

Review Article

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Brief Review of the Effects of Recreational Marijuana Legislation on the Use and Abuse of Marijuana and other Substances

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ABSTRACT

A review of the current literature concludes that the recreational marijuana legislation did not reveal significant negative consequences on the use and abuse of marijuana and other substances but might even have exerted some beneficial effects.

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Introduction

Since the 1960s, when marijuana use became popular, the recreational user faced stiff legal penalties. Even a small amount of marijuana could result in fines in the thousands of dollars and/or jail sentences for many years. As the “war on drugs” proved ineffective and caused considerable harm to the users as well, states started to decriminalize the recreational use of marijuana and since 2012 to legally (recreational marijuana legislation or RML) allow its casual use. The number of states which now allow the recreational use is still small (11 as of October 2020) but seems to be growing rapidly. At present, there is still some debate if this particular legalization caused more good than harm.

Fortunately, a fair number of studies are now available which can address some of the most frequently voiced concerns. This brief review will address if recreational marijuana legislation lead to an increase in the number of casual users, an increase in abusers with a diagnosis of a Marijuana (Cannabis) Use Disorder (CUD) and an increase in the use of other drugs. The review is based on pertinent and more recent studies from universities, the government or reputable organizations (like the AAA) as accessed through pubmed and the internet.

First, Did Legalization of Recreational Use of Marijuana Increase the Number of Users?

In the USA, the national Youth Risk Behavior Survey reported the following data: The question “did you ever use marijuana” was answered with a “yes” by 31% in 1991, 47% in 1997, 40% in 2003, 39% in 2011 and 37% in 2019. The question “do you use currently marijuana” was answered with a “yes” by 15% in 1991, 26% in 1997, 22% in 2003, 23% in 2011 and 22% in 2019. These global data show a relative use plateau over these years and do not show any significant impact of the legalization of recreational marijuana of some states on the global use of marijuana [1].

A survey by the Center of Disease Control (CDC) in Washington State resulted in the finding that marijuana use among children in sixth to twelfth grade slightly decreased after recreational legislation (year 2012). For instance, marijuana use at grade level

8 was reported by 9% in 2008, 9% in 2010, 9% in 2012 and 8% in 2016, at grade level 10 was reported by 18% in 2008, 19% in 2010, 19% in 2012 and 15% in 2016 and grade level 12 was reported by 25% in 2008, 25% in 2010, 27% in 2012 and 25 % in 2016. It was concluded that the use of marijuana by all age groups remained steady or declined following legalization [2].

A study based on data from the National Youth Risk Behavior Survey published in the Journal of the American Medical Association found that the odds of recent cannabis consumption (i.e., within the previous 30 days) fell by 8 percent after legalization, while the odds of frequent consumption (i.e., use on 10 or more of the previous 30 days) fell by 9 percent [3].

A comparison of marijuana use in Colorado (RML) and Kansas (no RML) showed that in Colorado 25% of the 18-25 old group used marijuana before (2012) and 31% after legalization (2016) and in Kansas the numbers were 12% and 16% , respectively. These numbers increased in both states with the increase in Colorado after legalization being 24% and in Kansas being 33%. While the number of users was higher in Colorado, its increase was smaller after legislation [4].

A survey of 5241 undergraduate students in Colorado showed that cannabis use increased since recreational legalization for all students, but more so for those over 21 years. Interestingly, out-of-state students reported even higher marijuana use than in-State students [5].

A study published in Psychology and Addictive Behavior compared marijuana use by Oregon students (RML) with students from non-RML states. This study found that Oregon students compared to other students showed relative increases in rates of marijuana use which, however, were small (odds ratio 1.29) [6].

A report published in Addiction compared marijuana use in the past 30 days at seven universities. It was found that rates of marijuana use increased from pre- to post legislation in 2015 at six of the seven universities but only for those individuals who reported

recent heavy use of alcohol [7].

