrants are possible using an electronic warrant system as has been established in jurisdictions such as Arizona (Chan 2013). Second, emergency medical personnel or

Table 2 Number of laboratory results for blood tests that included tests for THC[a].

Laboratory	Location	Year(s)	Cannabinoid-positive screen[b] (*n*)	Confirmed THC positive[c] (*n*)	≥5 ng/ml THC in blood[c] (*n*)	Cannabinoid positive < 5 ng/ml (%)[b]	THC positive < 5 ng/ml (%)[c]
CDPHE	CO	2010–2013	6,595	3,910	1,998	69.7	48.9
Chematox	CO	2013	2,159	1,561	1,252	42.0	19.8
WSP	WA	2011		1,036	593		42.8

Notes. [a]THC and cannabis are measured in nanograms per milliliter in whole blood.
[b]"Cannabinoid Positive" indicates blood-screening results that were found positive for cannabinoids, including but not limited to THC.
[c]"THC Positive" indicates blood test results that were found positive for THC, which is one of many cannabinoids.

law enforcement officers, particularly drug recognition experts, can be trained to draw blood samples as soon as possible at the scene. In contrast, drug recognition expert protocol and/or common practice in the field is to obtain a blood sample as the last step in a dozen protocol steps. Third, recent advancements in oral fluid testing suggest that this may be a viable alternative to blood tests in the future (Verstraete 2004), because oral fluids may be obtained at the roadside without delays inherent to blood draws.

Many have struggled in vain to define a blood level of THC (and other drugs and combinations of drugs) above which everyone is impaired and below which no one is impaired. Politicians may agree to such levels, even if scientists cannot (Reisfield et al. 2012). This study presents a difficulty with a "legal limit" approach to dealing with DUID; the level found in a laboratory test may not represent the level at the time of arrest. This should serve to increase the importance of behavioral assessments of impairment performed at the roadside by law enforcement officers, including drug recognition experts. Laboratory tests should be used to confirm the presence of drugs responsible for an impairment that is otherwise noted and documented by law enforcement officials. If used for that limited purpose, concerns about quantitative levels of drugs become less important.

Strengths and limitations

The court records used in this study were limited to cases of VH-DUI and a subset of VA-DUI cases in 2012 in Colorado. Given the difficulty of extracting data from court records, it is not feasible to examine the full range of traffic arrest cases; thus, we limited our study to only the most egregious infractions. The average delay for blood draws in nondeath and noninjury traffic arrests for DUI may be different (Urfer et al. 2014).

Furthermore, we were only able to examine a subset of VA-DUI cases, which may be systematically different from other VA-DUI cases. Because the VA-DUI subset that was selected does not represent all VA-DUI cases, one cannot make unbiased inference from these data about such factors as causes for DUI, but it should not bias inferences of time to draw blood. Data from a study in progress confirm this belief.

Our discussion of metabolism of THC and delays to testing are based on smoked marijuana. Marijuana consumed as "edibles" (e.g., cookies, candies, brownies) follows a more gradual metabolism curve. Furthermore, no data have been published on the blood clearance curves of THC from THC concentrates such as butane hash oil, honey oil, wax, shatter, budder, or any of its variants. Therefore, these conclusions may not apply to impairment from those forms of THC.

Given the current delays to blood testing in cases of arrests for VH and VA, many blood tests are unlikely to confirm that drivers who are impaired from smoking marijuana have THC levels in their blood above established legal limits.

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THE JOURNAL OF GLOBAL DRUG POLICY AND PRACTICE

Colorado's Decriminalization of Marijuana: A Forecast for Justice System Administrators

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Abstract

In the modern era of diminishing justice system budgets and liberalization of drug laws, states can learn valuable lessons from those states that have decriminalized or legalized marijuana use. For the justice system administrator in California and elsewhere an important question can be asked: What can states learn from Colorado's liberalization of its marijuana laws? Seven states, including California are poised to legalize cannabis and the debate continues whether this is a proper course of action, since opponents support the premise that cannabis is a powerful and dangerous drug, which contributes to serious health problems and criminal behavior while advocates dismiss those concerns due to the alleged benefits marijuana can have for the sick (Becker, 2015). Marijuana use has had a significant impact on the law enforcement agencies and citizens of California for many decades but recent research supports the premise that increases in marijuana cultivation and use is linked to the liberalization of marijuana laws, which present unique challenges for federal, state, and local law enforcement officials (United States Department of Justice {USDOJ}, Rocky Mountain High Intensity Drug Trafficking Area {HIDTA}, 2015) (USDOJ, HIDTA, 2015). This professional project will focus on health, justice system, environmental, and fiscal impacts of marijuana, based primarily on the Colorado experience. This paper intends to provide the modern justice system administrator or stake holder the basis from which to make a more informed decision on whether or not to support cannabis legalization in their jurisdiction or,

what, if any, restrictions should be applied to limit potential health, justice, environmental, and fiscal impacts that have impacted states like Colorado (Hudak, 2015).

Keywords: marijuana, cannabis, legalization, recreational, health, justice, environment, fiscal

Colorado's Decriminalization of Marijuana: A Forecast for Justice System Administrators

Introduction

In the modern era of diminishing justice system budgets and liberalization of drug laws, states can learn valuable lessons from states like Colorado that have decriminalized or legalized marijuana use. Budgets typically have a significant impact on a law enforcement agency's capacity to enforce marijuana laws, which can be particularly challenging for rural jurisdictions like Siskiyou County, California. Rural counties often struggle with law enforcement and justice system fiscal shortfalls, which diminish the capacity of agencies to enforce drug laws and correspondingly reduce their capacity to adjudicate non-violent offenses like marijuana-related crimes: "Over the past 5 years, the Court has dealt with a dramatic reduction in its budget that has compromised access to justice and resulted in closure of 3 court facilities" (Administrative Office Of the Courts, 2014 and Lopey, 2015). For the justice system administrator in California and elsewhere an important question can be asked: What can states learn from Colorado's liberalization of its marijuana laws? Seven states, including California are poised to legalize cannabis and the debate continues whether this is a proper course of action, since opponents support the premise that cannabis is a powerful and dangerous drug, which contributes to serious health problems, contributes to criminal behavior, adversely impacts the environment, and raises fiscal concerns, while advocates dismiss those concerns due to the alleged benefits marijuana can have for the sick (Becker, 2015).

Becker (2015) reports California voters are on the verge of deciding whether or not to support one or more laws that could legalize marijuana. The voters of the state voted in 1996 to approve Proposition 215, "The Compassionate Use Act of 1996." The intent of the law was to enable persons who are in need of marijuana for medical purposes to use it under specified conditions without fear of prosecution under the law. In 2004, the California Legislature enacted Senate Bill 420, which provided qualified patients and primary caregivers a limited defense for marijuana cultivation and use and the statute enacted specific maximum marijuana plant counts that could be cultivated pursuant to the law. According to Collinsworth and Collinsworth (2015), one law recently introduced, "The 2016 California Bipartisan Decriminalization of Cannabis Act" proposes numerous provisions of law which, if enacted, would not only decriminalize marijuana, but the law would prohibit employers from discriminating against marijuana users, would allow possession of processed marijuana for recreational and medicinal use up to five pounds, allow for the cultivation of 500 square feet cannabis gardens, would legalize concentrated marijuana extracts, and, allow for the collection of taxes that could include millions of dollars' worth of revenues levied for various state and local governmental agencies and jurisdictions.

Some experts feel a different perspective on marijuana could be beneficial by preserving law enforcement resources and at the same time reducing costs for incarceration: "…an honest…understanding of cannabis could prevent needless arrests and prosecutions, free up law enforcement, and save California communities millions…" (Conrad, 2010, p.1).

Colorado authorized the use of medical marijuana in November 2000, pursuant to Amendment 20, which: "…permitted a qualifying patient and/or caregiver of a patient to possess up to 2 ounces of marijuana and grow 6 marijuana plants" (USDOJ HIDTA, 2015). In 2009, marijuana "became de facto legalized through the commercialization of the medical marijuana industry" (USDOJ HIDTA (2015).

Currently, Colorado is experiencing the impacts of legalization after decriminalizing marijuana in November 2012, when Constitutional Amendment 64 was passed, which allows the recreational use of marijuana for anyone over the age of 21 and the amendment authorized the licensed marijuana retail stores, cultivation operations, and edible manufacturers, now common in Colorado (USDOJ HIDTA, 2015).

According to Gonzalez and Swanson (2015) and Graves (2015), marijuana use has had a significant impact on the law enforcement agencies and citizens of California for many decades but recent research supports the premise that increases in marijuana cultivation and use, legal and illegal in nature, is linked to the liberalization of marijuana laws, which presents unique challenges for federal, state, and local law enforcement officials. This professional project will focus on four topics related to the legalization of marijuana, including the impacts decriminalization has on health, the justice system, environment, and what implications enforcement or legalization has on jurisdictions and society from a fiscal standpoint.

This paper will primarily focus on health and justice-related impacts based on the laws enacted in Colorado. To streamline the examination and to ensure this professional project is limited in size to ensure its usefulness to justice administrators and others, only a limited examination of environmental and fiscal issues will be summarized in this document. An emphasis on actual research studies, based on an extensive literature review will maintain the credibility of the conclusions developed in this paper; however, anecdotal and special interest group perspectives, especially those generated from marijuana legalization advocates will be used because many of the pro-marijuana perspectives, especially related to health were found to be subjective and not always based on peer-reviewed research. Additionally, advocate websites do provide insights into the perspectives of marijuana supporters and can serve a useful purpose to balance the viewpoints of those on either side of the cannabis spectrum.

The objective of this paper is to provide enough valid information for justice administrators and others to thoroughly review key factors involved in cannabis legalization but at the same time the examination will be brief enough to increase the likelihood it is read by those interested in the topic. Another major objective of this paper is to be useful for stake holders, including elected officials, health and child welfare advocates, and citizens to find the paper a useful tool from which to educate and advocate for the best drug-related policy for their respective jurisdiction.

Health Impacts

Health impacts related to marijuana use are numerous and researchers have conducted thousands of studies that cite the adverse impacts that cannabis has on users; however, there is also research that supports some medicinal uses for the drug, especially in states like Colorado. According to EIHage (2015), marijuana retailers in Colorado sold nearly 40,000 pounds of pot in 2014, which includes over $2.4 million in edibles. According to USDOJ HIDTA (2015) marijuana is used extensively for medicinal and recreational purposes in Colorado and its proliferation has been linked to many health-related problems. Researchers such as EIHage (2015) have associated marijuana use in Colorado with many health-related problems: "…impaired short term memory, impaired reaction time, impaired motor coordination...altered judgment…addiction, lower IQ, and risk of psychosis" (p. 2). According to a Duke University study conducted by Meier, Caspi, Ambler, Harrington, Houts, Keefe, McDonald, Ward, Poulton, and Moffit (2012) marijuana is a harmful drug, especially to adolescents and the researchers found that heavy marijuana use over a period of 20 years is linked with neuropsychological decline and addiction; the top 10 states for teen marijuana use include Colorado, which has legalized marijuana, which make the drug more available for adolescent use (p. 1).

Dobuzinskis (2014) found that the legalization of marijuana in Washington and Colorado has substantially impacted the health of adolescents and adults in those states, linking casual marijuana use with brain abnormalities: “Young, casual marijuana smokers experience potentially harmful changes to their brains, with the drug altering regions of the mind related to motivation and emotion, researchers found…What we are seeing is changes in people who are 18 to 25 in core brain regions that you never, ever want to fool around with…” (p. 1). According to a study conducted by Meier et al. (2012) cannabis, while possessing both toxic and therapeutic properties, is linked with informant-reported cognitive problems, attention and memory loss, more persistent cannabis dependence, and a marked IQ decline: “In the present study, the most persistent adolescent-onset cannabis users evidence an average 8-point IQ decline from childhood to adulthood” (p. 5).

According to Hurley and Mazor (2013) marijuana use is increasing and scientific evidence supports health-related concerns at a time when the population’s acceptance of marijuana is at an all-time high: “56% support the legalization for recreational use and 70% for medical use” (Gonzalez and Swanson, 2012, p. 1). Research supports the theory that the availability of marijuana due to medicinal or recreational provisions of law increases the opportunities to consume the drug, which invariably contributes to the wide array of health and social problems inherent in the drug users, especially adolescents: “This is disquieting because many adolescents are engaging in heavy marijuana use…one in every fifteen high school seniors today is smoking pot on a daily or near daily basis” (Gonzalez and Swanson, 2012, p. 1).

