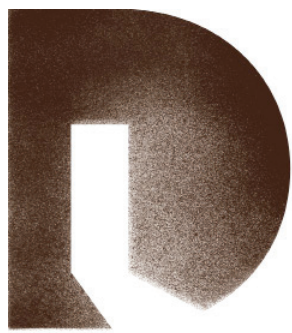


Estimated Effects of the Tax and Regulate Legislation in Rhode Island





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INTRODUCTION

Legislation introduced in Rhode Island to tax and regulate marijuana attempts to create a safer, controlled, and profitable market for the production and consumption of marijuana. The exact effects of the legislation are difficult to predict, but previous partial reforms guide predictions. The legislation strictly controls home production, wholesale production, retail, advertising, and safety standards. In doing so, it seeks to emulate reforms such as the medical marijuana laws of Maine and Rhode Island and the Dutch cannabis coffee shops. All of these have resulted in a reduction in harmful criminal justice consequences and have transformed a profit that currently funds drug dealers and cartels into productive tax revenue.

The following report outlines the legislation and estimates that Rhode Island would accrue \$21.5-\$82 million in tax revenue.

The Marijuana Regulation, Control, and Taxation Act will carefully control marijuana

Marijuana production, retail, use, and advertising will be stricter under this law than any current, non-prescription commercial product. It will be substantially more controlled than cigarettes and alcohol and far more controlled than marijuana sales currently are.

Home production: This legislation allows for personal cultivation by adults 21 and older. Home production is limited to two plants (only one mature plant) at one time, with a total of no more than three plants per household. Marijuana cultivation must be in a secure location and may not be visible to the public. Landlords can prohibit production. Additionally, this production is only allowable for personal use. Private, unlicensed marijuana sales will continue to be a felony.

Commercial production: The state will initially issue cultivation facility registrations to any of the three licensed medical marijuana compassion centers that wish to apply. After two years, the state will assess whether these cultivation facilities are able to meet demand and accept applications for additional cultivation facilities if necessary. Individuals under 21 are only allowed to be present inside any room where marijuana is cultivated or processed in very limited situations, such as if they are emergency personnel. Cultivation facilities will not be allowed within 1,000 feet of a school or place of worship. If additional cultivation facility registrations are accepted, they will be granted via a competitive scoring process that takes into account the applicants' applicable experience, training, and expertise; their plans for security and to prevent diversion; any criminal, civil, or regulatory issues encountered by other entities the applicant has controlled or managed; and the suitability of the proposed location. Cultivation facilities will be required to pay a non-refundable application fee not to exceed \$5,000, as well as annual renewal fees that may not exceed \$20,000.

Among other requirements, the Rhode Island Department of Business Regulation is charged with specifying requirements for labeling of marijuana, establishing reasonable security requirements, and establishing procedures for inspecting and auditing the

records or premises of marijuana cultivation facilities. A \$50/ounce excise tax will be imposed on any sales from marijuana cultivators to retailers.

Retail: The state will initially issue marijuana retail registrations to any of the three licensed medical marijuana compassion centers that wish to apply. Eventually, it will register a total of up to 10 entities statewide. Sales to individuals under 21 are strictly prohibited. Only in limited situations are individuals under 21 even allowed to be present inside any room where marijuana is stored or sold, such as if they are emergency personnel. Retailers will not be allowed within 1,000 feet of a school or place of worship. Bars cannot be retailers. Except for registrations granted initially to properly licensed compassion centers, retail registrations will be granted via a competitive scoring process that takes into account the applicants' applicable experience, training, and expertise; their plans for security and to prevent diversion; any criminal, civil, or regulatory issues encountered by other entities the applicant has controlled or managed; and the suitability of the proposed location. Retailers will be required to pay a non-refundable application fee not to exceed \$5,000, as well as a \$10,000 registration fee if selected. There is a \$10,000 annual renewal fee to keep retail registrations.

Among other requirements, the Rhode Island Department of Business Regulation is charged with specifying requirements for packaging and labeling of marijuana, establishing reasonable safety requirements, and establishing procedures for inspecting and auditing the records or premises of marijuana retailers. Retail sales of marijuana to adults 21 and older will be subject to a 10% sales tax.