The Substance Abuse and Mental Health Services Administration (SAMHSA) asked about marijuana use in the past months for the years 2011 and 2016. The “Yes” responses were 12% to 14% in Colorado, 12% and 15% in Oregon, 10% and 12% in Washington and 12% and 17% in Alaska. The national average showed 7% and 9%. All four states were above the national average and all showed some slight use increases after RML [8].

It has to be recognized that the data are obtained from questionnaires and answers from the respondents might not be correct in particular in states and at times when marijuana use was illegal. Here, out of fear, some users might not have reported their true use. Thus, pre-legislation data most likely will be higher and some reported increases might become smaller or disappear altogether [9, 10].

Second, Did Legalization of Recreational Use of Marijuana Increase the Number of Dependent Users?

While casual marijuana smoking is of concern, much more worrisome is if some of these individuals become addicted or dependent on Marijuana or will be diagnosed with CUD. Here, even small increases in CUD could have a major medical and economic impact.

A 2002-2016 National Survey on Drug Use and Health (NSDUH) data, including 22,651 individuals, found that the prevalence of CUD among people reporting daily/almost daily cannabis use during this time had decreased by 26.8% in adolescents, by 29.7% in ages 18-25, and by 37.5% in ages 26 plus during this period. These results were supported by a second large study which also found a similar decrease in the prevalence of CUD after RML [11-13].

Data obtained from 749,500 persons aged 18 or older who participated in the 2002-2017 NSDUH showed that adult cannabis users past-year prevalence of DSM-IV diagnosed CUD decreased from 14.8% to 9.3%, daily/near daily use increased from 18.0% to 27.2%, and DSM-5 diagnosed moderate (4-5 criteria) and severe (6+ criteria) CUD decreased from 4.3% to 3.1% and from 2.4% to 1.3%. Again a decrease in spite of the fact that some states had legalized recreational use of marijuana during this time [14].

A paper published in JAMA Psychiatry reported that problematic use (CUD) among adolescents aged 12 to 17 was 25% higher in RML states (a small increase from 2.18 to 2.72 percent) compared to states without legal recreational use. Among young adults aged 18 to 25, there was no difference found in problematic marijuana use between states [15].

Another way to assess the harmful health effects of marijuana is to determine the number of visits to emergency rooms and hospitalizations this substance might have caused. Treatment admissions from 2008 to 2017 associated with marijuana use from the SAMHSA TEDS-A dataset for adolescents age 12-17 were compared between Colorado/Washington (RML) with non-RML states. For all states in the analysis, the rate of adolescent treatment admissions for marijuana use declined significantly over this period with the mean rate falling nearly in half. The decline in admission rates was greater in Colorado and Washington as compared to non-RML states following RML, though this difference was not significant [16].

In Colorado, visits to emergency rooms and hospital admissions with a possible mentioning of marijuana use or a related billing

code resulted in the following data: emergency room visits rose from 739 in 2010-2013 to 956 in 2014-2015 and hospitalizations from 1440 to 2413 for the same time period. This is a considerable increase after RML. However, it has to be mentioned that the mere mentioning of marijuana use might not have been the cause for the visits or hospitalizations. Furthermore, a significant number of children was included in these data which ate poorly supervised marijuana laced edibles. Thus, these large increases might have to be reduced significantly before relating them specifically to a marked increase in CUD [17,18].

Temple University collected data for treatment admissions for marijuana use from the SAMHSA TEDS-A dataset for adolescents age 12-17 between the years 2008–2017. Colorado and Washington were compared to non-recreational use states and it was found that the decline in admissions rates over this time period was greater in Colorado and Washington compared to non-recreational states albeit it was not statistically significant. Colorado/Washington (RML) reported for the years 2011, 2015 and 2017 marijuana related admission rates of 85, 60 and 20 while the non-recreational states reported an admission rate of 50, 40, and 30. While Colorado/Washington started out with a higher admission rate, in 2017 there was no difference between recreational and non-recreational states. The authors conclude that adolescent treatment admissions for marijuana use did not increase in Colorado and Washington following RML [19].

