

A Public Health Impact Report of Marijuana in Rhode Island

December 2016



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www.oceanstateprevention.org



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Executive Summary

The goal of this health impact report is to determine the potential health and social impacts of marijuana in Rhode Island.

History of RI Legislation Related to Marijuana

In 2006, RI legalized marijuana for “medicinal purposes”. This law has been revised over the years to include additional qualifying conditions and to modify the mechanism whereby patients can obtain marijuana products

In 2013, RI repealed criminal penalties for possession of less than one ounce of marijuana

From 2010-2016, bills were introduced to tax and regulate marijuana for all residents. To date, none of these bills has passed

In 2016, MA voters elected to legalize marijuana

Behaviors and Attitudes Related to Marijuana

From 2013 to 2014, marijuana use increased in all geographic locations across the United States, with the greatest increase in the Northeast region

Adolescent use of marijuana is higher in states with enacted medical marijuana laws

Over the past years, fewer high school students in RI perceive marijuana use as harmful

Increases in marijuana use parallels a declining perceived risk of harm.

Educational Impact of Marijuana Use

Early initiation of marijuana use is associated with lower income and college degree completion, a greater need for economic assistance, unemployment, and use of other drugs, including opioids

Student Assistant Counselors in Rhode Island have witnessed an increase in the number of students under the influence of marijuana while at school in the 2015-2016 school year

College students using marijuana are at risk for negative future academic outcomes

Health Impact of Marijuana

With long-term marijuana use, executive functions can continue to be impaired, memory and attention increasingly worsen, and risk-taking and poorer decision-making can result from functional brain alterations.

Research on the negative physical and mental effects of marijuana is ongoing.

Costs Associated with Prevention of Youth Substance Use

RISAPA currently derives funding only from the federal Substance Abuse Prevention and Treatment (SAPT) Block Grant. There are no prevention funds in the state budget.

The RISAPA coalitions use their funding to address underage drinking, illicit drug use, prescription drug misuse, and tobacco prevention.

The proposed RI FY2017 budget includes a call for only 5.0 full-time employees (FTEs) to monitor the medical marijuana program, piling in comparison to Colorado’s 70 FTEs

Where Do We Go from Here? – Data Collection

The current situation suggests that marijuana use in RI will continue to increase. RI lacks a data collection infrastructure to monitor this public health crisis. Efforts should be made to address this gap, especially before any further legislative changes are made which could have adverse effects on RI’s population.

A Public Health Impact Report of Marijuana in Rhode Island

The purpose of this report is to detail the current impact of marijuana use and potential implications for the future for Rhode Island.

I. History of Marijuana Legislation in Rhode Island

a. Medical Marijuana Program – administered through the Department of Health

In 2006, Rhode Island legislators approved the legal use of marijuana to “treat or alleviate pain, nausea, and other symptoms associated with certain debilitating medical conditions” among patient registry-cardholders.¹ These symptoms include:

- Cancer or the treatment of this condition,
- Glaucoma or the treatment of this condition,
- Positive status for Human Immunodeficiency Virus (HIV) or the treatment of this condition,
- Acquired immune deficiency syndrome (AIDS) or the treatment of this condition,
- Hepatitis C or the treatment of this condition,
- A chronic or debilitating disease or medical condition, or its treatment that produces one or more of the following:
 - o Cachexia (wasting syndrome)
 - o Severe debilitating chronic pain
 - o Severe nausea
 - o Seizures, including but not limited to those characteristic of epilepsy
 - o Severe and persistent muscle spasms, including but not limited to those characteristic of multiple sclerosis or Crohn’s disease
 - o Agitation related to Alzheimer’s Disease

Additionally, in July 2016, RI approved the addition of post-traumatic stress disorder (PTSD) to the list of diagnoses.

Three years following this enactment, the Department of Health approved three licensed dispensaries for operation to sell medical marijuana products. In 2016, in an attempt to regulate a largely unregulated program, revisions were made to the law to set up marijuana cultivator licenses and a plant tagging system to stem the problem of diversion of excess marijuana supplies from caregivers to unauthorized marijuana users. Further regulations are currently in process by the Department of Business Regulation and Department of Health.

b. Decriminalization – penalties administered through Traffic Tribunal

In 2013, state-level criminal penalties associated with the possession and cultivation of less than one ounce of marijuana was repealed in Rhode Island. Through decriminalization, Gov. Lincoln Chafee signed a bill that significantly reduced the penalties of possession to be punishable by a \$150 fine. Possession of 1 ounce – 1 kilogram of marijuana for personal use is a misdemeanor punishable by a maximum of 1-year imprisonment and a maximum fine of \$500. Additionally, possession with the intent to distribute, is a felony punishable by a mandatory sentence between 10 to 50 years’ imprisonment, with a maximum fine of \$500,000.

On December 31, 2015, there were a total of five sentenced Rhode Island offenders (out of 2,458 inmates that day) housed at the Rhode Island Department of Corrections (RIDOC) serving a term for only charges relating to marijuana. For that day, this number constitutes less than 1% of the total sentenced population of the Adult Correctional Institutions. To continue, only eight of the 3,075 total inmate population were housed in the RIDOC for charges solely related to marijuana. This is consistent with the previous years’ (2014) sentencing of only six inmates serving at the Adult Correctional Institutions in Rhode Island for charges only related to marijuana.

c. Legalization of recreational marijuana proposals

In 2016, for the sixth year in a row, proposed legislation has called for the legalization of recreational marijuana use among adults 21 years or older.² Petitioning to regulate and tax recreational marijuana, proponent legislators are seeking to regulate marijuana “in a manner similar to alcohol.”

Policymakers argue that the absence of a “legal, tightly regulated market” has led to the emergence of an illicit marijuana industry and could be replaced with legitimate taxpaying businesses if this bill is passed. Opponents cite the growing data from states that have already legalized marijuana that shows a worsening public health impact, especially as related to youth use and driving consequences and a cost burden for regulation that outpaces projected windfalls. An additional area for concern is the geographical availability of recreational marijuana now that MA has legalized it.

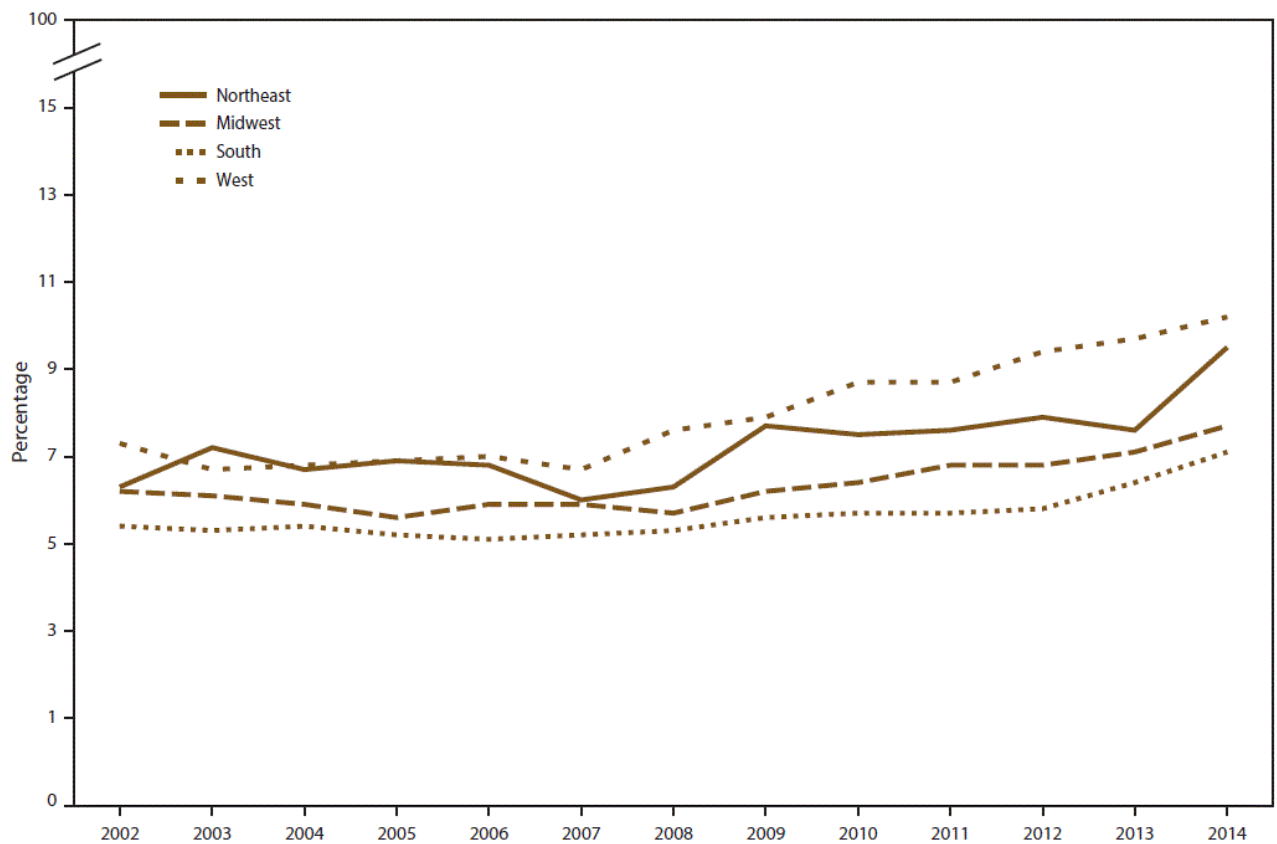
II. Behaviors and Attitudes Related to Marijuana

Prevalence can be described as encompassing the number of individuals using marijuana, the age at which they begin use, the age at which they stop using, the frequency with which they use, and the concentration they use on each occasion.³

a. Prevalence and impact of marijuana use among adults

Nationally, the prevalence of past month use increased among persons aged ≥ 18 years. For 18 to 25 year olds, prevalence of past month use increased from 16.6% in 2008 to 19.6% in 2014. Additionally, marijuana use increased in all geographic locations, in which the greatest increase from 2013 to 2014 was in the Northeast region.⁴