Gonzalez and Swanson (2012) further associated the availability and pervasive use of marijuana by adolescents with intelligence and psychological development: “They report a global decline in intelligence quotient (IQ) and neuropsychological performance associated with persistent regular

cannabis use (4 or more times per week)" (p. 1). Furthermore, there appears to be significant scientific evidence that supports a more cautious and prohibitive posture related to the medicinal use or legalization of marijuana based on facts and practicality.

According to Kleber and DuPont (2012) the FDA has not endorsed marijuana or any other medication that is smoked; moreover, they assert that most of the evidence presented by cannabis advocates in support of its efficacy is anecdotal and smoked marijuana is an unacceptable delivery system with harmful effects: "Marijuana can be contaminated with molds, fungi, or herbicides… cannabis plant contains over 400 substances and over 60 cannabinoids…with no scientific approval, dosage control, or quality control" (p. 564-565).

Gonzalez and Swanson (2012) researched the side effects that are more likely to occur with higher marijuana potency and earlier onset of adolescent marijuana use. For example, Gonzalez and Swanson (2012) link cannabis potency and frequency of use with brain abnormalities, especially since brain development, especially in the young teenager, is susceptible to the effects of marijuana's active ingredients while the brain is still in developmental stages of growth, which is often misunderstood by users and observers.

According to Dobuzinskis (2014, pp. 1-2) pot legalization advocates make the argument that marijuana it is safer than alcohol (Ingraham, 2014) but research conducted in a collaborative effort between Northwestern University's medical school, Massachusetts General Hospital, and Harvard Medical School, substantiated a direct correlation between frequency with which marijuana is consumed and abnormalities of the brain. Researchers found that marijuana affects the brain differently when compared with alcohol: "But while researchers do not know exactly how the mental rewiring seen in users affects

their lives, the study shows it physically changes the brain in ways that differ from drinking…" (Dobuzinskis, 2014, p. 1).

Dobuzinskis (2014) found that young people are particularly susceptible to harmful brain changes and marijuana essentially altered regions of the mind related to motivation and emotion (Dobuzinskis, 2014, pp. 1-2). Additional research on marijuana's impact on the brain was conducted by Gilman, Kuster, Lee, Lee, Kim, Makris, et al. (2015) and they found that cannabis use is quantitatively linked to nucleus accumbens and amygdale abnormalities in young adult recreational users, due to the adverse impact of marijuana's active ingredient, tetrahydrocannabinol (THC or "potency") on the brain's reward/aversion regions implicated in addiction. Gilman, et al. (2015) and his fellow researchers concluded that MRI scans on young recreational users of marijuana indicated morphometry in brain structure that substantiated salient exposure-dependent alterations across three measures and an altered multimodal relationship for the marijuana group: "These data suggest that marijuana exposure, even in young recreational users, is associated with exposure-dependent alterations of the neural matrix of core reward structures…" (Gilman, et al., 2015, p. 1).

Researchers such as Wang, Roosevelt, Heard, and Heard (2013) and Tashkin (1993) have conducted numerous studies that link marijuana use with brain structure and development but other adverse health impacts have been recorded as well. According to Monte, Zane, and Heard (2015) marijuana (tetrahydrocannabinol or THC) is associated with psychosis, anxiety, and depression and admissions to emergency departments (ED) rooms have increased for a variety of reasons. These emergency room visits were linked with marijuana use, including admissions to the University of Colorado burn center, which has experienced a substantial increase in marijuana-related burns: "In the past two years, the burn center had 31 admissions for marijuana-related burns, some cases involve more than 70% of body

surface" (some caused by butane as a solvent, which is linked to THC extraction labs)" (p. 2). However, Monte et al. (2015) also cited the theory that some seizure disorders may benefit from cannabis use and the study cited the possible benefits of marijuana as an anti-inflammatory for bowel disease and mentioned its safer therapeutic window when compared with opioids. Monte et al. (2015) claims that his research showed evidence that people residing in states that legalized marijuana had lower opioid-related death rates.

Monte et al. (2015, p. 2) further cited the alarming increase in the admissions to hospital EDs due to cannabis ingestion (0 in five years preceding legalization and 7 in previous year and 14 admitted to intensive care in current year); The vast majority of intensive care admissions of children involved the ingestion of edible THC products. According to USDOJ HIDTA (2015) Colorado did not regulate marijuana edibles, which has proven to be a major health-related concern for physicians and law enforcement practitioners.

Monte et al. (2015, p. 3) further observed that the use of medical marijuana for a wide range of disorders is inconsistent with the science supporting its use but the researchers did highlight the need for more high-quality research. Ashton (1999) found that research in other countries such as the United Kingdom indicate that there are serious health and other risks associated with increased marijuana use to individuals and communities, but report that cannabinoids as therapeutic agents to relieve chronic pain management and palliative care is worthy of further study (p.646).

According to the Office of National Drug Control Policy (ONDCP) (2011), marijuana is the most widely used illicit drug in America with 14.6 million (75 percent) marijuana users of the 20 million illicit drug users. ONDCP (2011) disputes the myth that marijuana is harmless and cites a number of health-related

scientific studies that support this position: “Marijuana smoke contains 50…to 70 percent more carcinogenic hydrocarbons than does tobacco smoke…marijuana may promote cancer of the respiratory tract and disrupt the immune system” (p. 2). ONDCP (2011) cites other adverse health impacts of cannabis use that seriously influences one’s health and society’s potential liability to treat chronic illnesses inflicted upon users: “Marijuana smokers have a heightened risk of lung infection…Long-term use of marijuana may increase the risk of chronic cough, bronchitis, and emphysema, as well as cancer of the head, neck, and lungs” (p. 2).

ONDCP (2011) cites research in England that found that smoking marijuana for even less than six years causes a marked deterioration of lung function and cannabis robs the body of antioxidants that protect cells against damage associated with heart disease and cancer.

Dick (2014) claims that health-related concerns related to marijuana addiction have been largely exaggerated by governmental researchers. ONDCP (2011) disputes the claim that marijuana is not addictive. For example, ONDCP (2011) studies found that marijuana is a powerful, potentially addictive drug: “Average THC levels rose from less than 1 percent in the mid-1970s to more than 6 percent in 2002. Sinsemilla potency increased in the past decades from 6 percent to more than 13 percent…up to 33 percent” (p. 4). ONDCP (2011) reports that the health-related costs to society associated with marijuana use are severe due to lost employee productivity, public health care costs, and accidents.

To further demonstrate the implications of health-related concerns related to addiction, EIHage (2015) raised the serious issue of the elevated potency of modern cannabis. EIHage (2015) reported today’s marijuana is five times stronger than the pot of the 1960’s: “A 2015 study found that the level of THC in Colorado pot is 18.7 percent, with some retail pot containing 30 percent THC or higher” (p. 2). EIHage

(2015) reports another startling research conclusion about addiction, citing recent addiction rates as higher than previously recorded: “Adolescents are at an increased risk for marijuana addiction, which increases from about 1 in 11 (9%) among overall users to 1 in 6 (17%) among teens” (p. 2).

According to a study conducted by Volkow, Baler, Compton, and Weiss (2014), adverse health effects of marijuana use include a 9% risk of addiction, a decline in IQ, propensity to use other drugs due to the “gateway” impacts, and regular marijuana use has been linked to an increased risk of anxiety and depression. Volkow et al. (2014) further studied and linked the adverse effects of marijuana use on school, lifetime achievement, risk of motor vehicle accidents, and the risk of cancer. Volkow et al. (2014, p. 2221) concluded that heavy marijuana use has been linked to socioeconomic assistance, unemployment, criminal behavior, and lower satisfaction with life in general (p. 2221).

Although Volkow et al. (2014) cited the conclusion that the effects of long-term cannabis use on lung cancer are unclear but he did link marijuana with the inflammation of the large airways, increased airway resistance, and lung hyperinflation, and he concluded that marijuana smokers are more likely to report symptoms of chronic bronchitis.

Volkow et al. (2014) further linked marijuana use to vascular conditions that increase the risks of myocardial infarction, stroke, and transient ischemic attacks during cannabis use (p. 2222). Volkow et al. (2014) found that cannabinoids have also been linked with the relief of some medical conditions (e.g., glaucoma, nausea, AIDS – Associated anorexia and wasting syndrome; chronic pain, inflammation, multiple sclerosis, and epilepsy). Barcott and Scherer (2015), as investigative journalists from Time Magazine, also cited the medical benefits of marijuana for some medical conditions.

Hurley and Maxor (2013) conducted research linking marijuana's impacts on children with the legalization of cannabis in Washington and Colorado. An older but similar study conducted by Wall, Poh, Cerda, Keyes, Galea, and Hasin (2011) also found a higher adolescent cannabis use and less inhibitions towards the drug in states that had enacted medical marijuana laws (MML): "States with MML had higher average adolescent marijuana use…and lower perception of riskiness, during the period 2002-2008 compared to states without MML…" (p. 1).

Konrad and Reid (2013) cited a study by The American College of Pediatricians, which reported 64% of Colorado physicians agreed that marijuana presents serious mental health concerns and 61% cited serious concerns with the physical health risks associated with medicinal marijuana use; moreover, 81% of those same physicians believed doctors should be formally trained before issuing marijuana recommendations. Most physicians cited in this study from Colorado had serious reservations about medicinal marijuana, despite the prevalence of cannabis in the state: "…most family physicians are not convinced of marijuana's health benefits and believe its use carries risks" (Kondrad and Reid, 2013, p. 1). Levy (2013) cited similar concerns about marijuana's impact on children and adolescents. Again, a prominent research study conducted by Meier et al. (2012) found substantial neurological declines from childhood to midlife for marijuana users.

A study conducted by Hagler (2015) found marijuana has been linked to other serious health disorders involving cancer and even impotence: "Chronic smoking of marijuana and its active chemical THC has consistently been shown to increase the risk of development of testicular cancer..., THC can also cause endocrine disruption…gynecomastia, decreased sperm count, and impotence" (p. 7).

Various governmental organizations, such as ONDCP (2011) and USDOJ HIDTA (2015) have published the results of studies and analyses that summarize the deleterious impacts of marijuana use from a health perspective. Pagliaccio, Barch, Bogdan, Wood, and Wood (2015) conducted research that highlighted the impacts of marijuana use and brain function. Research conducted by Smith, Cobia, Wang, Alpert, and Cronewett (2013) linked marijuana use with working memory deficits and psychological disorders and associated cannabis use with an onset of psychosis when used at an earlier age. Stephanis, Dragovic, Power, Jablensky, Castle, and Morgan (2013) associated the early use of marijuana with the onset of psychotic illness: "This neurodevelopmental 'window of vulnerability' is supported by findings that demonstrate that early cannabis exposure is a risk factor for psychosis-related outcomes in young adults" (p. 253).

Volkow et al. (2014) studied and documented other adverse health effects of marijuana use. As previously stated, Wall et al. (2012) found in their study that marijuana use is higher in states with medical marijuana laws, which present serious health implications due to increased use of cannabis. Watts and McKiernan (2014) found in their research that fatal traffic collisions are on the rise in states like Colorado, which points to the human, family, and societal costs of drug abuse, which includes marijuana use, which is more widely available than most other illicit drugs.

Collinsworth and Collinsworth (2015) point to the opposing viewpoint that marijuana is a legitimate medicine and should be legalized. CBS (2014) points to the conclusion that California has become the next battleground for the marijuana legalization movement, which, upon examination is plausible, since the state was the first to legalize medical use of marijuana in 1996. Dick (2014), Becker (2015), Lysiak (2014), and organizations like the National Organization for the Reform of Marijuana Laws (NORML) (2015) and Law Enforcement Against Prohibition (LEAP) cite the recurring theme that it is common for

governmental officials and law enforcement administrators to distort the anti-marijuana argument for various reasons.

According to other physicians, such as Finn (2015) there are numerous scientific studies that report the effects of endocannabinoids in the human body and the majority of these studies are in the mental health and behavioral disciplines. Finn (2015) further points out that several physiological effects of marijuana on body systems are evident: “There are effects on the cardiovascular, pulmonary …, central nervous system…, immune system…There is evidence of both tachycardia…, bradycardia and hypotension…, There are reports of angina and myocardial infarction” (p. 3). Finn (2015) goes on to report the effects of cannabis on the central nervous system such as impaired memory, coordination, processing, reaction time, problem solving, learning, and long-term marijuana use has been linked to not only learning and memory, but can impact one’s IQ, which has been previously cited in other research studies.