Before coming to a conclusion it has to be recognized that marijuana is now thought to be one of the least addictive drugs. For instance, about 8-10% of all marijuana users become eventually drug dependent which is considerably less than tobacco (32%) or alcohol (15%). This also becomes evident when looking at the age distribution of marijuana use. For instance, the questions if marijuana was used last year and used daily was answered by 12% and 1% of 12-17 year old, 33% and 9% of 18-25 year old and 11% and 3% of 26 and older individuals. Here, use peaks at about 22-24 but then begins to drop sharply after age 26 indicating that the majority of individuals quit the use of marijuana voluntarily without showing any problematic use [20-22]. Furthermore, CUD can manifest itself in different degrees of severity. For instance, a recent NESARC study reported that the estimated distribution of lifetime severity levels of CUD in the U.S.A. were: mild (2.85%), moderate (1.42%), and severe (2.0%) Thus, a reported diagnosis of CUD if not specifically described must not always mean a severe disorder [23].

Third, Did Legalization of Recreational Use of Marijuana Increase the Use of Alcohol and other Drugs?

Marijuana is often cited as a “gateway” drug meaning that its use leads to the use of other drugs including heroin, later on. However, this proposition has now been found to be outdated. Evidence shows that the vast majority of marijuana users do not go on to use other drugs and the use of marijuana is most often predated by the use of alcohol and smoking [24-27]. Nevertheless, it might be of interest to see what RML did to the use of other drugs.

Alcohol

While marijuana and alcohol are often used simultaneously, not all marijuana users also imbibe alcohol at the same time. A study conducted by the Universities of Michigan and Texas State found that in the years 2002 to 2012 only a small subset of marijuana users also drank alcohol but this co-use increased from 20% to 26% over time. Another study also found that only 1 in 5 individuals consumed both marijuana and alcohol simultaneously [28,29].

A study using longitudinal data from the National Epidemiological Study of Alcohol Use and Related Disorders found that adults who reported marijuana use during the first wave of the survey were more likely than adults who did not use marijuana to develop an alcohol use disorder within 3 years. However, people who used marijuana and already had an alcohol use disorder at the outset were at much greater risk of their alcohol use disorder worsening. Thus, marijuana use had only a slight effect on increasing the use of alcohol [30].

The National College Health Assessment-II survey of 18-26 year old undergraduates attending colleges in states that did or did not implement RML by 2018 found that RML was associated with a decreased alcohol binge drinking prevalence [31].

A survey of 3 schools located in states with different laws regarding recreational marijuana use found that about three-fourths of all participants reported at least 1 occasion of simultaneous marijuana and alcohol (SAM) use in the past year. Students in a state with decriminalized marijuana use reported higher frequency of past-year SAM use (76% and 30 days of SAM use) than students in states with legalized (75% and 20 days of SAM use) or criminalized (68% and 21 days of SAM use) legal status [32].

Assessing the simultaneous use of marijuana and alcohol in Washington State found no statistically significant change between pre and post recreational legislation. Pre alcohol consumption was reported by 12.9% while post alcohol consumption was reported by 12.6%. In contrast, a National Survey on Drug Use and Health (NSDUH) was cited which showed an increase from 15.5% to 19.1%, although this change was statistically not significant [33].

In December 2017, a study evaluated the sale of alcoholic beverages up to 2015 to find that the decrease in sales correlated with the rise of cannabis legalization. Forbes recently reported that alcohol sales have dropped by 15% or more in the states that had legalized marijuana [34].

After the recreational legalization of marijuana, Colorado, Washington and Oregon did not experience increases in binge drinking. A comparison of these 3 states (average) with the national average showed for 2011 rates of 23% and 23% and for 2016 (past legislation) rates of 25% and 26%. Thus, these states were well within the national norm [8].