Safety compliance facilities: The state will register two entities to operate as safety compliance facilities. Safety compliance facilities will test marijuana grown by cultivators or purchased for sale by retailers for contaminants and potency. All employees must be 21 or older. As is the case with retailers and wholesalers, safety compliance facility registrations will be granted via a competitive scoring process that takes into account the applicants' applicable experience, training, and expertise; their plans for security and to prevent diversion; any criminal, civil, or regulatory issues encountered by other entities the applicant has controlled or managed; the applicants' plans for services; and the suitability of the proposed location.

Safety compliance facilities will be required to pay a non-refundable application fee not to exceed \$5,000, as well as a \$5,000 registration fee if they are selected. There is a \$5,000 biannual renewal fee to keep safety compliance facility registrations. Among other requirements, the Rhode Island Department of Business Regulation is charged with establishing reasonable security requirements and procedures for inspecting and auditing the records or premises of marijuana safety compliance facilities.

Distribution of revenue: After sufficient revenue has been kept by the Department of Business Regulation and the Department of Health to regulate marijuana businesses, 50% of the revenue raised from fees and excise taxes will go to the general fund; 40% will be distributed to the Rhode Island Department of Health for use in voluntary programs for the prevention or treatment of alcohol, tobacco, or controlled substances abuse; and 10% will be used for medical marijuana research.

Use: This will not change laws that currently govern use by anyone under 21. Smoking marijuana in an outdoor public place will continue to be a civil offense and punishable with a \$150 ticket. Smoking marijuana in an indoor public place will be a misdemeanor punishable by a fine of up to \$250 and up to 10 days in jail for a first violation, and by up to a \$500 fine, up to 30 days in jail, or both, for any subsequent violations.

Advertising: Advertising restrictions will be set by the state, but they will be at least as strict as tobacco advertising. This means:

- No advertising on billboards, outdoors, or on public transportation
- All print advertising must contain health warnings
- All audio and video advertising is strongly curtailed, allowing only static black text and no music or sound effects
- No advertising can target youth
- The state may adopt any other constitutional limitations on advertising

The marijuana market will have far fewer retailers than cigarettes and alcohol. Marijuana will not be sold in places minors frequent. It will not be legal to smoke marijuana in public. The television and radio campaigns employed by alcohol companies will not be allowed. The

proposed bill is in some ways even stricter than previous reforms already put into place in the Netherlands, Southern Australia, and Alaska. For example, for almost a decade, Alaska allowed personal production within a private residency with no restriction on the number of plants as long as they were for private use. The Netherlands and Southern Australia currently allow retail and use in limited public locations, more public and more accessible than under this law.

Smoking marijuana in an outdoor public place will continue to be a civil offense and punishable with a \$150 ticket.

Revenue from Marijuana Taxation and Regulation

Under the tax and regulate legislation, Rhode Island will receive from \$21.5-\$82 million in tax revenue. Forty percent of the excise tax will go towards drug use prevention and treatment, 10% will go to medical marijuana research, and 50% will go towards general revenue. Of the total tax revenue, \$19-52 million will come from the \$50/ounce excise tax, \$1.5-\$17.5 million from sales tax, and \$1.5-\$12.5 million from income tax. This means Rhode Island will have an estimated \$7.6-\$21 million in additional funding for drug prevention and treatment, or 40% of the excise tax revenue. There will be \$10.5-\$50 million in general revenue and \$1.9-\$5.2 million for research into medical marijuana.

This report draws on the methodologies of several previous studies to produce the estimates in Chart 1. Kilmer, Caulkins, Pacula, MacCoun, and Reuter have produced the best tax revenue estimates as part of a RAND Corporation study for California.¹ The Federal Office of National Drug Control Policy estimates consumption based on national surveys, and Professor Jeffrey Miron of the Harvard Department of Economics produced a national estimate for tax revenue from marijuana taxation. These provide a reasonable margin for tax revenue, consumption, and price changes under regulation.

[1] Kilmer, et al., 2010. "Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets." RAND Corporation.

Chart 1: Tax Revenue Estimates

Current National Use, metric tonnes	1,610-4,285
Current RI use, metric tonnes	8.8-24
Starting price/ounce	\$292-\$375
Post tax price reduction	30%-70%
Percent of use not taxed	10%-40%
Estimated RI annual marijuana expenditure with regulation, including taxes (millions)	\$30-\$251
Total State Tax Revenue (millions)	\$21.5-\$82
Excise Tax	\$17-\$52
Sales Tax	\$3-\$17.5
Income Tax	\$1.50-\$12.5

The arguable range of tax revenue is still relatively wide, largely because of the range in estimated current marijuana use. A 2012 paper by RAND researcher Beau Kilmer summarized previous estimates and suggested a range of 1,000-10,000 metric tonnes (MT).² That range will generate a similarly large range for tax revenue estimates.