Figure 1: Percentage of past month marijuana use among person aged ≥ 12 was greatest for the Northeast region from 2013 to 2014

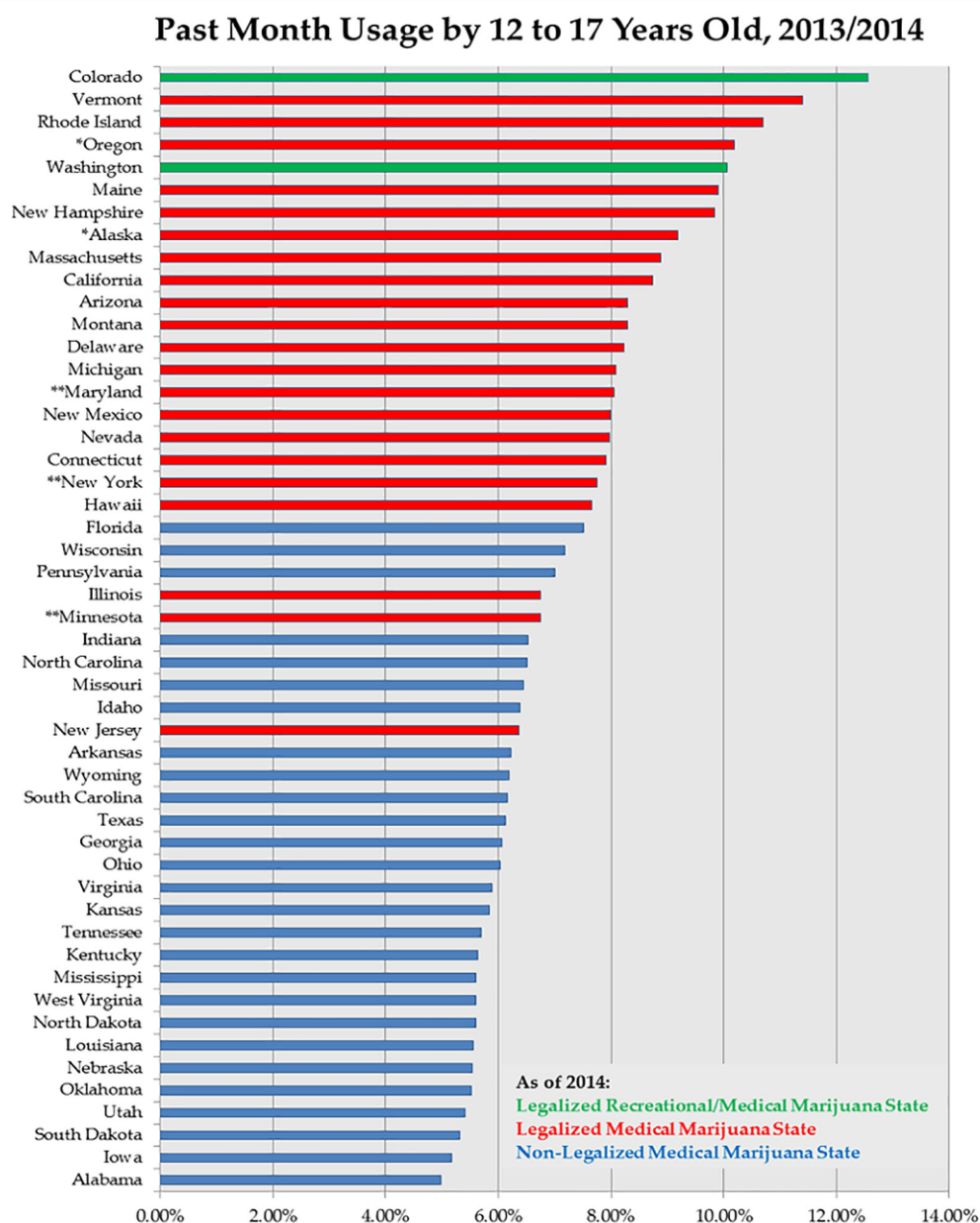


Source: National Survey on Drug Use and Health, United States, 2002 – 2014

b. Prevalence of marijuana use among adolescents

As noted by many surveys conducted, most marijuana use begins in adolescence.^{5 6} In 2013, Rhode Island showed the third highest past month use of marijuana among children 12 to 17 years old across the nation.

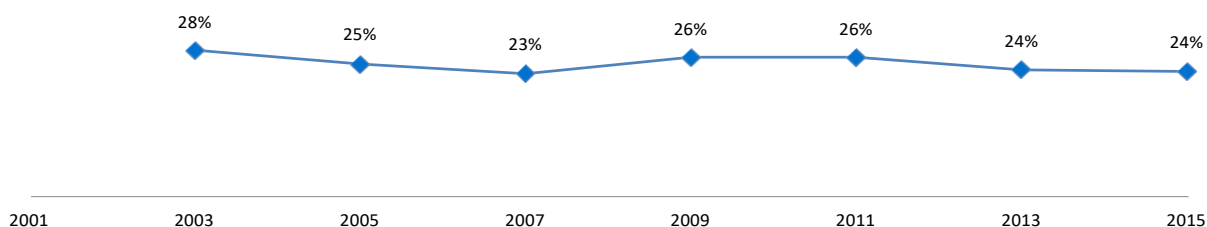
Figure 2: State-by-State Past Month Usage by 12 to 17 Years Old, 2013



Source: Colorado HIDTA Legalization Impact, 2015 – SAMHSA.gov, National Survey on Drug Use and Health 2013 and 2014

From 2003 to 2015, RI youth prevalence of marijuana has decreased slightly in response, in part, to years of prevention efforts from coalitions across the state. However, funding for prevention has significantly decreased over the past 10 years, potentially impacting the future prevalence rates. Marijuana use during the past 30 days among high school students (grade 9-12) has decreased from 2011 to 2015, from 26% to 24%, in spite of decreasing perception of harm.

Figure 3: Marijuana use has decreased among RI high school students
Percent of students who used marijuana one or more times
during the past 30 days

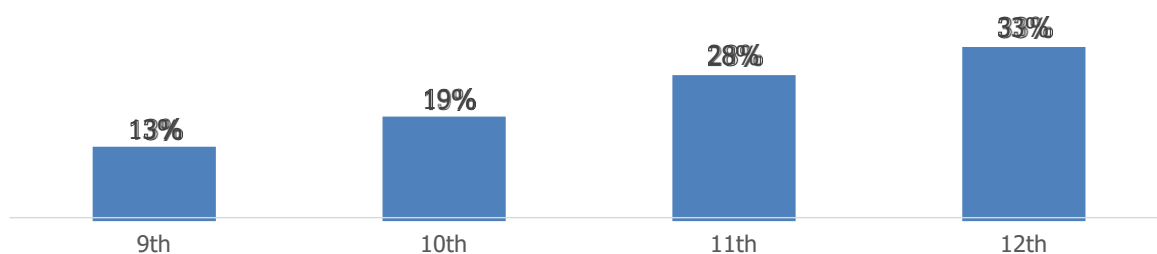


Source: Rhode Island Youth Risk Behavior Survey, 2015

High school senior students (grade 12), use marijuana more frequently than their younger counterparts.

Figure 4: 12th graders and males use marijuana more than their counterparts

Percent of Rhode Island students who used marijuana one or more
times during the past 30 days by grade, 2015

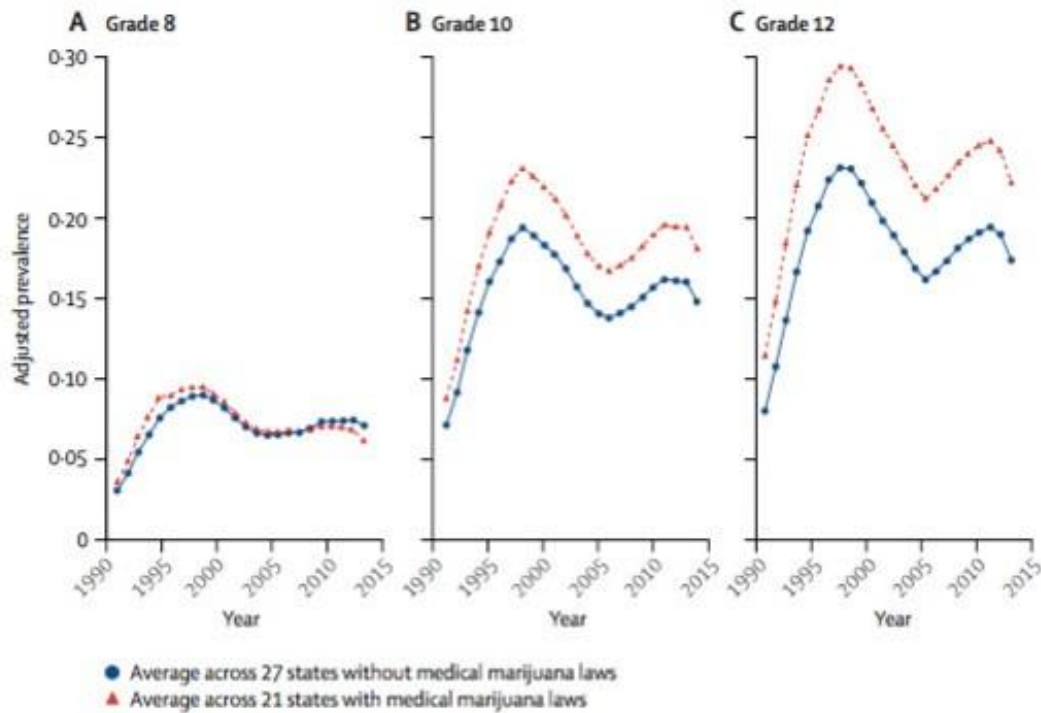


Source: Rhode Island Youth Risk Behavior Survey, 2015

c. Prevalence of marijuana use in states with medical marijuana programs

Adolescent use of marijuana is higher in states with enacted medical marijuana laws, such as RI, as compared to these states' counterparts.⁷

Figure 5: Adjusted prevalence of US adolescent marijuana use by year (1991-2014), school grade, and whether states had medical marijuana laws.