However, Finn (2015) also cites scientific evidence that cannabis-derived compounds may have analgesic properties similar to opioids. Research also indicates that children who use marijuana at least once a month suffer negative consequences as they grow older: “…teens who smoke marijuana at least once a month are up to three times more like to have suicidal thoughts and depressed teens are twice as likely to be dependent on marijuana” (Finn, 2015, p. 7). Serious psychological disorders have also been linked to youth marijuana consumption: “…teens who use marijuana increase their chances of developing psychosis in young adulthood…up to four times; there is a strong relationship between marijuana use and development of schizophrenia” (Finn, 2015, pp. 7-8).

Meier et al. (2012) and Gonzalez and Swanson (2012) cite the persistent and recurring physical and psychological problems caused by cannabis; however, one study conducted by Rylander, Valdez, and

Nussbaum (2014) was unable to validate the legalization of marijuana in Colorado with the state's unusually high suicide rate but the study did validate the need for further study and the results were not generalizable to those with existing severe mental illness.

Justice System Impacts

According to Lyziak (2014), currently twenty-three states and the District of Columbia have enacted medical marijuana laws and sixteen states have decriminalized marijuana (Lyziak, 2014). This fact provides significant challenges to the justice and social systems tasked with handling the impacts of increased marijuana use; however, the controversy about the impacts that marijuana has on society and whether or not its effect on the justice and social systems and more importantly, people, families, and communities are recurring themes that warrant serious consideration.

Recent studies and reports illustrate the health and justice impacts of marijuana legalization, both medicinal and recreational, in states like Colorado have been significant, which takes its toll on society and the justice system. According to Lysiak (2014), an estimated 22 million pounds of marijuana is grown each year in the United States with 80 percent of that cultivated in five states: Hawaii, California, Washington, Tennessee, and Kentucky. According to Grilo (2015) marijuana trafficking is still a significant problem in America; however, the legalization of cannabis in many states has led to a decrease in the seizures by the U.S. Border Patrol and Mexican authorities: "The U.S. Border Patrol has been seizing steadily smaller quantities of the drug, from 2.5 million pounds in 2011 to 1.9 million pounds in 2014…Mexico's Army seized 664 tons in 2014…a 32% drop" (p. 1).

Although marijuana advocates often accuse the justice system of unjustly incarcerating marijuana law violators, the truth is very few marijuana offenders are serving sentences in state prisons: "Just one-tenth

of 1 percent of state prisoners are marijuana-possession offenders with no prior sentences" (Lysiak, 2014).

Some experts blame politicians for the proliferation of marijuana cultivation and the adoption of medicinal and recreational cannabis, which has created problems for the justice system, has created momentum for the legalization movement, and many critics cite the fact that these laws are often passed without analyzing scientific studies that show the deleterious impacts marijuana has on society: "Cowardly politicians, eager to please the pot heads and the marijuana lobby, never mention these facts…Invariably, the pot addicts call to defend their addiction" (Lysiak, 2014, Time Magazine quote by Dr. Michael Savage). Lysiak's (2015) Time Magazine article also mentions the fact that even though marijuana has been allowed in Colorado since 2000, a survey of 520 family physicians found that most doctors oppose the medicinal or recreational use of marijuana due to its impact on mental and physical health, and many were opposed to its use under all circumstances: "According to the 'Colorado Family Physicians' Attitudes toward Medical Marijuana' report, 46 percent of doctors…opposed recommending the drug under any circumstances." This conclusion by Lysiak (2015) indicates that even physicians are suspicious of the marijuana legalization movement and see its detrimental effects on patients, which also has an impact on the justice system, which will be summarized in this analysis.

According to USDOJ HIDTA (2015) marijuana advocates cite a number of benefits that legalization of marijuana potentially provides in this country, including elimination of arrests for possession and sale (reduces people with criminal records and prison populations); legalization could free up law enforcement resources for more serious crime response operations; reduce traffic fatalities since users will switch from alcohol to marijuana, which allegedly does not impair driving as much as alcohol; legalization will result in no increased use among youth, due to regulations; added revenue generated by

taxation could help all involved jurisdictions, and, advocates claim legalization will eliminate the black market sale of marijuana (NORML, 2015).

According to the same USDOJ HIDTA (2015) report, opponents of marijuana legalization, many from the law enforcement and health professions, cite negative consequences that the legalization of marijuana has had in Colorado that include some of the following: Increase in marijuana use among adolescents due to "messaging" and availability; increase in marijuana driving fatalities; rise in number of marijuana-addicted users in treatment; diversion of marijuana to non-legalization states; adverse impacts and costs generated by the physical and mental health damage caused by marijuana use, and, there is evidence, much of it generated by scientific research studies that assert that the cost to society resulting from the legalization of marijuana will far outweigh any potential revenue generated by legal marijuana transactions.

Kleber and DuPont (2012) further question the appropriateness and potential crime problems created by marijuana dispensaries that have increased in number in states like Colorado and California and the researchers caution physicians about their decisions to prescribe marijuana, since these so-called prescriptions or "recommendations" potentially impact crime and disorder in communities: "Many cities in Colorado and California are banning dispensaries because of the chaos they create; physicians who refer patients have unwittingly but nonetheless effectively contributed to the crime and other problems…" (pp. 564-568). Kleber and DuPont (2012) cite scientific research in their analyses that point to other health and societal problems associated with marijuana use, which debunks marijuana proponent claims that consumption of cannabis is relatively benign: "…more drugged driving with the potential for more traffic accidents; short-term memory deficits; decreased concentration, attention, and

information processing; and aggravation of symptoms and course of schizophrenia; relapse of stable schizophrenia, and earlier onset of schizophrenia in vulnerable males" (p. 566).

Ludlum and Ford (2010) studied California's medical marijuana provisions of law and contrasted the emotional justification for marijuana to treat serious illnesses and the more prudent questions pertaining to the efficacy and effectiveness of the current laws, recommending that eligibility for the drug should be limited, dispensaries should be reduced in number, and marijuana should be taxed; however, overall, the researchers concluded California's laws are a failure: "…emotional justification and voter support is not enough to make a program work. And recent history has shown that California's law has been a disaster" (p.70). This conclusion argues that serious circumspection is needed to thoroughly assess the impacts of marijuana legalization for medicinal or recreational use before such action is taken. Thus far, studies cited in this brief analysis of marijuana use substantiate sufficient cause for pause on health and justice implications alone.

What are other impacts of marijuana legalization for medicinal or recreational purposes on the justice system? Many scientific studies support opponents of marijuana legalization and often times, law enforcement and other justice system officials see firsthand the catastrophic impacts that marijuana and other drugs have in the communities within which they work and reside and it is a certainty that much of the crime committed in any given jurisdiction can be attributed to marijuana use and the proliferation of other illicit drug use (Lopey, 2015; USDOJ HIDTA, 2015; ONDCP, 2011).

For example, crimes in rural Northern California counties range from murders to the large-scale cultivation of marijuana on public lands and private property purchased for that purpose (Lopey, 2015

and Graves, 2015). One recent example cited by Rocha (2015) summarizes the tragic murder of three men who allegedly tried to steal marijuana plants from their marijuana garden in Northern California.

Marijuana use often results in other crime and deviancy problems associated with not only adults, but adolescents as well. Green, Doherty, Stuart, and Ensminger (2010) concluded that adolescent marijuana use leads to criminal involvement in adulthood. The longitudinal study of urban African Americans linked marijuana use early in life to adverse long-term consequences, including serious criminal involvement (Green, et al., 2010). The study by Green et al. (2010) concluded that other negative marijuana-related outcomes that help lead to crime and justice challenges include: "negative long-term consequences, including reduced educational attainment, unemployment, early pregnancy, and poor health."

Green et al. (2010) found that heavy adolescent marijuana users are more likely than non-users to have interactions with the criminal justice system: "…58% of heavy adolescent users have an arrest record compared to 34.8% of light/non-users" (pp. 1-8). According to a study conducted by USDOJ HIDTA (2015) disturbing trends emerged from the legalization of marijuana for recreational purposes in Colorado, including impacts on impaired driving, youth marijuana use, adult marijuana use, emergency room admissions, marijuana-related exposure cases, and diversion of Colorado marijuana to other states. According to the USDOJ HIDTA (2015) in 2014 there was a 32 percent increase in marijuana-related traffic deaths in just one year and Colorado marijuana-related traffic deaths increased 92 percent from 2010 to 2014 (average marijuana-related traffic deaths increased from 59 to 83 from 2009-2012 to 2013-2014, during the post-legalization period, p. 17). USDOJ HIDTA (2015) reported 488 total traffic deaths in Colorado in 2014 with 94 that were marijuana-related, 19.26% marijuana-related; compared to 2006, when 535 traffic deaths included 37 marijuana-related deaths but totaled only 6.9% (pp. 15-17).

USDOJ HIDTA (2015) noted that only 47 percent of the Colorado fatal drivers were tested for marijuana during these time periods. USDOJ HIDTA (2015) reported that the Denver Police Department experienced a 100% increase in DUI-drug arrests from 2013 to 2014 (33 and 66 respectively). USDOJ HIDTA (2015) reported that during 2014, the Colorado State Patrol arrested 674 DUI-drug suspects under the influence of marijuana compared to 874 total DUI-drug arrests, with marijuana arrests comprising 77% of the total DUI-drug arrests).

Although actual numbers were not cited, USDOJ HIDTA (2015) reported that 11.16 percent of Colorado youth 12 to 17 years-old were considered marijuana users compared to 7.15 percent nationally, ranking Colorado 3rd in the nation and 56 percent higher than the national average. USDOJ HIDTA (2015) reported drug-related expulsions in Colorado increased 40 percent from 2008 to 2014, most for marijuana violations (3,874 to 5,167) and sixth grade users of marijuana are common (p. 40).

Although actual numbers were not cited, USDOJ HIDTA (2015) reported a 20 percent increase in the percentage of 12 to 17 year-old probationers testing positive for marijuana since its legalization; adult marijuana usage in Colorado is increasing and during 2013, 29 percent of Colorado college students were considered current marijuana users (2nd in nation and 54 percent higher than national average).

Although actual numbers were not recorded, USDOJ HIDTA (2015) reported that in 2013, 10.13 percent of adults 26 years-old and over were considered marijuana users (5th in nation and 86 percent higher than national average) and probationers age 8 to 25 and 26+ years-old testing positive for marijuana increased 49 and 87 percent respectively since marijuana legalization was enacted in 2013.

USDOJ HIDTA (2015) reported that in 2014, when retail marijuana businesses began operating, a 29 percent increase in marijuana-related emergency room visits resulted and calls to the poison control center in Colorado doubled in 2014 compared to 2013. USDOJ HIDTA (2015) reported a 38 percent increase in marijuana-related hospitalizations and during 2014, there were 16 incidents involving children ingesting marijuana compared to only 2 in 2013 (children under 12) (p. 3).

USDOJ HIDTA (2015) reported a 72 percent increase in 2014 marijuana exposures and during 2013 to 2014, there was a 138 percent increase in children being exposed to marijuana; during the last 10 years, marijuana drug-related treatment admissions in Colorado was 6,491, second only to alcohol (12,943) and was higher than methamphetamine admissions (5,044).

USDOJ HIDTA (2015) reported an alarming increase in the interstate seizure of Colorado marijuana destined to other states; during 2009 to 2012, interdiction seizures of Colorado marijuana increased 365 percent; the average pounds of marijuana seized, destined for 36 other states increased 33 percent (52 to 242 per year) (2008 to 2014). USDOJ HIDTA (2015) cited a massive increase (2,033 percent) in U.S. Mail interceptions of Colorado marijuana, destined for 38 states, from 2006 to 2008; during 2013 to 2014, the average number of seized parcels containing Colorado marijuana destined outside the United States increased over 7,750 percent. USDOJ HIDTA (2015) compared 2005 seizures of 54 to the 360 seizures recorded in 2014, after legalization, which illustrates the significant problem associated with marijuana legalization and interstate seizures of marijuana originating in Colorado. Alarmingly, a 2015 HIDTA survey indicated that 100 interdiction experts estimates they seize only 10 percent or less of what gets through undetected (p. 103).

According to USDOJ HIDTA (2015) THC extraction lab seizures more than doubled between 2013 and 2014 (18 to 30), and other impacts to the justice system were evident as well. For example, crime in Denver increased 12.3 percent from 2012 to 2014; homelessness increased with marijuana considered a key factor, and Denver allowed more medical marijuana centers (198) than pharmacies (117). USDOJ HIDTA (2015) cites one report from Denver that the Salvation Army shelter once housed 190 people a night but now is averaging 345 people a night (p. 147). USDOJ HIDTA (2015) cites an alarming report from Denver, that homeless, transient, and sheltered inmates make up 25 percent of the local jail population and only 20 percent of this number commit minor crimes and the same report claims that at least 25 percent of homeless people travel to Colorado for a marijuana-related purpose (p. 147).