This report relies on two methodologically sound studies that estimate 1,610 MT and 4,285 MT of national marijuana use annually. These ranges produce estimates of between one to three grams per

week for the average user. Unfortunately, there is not solid evidence that allows for a smaller estimated range.

The higher estimate of 4,285 MT is from ONDCP.³ For the low estimate, this estimate uses an earlier ONDCP report adjusted to more current levels, relied on by Professor Miron. In order to be sufficiently conservative, this report uses the 1,610 MT estimate as the low estimate for use. This is applied to Rhode Island by calculating the proportion of all national marijuana users in Rhode Island, .55%.⁴ The price range of marijuana is less variable, and this paper uses \$292/ounce as the low estimate and \$375/ounce as the high estimate.⁵

[2] Kilmer, Beau. 2012. *Debunking the Mythical Numbers About Marijuana Production in Mexico and the United States. Rethinking the "War on Drugs" through the US-Mexico Prism*. The 1,000 estimate is from Abt Associates. (2001). "What America's users spend on illegal drugs 1988-2000." Cambridge, MA: Abt Associates, Inc. The 10,000 estimate is from Gettman, J. (2006). "Marijuana production in the United States." *Bulletin of Cannabis Reform*, 2. Cambridge, MA: Abt Associates, Inc.

[3] "What America's Users Spend on Illegal Drugs." 2012. Office of National Drug Control Policy, Washington, D.C. Estimates based on National Survey on Drug Use and Health.

[4] 2010 U.S. Census data is used to estimate the population of the U.S. and Rhode Island. The percentage that used marijuana in the last month in the U.S. and in Rhode Island is estimated using the federal SAMSA NSDUH survey results from 2010 and 2011. <http://www.samhsa.gov/data/NSDUH/2k11State/NSDUHsaeTOC2011.htm>

[5] The low price estimate of \$292/ounce was used by the ONDCP in their 2000 study and also by Professor Miron. The high price estimate is actually in the middle of the range estimated by the RAND corporation. Because people generally buy marijuana in smaller amounts, it is difficult to estimate what the functional price is. ONDCP's 2000 price estimate relies on the NSDUH survey. Once again, the numbers used in this study are on the conservative side of reported ranges. Kilmer, et al., 2010. "Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets." RAND Corporation. Cites Bond, Brittany M. and Jonathan P. Caulkins, "Potential for Legal Marijuana Sales in California to Supply Rest of U.S.," Santa Monica, Calif.: RAND Corporation, WR_765. Although the paper addresses California use, the price estimates are based on national data from two law enforcement and two user reports.

Total tax revenue: The final tax revenue estimates include the \$50/ounce excise tax, as well as a 10% state sales tax and an additional 7% income tax.⁶

Estimated price under regulation: The model requires an estimate for the price of marijuana under this legislation. Most research suggests that the price of marijuana will decline. While the price has not declined substantially in places where marijuana sales have been decriminalized, such as the Netherlands, regulation may make production and delivery cheaper by decreasing the costs of operating an illegal business. However, for the foreseeable future marijuana will continue to be illegal under federal law, and there are a number of reasons that the price drop could be substantially lower as a result. For example, landlords may charge higher rates and businesses may budget for possible legal fees and asset forfeiture. Other studies estimate a price reduction between 50% and 90% pre-tax or 33%-75% post tax.⁷ These price reduction estimates are applicable to the legal and regulatory framework expected under this legislation. Different models, making marijuana more or less easy to grow and sell than this legislation, would expect higher or lower prices than this range. The \$50/ounce excise tax will partially compensate for the potential reduction in price.

Elasticity of use: Revenue models require an estimate for how changes in price will affect use. Elasticity describes the ratio for how use changes with price. Most studies use an elasticity of -.5.⁸ Because of the uncertainty in this estimate, this study used a range from -.3 to -.5. This change introduces only a relatively small additional uncertainty into the model.⁹ Changes in price are only one factor in the possible changes to use. Overall change in use will also be influenced by a number of factors, which may include availability of marijuana and perceptions of marijuana use. Increased funding for education and treatment may also have an effect on use, as may the decrease in the “forbidden fruit” allure that marijuana currently has because of its illegal status. There is some evidence as to how marijuana use changes as price changes, which has been used to estimate elasticity, but there is not enough evidence to predict overall changes in marijuana use.