Source: Hasin DS et al. *Lancet Psychiatry*. 2015;2(7):601-608.⁶

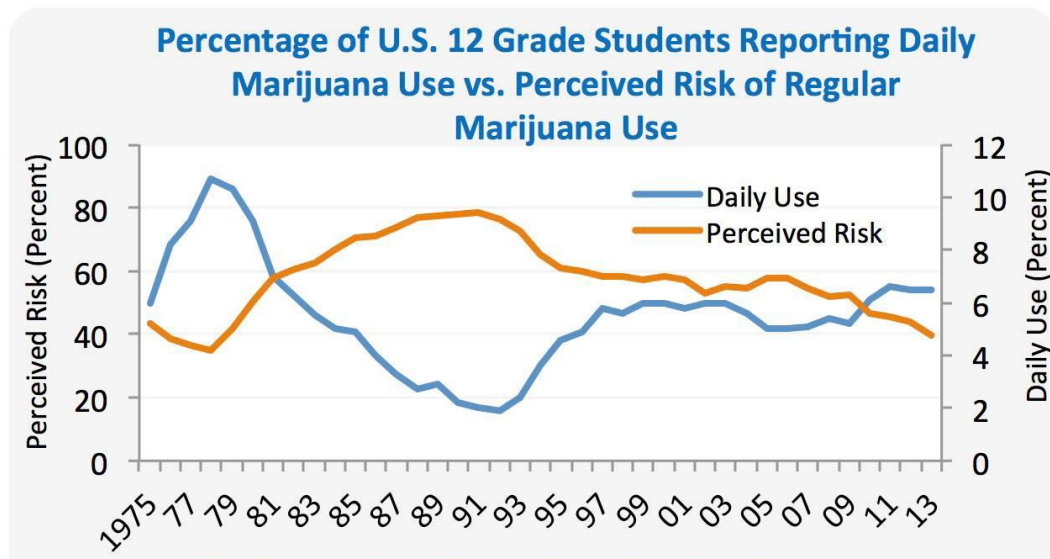
d. Age at first use

As prevention coalitions across Rhode Island have stressed the importance of parental monitoring and avoiding marijuana use by children, the use of marijuana before age 13 has steadily decreased from 2003 to 2013, with only 7% these of students using. Nationwide, results from the 2015 Monitoring the Future Study illustrate that 15.5% of 8th graders have used marijuana in their lifetime.⁸

e. Perceptions of risk amongst youth

As legalization of medical and recreational marijuana use has become a much more commonplace topic for discussion in the general population, adolescent perceptions of harm resulting from marijuana use have decreased nationally (Figure 6).

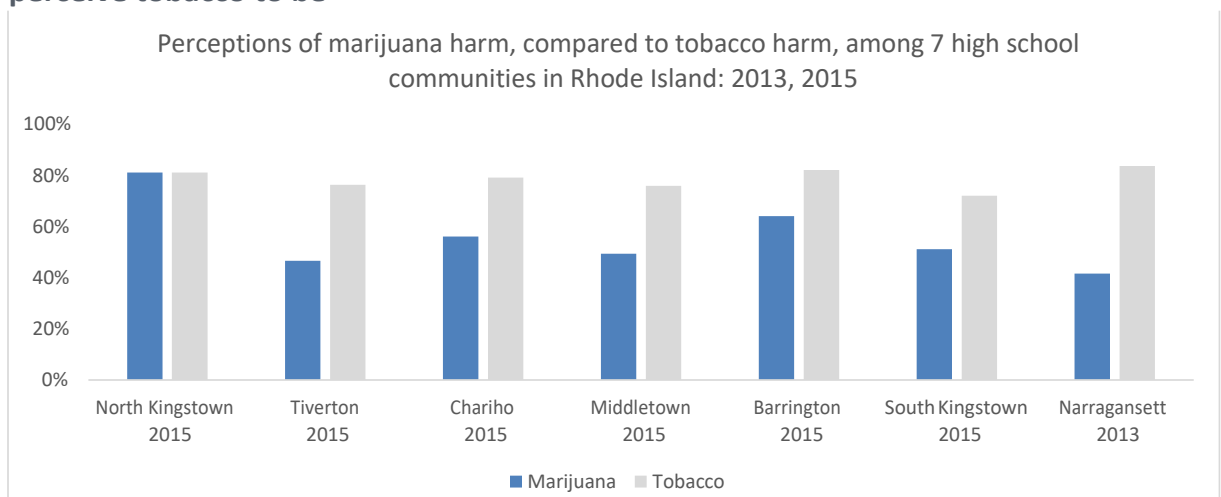
Figure 6: Perceived risk of marijuana use has decreased.



Source: *The Monitoring the Future Study, the University of Michigan, 2013*

Consistent with these national results, in a survey distributed to seven high school communities across Rhode Island, through federally funded Drug Free Communities grants, less than 60% of students among five of the seven populations believed there were risks from smoking marijuana (**Figure 7**). A national study conducted in 2007 found that “abstainers (individuals who have never used marijuana) perceive greater risks related to marijuana use than users, suggesting that perceived risks may be particularly relevant with respect to initiation of use.”⁹ Furthermore, despite no scientific evidence to support the idea that marijuana is less harmful than tobacco, youth seem to believe otherwise.

Figure 7: RI High school students perceive marijuana as less harmful to teens than they perceive tobacco to be



Sponsored by the Drug-Free Communities grant, 2015

f. What happens to youth when recreational marijuana is legalized for adults?

Using the Monitoring the Future Study and RI Youth Risk Behavior Survey, Palamar and associates estimated the potential increase in prevalence if marijuana were it to be regulated in a particular state.¹⁰ Among United States' 12th grade students in 2013, 52% reported ever using marijuana. Using the estimated increase from the article, should marijuana be legalized in RI, 63% of 12th grade students might begin use.¹⁰ As revealed by the Monitoring the Future Study, conducted in 2013, "increases in marijuana use continue to parallel softening attitudes about the perceived risk of harm and disapproval associated with marijuana use."¹¹

III. Educational Impact of Marijuana Use

a. High school suspensions in Rhode Island related to substance use

As years of completed schooling have been shown to be highly correlated with long-term social and economic outcomes, studies demonstrate that increase in substance use is associated with reduced education attainment and negative academic outcomes among adolescents.^{12 13 14} Through monitoring suspension data, school officials have the opportunity not only to aim to reduce substance use to improve school attendance, but also address the "implications for cost-effectiveness and other interventions designed to reduce adolescents' substance use."¹³ In a 2009 prospective study following 4,500 7th graders through high school in South Dakota, McCaffrey and colleagues established an association between marijuana use and dropping out of high school, showing that marijuana users were twice as likely to drop out of school as non-users.¹⁵

Additionally, monitoring suspension data is important given the groups of students most likely to be suspended. According to a report by the American Civil Liberties of Rhode Island, "students of color and students with disabilities remain disproportionately removed from school and propelled down the school-to-prison pipeline, out of the classroom and into the courtroom."¹⁶

Currently in high schools across Rhode Island, possession or being under the influence of illicit drugs accounts for 401 out-of-school suspensions.

Table 1: Incident of suspensions in Rhode Island high schools, by the number of infractions, during 2013-2014 school year

	Out of School Suspensions	In-School Suspensions	Interim Alternative Educational Setting	Total
Possession or Under the Influence	401	41	1	443
Sale of Possession with Intent to Sell	18	5	0	23

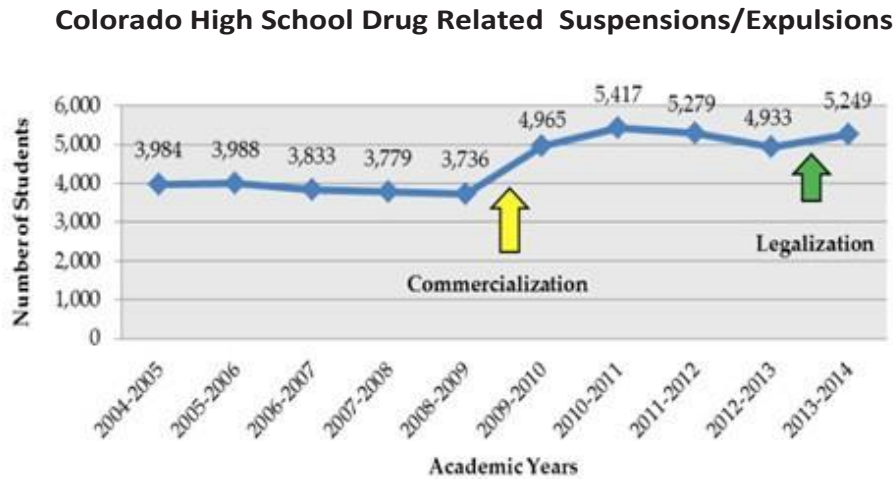
Source: Rhode Island Education Data Reporting

Student Assistance Counselors in Rhode Island, who are trained to handle substance abuse-related problems encountered by teens and provide classroom-based prevention, have also noticed the immediate impact of marijuana use among students within their schools. Of those present at their schools from 2012 to 2013, the majority of counselors have seen at least a slight increase in the number of students under the influence of marijuana while at school in the 2015-2016 school year. Additionally, peers, parents, and the media were perceived by counselors as having the largest impact on the average student's decision whether or not to use marijuana.¹⁷

b. High school suspensions in states where recreational marijuana has been legalized

Particularly in Colorado, drug-related suspensions/expulsions (predominantly marijuana violations) increased **40 percent** from school years 2008-2009, during marijuana commercialization, to 2013-2014 when recreational use of marijuana was legalized.