Another disturbing trend cited in the USDOJ HIDTA (2015) report is the increase in THC (potency) levels from an average of 3.96 percent in 1995 to an average of 12.55 percent in 2013; however, the average potency level in Colorado is 17.1 percent.

Despite claims that legalization of marijuana will reduce criminal activity and black market sales of cannabis products, scientific research refutes this assertion, based on the Colorado experience. USDOJ HIDTA (2015), Mallery (2011), Cohen (2009), and Barringer (2013) found that crime and illicit drug trafficking have increased exponentially in Colorado and other states that have legalized medical and/or recreational marijuana. Chu (2013) and other researchers have linked the legalization of marijuana for medicinal use with illegal use of the drug.

According to research conducted by Cohen (2009) many citizens have been confused by political ideologies, pandering, misinformation, and poor decisions that ultimately result in the promulgation of laws that have failed to take into account the results of scientific research related to the proliferation of

marijuana and its potential downfalls. Ferner (2105) cites the perspective that some federal officials have indicated that drugs like heroin are more dangerous than marijuana but the availability and proliferation of marijuana makes it a dangerous drug that impacts the entire justice system.

Ingraham (2015) cited a recent comment by the acting chief of the Drug Enforcement Administration (DEA) in a news report summarized by the Washington Post on November 10, 2015, indicated the official's disdain for marijuana as a legitimate drug. Acting DEA chief Chuck Rosenberg was probably representing the views of many law enforcement administrators in California, who have witnessed the abuse of medicinal marijuana laws since its inception: "What really bothers me is the notion that marijuana is also medicinal – because it's not…We can have an intellectually honest debate about whether we should legalize something that is bad and dangerous, but don't call it medicine-that is a joke" (Ingraham, 2015, p. 1).

According to Hall and Weier (2015) young adults are particularly vulnerable to the adverse impacts of marijuana intoxication: "cannabis-related harms that may increase among these young adults would include: increased convictions for cannabis-impaired driving; increased car crashes…and increased emergency room attendances for …cannabis intoxication" (p. 16).

Marijuana's impact on the justice system can be translated to crime and delinquency rates that are influenced by cannabis use and related drug trafficking. For example, according to Healy (2014) law enforcement officials in Colorado and neighboring states, emergency room doctors, and others are concerned about recent problems associated with legalization of marijuana in Colorado. According to Healy (2014) one Denver man, after buying marijuana-infused Karma Kandy from a Colorado recreational marijuana shop, pulled a handgun from a family safe and killed his wife. Healy (2014) adds

that physicians claim an alarming increase in emergency room admissions for children and adults sickened by potent edibles laced with cannabis. In the same article, Mr. Kevin Sabet, executive director of Smart Approaches to Marijuana, claims: “We’ve seen lives damaged. We’ve seen deaths directly attributed to marijuana legalization. We’ve seen marijuana slipping through Colorado’s borders. We’ve seen marijuana getting into the hands of kids” (Healy, 2014).

Ghosh, Van Dyke, Maffey, Whitley, Erpelding, and Wolk (2015) conducted research that substantiated alarming impacts from Colorado’s legalization of marijuana that allowed recreational marijuana and commercial production and distribution of medical cannabis; moreover, more than 500 medical-marijuana dispensaries began operation and registrants for medicinal cannabis, which totaled 4,819 in December 2008, but rose to 115,467 by December 2014.

Ghosh et al. (2015) found that adolescent access to marijuana increased dramatically and so did the products available for legal consumption for black market sales (e.g., consumables include candies, lozenges, baked goods, and beverages). Ghosh et al. (2015) reported THC levels increased from 15% to more than 20% with concentrated THC products (e.g., honey oil, hashish, etc.) reaching up to 90%, potency, which endangers adults and children: “…since retail sales began in 2014, the Rocky Mountain Poison and Drug Center has received over 70% more calls related to marijuana exposure than it did in 2013” (p.2). As previously mentioned, Ghosh et al. (2015) also found evidence that Colorado drivers testing positive for THC that are involved in fatal traffic collisions are on the rise: “…a Colorado-specific study revealed an increase in traffic fatalities involving drivers who test positive for marijuana” (p. 2). Ghosh et al. (2012) evaluated a Colorado passed law setting a limit of 5 ng of THC per milliliter of blood at which drivers are considered to be under the influence of marijuana in response to the

dangers associated with increased drugged driving incidents. This new law was necessitated by the enormous drugged-driver fatal traffic collision problem evolving in Colorado.

Giuliano, Fikru, Schondelmeyter, and Dann (2015) concluded that most studies that support marijuana as a legitimate medicine are anecdotal and lack the scientific scrutiny to validate the medical use of cannabis: “While a number of studies…examine medical marijuana use, most are anecdotal or a series of case reports…few of these research studies have used scientifically rigorous and valid methods or well-controlled research designs to assess the safety, effectiveness, or long-term use of marijuana” (p. 2). This conclusion presents a challenge to law enforcement and justice officials because laws are being passed that impact their mission, budgets, safety, and workload without proper consideration of the many research findings that could adequately influence the resulting legislation and inevitable problems.

According to Sullivan (2012) the impact of marijuana on organized crime and the emergence of drug cartels from Mexico and Central America are essentially criminal insurgencies that battle for dominance of the corridors that represent lucrative transshipment of drugs in the United States. Violence is a hallmark of rival drug cartels and has had a devastating impact on Mexico and border and inland regions of the United States: “Mexico’s drug war has killed an estimated 40,000 persons since 2006 when President Calderon declared war on the cartels” (Sullivan, 2012, p. 8). The violence in Mexico and Central America encourages immigration to the United States and creates instability: “…the Geneva-based Internal Displacement Monitoring Center, or IDMC, estimates 115,000 people have been displaced by Mexico’s drug violence” (Sullivan, 2012, p. 11). Riddell (2014) cites the fact that many law enforcement administrators and researchers have warned about other negative impacts associated with marijuana use and its link to deadly drug cartels. Sullivan (2012) emphasizes the claim, which is

substantiated by his research, that drug wars have been linked to insurgencies and other major justice system challenges.

According to Wall et al. (2012) the impacts of marijuana use on adolescents in states that have medical marijuana laws like Colorado create serious justice system problems. Watts et al. (2012) researched the phenomenal 100 percent increase in fatal pot-related traffic collisions, which pose a serious problem for justice and health care systems, and others impacted by the traffic-related deaths.

According to Mallery (2011) marijuana cultivation and trafficking operations in the United States present other serious justice system problems to the law enforcement administrator since marijuana trafficking operations can be sophisticated and well-protected by drug trafficking organizations (DTO) primarily from Mexico. Mallery (2011) cites the research conclusion that DTOs from Mexico are directly involved in the cultivation of a large number of marijuana plants, primarily in public land areas and these DTOs threaten public safety and law enforcement responders: “The transition of traditional marijuana cultivation to DTO cultivation has transformed the scale, methods, economic scope, and environmental impact of marijuana growing…Each DTO site supports between 5,000 and 50,000 plants” (p. 11-12). The dangers encountered by law enforcement and innocent citizens cannot be underestimated or understated: “…site…may contain…radios, alarms, scanners, night vision goggles…,chainsaws…and weapons…Armed guards are present at every site and carry weapons such as AR-15 assault rifles, AK-47 machine guns, hunting rifles, shotguns, and pistols…anybody in the near vicinity…is in extreme danger” (pp. 2-3).

Becker (2015) argues that marijuana, whether we like it or not, should be legalized for medical and recreational use and this will inevitably happen in most, if not all, states. Collinsworth and Collinsworth

(2015), CBS (2015), Glenza (2014), and the Huffington Post (2015) cite a growing legalization movement in California and predict medical marijuana legalization effort will succeed in the near future. Some subject matter experts and even law enforcement officials in the United States support legalization of marijuana and other drugs as a way to reduce the black market sale of drugs, limit prison commitments, eliminate massive spending budgets for enforcement of drug laws, and eliminate corruption that occasionally erupts from drug trafficking and drug enforcement. One prominent representative of LEAP, Dr. Inge Fryklund, a former United States Agency for International Development (USAID) official and advisor to the Afghan Supreme Court and Ministry of Justice in Afghanistan, recently visited some Northern California sheriffs and attempted to garner support for her anti-drug enforcement and anti-prohibition stance, including marijuana legalization. According to Fryklund (2014) who compares America's war on drugs and the United States' efforts against poppy production in Afghanistan, which she claims has been damaging and counter-productive to the economy, the Global War on Terrorism, and has led to corruption: "Our war on poppy production in Afghanistan has…slowed prosecution of the war…, distracted attention from Afghan governance deficiencies…, impeded economic development…, the rule of law, fostered corruption, and resulted in the deaths of US and Coalition forces…" (p. 3).

Fryklund's (2014) comments about blaming America's efforts in Afghanistan and the lack of robust reconstruction progress there based on the rather secondary role that the United States military and coalition forces have played to address the poppy cultivation (narcotics) problem there is emblematic of how many pro-drug legalization advocates take their efforts to the extreme. Like heroin and other opiates, marijuana has deleterious health and justice system impacts and there are serious ramifications for legalization on either front (NORML, 2015; USDOJ HIDTA, 2015; Graves, 2015; Downs, 2015; and

EIHage, 2015). Organizations like LEAP and the Organization for the Reform of Marijuana Laws (NORML) (2015) and Cole (2011) LEAP has advocated the legalization of marijuana for years.

Organizations like LEAP have used supportive law enforcement officials to reinforce their message for years that drugs should be legalized and drug control policies overhauled (LEAP Brochure, Criminal Justice Professionals Speaking Out Against the "War on Drugs"). The Gazette (2015) and many other pro-marijuana publications attempt to convince Americans and others that current marijuana laws, regulations and law enforcement efforts are ineffective and too costly.

According to King and Mauer (2006), the war on drugs and the battles waged against marijuana have been unsuccessful and have wasted valuable resources badly needed by the justice system. King and Mauer (2006) further claim that since 1990, the primary focus on the war on drugs has shifted to low-level marijuana violations of law: "During the study period (1990-2002), 82% of the increase in drug arrests nationally (450,000) was for marijuana offenses…Of the nearly 700,000 arrests in 2002, 88% were for possession; only 1 in 18 of these arrests resulted in a felony conviction". King and Mauer (2006) further claim that their research found that $4 billion per year was spent for marijuana enforcement, mostly for minor offenses.

King and Mauer (2006) also urge policy makers to consider diverting more funding, such as the $19 billion annual federal allocations for the war on drugs for treatment and prevention, since current ratios represent 2:1 enforcement versus treatment/prevention funding: "The financial and personal investment in marijuana offenses, at all points in the criminal justice system, diverts funds away from other crime types…a questionable policy choice".

According to Skelton (2015), marijuana advocates are actually spreading a false narrative about marijuana arrests, since most possession charges are infractions or misdemeanors and rarely result in incarceration sentences; moreover, he disputes the claims that enforcement costs too much and jail time is wasted: “The weed warriors are back…And one old tale they’re spinning is pure bunk…But in California, using marijuana to get a buzz has been decriminalized since the mid-1970s…hardly anyone is locked up in California prisons or county jails on any type of marijuana sentence” (p. 2). Skelton (2015) cited statistics that support his claim that very few marijuana offenders spend time in jail or prisons: “In prisons, only about three-tenths of 1% of the total inmate population is incarcerated for a marijuana offense…, total California felony arrests last year, according to the state attorney general, just 3% were on any marijuana charge…, for misdemeanor arrests…, less than 1%” (p. 2).

According to Barcott and Scherer (2015, p. 53), 116,000 residents of Colorado are using marijuana, which represents the highest proportion of any state in America (2.2%) but marijuana possession charges have dropped 80%. Barcott and Scherer (2015) claim that the 3% state tax rate on medical marijuana and the 28% state tax rate on recreational marijuana totaled $44 million in 2014. Taxation is a tempting alternative for jurisdictions facing dwindling budget allocations and this attractive element of the legalization process in Colorado helped convince voters to approve the current statute.

According to Healy (2014), EIHage (2015), and USDOJ HIDTA (2015), law enforcement officials in Colorado face not only the expansion of marijuana grow sites, and the exponential increase in medicinal and recreational users but a growing number of people are attempting to capitalize on the potential profits derived from the growing industry. For example, one magazine article (Time) cites the huge profits that potentially influence the marijuana business: “Wall street analysts believe there are going to be two or three billionaires minted in this industry in the next 10 years…this kind of opportunity comes

around only once in a generation" (Barcott and Scherer, 2015; quote by T. Keber, Time Magazine, p. 68).