Percent of use not taxed: Not all marijuana use will be taxed. Marijuana cultivated at one’s home, medical marijuana use, and any continued underground market use will not be subject to the excise tax. Kilmer includes large ranges in size of the un-taxed market. Miron did not include this statistic at all. What little is known about potential tax avoidance comes from a comparison against tobacco tax avoidance. California

[6] Miron estimates that traditional tax rates, including income and sales tax, are 30% of total expenditure. This would include the 7% sales tax, as well as a state and national income tax. This report removed the national income tax and assumed state overall income tax is 7%, or about one half the rate of federal income tax. The state corporate income tax rate is 9%, and the individual rate ranges from 4%-6%.

[7] Kilmer, (2010) and Miron, (2010). As described in the Kilmer, the price estimate also relies on the assumption that people will not produce marijuana at the largest, most efficient scale possible because of fear of prosecution by the federal government. This, in addition to the limitation on number of producers, will likely moderate the price changes under this legislation.

[8] According to Kilmer, the price elasticity is around -.54. Miron also uses an elasticity of -.5. This means that if the price goes down by 50%, use will go up by 25%. However, the data used for these estimates has limited applicability. As discussed in “Altered State?”, participation elasticity is well studied, meaning how the number of users changes with price. Participation elasticity is approximately -.3. However, how marijuana users react to changes in price is poorly understood. Kilmer, et al. analyzed NSDUH survey data to look at how income relates to marijuana use. Their method is admittedly generally not ‘satisfying.’ It also tells us little to nothing about how use will react to large changes in price.

[9] The lower estimate decreases from \$23 million to \$21.5 million and the higher estimate decreases by \$8 million.

estimates that 12-27% of cigarettes evade California excise taxes because of people buying cigarettes legally in other states or Mexico. It is hard to apply this figure to marijuana given that no state bordering Rhode Island allows non-medical marijuana sales.¹⁰ This study uses a range from 10%-40% for untaxed marijuana in order to be relatively conservative.

Criminal Justice Costs and Savings

Taxation and regulation of marijuana will decrease the human and financial burden of marijuana delivery prosecutions. Rhode Island decriminalized marijuana as of April 2013, meaning that hypothetically most of the costs attributed to simple possession cases should disappear. Rhode Island no longer incarcerates individuals for simple possession of marijuana, courts no longer spend time prosecuting them, and police do not spend anywhere near the same amount of time arresting people for possession. However, under current law, a significant number of people will likely continue to be incarcerated each year for distributing the marijuana that is now decriminalized.

If marijuana were legalized, it is likely that the criminal market would shrink dramatically, and almost all prosecutions for delivery would stop.

If marijuana were legalized, this would have a large effect on the criminalization of possession of marijuana with intent to deliver, manufacturing, and delivery (hereafter referred to as delivery). Likely, the criminal market would shrink dramatically, and almost all prosecutions for delivery would stop.

According to Uniform Crime Report data, there were 236 arrests for marijuana sale or manufacturing in Rhode Island in 2010. However, many of those cases involved other charges as well or did not result in convictions. Using court and Department of Corrections (DOC) data and working in conjunction with the DOC Department of Research and Planning, this report predicts 42 convictions a year for marijuana delivery, where delivery is the controlling charge. On average, these 42 convictions result in filling 26 beds in the Rhode Island prison.

Although the average cost of those beds is around \$40,000/year, for a total of one million in costs, there may only be a savings of around less than \$100,000 under legalization. Small reductions in total beds do not allow the DOC to close a module or facility, and so do not allow them to decrease staff appreciably. While the collective financial savings are not huge, this legislation will free up important bed space, police time, and prosecution and judiciary time that is currently spent prosecuting these cases every year.

[10] California Board of Equalization, "Preliminary Estimates of California Cigarette Tax Evasion," June 1999. It is hard to extrapolate to marijuana. Tax by weight on cigarettes is about one tenth of the proposed tax on marijuana. But use of marijuana is much lower than cigarettes, so according to Kilmer, the average user of marijuana would end up paying about the same annual tax on marijuana as the average cigarette smoker. One other important consideration is that there is an easy source of underground cigarettes for avoiding state excise taxes imported from other states and countries that are produced legally. At least, at this point, there is not a substantial legal source of marijuana to serve as a competition.