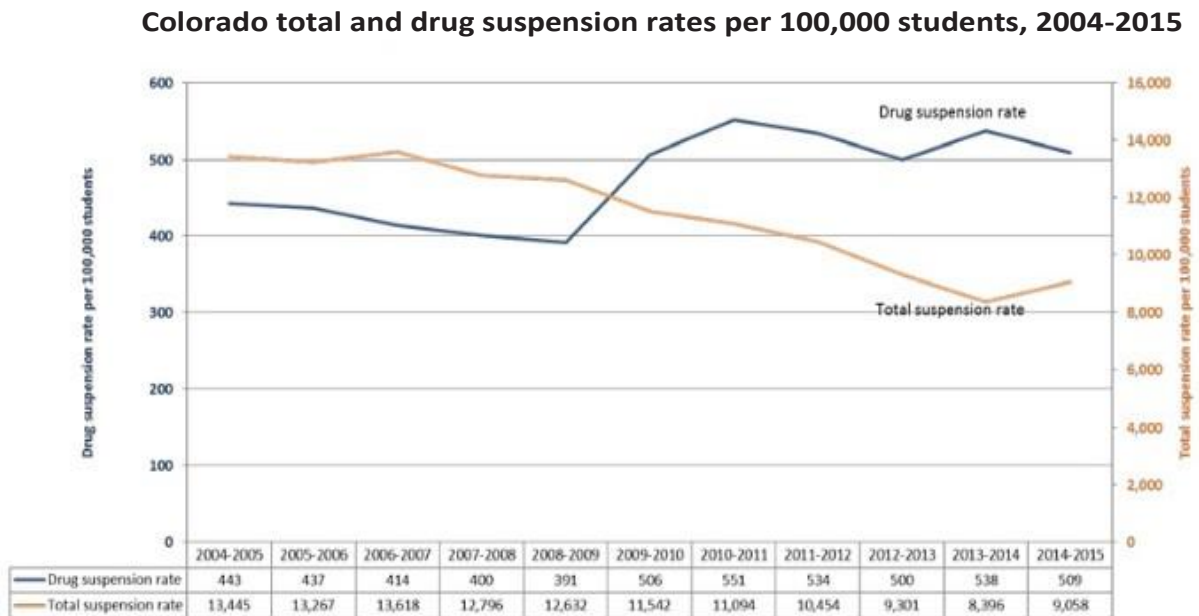
Figure 8: Colorado high school drug-related suspensions/ expulsions has increased from 2004 to 2014.



Source: Colorado Department of Education, 10-Year Trend Data: State Suspension and Expulsion Incident Rates and Reasons

In the 2014-15 school year, discipline for drugs accounted for 41% of all expulsions, 31% of all law enforcement referrals, and 6% of all suspensions in Colorado.

Figure 9: Colorado students were suspended for drugs at a rate of 509 per 100,000.



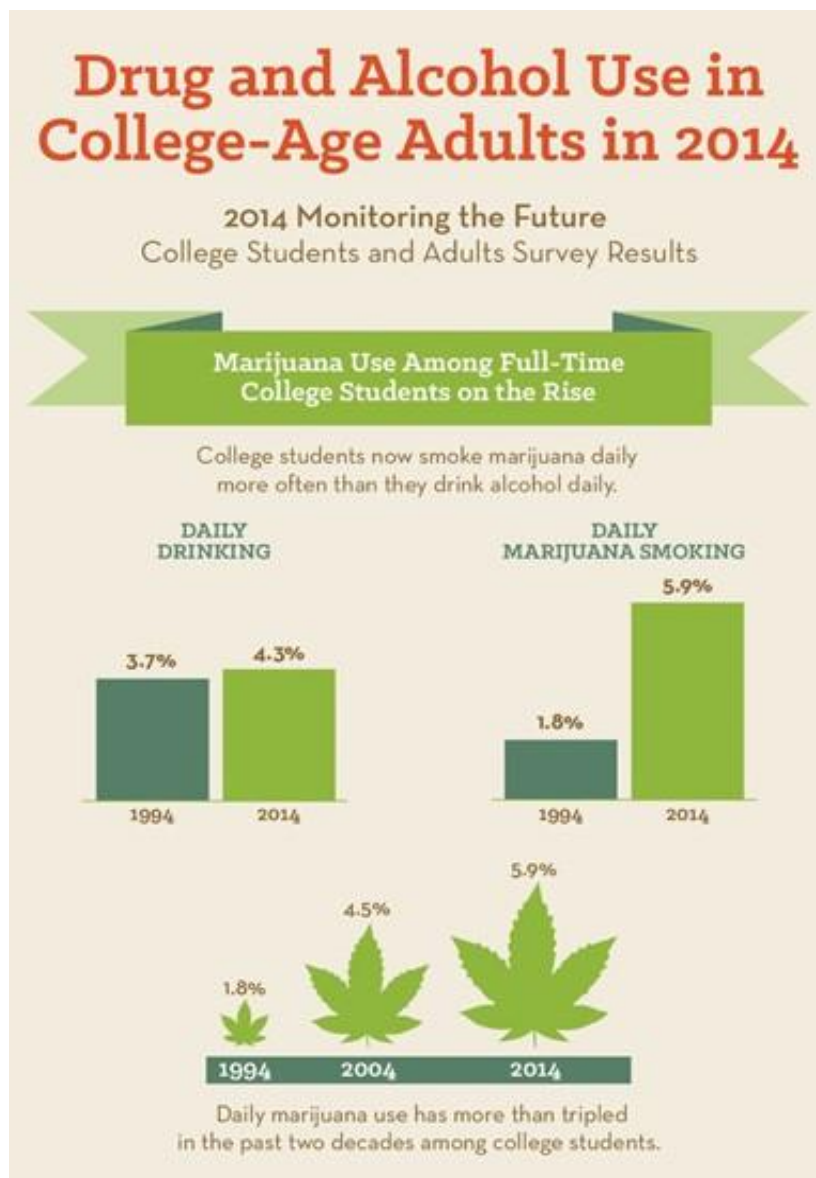
Source: Colorado Department of Education, <http://cde.state.co.us/cdereval/suspend-expelcurrent>, retrieved 04/30/2016.

c. Marijuana use among college students

An estimated 6.8 million young adults aged 18 to 25 in 2014 were current users of marijuana, accounting for 31.8% of individuals, nationally, who used marijuana in the past year.⁵ In Rhode Island within that same year, 44% of our estimated 50,000 young adults reported using marijuana.¹⁸ College-age students risk potential short- and long-term impacts from constant marijuana use. A 7-year longitudinal study found that marijuana users were at risk for several adverse health outcomes such as:

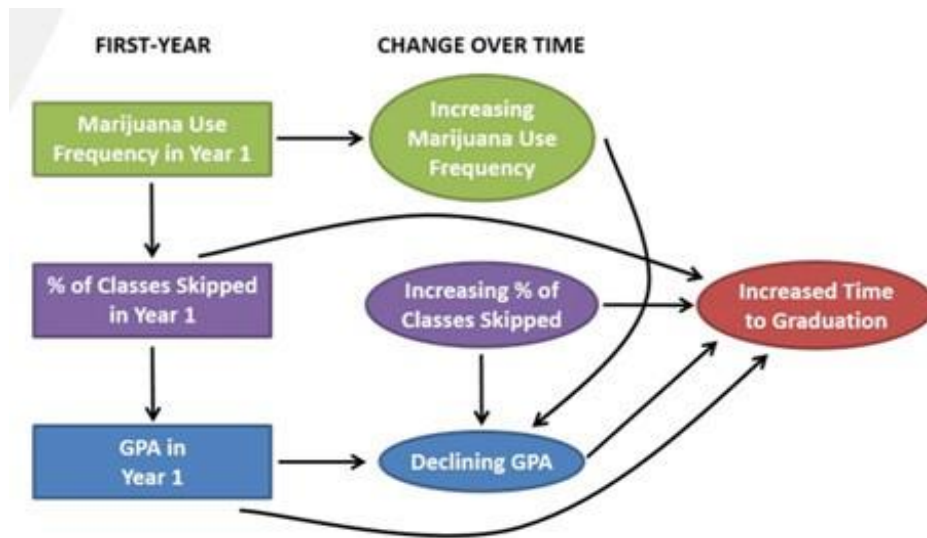
- functional impairment due to injury, illness, or emotional problems
- lower reported general health
- more psychiatric symptoms
- lower health-related quality of life, and
- increased service utilization for physical and mental health problems three years post-college¹⁹

Figure 10: 2014 Monitoring the Future Survey Results



Additionally, an 8-year study evaluated the indirect effects of marijuana use on college students, particularly in their first-year and how it influenced their academic trajectory in the coming years. Those who increased marijuana use tended to skip more classes, which led to a lower GPA in their first year and became suggestive of their future academic outcomes.²⁰

Figure 11: Marijuana use in the first year of college negatively impacts one's academic trajectory



Source: *The Center on Young Adult Health and Development, University of Maryland School of Public Health*²¹

d. Academic and future outcomes for adolescents who use marijuana

Research has been conducted on the longitudinal patterns of marijuana use that lead to negative health and social outcomes, accounting for social environmental factors, individual difference characteristics, and patterns of other substance abuse.^{21 22} Epstein and colleagues found that use of marijuana in early adolescence, even when followed by cessation, led to lower levels of functioning in adulthood.²¹ Additionally, “early use may have reduced school motivation or brought on sanctions, such as police involvement or school suspension, which undermined academic achievement and may have contributed to higher levels of high school dropout.”²¹