Research and government reports substantiate the reality that Colorado is experiencing negative impacts associated with marijuana legalization and so have numerous other states. According to Healy (2014) states like Kansas have experienced a 61 percent increase in seizures of marijuana that could be traced to Colorado, and illegal drug trafficking has had a major impact on Kansas and other states, and unfortunately, Colorado and federal authorities have been unwilling to intervene.

According to Healy (2014), police and fire officials across the state have been alarmed by a sharp increase in home explosions caused by people using flammable butane to make concentrated cannabis and despite numerous regulations governing the actions of marijuana stores throughout the state, dangerous illicit markets are enduring challenges for the justice system. According to USDOJ HIDTA (2015) edible marijuana products were not regulated in the Colorado legislation, which contain high levels of concentrated THC, often in harmful 100 milligram quantities.

According to Finn (2015), marijuana ingestion impacts reaction time, problem solving, and coordination, which causes traffic collisions and deaths in Colorado in far greater numbers than normally encountered prior to the legalization of marijuana: "The total number of drivers involved in fatal crashes decreased from 721 to 587…The drivers of fatal crashes involving all drugs steadily increased from 21 to 52…those drivers testing positive compared to other drugs increased from 28% to 56%" (Finn, 2015, p. 9). According to Griffits (2015, p. 1), the National Cannabis Prevention and Information Centre (NCPIC) found that 70 percent of recent cannabis users in New South Wales (4,600 surveyed) over the age of 18 drove while under the influence of cannabis and further research validated

that cannabis use increased the risk of motor vehicle crashes by up to 300 percent, which debunks the myth that cannabis drivers are more in control or aware of their driving behavior.

Although this project focuses primarily on Colorado and other states, scientific research in other countries like Australia can be revealing and useful in evaluating potential impacts in America. Hartman and Heuestis (2012) conducted research identifying cannabis as the most prevalent illicit drug used by impaired drivers and their research found that motor vehicle accidents increased approximately 2-fold after consuming marijuana and their analysis identified other disturbing facts: "Nearly two-thirds of US trauma center admissions are due to motor vehicle accidents…Alcohol and cannabis are the drugs most frequently detected…Colorado, which legalized medical marijuana in 2000, has seen increased numbers of DUIC cases…" (p. 2-3).

Hartman and Heuestis (2012) found cannabis effects include alterations in reaction time, perception, short-term memory, attention, motor skills, tracking, and skilled activities, which are common research findings. Their research clearly shows the link between cannabis use and driving under the influence offenses and mishaps, which is a serious concern to law enforcement and justice system providers. Moreover, fatal traffic collisions are costly to society for a number of reasons and adversely impact the involved families: "DUIC is an important public health and safety concern that requires the development of an evidence-based policy and legislation… Consuming cannabis before driving, with or without alcohol, is a common occurrence that produces substantial morbidity and mortality on the roadway" (Hartman and Huestis, 2012, p. 8).

According to ONDCP (2011), a direct relationship between marijuana use and subsequent use of other drugs may be hard to prove but research indicates that those who started using marijuana early are more

prone to abuse other illicit drugs, which is a serious concern to the law enforcement administrator and other social service providers: “Adults who were early marijuana users were found to be: 8 times more likely to have used cocaine; 15 times more likely to have used heroin; 5 times more likely to develop a need for treatment of abuse or dependence on any drug” (p. 9). ONDCP (2011) research discovered that in Europe, the Dutch are reconsidering their liberal drug laws after marijuana use between 1984 and 1996 nearly tripled – from 15 percent to 44 percent among 18 to 20 year-old Dutch youth.

While short on scientific research to support their positions, many marijuana advocates blame the government for misinformation and misaligned priorities that needlessly keep the drug wars and anti-marijuana campaigns flourishing. According to Dick (2014) the USDOJ’s Rocky Mountain HIDTA has developed reports that spread disinformation and their narrative promotes false justification for maintaining their status quo budgets: “With more and more state and local governments moving away from prohibition of marijuana and this trend showing no signs of reversing, the HIDTA people, along with their…allied agency beneficiaries, must be having some job security concerns” (p. 2).

Dick (2014) claims FBI statistics indicate marijuana accounts for 48.3 percent of all drug arrests and he claims that many arrestees were in possession of marijuana only: “By mere possession, there was one marijuana arrest every 48 seconds in 2012; including arrests for distribution, there was a pot-related arrest every 42 seconds, the same interval as in 2011” (p. 2). Dick (2014) further postulates that HIDTA’s $238 million in ONDCP grants constitutes “policing for profit” through drug war asset seizures and he cites benefits derived by prosecutors, private and public prisons that “cage” drug war convicts, and treatment centers where people with no addiction attend court-ordered treatment. Dick (2014) further asserts arms’ manufacturers have found new income opportunities due to police

militarization efforts under the guise of the war on drugs, which extends to marijuana eradication efforts in numerous jurisdictions.

Law enforcement practitioners with experience in the field such as Lopey (2015), Graves (2015) and USDOJ Rocky Mountain HIDTA subject-matter experts dispute such claims and report that the proliferation of marijuana has spread from public lands in rural California counties to private lands, where illegal marijuana trafficking is rampant; moreover, marijuana eradication efforts often involve "high risk" operations against heavily-armed DTOs (drug cartel) members who pose a substantial danger to law enforcement and the public. Dick (2014) further claims, with no scientific research to back-up his assertions, that Americans are rejecting the government and private drug war beneficiaries propaganda and experiencing the benefits of "live and let live" over "arrest, find, and incarcerate" approaches to the marijuana problem. One opposing argument to the theory postulated by Dick (2014) is the fact that Ohio voters soundly defeated a marijuana legalization measure recently, which was reported by Garofali (2015) in an article printed in the San Francisco Chronicle.

According to Downs (2015), one recent effort by California to regulate marijuana products just recently passed legislative review and signed into law by Governor Jerry Brown, incorporates three new laws, currently called the Medical Marijuana Regulation and Safety Act (MMRSA) (Assembly Bills 266 and 243, and Senate Bill 643). According to the law's authors and Downs (2015), patients will have assurances that their products are safe, law enforcement will have the authority to enforce marijuana-induced driving under the influence provisions of law, the environment will be protected from neglect, water diversions will be curtailed and managed, and the medical marijuana industry will come out of the shadows and regulated. According to Downs (2015) the law will include a limit on plant counts and permit requirements will be imposed at the state and local levels (pp. 1-5).

These laws sanction marijuana to some degree but may provide law enforcement, state and local officials, and other stake holders with more authority and regulatory provisions with which to control the largest cannabis-producing state in America and local governments will retain substantial control: “California has the world’s largest and oldest cannabis market estimated at $1.3 billion in annual sales and nearly half the legal US market” (Downs, 2015, p. 2).

Developments in the marijuana regulatory arena are evolving almost daily, which further challenges the justice system. It remains to be seen how these laws will impact justice system stake holders, especially law enforcement, but advocates argue that some of its provisions will prevent some of the justice system problems encountered in states like Colorado. According to White (2015) the new California law, which took effect on January 1, 2016, protects small businesses engaged in marijuana-related production activities and creates a process for taxation. According to Downs (2015) currently, support for legalization of marijuana in California is about 52 to 54 percent but a united front of law enforcement officials, lawmakers, business and churches and opposition from stoners and growers against legalization could upend this effort (p. 2).

According to Mallery (2011), the federal government has initiated numerous attempts to curtail the illegal drug trade, especially originating from DTOs from Mexico with special funding assistance programs; however, the money has yet to appreciably influence the flow of drugs into the United States nor inhibit widespread marijuana cultivation operations on public lands, especially in the Northwest: “President Obama met with officials in Mexico City and augmented ‘ongoing US aid to Mexico under the Merida initiative: a three-year, $1.4 billion package aimed at helping Mexico fight the drug cartels…However, this money is yet to incur any noticeable effect…” (p. 44).

Mallery (2011) asserts in his research report that the only way to oppose cultivation trends is to change the role of marijuana in states like California and the United States through legalization. California law enforcement administrators are generally opposed to legalization but legislators in California have recently attempted to legalize cannabis with negative results: “California legislator Tom Ammiano proposed the Marijuana Control, Regulation, and Education Act (Assembly Bill 390) in 2009 in an effort to take marijuana cultivation out of cultivator control and put it to use for the government through tax revenues” (Mallery, 2012, p. 45). According to Mallery (2012) it was estimated that the taxation of marijuana could generate over a billion dollars in tax revenues while saving hundreds of millions more in enforcement and other justice-related costs, such as prosecution and incarceration.

According to USDOJ HIDTA (2015), ONDCP (2011), and EIHage (2015), research links the justice-related implications related to the medicinal use and legalization of marijuana for recreational purposes, which has had a profound influence on Colorado and many other states. These states have endured the impact of rampant drug abuse, health-related problems (mental and physical), deviancy, drugged drivers, drug trafficking, homelessness, and rising crime rates; moreover, Colorado’s problems have imposed social and health costs on the tax payers of Colorado and research associated with alcohol and tobacco costs illustrate the reality that the tax revenues derived from medicinal and recreational marijuana use will not pay for up to 90 percent of the expenses incurred and the damage done by the drug.

This burden is often absorbed by law enforcement and other justice system partners; however, other researchers such as Winterbourne (2012), Dick (2014), Fryklund (2014), Franklin (2010), and organizational missions from LEAP and NORML claim that the war on drugs has been unsuccessful, costs too much and discriminates against African Americans and Hispanic Americans, who currently

account for 85% of arrestees in some states and non-white drug offenders account for nearly 75% of all drug offenders currently in US prisons.

Other experts in the field such as Sullivan (2012) found that relying on illicit drug economies present imminent threats to law and order and stability of numerous nations and societies: “The drug trade and other illegal economies generate multiple threats to the United States and other states and societies; At the same time, large populations around the world in areas with minimal state presence, great poverty…are dependent on illicit economies…including the drug trade…” (p. 33). According to ElHage (2015) the “new” black market is flourishing in Colorado through the illegal diversion of “medical marijuana” to other states, which was elaborated on earlier and other states are taking action against Colorado due to the 397% increase in interdiction seizures of Colorado marijuana destined to 40 other states”. ElHage (2015) further reports that there is a significant legal battle originating from other states to repeal Colorado’s legalized marijuana provisions: “In February 2015, nine former DEA administrators signed an amicus brief to the U.S. Supreme Court in one lawsuit filed by Oklahoma and Nebraska that seeks to overturn Colorado’s marijuana law” (p. 3).

According to ElHage (2015), the impacts of Colorado’s legalization of marijuana for recreational and medicinal purposes have had a devastating impact on those states filing suit against Colorado: “…they argue the law ‘has already drained the plaintiff States’ resources and imperiled the lives, health, and well-being of their citizens,’ and these injuries will …mount as long as Colorado authorizes the injection of a dangerous substance into the stream of commerce” (p. 3). In rural counties of California, marijuana has led to violent crimes in counties contiguous to Siskiyou County. According to Sheriff B. Haney (2015) four murders investigated in the small county of Trinity in Northern California within the last two years (2014-2015) have been linked to marijuana cultivation or use.

The health and justice system impacts that marijuana legalization for medical or recreational purposes have had on Colorado and other states and nations have been profound but often times controversial since there are advocates for and against marijuana prohibition. Another significant marijuana-related impact that has been influenced by the proliferation of marijuana in many states has been its impact on the environment. Although marijuana cultivation's impact on the environment has not been studied or researched as widely as the health and justice impacts, this area of concern is growing exponentially, especially in drought-laden, rural counties in the Northwest and elsewhere.

Environmental Impacts

The environmental impacts of illicit and legal marijuana have far-reaching impacts on many states like Colorado and California. For example, research by Bauer, Olson, Cockrill, van Hatten, Miller, and Tauzer et al. (2015) found that marijuana cultivation has proliferated in northwestern California since the mid-1990's and the impacts on the environment appear substantial: "Our results indicate that after demand for marijuana cultivation has the potential to divert substantial portions of stream flow in the study watersheds, with an estimated flow reduction of up to 23% of the annual seven-day low flow…watersheds…" (p. 1). Bauer et al. (2015) links diminished stream flow with the lethal or sub-lethal effects on state-and-federally-listed salmon and steelhead trout and their research further associates the lack of sufficient water flows caused by marijuana cultivation with the further decline of sensitive amphibian species (p. 1).

Bauer et al. (2015) researched stream and watershed reductions in remote Northern California marijuana cultivation areas, which are substantial: "…from 2008-2012 the total numbers of outdoor plants eradicated in California has ranged from 53% to 74% of the total plants eradicated in the United States" (p. 1). This situation creates potential catastrophic impacts on the environment and the research of Bauer

et al. (2015) found a lack of regulatory framework to deal with the problem and cited the viewpoint that there is little or no distinction between plants grown for the illegal black market and those cultivated for legitimate medicinal purposes.