The Human Costs of Marijuana Prosecutions

Every individual prosecuted and incarcerated for delivery of marijuana results in significant human costs. Tens of thousands of Rhode Island residents rely on the illicit market for marijuana. As long as there is demand, there will be a supply of marijuana, and some of the providers of the marijuana will be prosecuted, incarcerated, and saddled with felony records for the rest of their lives. These individuals are not for the most part dangerous criminals. According to an OpenDoors analysis of DOC data, only 28% of those incarcerated for marijuana delivery from 2004-2009 had any sort of violent conviction on their record. Additionally, prosecution is very racially biased. Although use of marijuana is relatively constant across racial categories,¹¹ 46% of all individuals incarcerated for marijuana delivery were black or Hispanic, which is 100% greater than their proportion of the Rhode Island population.¹²

The enforcement of marijuana possession laws is also very racially biased. According to the ACLU, in 2010, blacks in Rhode Island were over two and a half times as likely to get arrested for marijuana possession than their white neighbors, despite similar use rates.¹³ While Rhode Island no longer arrests individuals for possession of up to an ounce of marijuana, there is no reason to believe this disparity will decrease with

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regard to the number of civil citations issued to blacks versus whites for marijuana possession moving forward.

This case illustrates the harmful collateral consequences of maintaining an illicit marijuana market:

Josh Giorgi was a freshman at University of Rhode Island studying wildlife conservation when he was arrested for marijuana delivery

in an undercover operation in 2006. The sting resulted in the arrests of nine individuals for drug delivery charges, but Giorgi was one of only two that ended up with a prison sentence. Giorgi served 13 months in prison in both the training school and the Adult Correctional Institute for the charges, and he will be on probation until he is 28. Giorgi, a Federal Hill native, says he was dealing marijuana on a small scale to help pay his tuition. He was never arrested for anything else prior to or since that conviction.

After release, he says he applied to jobs and apprenticeships everywhere but most places would not take him because of his record. He started working in a local grocery store that did not do background checks. He continued to work hard and find more skilled employment, and for the last three and a half years, he has worked for an international manufacturing company with offices in Rhode Island, working his way up to logistic coordinator. He owns a house and is now a father.

[11] For example, according to SAMSA, in 2007, 46% of white people over 26 reported lifetime marijuana use, while only 38% of blacks and 27% of Hispanics reported lifetime use.

[12] According to the 2010 Census, 76.5% of Rhode Islanders are white (non-Hispanic) and only 23.5% are black or Hispanic.

[13] American Civil Liberties Union, "The War on Marijuana in Black and White: Billions of Dollars Wasted on Racially Biased Arrests," June 2013.

Despite his hard work and success, he says that because of that one mistake, he was treated like a serious criminal, and he continues to pay a heavy price. He was unable to re-enroll in school and was never able to complete college. Though he hopes to return at some point, his felony record continues to present obstacles. “I made a mistake, but I am not a criminal,” he says. “I do not want to see anyone else’s life ruined like mine was for selling marijuana, but as long as people use marijuana, they will buy it from someone. So someone will keep going to prison until people that want it have a legal way to buy it.”

Marijuana Use is Safer Than Alcohol

The majority of research has concluded that marijuana has medical benefits, has no demonstrated dangerous, long-term health effects for most people, and as a whole is safer than alcohol — both for consumers and communities. Still, in general, marijuana use is not recommended, and frequent marijuana use can have negative health effects for some people. Any policy changes to marijuana law should discuss how marijuana use affects human health and consider successful methods for decreasing marijuana dependency, such as addiction counseling and the treatment and educational funds included in the tax and regulate legislation.

Marijuana has been established to provide significant medical benefits.¹⁴ In 2006, medical marijuana was established in Rhode Island for the treatment of symptoms associated with debilitating medical conditions, including cancer, glaucoma, HIV, hepatitis, seizures, chronic pain, and severe nausea. The Rhode Island Medical Society supported the law.

There is no conclusive evidence that chronic marijuana use causes long-term neurological impairment, emphysema, or cancer in most users. Heavy use of marijuana does impact memory and brain function during use; however, studies demonstrate that these effects end after termination of use.¹⁵ Marijuana has been proven to cause wheezing, cough, and shortness of breath while smoking.¹⁶ However, studies have shown no sustained impairment to lung function or increased emphysema.¹⁷

[14] Center for Medicinal Cannabis Research. “Report to the Legislature and Governor of the State of California.” 2010. University of California.