In a longitudinal study assessing the changes in IQ between age 13 and age 38, Meier and colleagues found that early and persistent cannabis users showed an average decline of eight IQ points compared with peers who had not used cannabis and occasional cannabis-using peers.²³ This data is supported by later findings that demonstrate an association between poor verbal memory and sustained daily use of cannabis throughout the adult life.²⁴

As gathered by a 2016 report from the World Health Organization, longitudinal studies have shown that early introduction of heavy cannabis use is associated with lower income, lower college degree completion, a greater need for economic assistance, unemployment, and use of other drugs.^{25 26 27 28}

IV. Health Impact of Marijuana Use

a. Physical health impact of marijuana use

Marijuana can impact one's physical and mental wellbeing. When smoked, marijuana travels through the lungs and to the entire body through the bloodstream. As it reaches the brain, tetrahydrocannabinol (THC), the compound in marijuana responsible for psychoactive effects, also negatively impacts cognition, attention, emotionality, motivation, coordination, and sensory perception, as illustrated.²⁹

With long-term marijuana use, executive functions can continue to be impaired, memory and attention increasingly worsen, and risk-taking and poorer decision-making can result from functional brain alterations.^{30 31}

Along with those changes, a person may show at least two of the following signs, developing within two hours of cannabis use:

- Pink eye
- Increased appetite
- Dry mouth
- Increased heart rate³²

Additionally, strong evidence has illustrated that the respiratory, cardiovascular, reproductive, and immune systems are adversely impaired with marijuana use.^{30 33 34 35}

When marijuana travels through the lungs, the cell linings in these airways become damaged, resulting in symptoms such as chronic coughing, phlegm overproduction, wheezing, and acute bronchitis.^{34 38} Furthermore, chest pain, increase in blood pressure, heart arrhythmias, and cardiomyopathy also may occur.^{37 38}

In addition to its neurocognitive impact, THC is responsible for immunosuppression, making users more susceptible to infections and various cancers.^{30 35} As a result, marijuana users are at an increased risk for prostate, lung, nasopharyngeal and oropharyngeal cancer, stroke, congestive heart failure, myocardial infarctions, and sudden cardiac death.³⁰

Finally, marijuana use during pregnancy is linked to maternal anemia, low infant birthweight, and a need for neonatal intensive care.^{39 40} When compared to mothers who did not use marijuana, infants whose mothers did use were twice as likely to need placement in an intensive care unit.⁴⁰ Additionally, long term effects such as child underachievement and childhood depression and anxiety symptoms were associated with at marijuana use at varying stages of the pregnancy.⁴¹

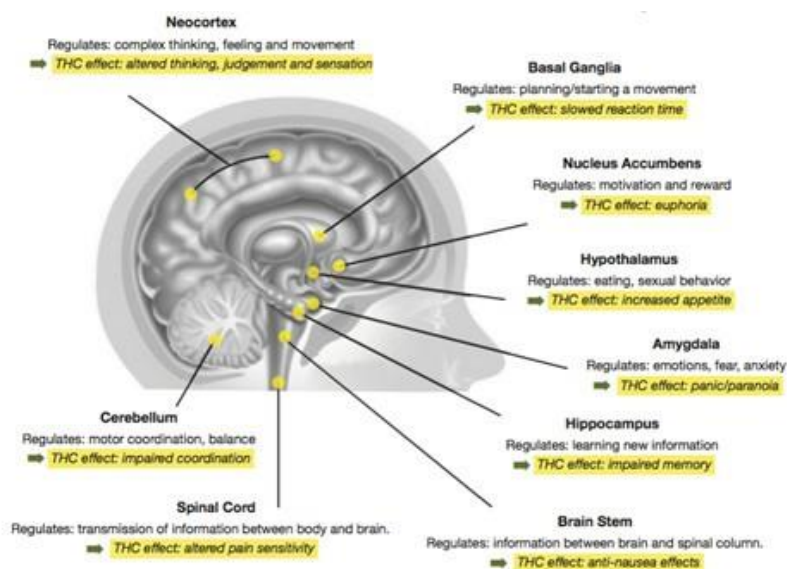
Research on the negative physical effects of marijuana is emergent and ongoing. Due to federal restrictions on the supply of research-grade marijuana, findings have been slower to emerge than they might have without such restrictions. Furthermore, the body of research that currently does exist on marijuana has yet to capture the effects of increased concentrations of THC now found commonly in use throughout the US.

b. Mental health impact of marijuana use

Among the topics encompassing the impact marijuana use has on the body, the mental health impact has been, and continues to be, one of the most studied topics to date. While a sizeable amount of research establishes the change in brain morphology with marijuana use, a substantial body of work also illustrates the exacerbation of acute conditions and serious mental illnesses.

According to the 2014 National Survey on Drug Use and Health, of the 21.5 million people in the United States with a substance use disorder, 4.2 million people had past year disorders related to their use of marijuana.⁵

- Anxiety
- Sensation of slowed time
- Impaired judgement
- Or social withdrawal



As defined by the DSM-5, acute cannabis intoxication is a recent use of cannabis where a person demonstrates clinically significant problematic behavioral or psychological changes that developed during, or shortly after, cannabis use. These changes can include:

- Impaired motor coordination
- Euphoria
- Anxiety
- Sensation of slowed time
- Impaired judgement
- Or social withdrawal

Even people using marijuana intermittently or experimenting during adolescence or early adulthood may experience the symptoms mentioned above. However, in recent years, more youth and adults have progressed to using marijuana regularly, or for longer periods of time.⁴² To that end, disorders such as cannabis dependence and addiction can occur and may become problematic to overall wellbeing.

As detailed by the article, Adverse Effects of Marijuana Use, “as compared with persons who begin to use marijuana in adulthood, those who begin in adolescence are approximately 2 to 4 times as likely to have symptoms of cannabis dependence within 2 years after first use.”²⁹ The article continues that early and persistent users are at an increased risk of addiction and dependence, and that can then predict a risk for use of other illicit drugs.²⁹

Studies strongly indicate the heritability of cannabis addiction, as some people who begin use may inherently be more at risk for dependence than others.⁴³ One in ten adults and one in six adolescents who try marijuana will become addicted.²⁹ Moreover, the constant development of the brain during adolescence makes this group more susceptible not only to addiction, but to an increased risk of developing acute psychotic symptoms or chronic psychotic disorders.

As detailed by studies collected by the authors of the Vermont Health Impact Assessment, cannabis use and its association to psychotic disorders has been well established. The authors explain:

“There appears to be consensus regarding the finding that individuals at risk to develop schizophrenia through genetic factors (i.e. family history, high risk genotype) and environmental factors (i.e. early onset child maltreatment/abuse) significantly increase that risk by using marijuana starting in adolescence. Furthermore, it appears that early marijuana use accelerates the progression from symptoms to diagnosis such that at-risk marijuana users are diagnosed with schizophrenia several years earlier than at-risk nonusers.”³

For regular marijuana users, the risk of experiencing marijuana withdrawal symptoms is also a cause for concern. These symptoms include:

- Irritability
- Anxiety
- Sleep difficulties
- Craving
- Dysphoria²⁹

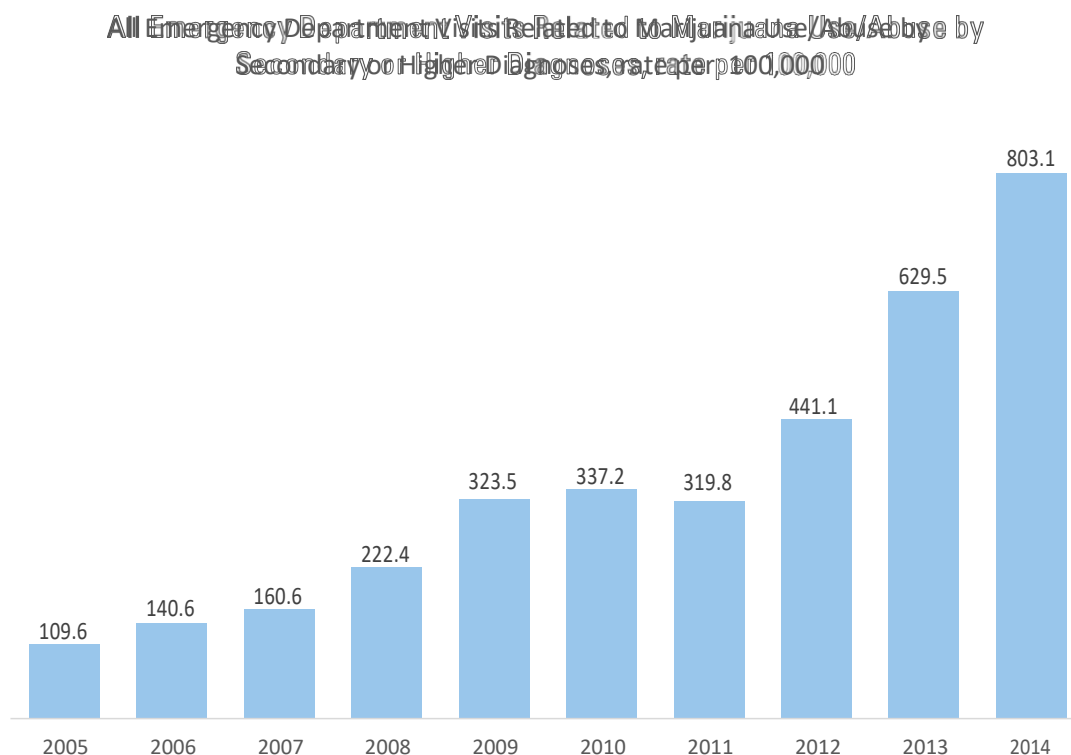
Though these symptoms may not appear to be immediately life-threatening, they can lead to the use of other more illicit drugs, feelings of depression, or in some cases, an increased risk for committing suicide.