According to Barringer (2013), marijuana crops threaten forests and wildlife. Barringer (2013) cited the example of the Pacific fisher, an animal that has been poisoned by anticoagulants in rat poisons like "d-Con" which is frequently used by marijuana cultivators in rural California pot grow sites. Marijuana growers use "d-Con" and other hazardous materials to protect their crops from rodents, including the wood rat. Barringer (2013) cites a number of potentially catastrophic environmental impacts of the marijuana drug trade, including the death of six poisoned Pacific fishers, leveling of mountain tops to initiate larger and more efficient grow sites; watershed and stream diversions; and additional environmental damage occasioned by drug cartels from Mexico and local growers; Mexican drug cartels alone are suspected to have cultivated 70,000 to 100,000 marijuana plants in the Humboldt County (California) area alone.

Mallery (2011) conducted research that further substantiates the reality that illegal marijuana cultivation on California public lands has become a significant problem affecting natural resources and public safety. "Illegal marijuana cultivation on California public lands has become an increasingly significant problem affecting natural resources and public safety…Cultivators degrade some of the few natural places left by altering land, diverting water, applying chemicals, and inhibiting sites for long periods of time…" (p. 1).

These scientific finding are alarming to western states like California that have suffered drought conditions for over four years. According to Stoa (2015) the proliferation of marijuana and lack of

regulation to protect holders of riparian or prior appropriative waters rights after the Governor of California Jerry Brown issued a drought state of emergency in response to shortfalls in freshwater supplies in the state, has had a catastrophic impact on watersheds: “But in March of 2015, the first credible scientific study…found that the demand for water to irrigate marijuana plants often outstripped water supplies” (p. 4). Stoa (2015) found in his research that some areas in marijuana cultivation areas were created a crisis for local officials and other water users: “…the lack of regulation is creating an enforcement crisis, an investment crisis, and an environmental crisis” (p. 59).

Stateman (2015) found marijuana cultivation, legal and illegal, presents many challenges to legal doctrines, administrative agencies, and other stake holders and there is conflict created when attempting to balance the needs of legitimate holders of existing water rights with the demands of marijuana producers, which, in some areas, grow one of the country’s biggest cash crops. According to Carah, Howard, Thompson, Short, and Bauer et al. (2015) many studies about marijuana have focused on health and justice implications of legalization but few have studied the impacts of marijuana on environmental harm associated with commercial cultivation.

Lysiak (2014) reported the dramatic impact on water use and pollution caused by large-scale marijuana operations, which often ravage many land areas (Lysiak, 2014). According to Lopey (2015), Conrad (2015), CBS (2014), and Sides (2015), insecticides, pesticides, rodenticides, and tons of garbage have had a deleterious impact on many rural counties in Colorado and California. USDOJ HIDTA (2015) reports the negative impacts on the environment that the expansion of marijuana cultivation has had in states like Colorado. According to Barringer (2013) there is overwhelming evidence that marijuana crops damage forests and wildlife.

Frank (2014) reported marijuana supporters are against farms and fish: “The lovers of marijuana, not understanding how it grows, are the haters of farms and fish” (p. 1). According to Frank (2014) marijuana plantations “guzzle” enormous amounts of water and spill pesticides, fertilizers, and stream-clogging sediments into waters, including the Eel and Klamath rivers of Northern California, endangering native Chinook salmon and other species.

Bland (2014) found the proliferation of marijuana in California referred to as the “Emerald Triangle” endangers salmon populations. According to Bland (2014) marijuana growers often withdraw water directly from small streams and use up to 6 gallons per day per plant during the summer growing season. Bland (2014) cited a statement by Mr. Scott Bauer, a fisheries biologist with the California Department of Fish and Wildlife, that lamented the fact that 24 tributaries of the Eel River, in which spawning runs of Chinook salmon previously flourished, have nearly vanished, many going completely dry in 2013, primarily due to irrigation water taken for pot farms.

Bland (2014) and Mr. Bauer also cite the claim that there are 4,000 pot growers in Humboldt County alone and it is not just water that endangers native species but chemicals and nutrients discharged into streams and other watersheds: “Fertilizers that drain into rivers can cause floating carpets of algae to grow…theses mats begin to decay, the breakdown process steals oxygen from the water, suffocating fish…Bauer has discovered pools full of dead adult Chinook salmon – fish full of eggs” (p. 2).

Mallery (2011) reports marijuana is California’s largest cash crop estimated to be worth 10 to 14 billion dollars annually in the state, which has led to large-scale marijuana cultivation sites on public lands and Mallery cites both domestic and drug cartels as responsible parties with Mexican drug cartels by far the greatest producers in most areas. According to Mallery (2011) drug trafficking organizations often

create significant environmental challenges to land managers, citizens, and law enforcement through methods used for high-yield marijuana crops, which garner the most profits: "…cultivators cut or wear trails…, kill small vegetation…, contribute to the spread of Phytophora ramorum…, transport this pathogen to uninfected oak trees…Their movement… spread a variety of harmful invasive species including thistles, Vinca, Periwinkle, English Ivy Yard, and others…" (p. 23). DTO and local growers often use harmful chemicals and other pollutants to grow marijuana in remote public land areas: "…cultivators use chemical techniques to maximize THC content and bud production…In short, remote cannabis cultivation forever changes the ecosystems in which it takes place…for every acre of forest land planted with marijuana, 10 acres are damaged" (pp. 24-25).

Mallery (2011) cites other environmental impacts of marijuana cultivation, including water diversions, which he has found creates adverse effects for humans and the environment. In California, similar impacts are felt in private and public land marijuana grow operations Lopey (2015) and Graves (2015) because similar methods are used on rural parcels privately purchased for exploitation by cannabis growers.

Although all of the environmental impacts of marijuana cultivation cannot be summarized in this document, Mallery (2011) reports the most devastating impact on the environment can be found in the chemical application often employed by cannabis growers since industrial agricultural techniques are used with chemicals applied in order to create plants that grow faster, develop desired traits, and produce the maximum yield (bud production). Mallery (2011) reports that it is important for growers to protect the crops, which produce an expensive yield by using illegal and otherwise dangerous chemicals to control and kill deer, rodents, mites, or other animal life: "An average cultivation site of about 5 acres

and 7,000 plants can contain 20 pounds of rat poison, 30 bags of fertilizer, plant growth hormones, insecticides, herbicides, fungicides, and a variety of other chemical inputs" (p. 28).

Mallery (2011) reports DTOs import banned chemicals from Mexico which they apply in unrestricted amounts, causing extensive harm to the laborers and to the ecosystems exposed to the hazardous substances. Mallery (2011) further reports remote marijuana grow sites require extensive clean-up once detected and marijuana plants, water diversion systems, drip irrigation systems, camp site and surrounding areas often contain tons of trash: "…the average cost of cleanup per site is $5,000…when environmental remediation is included, the cost of site processing doubles…to approximately $10,000…expenses include helicopter fees, fuel consumption, wages, gear, trash disposal fees, and other costs" (p. 38). Mallery (2011) reports that in 2007, the U.S. Forest Service eradicated 346 sites and allocated $300,000 to site cleanup and remediation.

According to nationalforests.org (2015), California's environment has been devastated by marijuana cultivation and on average, law enforcement locates 300-600 trespass grow sites in California on an annual basis and an additional 300 to 500 grow sites go undetected, leaving rural communities deluged with the environmental blight that occasions the cannabis grows: "…this means 9,000 pounds of rodenticide, 70,200 pounds of fertilizer, 726 miles of irrigation line, 4,800 gallons of insecticide, 6,000 gallons of Carbofuran, and 300 tons of garbage are deposited in our forests annually" (p. 4-6). Carbofuran is a deadly insecticide banned in the United States but imported from Mexico.

Opponents of marijuana prohibition often cite the theory that legalization of cannabis would curtail the black market and eliminate the DTOs in states like California; however, USDOJ Rocky Mountain HIDTA (2015) and other experts such as ONDCP (2011) and Garofali (2015) refute that assertion.

California's recently passed Medical Marijuana Regulation and Safety Act may curtail the damaging effects marijuana cultivation has on the environment by imposing licensing, water rights, and restrictions on chemical methods; however, this law took effect on January 1, 2016 and its impact on the growing marijuana cultivation and proliferation challenges facing law enforcement and public health partners is still underdetermined and it is not likely to change the environmental damage perpetrated by thousands of illegal and even legal growers of marijuana in the immediate future. Another important issue that has garnered a lot of attention recently is the fiscal impact that medicinal and recreational marijuana has on impacted organizations and jurisdictions.

Fiscal Impacts

Fiscal impacts of marijuana legalization is a complex and controversial topic in states like Colorado, where projected tax revenues generated by hundreds of thousands of transactions conducted at state-sanctioned stores have not matched early projections: "The industry has generated $12.6 million in taxes and fees so far, though the revenues have not matched some early projections" (Healy, 2014). Downs (2015) cites the estimate that California alone has the world's largest medical cannabis market estimated at $1.3 billion in annual sales and he asserts that California comprises nearly half of the legal US market (Downs, 2015).

Many experts in the field do not believe that fiscal proceeds will compensate for the health, justice, and environmental impacts inflicted by wide scale proliferation of medicinal and recreational marijuana. According to Graves (2015) alcohol kills 100,000 people annually, and tobacco kills another 500,000 every year in the United States; however, society gains about $15 to $20 billion annually in alcohol-related tax revenues and receives about $25 billion in tobacco taxes, which only meets about 10% of the enormous price tag for alcohol and tobacco-related health, social, and justice related costs each year,

estimated to be about $200 billion. Graves (2015) points to research that for every $1.00 spent in drug use prevention strategies that $10.00 is saved in treatment costs.

Some counties in California have come to rely on the marijuana industry to rehabilitate dwindling economies severely damaged in recent history by the declining timber industry. According to Barringer (2013) marijuana is essential to the economy of Humboldt County and a cultural icon of resistance to authority: "…a local bank, estimated last year that marijuana infused more than $415 million into the county's annual economic activity, one-quarter of the total" (p. 1). Moreover, Glauser (2012) estimated that the federal government would experience a savings to their annual budget of $25,963,686,520.00 if drugs were legalized.

Marijuana sales, indirect commercial support transactions, and law enforcement costs to enforce marijuana laws are often cited as the most controversial fiscal-related issues related to cannabis legalization or medicinal use, since there is a huge potential for tax revenues and theoretically, savings associated with law enforcement counter-drug operations that have been expensive for decades may be achieved if marijuana prohibition is ended. Researchers like Hudak (2015), Kopel and Burns (2013), and Beck (2015) support a different perspective on marijuana and cite the fiscal advantages associated with legalization and invariably anti-prohibitionists cite the perceived ineffectiveness of law enforcement efforts to curtail the illicit drug and often compare marijuana laws with the prohibition of alcohol implemented in the United States after World War I.

According to Nadelmann (1989), the war on drugs and prohibition of marijuana is increasingly costly and counterproductive. Nadelmann (1989) claims that the United States has seen little success in limiting illicit drug trafficking of heroin and cocaine and compares this lack of success with

governmental policies directed towards marijuana: "…during the past decade, the wholesale price of a kilo of cocaine has dropped by 80%...even as purity of a gram of cocaine has quintupled from 12 to 60%...heroin…has been similar." Nadelmann (1989) claims total government expenditures devoted to drug laws amounted to $10 billion in 1987 and his research reports that states and local expenditures in the $5 billion range, one-fifth of total investigative resources.

Nadelmann (1987) admits, however, that legalization is a risky policy, one that could lead to an increase in drug abuse, but he asserts the lack of success and expense associated with drug enforcement as factors that should lead political leaders to consider elimination of prohibition policies in America. His research, while dated, is consistent with the contemporary views of Organizations like NORML and LEAP, which want to legalize marijuana and divert funds spent by law enforcement resources from marijuana interdiction to more pressing law enforcement matters (NORML, 2015; LEAP, n.d., and Cole, 2011). According to other sources, such as the Huffington Post (2013), legal marijuana states have collected over $200 million in tax revenues, which proponents claim is proof that marijuana can be controlled, taxed, and managed appropriately at the state level (Glenza, 2015; Becker, 2015; Collinsworth and Collinsworth, 2015).