[15] Kalant, “Adverse effects of cannabis on health: an update of the literature since 1996.” *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 28 (2004): “Cognitive impairments of various types are readily demonstrable during acute cannabis intoxication, but there is no suitable evidence yet available to permit a decision as to whether long-lasting or permanent functional losses can result from chronic heavy use in adults.”; Fried, et al., “Current and Former Marijuana Use: Preliminary Findings of a Longitudinal Study of Effects on IQ in Young Adults.” *CMAJ* 166 (2002): 887-91. “Current marijuana use had a negative effect on global IQ score only in subjects who smoked 5 or more joints per week. A negative effect was not observed among subjects who had previously been heavy users but were no longer using the substance. We conclude that marijuana does not have a long-term negative impact on global intelligence. Whether the absence of a residual marijuana effect would also be evident in more specific cognitive domains such as memory and attention remains to be ascertained.”

[16] Taylor, et al., 2002a. “A longitudinal study of the effects of tobacco and cannabis exposure in young adults.” *Addiction* 97, 1055– 1061. Taylor, D.R., et al., 2000. “The respiratory effects of cannabis dependence in young adults.” *Addiction* 95, 1669– 1677.

[17] Taylor, et al., 2002a.; Tetreault, et al., 2007, *Archives of Internal Medicine*, Vol. 167.

Previous research had indicated that chronic marijuana use probably increases the risk of respiratory cancer; however, in 2006, a large controlled study reported that frequent marijuana users did not have increased rates of cancer.¹⁸

Marijuana can be addictive, and an estimated 10% of marijuana users develop dependency.¹⁹ The Institute of Medicine noted that, “Although few marijuana users develop dependence, some do. Risk factors for marijuana dependence are similar to those for other forms of substance abuse.”²⁰ While marijuana withdrawal symptoms have still not been conclusively established, most research shows that withdrawal after heavy use causes symptoms such as irritability and sleep loss, similar to withdrawal from tobacco.²¹ The Institute of Medicine noted that withdrawal from marijuana is “mild and subtle compared with the profound physical syndrome of alcohol or heroin withdrawal.”²² Overall, marijuana is less addictive than either cigarettes or alcohol.²³

As opposed to alcohol, excessive use of marijuana and marijuana withdrawal cannot be fatal.

Lastly, although marijuana use has possible negative effects, it is safer than alcohol. As opposed to alcohol, excessive use of marijuana and marijuana withdrawal cannot be fatal. While alcohol is known to be associated with violent behavior, this is not true for marijuana.²⁴ Research has shown a correlation between motor vehicle accidents and marijuana use, although less so than with alcohol, and experimental evidence has shown less impairment than alcohol and relatively increased caution while driving.²⁵

[18] In a 2002 review of the evidence, Hall and McPhee concluded that there were good grounds to believe that chronic smoking of marijuana causes cancer. Conclusions were largely based on the existence of cancer-causing indicators in the lungs of marijuana users. However, a more rigorous study of cancer incidence in 2006 found no evidence: “they[the results] suggest that the association of these cancers with marijuana, even long-term or heavy use, is not strong and may be below practically detectable limits. (Hasibe, et al., “Marijuana Use And the Risk of Lung Cancer and Upper Aerodigestive Tract Cancer.” *Cancer Epidemiological Biomarkers & Prevention* 15 (2006) 3.

[19] Hathaway, A.D. (2003). “Cannabis effects and dependency concerns in long-term frequent users: a missing piece of the public health puzzle.” *Addiction Research and Theory* 11 (6): 441-458. Poulton, R., et al., 2001.

“Persistence and perceived consequences of cannabis use and dependence among young adults: implications for policy.” *N. Z. Med. J.* 114, 544-547; Fergusson, D.M., Horwood, L.J., 2000. Cannabis use and dependence in a New Zealand birth cohort. *N. Z. Med. J.* 113, 156-158.

[20] Joy, J., et al. *Marijuana and Medicine: Assessing the Science Base*. National Academy Press, 1999. p. 6.

[21] Budney, A.J., et al., 2003. “The time course and significance of cannabis withdrawal.” *J. Abnormal Psychol.* 112, 393-402; Smith, N.T., 2002. “A review of the published literature into cannabis withdrawal symptoms in human users.” *Addiction* 97, 621- 632.

[22] *Marijuana and Medicine: Assessing the Science Base*, 90.