According to the 2015 Rhode Island Youth Risk Behavior Survey, 26.4% of youth reported feeling depressed and 10.6% report attempting suicide one or more times during the past year.⁶⁴⁴ Frequent marijuana users carry the highest risk for developing depression and anxiety.⁴⁵ Additionally, following a meta-analysis assessing the long-term impact of adolescent marijuana use, the study found that adolescents using marijuana before the age of 17 years are at a seven times increased risk of attempting suicide.⁴⁶

c. Treatment for substance use disorders involving marijuana use

Within the span of a decade, Rhode Island emergency department visits related to marijuana use/abuse by primary diagnosis have steadily increased, at a rate per 100,000 visits, and peaked in 2013 at 57.8 per 100,000 visits. Additionally, a secondary – or higher – diagnosis of marijuana use/abuse among Rhode Island emergency department visits has increased significantly from 2005 to 2014, with 803.1 per 100,000 visits.

Figure 12: Cannabis Related, Secondary or Higher Diagnosis, has increased significantly from 2005 to 2014



Source: Emergency Department Database, Rhode Island Department of Health, Center for Health Data and Analysis

Finally, data from the 2014 SAMSHA Treatment Episode Dataset illustrates that marijuana is a primary substance of abuse among each age group, 12 to 17 years old, 18 to 20 years old, and 21 to 25 years old, far exceeding treatment admission for alcohol.

Table 2: Rhode Island Substance Abuse Treatment Admissions are higher for marijuana users than for alcohol users as noted by Primary Substance of Abuse Year – 2014.

Age of Admission	Alcohol only	Marijuana only
12-17	0.4%	26%
18-20	1.3%	12.3%
21-25	6.4%	22.4%

Source: SAMHSATreatment Episode Dataset

V. Costs Associated with Prevention of Youth Substance Use

a. Evidence-based prevention strategies

The Rhode Island Substance Abuse Prevention Act (RISAPA) promotes comprehensive prevention programming at the community level. Thirty-four (34) municipal task forces, covering thirty-eight (38) cities and towns, engage in local needs assessments. They use a data-driven, decision-making framework for planning, implementing evidence-based practices, and evaluating strategies, policies and programs in order to produce long-term reductions in substance misuse and abuse.⁴⁷ Funding currently derives only from the federal Substance Abuse Prevention and Treatment (SAPT) Block Grant, with no prevention funds dedicated from the state budget. Funding is population-based and ranges from about \$13,000 to \$60,000 per community. The RISAPA coalitions use their funding to address underage drinking, illicit drug use, prescription drug misuse and tobacco prevention for the entire community. That funding mechanism will change as of January 1, 2017, as the State introduces a new regional model to deliver prevention within the existing funding structure.

Moreover, due to the limited number of current states with recreational marijuana use laws enacted, looking to policies on tobacco and alcohol have been instrumental in determining how regulation could influence marijuana-related morbidity and mortality in Rhode Island.

As detailed in the 2016 Vermont Health Impact Assessment, strong evidence has shown that enacted tobacco smoke-free policies in work and public places and comprehensive alcohol control are associated with a variety of health benefits.³ In particular with alcohol, studies have shown that comprehensive control efforts should be focused on reducing excessive consumption and reducing episodes of alcohol poisoning, impaired driving, injuries, and fatalities.^{3 48 49} For example, alcohol taxes and higher prices is associated with fewer motor vehicle accidents, less alcohol-impaired driving, and less mortality from liver cirrhosis.^{3 50}

In recent years, the U.S. Community Preventative Services Task Force has conducted several systematic reviews and determined that the following policy interventions elicited the greatest success in monitoring excessive alcohol consumption:

- Enforce dram shop liability
- Increase alcohol taxes
- Limit hours of sale
- Limit alcohol outlet density
- Enhance enforcement of laws prohibiting sales to minors
- Maintain government control over alcohol sales³

Moreover, setting the minimum legal sale age of 21 for both tobacco and alcohol, utilizing child-resistant packaging for electronic nicotine delivery systems liquid nicotine cases, and displaying graphic health warning labels on tobacco packaging have also been cited as effective strategies in reducing youth access to tobacco and alcohol.^{3 51}

To continue, previous research indicates that regulating the density and location of outlets selling tobacco or alcohol products impacts the rate of use among youth.^{52 53 54} A high density of tobacco and alcohol retailers in a given area, respectively, is positively associated with increase rates of tobacco and alcohol misuse.^{53 54}

Finally, by prohibiting the sale of adult-only substances at certain retailer types, limiting times of sale, instilling high minimum price laws, and regulating marketing and advertising of tobacco and alcohol products through flavor prohibitions and display restrictions, best-practice in substance use control and prevention.³ Ultimately, imparting these limitations allows better control over product regulation in order to determine best practice for prevention.

However, some caution may be needed before direct comparison between alcohol, tobacco, and marijuana regulation may be made. After all, home growing of marijuana is already establishing itself as an explosive new industry. This is not the case in regards to alcohol and tobacco.

Therefore, current regulatory mechanisms for existing legal substances may fail to address the needs of a marijuana regulatory system. And, furthermore, according to a recent article by Harvard scientists, “Colorado spent much of those tax revenues for its first year of enforcement and oversight of the new marijuana marketplace. This figure does not include the indirect costs such as emergency room visits, lost productivity, and car accidents. Any new revenue would almost certainly be vastly insufficient to cover the societal costs of legalization – which is why both tobacco and alcohol cost us about ten times the revenue they generate.”⁵⁵

b. Costs associated with the labor needed to regulate the recreational marijuana market is an important factor to consider prior to adoption

For alcohol, only \$35,000 per year is shared between all Rhode Island cities and towns for alcohol purchase surveys to determine the prevalence of underage alcohol purchases. Alcohol purchase surveys are conducted once a year to a collection of establishments across Rhode Island. Unfortunately, coverage of communities across the state vary by year, ranging from 47.8% of establishments included in the sample in 2008 to 93.2% in 2010. This inconsistency must be deliberated upon to determine what changes may need to be made to fund regular purchase surveys for marijuana retailers – both medical marijuana dispensaries and recreational businesses – were this measure to pass.

In 2016, Governor Raimondo published a proposal for the FY2017 budget, which included an outline of medical marijuana regulatory changes. From the proposal, the Department of Business Regulation would be responsible for licensing compassion centers, compassion center staff, cultivators, and caregivers, selling plant tags and maintain a tag database, with the Department of Health maintaining licensing authority over patients and authorized purchasers.⁵⁶ Currently, the Department of Health handles all of these tasks exclusively. The budget includes only 5.0 FTEs to support the program:

- 2.0 Chief Public Inspection Officers
- 1.0 Licensing Aide
- 1.0 Chief of Inspections
- 1.0 Senior Legal Counsel⁵⁶

In contrast, government agencies in Colorado, Washington, Oregon, and Alaska have structured their marijuana regulation divisions to account for the volume of marijuana-related incidences across their state. With Colorado’s population roughly five times that of Rhode Island’s at 5.35 million people, their government agencies currently have 70 FTEs dedicated to marijuana regulation and are proposing to add 15 more FTEs.

If legalization were to occur in Rhode Island, modeling inspection practices after Colorado’s extensive procedure could provide a starting point. Colorado officials are quick to point out that they’re procedures are still a work in progress. As detailed in a summary of the Medical Marijuana Research conducted by the Rhode Island’s Attorney General’s Office, in Colorado,

“Retail stores, cultivation, and manufacturing facilities are subject to local safety inspections to confirm that no health or safety concerns are present (including annual fire safety inspection [allows for an Independent Health and Sanitary Audit]).

Facilities must make standard production procedures for each of its edible products available for inspection by the Marijuana Enforcement Division, the Colorado Department of Public Health & Environment, and local licensing authorities.

Labs must be inspected prior to initial certification, annually and thereafter. Inspectors can inspect at any time during business hours and can require samples for testing if there are reasonable grounds to believe that marijuana is contaminated or mislabeled, or there is a violation of any product safety, health, or sanitary law, rule or regulation.

Inspectors can inspect any books and records in any way connected with any licensed or unlicensed activity, including log of visitor activity in limited access areas or employee training records.”⁵⁷

Ultimately, in order to implement any sort of effective regulation, there would need to be a significant amount of allocated funds for responsible departments and an increase in the FTEs upholding management.

VI. Where Do We Go from Here? - Data Collection

Though measuring the prevalence of marijuana use has shed light on its use in Rhode Island, not all communities have been able to collect this data comprehensively, and steps should be taken now to determine marijuana's true impact on public health and safety for Rhode Island residents under the current laws and as a potential baseline should future changes occur.