According to Norman (2015), Colorado has received $76 million from legal cannabis sales during 2014 on $700 million in sales. Norman (2015) claims this money is better allocated and spent by the government instead of invested into black market or illegal marijuana distribution networks. Norman (2015) disavows the black market sales outside the state of Colorado, which has risen exponentially since cannabis was legalized in the state for medicinal and later, recreational use. As previously reported, USDOJ HIDTA (2015) reports a significant increase in illicit cannabis diversions to other states: "During 2009-2012, when medical marijuana was commercialized…, interdiction seizures of

Colorado marijuana increased 365 percent; during 2013-2014, when recreational marijuana was legalized…seizures of Colorado marijuana increased another 34 percent" (p. 4).

Bennett (2007), USDOJ HIDTA (2015), Lopey (2015), Graves (2015), Conrad (2010), Riddell (2014), ONDCP (2011), and Chu (2013) and most law enforcement officials and those in the drug enforcement business are convinced that legalization of drugs, including marijuana, will create justice, health, environmental, and economic problems that will not be sufficiently mitigated or offset by tax revenues, much like the deficits society absorbs with tobacco and alcohol-related problems, but most report that the human, societal, and crime-related ramifications are even more significant.

Although the human and societal costs of marijuana addiction and recreational use are hard to fully calculate, the costs associated with vehicle accidents involving THC ingestion can be significant: "According to the National Highway Traffic Safety Administration…2010, the total economic costs for a vehicle fatality is $1,398,916. That includes property damage, medical, insurance, productivity…" (USDOJ HIDTA, 2015, p. 27). USDOJ HIDTA (2015) cites the individual costs associated with the first DUI-related offense as $10,270 (p. 27). These costs are likely much higher since the research conducted by the National Highway Traffic Safety Administration was concluded in 2010.

Caputo and Ostrum (1994) report that there are significant benefits to be considered when considering ending marijuana prohibition and the potential for large tax revenues and other financial benefits of legalization could prove beneficial to society. Winterbourne (2012) claims the costs of funding the war on drugs are estimated between $26 and $58 billion annually, including enforcement and incarceration activities, which he claims is not working in the best interests of Americans: "Add to these costs the money required for drug education programs…$1.3 billion in 2001…America is dumping money into a

system which has failed to display any significant deterrence or reduction in illegal drug use by either…youth or adult populations" (p. 98).

Glauser (2012) hails legal distribution and taxation by others as a miracle cure for the ailing economy. Patton (2010) and other scholars argue there are advantages and disadvantages associated with the legalization of marijuana. Researchers argue there are compelling budgetary factors associated with marijuana prohibition, including costly law enforcement expenditures for cannabis reduction operations and there is evidence that taxes derived from legitimate marijuana sales benefit public budgetary revenues: "According to the state's department of revenue, the first ten months of legal marijuana sales have resulted in nearly $40 million in tax revenues" (Polis, 2015).

In Colorado, some crime reduction programs have benefited from tax revenues associated with cannabis sales: "Upwards of $8 million has been allocated to fund youth education and drug prevention efforts" (Polis, 2015). Beck (2015), Katel (2006), and Norman (2015) claim that legalization advocates, such as the Law Enforcement Against Prohibition (LEAP) group, are convinced the "war on drugs" is a failure and costs too much tax dollars to sustain: "The War on Drugs has cost more than $1 trillion dollars, yielded no positive outcomes, and has ultimately diverted the penal system's attention from more important crimes" (Beck, 2015 p. 2). Stateman (2009) postulates that marijuana is the answer to California's economic woes: "Pot, is after all, California's biggest cash crop, responsible for $14 billion a year in sales, dwarfing the state's second largest agricultural commodity – …which brings in $7.3 billion a year..." (p. 1). Stateman (2009) cites a retired Orange County Superior Court Judge James Gray, a proponent of legalization, who estimates California can save $1 billion a year legalizing pot through the cessation of arrests, prosecution, and imprisonment savings.

Stateman (2009) cites a law enforcement-affiliated opponent of marijuana legalization, Mr. John Lovell, lobbyist for the California Peace Officers' Association: "We have enough problems with alcohol and abuse of pharmaceutical products. Do we really need to add yet another mind-altering substance to the array?" (p. 2). Most law enforcement administrators and critics of marijuana legalization such as Graves (2015) and Jangi (2015) would probably agree with Mr. Lovell, since they are on the frontline and see the damaging influences illicit drugs, including marijuana have on adolescents, families, communities and the growing crime problem: "There is a serious drug problem in this country, and marijuana is a much bigger part of the problem than most people realize…Of the 7.1 million Americans suffering from illegal drug dependence or abuse, 60 percent abuse…marijuana" (ONDCP, 2011, p. 1).

Researchers have studied ways government entities can reduce the drug's wars damage to dwindling budgets. According to Koppel and Burrus (2012) numerous factors have led to fiscal challenges faced by most jurisdictions in America, which have generally adversely impacted public services provided to the public: "Soaring Medicaid costs, reduced tax revenues because of economic stagnation and the collapse of the housing bubble, and enormous expenditures on pensions for retirement governmental employees have imposed stress on…most every state government".

Kopel and Burrus (2012) found that between 2001 and 2010, Colorado's violent crime rate fell by 8.3%, property crime dropped 30.4% but during the same period, the prison population increased by 38.4%. According to Kopel and Burrus (2012) Colorado annual costs per inmate are $32,334 for public prisons and $21,571 for private institutions, an enormous sum that exceeds the cost of a college education in prestigious schools such as Harvard; moreover, the researchers blame drug laws as a major factor in increased prison expenditures. According to the Colorado Criminal Justice Reform Commission (CCJRC): "…drug offenses drive prison growth…drug offenders are more than 18% of Colorado's

prison population and no other violent crime is more than 7% of the population…" (Kopel and Burres, 2012).

According to Kopel and Burrus (2012), Colorado's House Bill 10-1352 lowered the statutory penalties for simple possession or use of controlled substances, which is projected to save the state $56.5 million over a five year period. Kopel and Burrus (2012) compared alcohol prohibition instituted in the United States 1929 to 1933, to the prohibition of marijuana, especially since prohibition denied the nation valuable tax revenues and cost jobs as well, and, the researchers compared the poor Depression Era economy that helped lead to the repeal of the 16th Amendment to current times in America, which is seeing a record national budget deficit in excess of $15 trillion when their research was completed. The national debt is much higher now. According to Kopel and Burrus (2012) Colorado spent $36.6 million per year enforcing laws against marijuana and the researchers claim 89.5% of the funds were used on enforcement for marijuana possession-related offenses, which, once eliminated should save Colorado $74 million a year.

Another research study conducted by Miron (2010) estimates that legalizing drugs would save roughly $48.7 billion per year in expenditures and enforcement, including $33.1 billion in savings to state and local governments, which includes a large portion attributed to the legalization of marijuana: "Approximately $22.3 billion of the savings would result from legalization of marijuana." Miron's (2010) research claims a tax revenue yield of $34.3 billion annually, if drugs are taxed at rates that are comparable to alcohol and tobacco and he attributes $6.4 billion of this revenue could be generated from the legalization of marijuana. Miron (2010) attributes the savings to federal, state, and local jurisdictions and reduced law enforcement, judiciary, corrections, and "other" costs generated by drug prohibition.

Although Miron's (2010) research appears valid and is worthy of consideration, current expenditures for drug enforcement, including marijuana eradication, adjudication, and incarceration can reasonably be assumed to be higher in the current era of law enforcement. According to ONDCP (2011), Americans spent $10.6 billion on marijuana purchases in 1999 alone and it is certain that this cost has risen since that time due to the proliferation of medical and recreational marijuana consumption in states like Colorado.

Drug War Statistics located at the Drug Policy Alliance website, "drugpolicy.org," claims the United States war on drugs costs in excess of $51 billion and 1.5 million people were arrested in 2013 for non-violent drug offenses, and the website claims that 693,482 people were arrested for marijuana law violations during 2013 and 609,423 of those citizens allegedly were cited or arrested for marijuana possession only. The website further claims that 2,220,300 citizens were incarcerated in the nation during 2013 (1 in 110 adults) and alarmingly, 57 percent of those inmates (federal, state, and local) were Black or Latino. This website claims that the United States could derive $46.7 billion in tax revenues per year if drug legalization resulted in tax rates similar to alcohol and drugs (drugpolicy.org, 2015).

According to research conducted by Hudak (2015), Colorado's legalization of marijuana is working and generating tax revenues that benefit the public and governmental organizations: "…the first $40 million collected through the 15 percent excise tax is to be used for public school construction…15 percent of the revenue collected…through…10 percent marijuana sales tax will be allocated to local governments" (pp. 2-3). According to Hudak (2015) remaining stipends will be used for enforcement through the Marijuana Tax Cash Fund, which benefits law enforcement, public safety, and public health communities, along with schools previously mentioned.

According to ONDCP (2011), the estimates by marijuana supporters that jails and prisons are full of marijuana violators is largely false. For example, even in 1997, less than 1 percent of all state prison inmates were serving time just for marijuana possession (0.7 percent) and only .03 of marijuana possession offenders were in prison for the first time. ONDCP (2011) research indicated that at the federal level, nearly 98 percent of the 7,991 offenders sentenced for marijuana crimes in 2001 were guilty of trafficking and only 2.3 percent (186 people) for simple possession of marijuana and the median amount possessed by these offenders was 115 pounds.

Proponents of marijuana legalization such as Franklin (2010) and Beck (2015) claim organizations like the USDOJ HIDTA (2015) spend time and money researching, writing, and producing reports that mislead the public and often ridicule professional products like the "USDOJ HIDTA (2015) "The Legalization of Marijuana in Colorado: The Impact" Volume 3 report." According to the Gazette Op/ED (2015) organizations like the USDOJ's HIDTA (2015) report invest other people's money and they strongly assail that the $238 million in ONDCP grants as a motive for law enforcement organizations to keep the drug war going, including marijuana enforcement, for self-preservation and for gaining assets and more money from the government. According to some anti-prohibition law enforcement officials such as Franklin (2010) he and other representatives of LEAP strongly believe the war on drugs has failed and made drug abuse and drug problems worse in America: "LEAP believes not only that the war on drugs has merely failed…but that it has actually made the drug problem much worse by squandering limited resources on harsh punishment while leaving treatment and prevention programs chronically underfunded" (p. 3).

USDOJ HIDTA (2015) and ONDCP (2011) officials would strongly disagree with Franklin (2010) and so would Graves (2015) and Lopey (2015) and many of the scientists cited in this paper. Apparently

compelling challenges exist for law enforcement, justice system officials, and other stake holders as the marijuana legalization issue is pondered now and in the future. Research analyzed in the text of this paper presents sufficient information with which to analyze the critical and compelling health, justice system, environmental, and fiscal impacts of marijuana legalization.

Conclusion

The impact of marijuana legalization in Colorado and other states will significantly impact public health, the justice system, environment, and budgets of involved jurisdictions. Most importantly, marijuana use impacts people, families, and communities. Justice system officials and other stake holders should not sacrifice short-term gains for long-term catastrophe as the marijuana legalization issue is analyzed.

Most researchers have reinforced the results of scientific studies that link marijuana to dependency and addiction and it is important to formulate analyses based on science instead of public opinion, politics, or emotion: “Marijuana dependency and addiction are becoming a huge problem in Colorado…There are far too many unanswered questions about the use of marijuana as a medicine…Science, not public opinion, should determine what is medicine” (Finn, 2015, p. 8).

Like a weather forecast, a justice system practitioner or casual observer can, through the Colorado experience and similar observations and research analyses, predict the weathering storm of the marijuana legalization and medicinal cannabis movement and its potential impact on their respective jurisdictions. Education, research, preparation, vision, and the right actions may influence important decisions in the future when it comes to the legalization of marijuana for medical or recreational use. Some justice officials and state officials, political and justice members, have consigned themselves to

the probability that marijuana will be legalized and the only thing that can be done is to prepare for its inevitable acceptance into law as a legal medicine or recreational endeavor.

According to Stelter (2015), there are valuable lessons to be learned in the Colorado experience with marijuana legalization; moreover, he believes it is important to prepare for similar legislation because its eventuality is almost assured in states like California: “The sea has shifted about marijuana whether you like it or not…You might not want it legalized, but learn from Colorado and look what could happen when you don’t think legalization will pass” (p. 65). Stetler (2015) and various Colorado experts advocate that other states act now to work with their communities, properly train their law enforcement officers, adapt to the laws, maintain a positive outlook, and remain flexible in the event marijuana legalization laws are introduced, theorizing that Colorado law enforcement officials did not believe marijuana legalization would happen but it did and many argue that such developments can easily happen in states like California.