A study published in the International Journal of Drug Policy reported that the prevalence of alcohol-related harms at home significantly decreased from 2.1% to 1.0%, and the prevalence of alcohol-related financial harms decreased from 1.5% to 0.8% in the State of Washington from 2014 to 2016 [35].

A review study from the University of Oregon found that legalization of recreations marijuana use increased binge drinking by about 11% among marijuana users but caused a decrease in overall alcohol consumption [36].

A paper published in The International Journal on Drug Policy reported that the authors found no evidence of a causal association between recreational cannabis legalization and changes in alcohol sales per capita [37].

Smoking

It has to be considered from the beginning that perhaps due to consistent public health marketing, tobacco use is in steady decline across the U.S. This will also affect smoking in states

with recreational marijuana use legislation.

A study published in Pediatrics showed that 51.6% of non-college and 46.8% of college individuals reported past-12-month usage of marijuana and/or smoked tobacco products. While marijuana use increased among college students between 2002 and 2016, the use of tobacco products decreased significantly. Past 30 day smoking decreased from 24% to 10% and past year smoking from 23% to 12%. Those not-in-college individuals showed just the opposite findings [38].

A comparison of smoking of 12 year and older in Oregon, Colorado and Washington with the national average showed for 2011 rates of 29%, 28%, 28% and 28% and for 2016 a rate of 22%, 21%, 20% and 24%. These data actually suggest a slight decrease in tobacco consumption after RML [8].

A paper published in the international Journal on Drug Policy reported that the authors found no evidence of a causal association between recreational cannabis legalization and tobacco smoking as evidenced in tobacco sales per capita [39].

In contrast, a study from the University of Dallas found that legalizing recreational marijuana was associated with an increase in cigarette consumption by about 4 to 7 % in Colorado, and between 6 percent and 7 percent in Oregon [40].

Other Drugs

The National Survey on Drug Use and Health compared recreational cannabis users (18 666) and non-users (57 196) between 2013 and 2016 in regard to their use and misuse of prescription opioid drugs. Misuse was found among 15% of users as compared with 3% of non-users. A prescription opioid use disorder was detected in 2.4% vs. 0.5%. Medical cannabis use, however, was not associated with prescription opioid use disorder while recreational cannabis use was [41].

Deaths from opioids, including the illegal substance heroin, are spiking around the United States. While the four states with legal marijuana have not escaped this trend, these states have not suffered the skyrocketing mortality rates from 2014 to 2016 that have afflicted other regions of the country. Opioid overdose death rates 2014 to 2015 in Colorado (12/100 000), Washington, Alaska and Oregon were slightly below the national average [8,9,11,13].

A report from the University of North Texas, the University of Florida and Emory University examined the association between Colorado's legalization of recreational marijuana use and opioid related deaths. This study found that RML resulted in a decrease in such fatalities (0.7 deaths per month) in Colorado [42]. The national Youth Risk Behavior Survey (YRBS) found that the question "Did you ever use cocaine" was answered with a "yes" by 6% in 1991, 8% in 1997, 9% in 2003, 7% in 2011 and 4 % in 2019. This seems to indicate that recreational legislation did not have a significant impact on the overall use of this substance. The same study asked about the use of heroin and it was found that its use before and after legislation decreased from 2.9% to 1.8% [43].

Conclusion

At present, there are no compelling data to suggest that marijuana use has increased significantly after RML but there are even some indications that use of marijuana has slightly decreased in the RML states. Available evidence regarding RML and CUD shows that RML did not cause a marked increase- as feared -in this disorder and it might even have decreased moderately in its frequency.

The effects of RML on the use of other substances show that the effects on alcohol consumption and use of tobacco products were insignificant and RML might actually have caused a decrease in their uses. This would be a beneficial effect since both alcohol and tobacco are well known to be more toxic than marijuana. For opioids and cocaine only insufficient data are available but RML does not seem to show a marked negative effect. This survey concludes that the worst fears before RML did not materialize and that RML might have few if any negative effects on the use and abuse of marijuana and other substances and might even have exerted some beneficial effects.

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