In comparison, along with nationally collected data, Colorado enlists multiple agencies to collect marijuana use information in order to keep up with regulation in its state. These agencies include:

- Department of Transportation
 - o Total number of fatal traffic accidents positive for marijuana
- Local Law Enforcement/State Highway Patrol
 - o Toxicology results from traffic investigations, notable case examples, and DUI/D arrests & citations
 - o Public use/ arrests and citation data
- Drug Recognition Experts (DRE)
 - o Total number of contacts mentioning marijuana
- Toxicology Labs and Coroners
 - o Total number of toxicology results positive for marijuana – collected by
- State Judicial Branch, Division of Probation Services
 - o Percent positive THC urinalyses
- School Resource Officers (SRO)
 - o SRO experience regarding frequency of marijuana-related incidents at school
- School Counselors Associations (SCA)
 - o SCA experiences regarding frequency of marijuana-related incidents at school
- State Department of Education
 - o Suspension, expulsion, and law enforcement referral data related to marijuana
- Epidemiology Working Group
 - o Interviews, studies to which they have contributed regarding youth and adult use
 - o Interviews, studies to which they have contributed regarding emergency room visits
- Advocacy Groups
 - o DUID Victim Voices
 - o Total number of cases that involved marijuana – collected by Drug Endangered Children Associations
- State Department of Public Health and Environment
 - o Emergency department data – collected by the Health Statistics and Evaluation Branch
 - o Hospitalization (admission and discharge) data
 - o Medical marijuana registry information
- Local/Statewide Hospitalizations/ER Visits
 - o Total number of accidental ingestions – collected by Children's Hospital
- Nationwide/Statewide Poison Center
 - o Total number of marijuana-related calls
- State Department of Human Services
 - o Drug type for treatment admissions for all ages – collected by the *Office of Behavioral Health*
- El Paso Intelligence Center (EPIC)
 - o Total number of seizures
 - o Total pounds of contraband seized
 - o Case examples

- US Postal Inspection, US Customs and Border Protection, EPIC/National Seizure System (NSS)
 - o Total number of packages seized
 - o Total weight per seizure
 - o Destination/origin of packages
- Local Fire/Police Departments
 - o Total number of calls for service related to THC extraction lab explosions
 - o Total number of injuries caused by THC lab explosions
 - o Address and location of explosions
 - o Synopsis of the explosion event
- State/Local Hospitals – Burn Unit
 - o Total number of burn victims related to THC extraction lab explosions
 - o Severity of explosions
 - o Average cost of damage caused by explosions
- Veterinarian’s Associations
 - o Marijuana-related pet poisoning
- State Department of Revenue (DOR)
 - o Monthly sales of tax revenue – collected by the Office of Research Analysis
 - o Report: Market Size and Demand for Marijuana in Colorado – collected by the Marijuana Enforcement Division
 - o Demand and market size, production amount – collected by the Office of State Budget and Planning
 - o Monthly sales of tax revenue and consumption reports
 - o Number of marijuana businesses and reported sales

This type and extent of data collection is the bare minimum that Rhode Island should consider as mandatory, presently and moving forward. Funding needs to be dedicated to this type of evaluation in order to establish a baseline and provide essential feedback going forward.

a. Traffic safety and testing

Currently, there are limited ways to measure impaired driving due to marijuana use in Rhode Island. Without a roadside test, like the portable breathalyzer for alcohol, Rhode Island relies on Drug Recognition Experts (DREs), officers trained in specific field tests to detect drug impairment beyond alcohol. Not all communities in Rhode Island have DREs on staff. Rhode Island could make efforts to educate residents about the dangers of marijuana-induced impaired driving and mandate roadside testing of all drivers involved in traffic accidents and fatalities. Published in May of 2016, a research report from the AAA Foundation of Traffic Safety found that after Washington state legalized recreational marijuana use, fatal crashes involving drivers who used marijuana doubled from 8% to 17% between 2013 and 2014.⁵⁸ Recommendations have been made to implement a maximum per se limit, in which specific amounts of THC are allowable prior to drivers being taken into custody. However, in this report, it was noted that these legal limits are “arbitrary and not support by science.”^{58 59} As described by the AAA Northeast Managing Director of Public Affairs, David Raposa,

“There is understandably a strong desire by both lawmakers and the public to create legal limits for marijuana impairment, in the same manner as we do with alcohol. In the case of marijuana, this approach is flawed and not supported by scientific research. It’s simply not possible today to determine whether a driver is impaired based solely on the amount of the drug in their body. Marijuana can affect driver safety by impairing vehicle control and judgement. States need consistent, strong and fair enforcement measures to ensure that the increased use of marijuana does not impact road safety.”⁵⁹

Instead, AAA suggests using more comprehensive enforcement measures to ensure public safety.

In effect, states should use a two-component system that requires:

1. A positive test for recent marijuana use
2. Behavioral and physiological evidence of driver impairment

Receiving training from two current law enforcement training programs – Advanced Roadside Impaired Driving Enforcement (ARIDE) and the 50-state Drug Evaluation and Classification (DEC) program – would be essential to implementing this system and providing law enforcement officers with the necessary skills to recognize drug-impaired driving.⁵⁹

b. Criminal penalties and local enforcement

As detailed by the Rhode Island Department of Corrections FY2015 Annual Population Report, “data for specific drug types indicate a drop in marijuana charges of 91 from FY07-FY15,” due to the legislation decriminalization of marijuana in 2013.⁶⁰ Unfortunately, it is difficult to determine if this data represents actual change in use or police procedures. Additionally, there is no mechanism in place to collect data on the incidences when police do not issue a ticket and no data has been made available to the Traffic Tribunal regarding the depositions of cases making it to their court.

Moreover, the Narcotics Unit/Rhode Island State Police High Intensity Drug Trafficking Areas (HIDTA) Task Force is responsible for investigating violations of the federal and state Uniformed Controlled Substance Act. As a result of the 2015 investigations and arrests, the task force, comprising of two non-commissioned officers and four detectives, seized 164 pounds of contraband marijuana and 269 plants.⁶¹ Nationwide, marijuana seizures show an increase in THC content to almost 10%. This information is not well documented in the RI seizures. Knowing this information could inform enforcement officers and public health officials of the pervasiveness of certain types of marijuana in a particular area and its relation to the health impact on residents. Also, it provides officers the opportunity to track the movement of types marijuana into Rhode Island from surrounding states or abroad.

Ultimately, as described during a forum titled, “Marijuana Regulatory Policy: Lessons from Western States” and hosted by Attorney General Peter Kilmartin, the Conference of Western Attorneys General, and the Taubman Center for American Politics at Brown University, Colorado and Washington representatives suggest that frameworks and regulatory infrastructure be in place before a state should consider marijuana legislation. In addition, collaboration with as many stakeholders as possible and constant communication through working groups across the nation is essential to monitor the impact of marijuana on society. Finally, dedicated funding should be in place to measure marijuana impact to public safety should be in place in order measure the effectiveness of such a system.

VII. Conclusions

Overall, Rhode Island struggles with its current regulatory infrastructure, data collection, and funding structures for alcohol, tobacco, and medical marijuana program.

Given the range of adverse negative public health and safety consequences of changing marijuana policy, particularly its impact on youth, it is imperative to shore up the identified inconsistencies in current RI marijuana regulations. The primary advice to Rhode Island from other states with enacted recreational marijuana use laws is to refine the current laws in place as soon as possible in order to lessen the public health and safety impact.

Elected officials and policy makers must ensure that evidenced based data on all of the social costs to individuals and communities is reviewed before making further changes to legislation. A thorough and independent assessment of the latest public health data from all medical and legalized states should be required before any change in law is passed. The electorate should be instructed in the full cost of implementing and overseeing such regulations and well as the cost to employers, schools, public safety officials and the potential long-term burden on healthcare treatment.

References

1. Medical Marijuana. State of Rhode Island: Department of Health. 2016. Available at: 1. <http://www.health.ri.gov/healthcare/medicalmarijuana/>. Accessed March 1, 2016.
2. State of Rhode Island: In General Assembly. THE EDWARD O HAWKINS AND THOMAS C SLATER MEDICAL MARIJUANA ACT. 2016. Available at: <http://webserver.rilin.state.ri.us/billtext16/housetext16/h7142.htm>.
3. Health Impact Assessment: Marijuana Regulation in Vermont. Vermont Department of Health; 2016.
4. Azofeifa A, Mattson ME, Schauer G, McAfee T, Grant A, Lyerla R. National Estimates of Marijuana Use and Related Indicators — National Survey on Drug Use and Health, United States, 2002–2014. *MMWR Surveill Summ* 2016;65(No. SS-11):1–25. DOI: <http://dx.doi.org/10.15585/mmwr.ss6511a1>.
5. National Survey on Drug Use and Health. 2014.
6. Rhode Island Youth Risk Behavior Survey. 2015.
7. Hasin D, Wall M, Keyes K et al. Medical marijuana laws and adolescent marijuana use in the USA from 1991 to 2014: results from annual, repeated cross-sectional surveys. *The Lancet Psychiatry*. 2015;2(7):601-608. doi:10.1016/s2215-0366(15)00217-5.
8. Monitoring the Future Study: Trends in Prevalence of Various Drugs. Drugabusegov. 2016. Available at: <https://www.drugabuse.gov/trends-statistics/monitoring-future/monitoring-future-study-trends-in-prevalence-various-drugs>. Accessed April 20, 2016.
9. Kilmer J, Hunt S, Lee C, Neighbors C. Marijuana use, risk perception, and consequences: Is perceived risk congruent with reality?. *Addictive Behaviors*. 2007;32(12):3026-3033. doi:10.1016/j.addbeh.2007.07.009.
10. Palamar J, Ompad D, Petkova E. Correlates of intentions to use cannabis among US high school seniors in the case of cannabis legalization. *International Journal of Drug Policy*. 2014;25(3):424-435. doi:10.1016/j.drugpo.2014.01.017.
11. Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E. & Miech, R. A. (2015). Monitoring the Future national survey results on drug use, 1975–2014: Volume 2, College students and adults ages 19–55. Ann Arbor: Institute for Social Research, The University of Michigan.
12. Roebuck M, French M, Dennis M. Adolescent marijuana use and school attendance. *Economics of Education Review*. 2004;23(2):133-141. doi:10.1016/s0272-7757(03)00079-7.
13. Engberg J, Morral A. Reducing substance use improves adolescents' school attendance. *Addiction*. 2006;101(12):1741-1751. doi:10.1111/j.1360-0443.2006.01544.x.
14. Marie O, Zölit U. 'High' Achievers? Cannabis Access and Academic Performance. Bonn, Germany: Institute for the Study of Labor; 2015.
15. McCaffrey D, Liccardo Pacula R, Han B, Ellickson P. Marijuana use and high school dropout: the influence of unobservables. *Health Econ*. 2009;19(11):1281-1299. doi:10.1002/hecl.1561.
16. Over Suspended And Underserved: Rhode Island's School Suspension Disparities In The 2014-2015 School Year. Providence, RI: American Civil Liberties Union of Rhode Island; 2015.
17. Rhode Island Student Assistant Counselor Survey. 2016.
18. <https://suburbanstats.org/population/how-many-people-live-in-rhode-island>
19. Caldeira, K.M., O'Grady, K.E., Vincent, K.B., Arria, A.M. (2012). Marijuana use trajectories during the post-college transition: Health outcomes in young adulthood. *Drug and Alcohol Dependence*. 125(3), 267-275. doi:10.1016/j.drugalcdep.2012.02.022
20. Arria, A.M., Caldeira, K.M., Bugbee, B.A., Vincent, K.B., O'Grady, K.E. (2015). The academic consequences of marijuana use during college. *Psychology of Addictive Behaviors*. 29(3), 564-575. doi: 10.1037/adb0000108
21. Epstein M, Hill K, Nevell A et al. Trajectories of marijuana use from adolescence into adulthood: Environmental and individual correlates. *Developmental Psychology*. 2015;51(11):1650-1663. doi:10.1037/dev0000054
22. Pardini D, White H, Xiong S et al. Unfazed or Dazed and Confused: Does Early Adolescent Marijuana Use Cause Sustained Impairments in Attention and Academic Functioning?. *Journal of Abnormal Child Psychology*. 2015;43(7):1203-1217. doi:10.1007/s10802-015-0012-0.