Stetler (2015) and many law enforcement administrators advocate for an equal share of tax revenues generated by marijuana sales to law enforcement but at the same time, Stetler warns that the $76 million promised to Colorado as tax revenues has not materialized and he argues that the money can be intoxicating but the social costs and ramifications must also be examined carefully by all stake holders. Additionally, funds generated in Colorado were not adequate to train law enforcement officers to deal with the challenges inherent in a proliferation of marijuana cultivation and use in Colorado: “Upon passage of the law, one of the biggest mistakes Colorado made was that it did not adequately allocate funds to train law enforcement officers about the implications of the law” (Stetler, 2015, p. 66). Stetler (2015) and others call for the early development of data collection systems to quantify the impacts of the marijuana laws.

Stetler (2015) and other Colorado justice system administrators are adamant about being prepared in advance, and exhort others to recognize and understand the problems that have occurred in Colorado. Stetler (2015) further exclaims that preparation can be an effective means to properly educate the public about the dangers associated with marijuana laws and what to do and what not to do should similar legalization laws be passed in California: "The overarching message from the session (38th annual California Police Chiefs {CPCA} training symposium) was that law enforcement agencies around the country need to learn from Colorado's experience…so missteps and mistakes aren't repeated" (p. 66).

Researchers have argued the many economic indicators that support and refute the premise that marijuana legalization can have a positive impact on the budgets of governmental agencies and impacted jurisdictions. The Colorado experience with legalization can certainly provide lessons for other states considering enacting similar laws to meet the needs of their justice system and citizens they serve before it is too late. Perhaps the most prophetic statement was made by Colorado Governor John Hickenlooper after marijuana was legalized: "If I could've waved a wand the day after the election (when the ballot measure was passed) would've reversed the election and said, This was a bad idea'" (EIHage, 2015).

This analysis of the health, justice, environmental, and economic impacts of marijuana legalization, primarily from the perspective of the Colorado experience should prove useful in evaluating the options available to virtually any justice system official or stake holder in California or elsewhere as they consider whether or not to support an expansion or implementation of marijuana legalization provisions in their jurisdictions. In the final analysis, there are many positive and negative arguments on both sides of the marijuana legalization debate.

Justice system officials and others must decide whether or not marijuana prohibition revocation is an option that serves the best interests of the citizens they serve or - is it a deal with the devil? Justice system officials are potentially risking a generation of children and adults, their budgets, their methods of operation, and their moral and legal reputations as peace keepers. Essentially, justice system officials must decide what kind of peace officer and people they want to be and represent now and in the future. The advice contained in USDOJ HIDTA (2015) report (Volume 3) warns all to be prudent in those deliberations: "Citizens and policymakers may want to delay any decisions on this important issue until there is sufficient and accurate data to make an informed decision" (p. 17). The ramifications of increased marijuana proliferation and use are critical to the future of virtually all California and external jurisdictions and sound, well-informed decisions based on scientific research and facts should be employed to avoid the pitfalls evident in the Colorado marijuana experience.

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Conflict Of Interest

I declare that I have no proprietary, financial, professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled: *"Colorado's Decriminalization of Marijuana: A Forecast for Justice System Administrators"*.

Author

Siskiyou County Sheriff-Coroner Jon E. Lopey has nearly 38 years of full-time law enforcement experience. Sheriff Lopey is a veteran of the Vacaville Police Department, California Highway Patrol, and is serving his second term as Sheriff-Coroner of Siskiyou County. Sheriff Lopey is a Viet Nam Era Marine veteran and is a retired Army colonel. Sheriff Lopey is a decorated combat veteran and has served extended tours of duty in the Republic of the Philippines, Haiti, Bosnia, Afghanistan, and Iraq. His military duties exposed him to police development and drugs in foreign nations. Sheriff Lopey served as a drug recognition expert (DRE) for nearly 20 years and has drug enforcement experience in Los Angeles, Bay Area and Northern California. He is a FBI National Academy graduate and belongs to numerous veterans' and law enforcement professional organizations, including life membership in the California Narcotics Officers' Association. A Reno native, he has completed his graduate degree at the University of Nevada, Reno.

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Treating Heroin Addiction in Florida

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Heroin abuse is less prevalent than any other drug of choice used by those seeking relief from their physical or emotional pain. However, it has caused untold destruction on individual lives and community health because of its powerful addictive qualities. Despite its comparative numbers to other drugs of abuse, the current resurgence of use around the country and in Florida warrant comprehensive coordinated community responses. **There are effective evidence-based interventions and treatments available. These treatments will save lives, families and communities.**

Heroin has been at the center of several drug epidemics in the United States since the opioid analgesic was originally synthesized by English chemist C. R. Alder Wright in 1874. Wright changed the molecular structure of morphine (from a variety of poppy) and created heroin (diamorphine, diacetylmorphine or morphine diacetate). Heroin was supposed to be a great new painkiller especially for the Civil War soldiers who became addicted to morphine as they lived in pain. It turned out to be much more potent and addictive than morphine.

Today, heroin abuse is higher than it was just a decade ago. The Centers for Disease Control reported that between 2002 and 2013 the heroin overdose deaths in the United States increased 286 percent or 8,257 deaths in 2013.

One of the epicenters of the heroin surge is Florida. For the last decade, Florida was a front-runner in the "pain clinic" growth that led to millions of people becoming addicted to a mind-altering substance, many for the first time in their lives. The Trust for America's Health stated that Florida has the 11th highest drug overdose mortality rate in the country. As states and local communities cracked down on "pain clinics" and started Prescription Drug Monitoring systems, obtaining opiates became more difficult. The result was a resurgence of heroin availability**.** Exacerbating this is the cost; **heroin can cost as little as one-third the price of prescription drugs like oxycodone.**

Heroin is correctly listed as a Schedule 1 drug – *it has a great potential for abuse and there is no acceptable medical use in the United States*. Couple this with the fact that this central nervous system depressant acts as a direct agonist on brain receptors which makes its use highly addictive and difficult to treat. Rapid physical dependence, fear of the painful withdrawal symptoms and the progressive nature of opiates in general lead to increased need and ever more chaotic lives.

Health issues like exposure to HIV, and both hepatitis B and C are increased and the need for more money may rapidly lead to criminal activity to support drug habits. The cost to society for treatment of these and other health issues connected to heroin addiction will increase if we do not create a united

front on decreasing demand. That only occurs when effective evidence-based prevention and treatment is available.

Hidden costs multiply when one considers how addiction to drugs like heroin increase societal, health, work and family problems. Heroin is almost always cut with something; one of the most dangerous additives is fentanyl-laced heroin – (f*entanyl: 80-100 times more potent than morphine and 40-50 times that of pharmaceutical-grade heroin).* This practice has led to thefts of fentanyl patches in nursing homes and from the gravely ill or elderly who often depend on such drugs to make life tolerable. Once addicted, individuals will often steal pills and other painkillers from their loved ones. Heroin also can be cut with acetylated morphine, brick dust, talc, quinine, caffeine, procaine, lactose, dextrose, mannitol, etc. Some of these can also lead to health costs. Often a user may consume other drugs and/or alcohol in conjunction with heroin. One highly lethal combination occurs when heroin is used with benzodiazepines. This often leads to expensive emergency room visits or deaths. Neglect of occupational and family responsibilities increase those hidden costs as employers deal with the residue of employee drug use or child welfare systems become further burdened when parents neglect or abuse their children.

Along with increasing education and encouraging decision-makers to take action, there are several reliable evidenced-based treatments and a method to treat acute overdose until medical help can arrive.

Naloxone – medical intervention for opioid overdose. With record numbers of overdoses and deaths, experts are promoting the use of naloxone (brand names examples – NARCAN, Evzio). Police and

other first responders can carry doses so they can save a life while transporting the individuals to hospitals. Naloxone, a pure opioid antagonist, can be injected or applied nasally. It was used in the past to verify opiate addiction or opiate influence since it immediately stops the action of the narcotics. The use of naloxone increases the window of time after an overdose for emergency help to arrive. The cautions include understanding that overdose symptoms can return within minutes and so repeated doses may be required while waiting for EMTs; it does have an expiration date; and there could be conditions that contraindicate the use of naloxone such as a history of heart disease. This intervention requires very little instruction. **Naloxone, while not a treatment for compulsive use of drugs, will save lives.**

MATS - Medication Assisted Treatments – all of the treatments below are more successful when used with effective behavioral therapy and the development of a lifelong program of recovery.

- **Naltrexone** (Vivitrol, Revia, Depade) – these medications, typically marketed as a hydrochloride salt – naltrexone hydrochloride (Revia, Depade), reverse the effects of opioids and are usually used primarily in the management of alcohol and opioid dependence. A once-monthly extended-release injectable form (Vivitrol) has gained positive acceptance and several states are looking at using this extended injectable medication prior to inmate releases for those with opioid abuse histories.
- **Buprenorphine (**Subutex) – is a semisynthetic opioid derivative of thebaine. It is a mixed partial agonist opioid receptor modulator that is used to treat opioid addiction in higher dosages, to control moderate acute pain in non-opioid-tolerant individuals in lower dosages and to control moderate chronic pain in even smaller doses. It is available in a variety of

formulations. This drug can be abused and needs strict medical monitoring. It has been sold on the streets to people who wanted to avoid the painful withdrawal from heroin.

- **Suboxone-** a registered trademark — this combination of drugs (buprenorphine and naloxone) is used to treat opioid addiction. This drug can be abused and requires strict medical monitoring.
- **Methadone** (Dolophine) – this synthetic acyclic analog of morphine and heroin acts on the same opioid receptors as heroin and has a 45 year history of safety when closely medically monitored and when coupled with effective counseling. It is used to treat long term or chronic addiction. It is recommended for use with pregnant, opioid-dependent women in order to prevent miscarriage or premature births. This synthetic opioid is the most widely used treatment for opioid dependence. Methadone, because of its long acting quality (24-36 hours) and strong analgesic effects, is used medically for chronic pain management. Once a therapeutic dose is determined, methadone allows individuals to work and live normal productive lives. Methadone is on **the World Health Organization's List of Essential Medicines,** a list of the most important medications needed in a basic health system. Methadone can be sold illegally on the streets which can contribute to overdose or death.

Heroin and other opiate abuse is a difficult relapsing disorder that often takes months or even years to properly treat. There are effective evidence-based medical treatments that have helped millions to reach recovery. These vary greatly in price, availability and access. An individual's physical, mental and emotional issues coupled with knowledge of their addiction history are key considerations when choosing treatments. People often begin their opiate addiction because of acute or chronic pain. This cannot be ignored when addressing heroin or other opiate abuse. Addiction is a brain disorder that

requires a holistic treatment approach. These effective medical treatments should be coupled with on-going monitoring, education, therapies such as cognitive behavioral, trauma-informed counseling and, when appropriate, medication and therapy for other co-occurring mental disorders. When those with addictive disorders have a chance at effective treatment, millions of lives are saved and families are restored which makes a safer and healthier Florida.

Conflict Of Interest

I declare that I have no proprietary, financial, professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled: *"Treating Heroin Addiction in Florida"*.

About the Author

Ms. Hamilton has spent the past 39 in the behavioral health care field with concentration in substance abuse, mental health and co-occurring disorders. Ms. Hamilton uses her expertise in treating families exposed to substance abuse, mental illness and trauma, especially women, adolescents and children (particularly those with pre and post-natal exposure to substances) in hundreds of workshops, trainings and webinar, including several publications. Ms. Hamilton also has many years as a therapist, program director and ultimately the President and CEO of a very large comprehensive behavioral health agency with over 500 employees who work in over 40 programs in seven counties in the western mid-coast of Florida. For over twenty years Ms. Hamilton has been the agency connection to research, especially research done with pregnant, post-partum and parenting women and adolescents and their families. She has been on the NIDA Clinical Trials Network (CTN) and the University of Miami Florida NIDA Node Alliance Steering Committee for over 15 years and is currently on the Executive Committee of the NIDA CTN Network where she has served as co-Chair. Among her publications she is the primary

author of a manual for family intervention (Family Support Network) testing in the Cannabis Youth Treatment Study (funded by SAMHSA); this manualized therapy is used in many agencies and states and is listed in the NREPP list of programs. Ms. Hamilton has participated in many clinical trials over the years; Cannabis Youth Treatment Study (co-PI): NIDA Peri-Natal 20; SAMHSA/CSAT PPWI; NIDA CTN Buprenorphine Study in Detoxification; Seeking Safety; NIDA CTN ADHD Study and many more. Ms. Hamilton is an international and national trainer in several evidenced based protocols and practices. She served on the Florida Learning Systems Advisory Board for the Department of Children. She currently serves on the SAMHSA GAINS Center Expert Panel and was a long time member of the Florida Governor's Drug Policy Advisory Board. She has served currently serves on the SAMHSA GAINS Center Expert Panel and was a long time member of the Florida Governor's Drug Policy Advisory Board.