[23] “Although [some] marijuana users develop dependence, they appear to be less likely to do so than users of other drugs (including alcohol and nicotine).” National Academy of Science, *Marijuana and Medicine: Assessing the Science Base*, 1999.

[24] Blondell, et al., “Toxicology Screening Results: Injury Associations Among Hospitalized Trauma Patients,” *The Journal of Trauma* 58 (2005); 561-700. In addition, fewer than 5% of law enforcement agencies identify marijuana as a drug that contributes to violent crime in their area (National Drug Intelligence Center, National Drug Threat Assessment, 2004).

[25] Smiley (1999). “Experimental studies have shown clear but modest impairment of driving skills and actual driving performance in subjects smoking small or moderate doses of cannabis, but that the drivers appeared to be less aggressive, more cautious, and more aware of their impairment than subjects impaired to a similar degree by alcohol.” Many articles have demonstrated correlation between accident and marijuana. See Kalant (2004) for a review, which concludes “the causal role of cannabis [in driving accidents] cannot yet be regarded as completely proven, but is strongly suggested...”

Research has shown that frequent marijuana use has no long-term effects on mortality, while alcohol abuse is associated with 35,000 deaths per year.²⁶ Frequent alcohol use is known to increase mortality rates through diseases such as liver cancer and cirrhosis.²⁷

Estimating Effects of Marijuana Reform in RI So Far

It is too early to estimate the effects of marijuana decriminalization, which just went into effect in April of 2013, on criminal justice costs or marijuana use. However, there is some evidence already on the effects of medical marijuana on statewide marijuana use, as well as driving fatalities, alcohol consumption, and suicides.

According to a study by Economists from University of Montana, University of Colorado, and University of Oregon, marijuana use increased in Rhode Island after medical marijuana laws came into effect.²⁸ Marijuana use amongst 18-25 year olds increased by 3.5% from the pre-legalization period to the post-legalization period, while use in Connecticut and Massachusetts declined. There was no evidence of an increase in use by minors.

The report looked at use in Montana, Vermont, and Rhode Island through medical marijuana legalization and compared them to nearby states that did not legalize medical marijuana and found consistent trends in all three states. Although marijuana use increased among some age groups, the study found no increases in use amongst minors.

The study then looked at the effect of medical marijuana laws on alcohol use and found that legalization of medical marijuana is associated with a 9% reduction in the mean number of drinks consumed by males, including a 25% reduction in the mean number of drinks consumed by 20-29 year olds. Medical marijuana laws were also associated with a 5.3% reduction in beer sales.

Largely as a result of this decrease in alcohol consumption, traffic fatalities decreased due to medical marijuana laws across the three states in the study. Legalization was associated with a 7.9% decrease in the traffic fatality rate and a 12% decrease in any blood alcohol level related fatal crashes. Another study by Rees, et al. looking at the same states found a 5% decrease in suicides associated with medical marijuana laws, with the effects greatest on suicide rates of those in their twenties.²⁹

[26] The 35,000 alcohol related deaths include 12,000 liver related fatalities (U.S. Centers for Disease Control, Vital Statistics Report, April 19, 2006).

[27] Sidney, et al. "Marijuana use and Mortality." *American Journal of Public Health* 87 (1997): 585-90; Data on 35,000 deaths is from the National Institute on Alcohol Abuse and Alcoholism, NIAAA Strategic Plan for Research, 2009-2014.

[28] "Medical Marijuana Laws, Traffic Fatalities, and Alcohol Consumption," with Daniel Rees and Benjamin Hansen, 2012. Forthcoming at *Journal of Law and Economics*.

[29] "Medical Marijuana Laws and Suicide," with Daniel Rees and Joseph Sabia, 2013. Revised and resubmitted to *JAMA Psychiatry*.

These results provide strong evidence that the changes in marijuana use that have resulted from Rhode Island marijuana law reform have had substantial positive effects on society.³⁰

[30] While there are a host of studies that look at the effects of marijuana, most are correlative. For example, one widely cited study by Guohua Li of Columbia University demonstrates that the risk of car crashes rises with greater marijuana consumption. However, the study only correlated marijuana use to outcomes, which assumes that there is no uncontrolled variable that might have caused the accidents instead of the marijuana use. These studies also do not account for the replacement of alcohol use by marijuana use. The natural experiment analyses in the Rees papers, because they have some form of pseudo-experimental control, provide stronger arguments than studies just based on correlation.