23. Meier MH, Caspi A, Ambler A, Harrington H, Houts R, Keefe RS, et al. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proc Natl Acad Sci U S A*. 109(40):E2657–64.
24. Auer R, Vittinghoff E, Yaffe K, Kunzi A, Kertesz SG, Levine DA, et al. (2016). Association between lifetime marijuana use and cognitive function in middle age: the Coronary Artery Risk Development in Young Adults (CARDIA) study. *JAMA Intern Med*. doi: 10.1001/jamainternalmed.2015.7841.
25. The health and social effects of nonmedical cannabis use. World Health Organization; 2016.
26. Fergusson DM, Boden JM, Horwood LJ (2015) Psychosocial sequelae of cannabis use and implications for policy: findings from the Christchurch Health and Development Study. *Soc Psychiatry Psychiatr Epidemiol*. 50(9): 1317–26.
27. Fergusson DM, Boden JM (2008) Cannabis use and later life outcomes. *Addiction*. 103(6):969–76.
28. Brook JS, Lee JY, Finch SJ, Seltzer N, Brook DW (2013). Adult work commitment, financial stability, and social environment as related to trajectories of marijuana use beginning in adolescence. *Subst Abus*. 34:298–305.
29. Volkow, N., Baler, R., Compton, W., & Weiss, S. (2014). Adverse Health Effects of Marijuana Use. *New England Journal Of Medicine*, 370(23), 2219–2227. <http://dx.doi.org/10.1056/nejmra1402309>
30. Repp KK, Raich AL (2014) Marijuana and health: A comprehensive review of 20 years of research. Department of Health and Human Services. Washington County, Oregon
31. Crean, R., Crane, N., & Mason, B. (2011). An Evidence-Based Review of Acute and Long-Term Effects of Cannabis Use on Executive Cognitive Functions. *Journal Of Addiction Medicine*, 5(1), 1-8. <http://dx.doi.org/10.1097/adm.0b013e31820c23fa>
32. Cannabis-Related Disorders Clinical Presentation: History, Physical, Causes. Medscape. 2016. Available at: <http://emedicine.medscape.com/article/286661-clinical>. Accessed October 5, 2016.
33. Pratap B Korniyenko A. Toxic Effects of Marijuana on the Cardiovascular System. *Cardiovascular Toxicology*. 2011;12(2):143-148. doi:10.1007/s12012-011-9150-y.
34. Owen, K., Sutter, M., & Albertson, T. (2013). Marijuana: Respiratory Tract Effects. *Clinical Reviews In Allergy & Immunology*, 46(1), 65-81. <http://dx.doi.org/10.1007/s12016-013-8374-y>
35. Rieder, S., Chauhan, A., Singh, U., Nagarkatti, M., & Nagarkatti, P. (2010). Cannabinoid-induced apoptosis in immune cells as a pathway to immunosuppression. *Immunobiology*, 215(8), 598-605. <http://dx.doi.org/10.1016/j.imbio.2009.04.001>
36. Marijuana and Lung Health. American Lung Association. 2015. Available at: <http://www.lung.org/stop-smoking/smoking-facts/marijuana-and-lung-health.html>. Accessed August 20, 2016.
37. Jouanjus, E., Lapeyre-Mestre, M., & Micallef, J. (2014). Cannabis Use: Signal of Increasing Risk of Serious Cardiovascular Disorders. *Journal Of The American Heart Association*, 3(2), e000638-e000638. <http://dx.doi.org/10.1161/jaha.113.000638>
38. Mittleman, M., Lewis, R., Maclure, M., Sherwood, J., & Muller, J. (2001). Triggering Myocardial Infarction by Marijuana. *Circulation*, 103(23), 2805-2809. <http://dx.doi.org/10.1161/01.cir.103.23.2805>
39. Gunn, J., Rosales, C., Center, K., Nunez, A., Gibson, S., & Ehiri, J. (2015). The effects of prenatal cannabis exposure on fetal development and pregnancy outcomes: a protocol. *BMJ Open*, 5(3), e007227-e007227. <http://dx.doi.org/10.1136/bmjopen-2014-007227>
40. Gunn, J., Rosales, C., Center, K., Nuñez, A., Gibson, S., Christ, C., & Ehiri, J. (2016). Prenatal exposure to cannabis and maternal and child health outcomes: a systematic review and meta-analysis. *BMJ Open*, 6(4), e009986. <http://dx.doi.org/10.1136/bmjopen-2015-009986>
41. Goldschmidt, L., Richardson, G., Cornelius, M., & Day, N. (2004). Prenatal marijuana and alcohol exposure and academic achievement at age 10. *Neurotoxicology And Teratology*, 26(4), 521-532. <http://dx.doi.org/10.1016/j.ntt.2004.04.003>
42. Learn About Marijuana: Factsheets: Dependence on Marijuana. [Learnaboutmarijuana.org](http://learnaboutmarijuana.org). 2013. Available at: <http://learnaboutmarijuana.org/factsheets/dependence.htm>. Accessed May 20, 2016.
43. Goldman, D. (2015). America's Cannabis Experiment. *JAMA Psychiatry*, 72(10), 969. <http://dx.doi.org/10.1001/jamapsychiatry.2015.1332>
44. <http://www.health.ri.gov/materialbyothers/yrbs/2015HighSchoolCodebook.pdf>
45. Patton, G. (2002). Cannabis use and mental health in young people: cohort study. *BMJ*, 325(7374), 1195-1198. <http://dx.doi.org/10.1136/bmj.325.7374.1195>

46. Nordentoft, M. (2014). Adolescent cannabis use and adverse sequelae in adulthood. *The Lancet Psychiatry*, 1(4), 249-251. [http://dx.doi.org/10.1016/s2215-0366\(14\)70343-8](http://dx.doi.org/10.1016/s2215-0366(14)70343-8)
47. Grants and Prevention Programs- Rhode Island -Dept of Behavioral Healthcare, Developmental Disabilities and Hospitals. Bhddhri.gov. Available at: http://www.bhddh.ri.gov/substance_use/grants_prevention.php.
48. Chang K, Wu C, Ying Y. The effectiveness of alcohol control policies on alcohol-related traffic fatalities in the United States. *Accident Analysis & Prevention*. 2012;45:406-415. doi:10.1016/j.aap.2011.08.008.
49. Erickson D, Lenk K, Toomey T, Nelson T, Jones-Webb R. The alcohol policy environment, enforcement and consumption in the United States. *Drug and Alcohol Review*. 2015;35(1):6-12. doi:10.1111/dar.12339.
50. Wagenaar A, Tobler A, Komro K. Effects of Alcohol Tax and Price Policies on Morbidity and Mortality: A Systematic Review. *American Journal of Public Health*. 2010;100(11):2270-2278. doi:10.2105/ajph.2009.186007.
51. Saffer H, Chaloupka F. The effect of tobacco advertising bans on tobacco consumption. *Journal of Health Economics*. 2000;19(6):1117-1137. doi:10.1016/s0167-6296(00)00054-0.
52. State of Rhode Island: Statutes. Prohibition on Distribution of Free Tobacco Products. Available at: <http://webserver.rilin.state.ri.us/Statutes/TITLE11/11-9/11-9-13.10.HTM>
53. Henriksen L, Feighery E, Schleicher N, Cowling D, Kline R, Fortmann S. Is adolescent smoking related to the density and proximity of tobacco outlets and retail cigarette advertising near schools?. *Preventive Medicine*. 2008;47(2):210-214. doi:10.1016/j.ypmed.2008.04.008.
54. Novak S, Reardon S, Raudenbush S, Buka S. Retail Tobacco Outlet Density and Youth Cigarette Smoking: A Propensity-Modeling Approach. *American Journal of Public Health*. 2006;96(4):670-676. doi:10.2105/ajph.2004.061622.
55. http://www.huffingtonpost.com/entry/harvard-scientists-agree-vote-no-on-legalization-in_us_581c1672e4b0102262411561
56. Governor's Budget FY2017 and FY 2016. Senate Fiscal Office Report – Budget Analysis. 2016 – H – 7464.
57. Medical Marijuana Research Summaries. Rhode Island Attorney General's Office.
58. Prevalence of Marijuana Involvement in Fatal Crashes: Washington, 2010-2014. Tefft BC, Arnold LS, Grabowski JG. May 2016. AAA Foundation for Traffic Safety.
59. An Evaluation of Data from Drivers Arrested for Driving Under the Influence in Relation to Per se Limits for Cannabis. Logan BL, Kacinko SL, Beirness DJ. May 2016. AAA Foundation for Traffic Safety.
60. Rhode Island Department of Corrections FY2015 Annual Population Report. October 2015. State of Rhode Island – Division of State Police.
61. <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive>